Part IIA

Supervision 12 - 2020 Exam

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This Class

- Review solutions to 2020 exam.
- Own solutions: may contain **typos**.
- Own solutions: may be **incomplete**.
- Overall: A1, A2 done very well. A3 many struggled.
- Nobody attempted B1 or C4, so I will not discuss these.

Short Questions

Question A1 - Set Up

- *A1. Suppose an economic agent faces the following optimisation problem:*

$$U = \max_{c,L} \left\{ \ln c + \ln(1 - L) \right\}$$
$$\text{s.t.} \quad c = wL - T$$

where c denotes consumption, L labour supply, $1 - L$ leisure, w the real wage, and T lump-sum taxes.

Question A1 - (a) Static Choice

- *(a) Derive the optimal choice of consumption, c, and labour supply, L.*

- Rewrite the problem, using the binding budget constraint:

$$U = \max_{c,L} \left\{ \ln c + \ln(1-L) \right\} = \max_{L} \left\{ \ln(wL - T) + \ln(1-L) \right\}$$

- To find optimal labour supply take FOC:

$$\text{FOC:} \quad \frac{w}{wL-T} - \frac{1}{1-L} = 0 \quad \Rightarrow \quad L = \frac{1}{2} + \frac{T}{2w}.$$

- The SOC proves this is an optimal solution:

$$\text{SOC:} \quad -\frac{w^2}{(wL-T)^2} - \frac{1}{(1-L)^2} < 0.$$

Question A1 - (a) Static Choice (Calibration)

- *(a ctd) Compute c, L and total utility U, with* $w = 1$, $T = 0$.

- Plug result for L into budget constraint to find c:

$$c = wL - T \quad \Rightarrow \quad c = w\left(\frac{1}{2} + \frac{T}{2w}\right) - T = \frac{w}{2} - \frac{T}{2}.$$

- Hence find utility:

$$U = \ln\left(\frac{w}{2} - \frac{T}{2}\right) + \ln\left(\frac{1}{2} - \frac{T}{2w}\right).$$

- Plug in $w = 1$ and $T = 0$ to show:

$$L = \frac{1}{2}, \quad c = \frac{1}{2}, \quad U = -\ln 4 < 0.$$

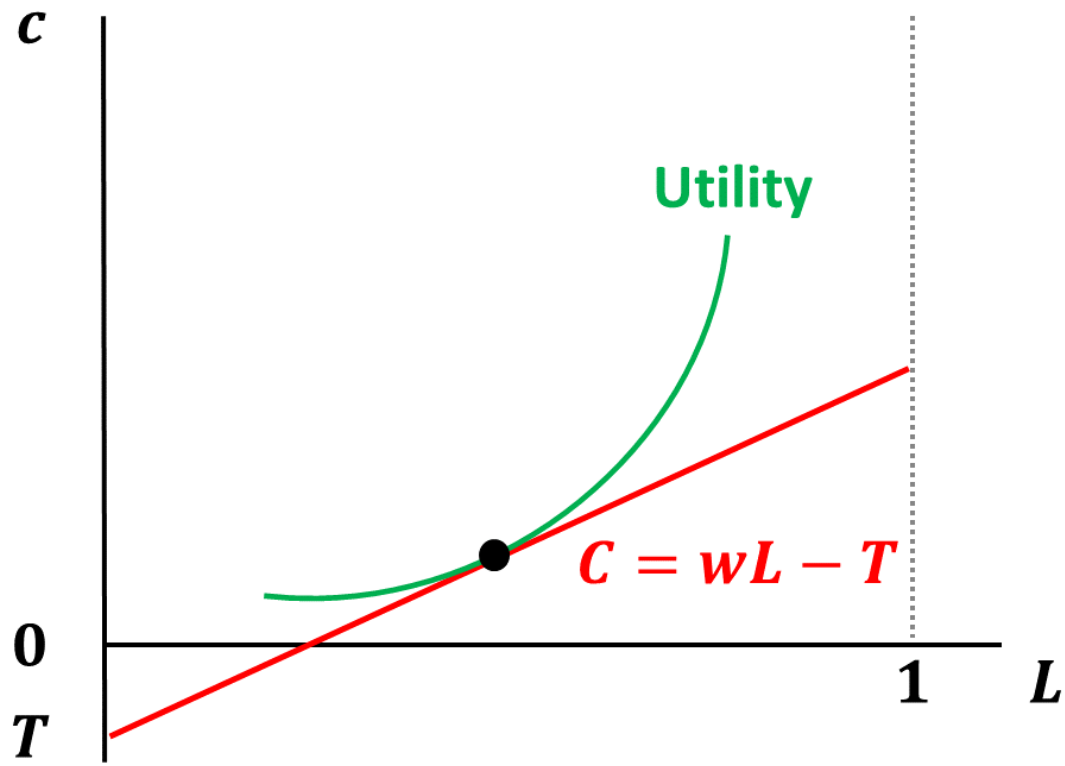
Question A1 - (b) Substitution Effect

- *(b) Suppose there is an increase in the wage from* $w = 1$ *to* $w = 4$*. Explain only the substitution effect of this wage increase and illustrate it using a diagram with leisure on the horizontal axis and consumption on the vertical axis.*

Question A1 - (b) Graphical I

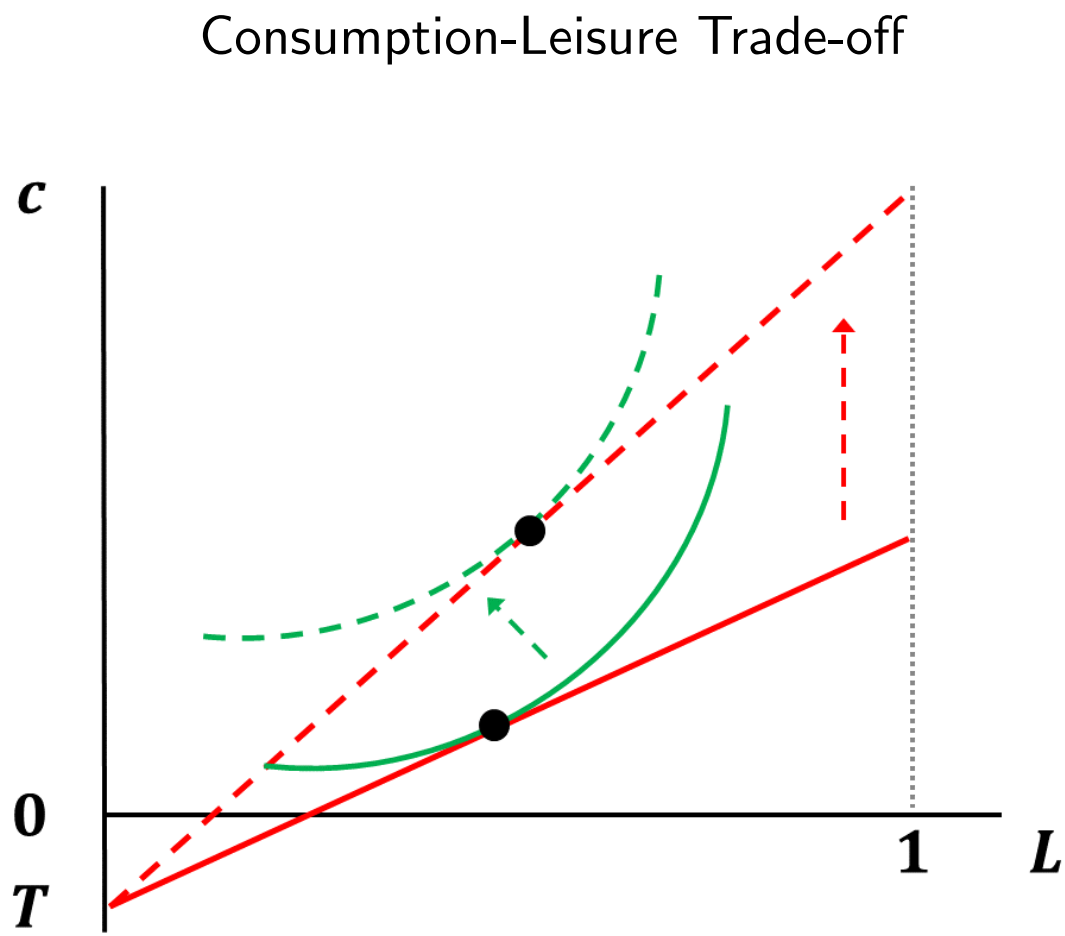
- Initial position. Utility from consumption and leisure.

Consumption-Leisure Trade-off



Question A1 - (b) Graphical II

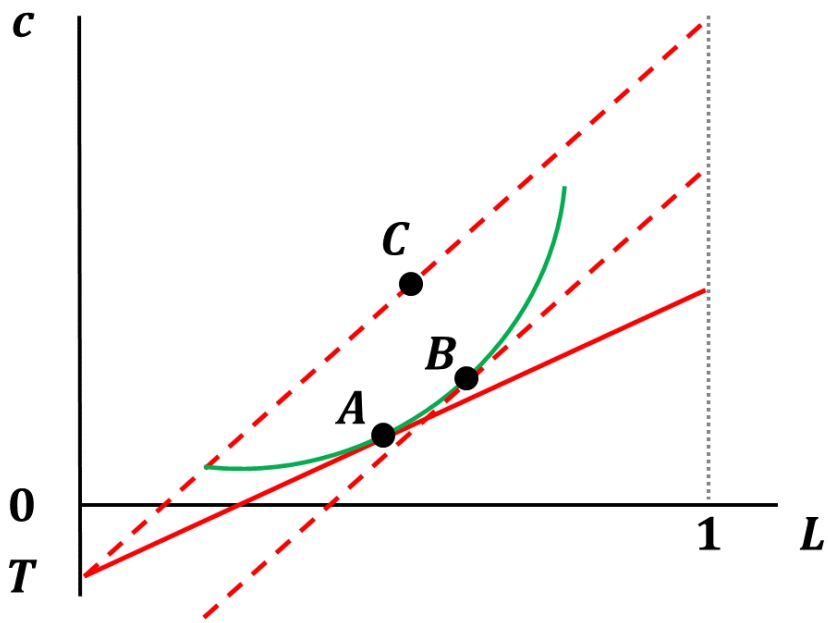
- Real wage increases, **unambiguously** improving welfare.



Question A1 - (b) Graphical III

- Two decomposition methods due to **Hicks** and **Slutsky**.
- **Hicksian** SE is the movement between points A and B below.
- Difference between original bundle and a new bundle arising with higher wages but on the **original** indifference curve.

Consumption-Leisure Trade-off



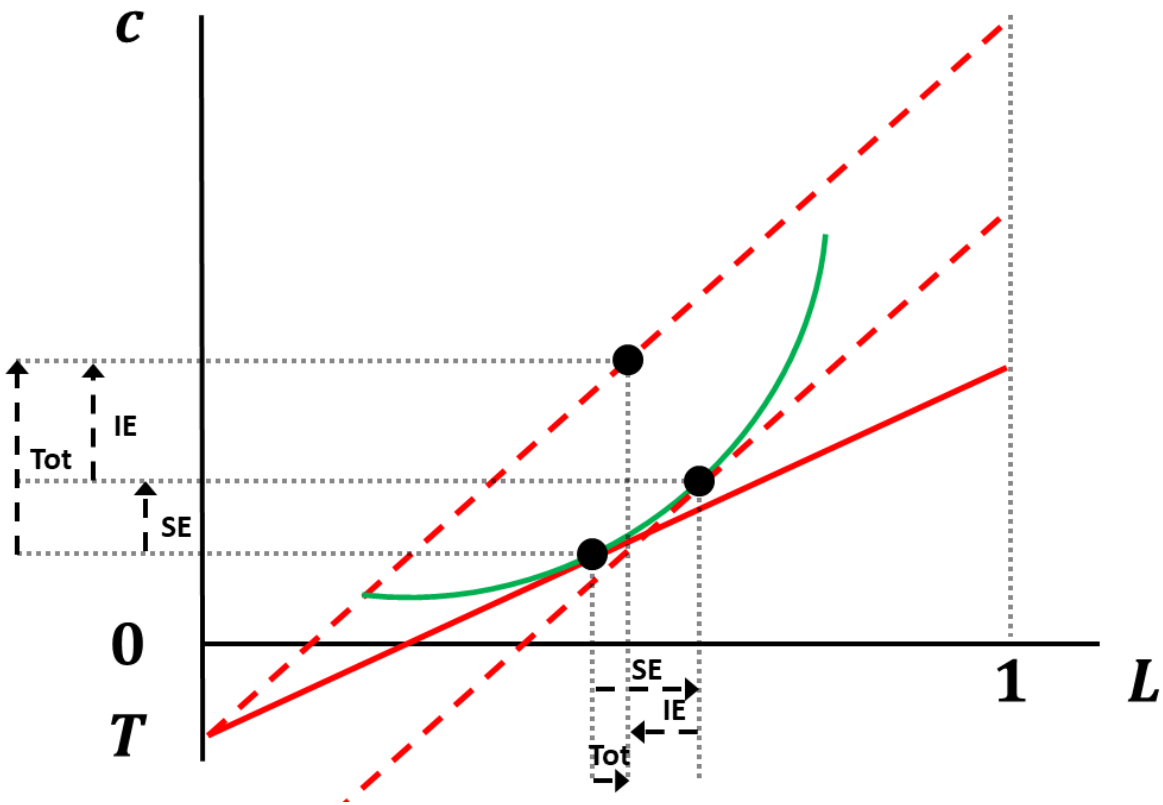
Question A1 - (b) Substitution Effect

- As $w \uparrow$, the **relative price** of leisure has risen.
- Thus SE results in **lower** leisure (as the opportunity has risen) and **higher** consumption (which is now more affordable).

Question A1 - (b) Total Effect

- Could then mention the total effect as both SE and IE.

Consumption-Leisure Trade-off



Question A1 - (c) Substitution Effect (Maths)

- *(c) Show mathematically that increasing the wage from* $w = 1$ *to* $w = 4$ *and simultaneously increasing taxes from* $T = 0$ *to* $T = 2$ *leaves the agent indifferent. Use this result to compute the substitution effect of the wage increase on both consumption* c *and labour* L*.*

Question A1 - (c) Substitution Effect (Maths)

- Plug in new values using analytical results:

$$c = \frac{w}{2} - \frac{T}{2}, \quad L = \frac{1}{2} + \frac{T}{2w}, \quad U = \ln\left(\frac{w}{2} - \frac{T}{2}\right) + \ln\left(\frac{1}{2} - \frac{T}{2w}\right).$$

- Hence the calibration results in:

	Initial (A)	SE (B)	Final (C)
w	1	4	4
T	0	2	0
c	$\frac{1}{2}$	1	2
L	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
U	$-\ln 4$	$-\ln 4$	0

- The SE is $+\frac{1}{4}$ for L and $+\frac{1}{2}$ for c.

Question A2 - Set Up

- *Consider the following McCall search model in which the reservation wage, w_r, is determined by:*

$$w_r - b = \underbrace{\frac{\beta}{1-\beta} \sum_{w \in W} \max\{w - w_r, 0\} Pr(w)}_{h(w_r)}$$

where β is the intertemporal discount factor, b denotes unemployment benefits, $W = \{w_1, w_2, w_3\}$ denotes the set containing the possible wage offers, and $Pr(w)$ denotes the probability of wage offer w.

- *Suppose that $\beta = \frac{5}{6}$, $W = \{2, 4, 6\}$, and $Pr(w_1) = \frac{1}{5}$, $Pr(w_2) = \frac{3}{5}$, and $Pr(w_3) = \frac{1}{5}$.*

Question A2 - (a) $h(w_r)$

- *(a) Carefully draw the function $h(w_r)$ with w_r on the horizontal axis and $h(\cdot)$ on the vertical axis.*

- Using calibrated values, the functional form becomes:

  $$h(w_r) = \max\{2 - w_r, 0\} + 3\max\{4 - w_r, 0\} + \max\{6 - w_r, 0\}$$

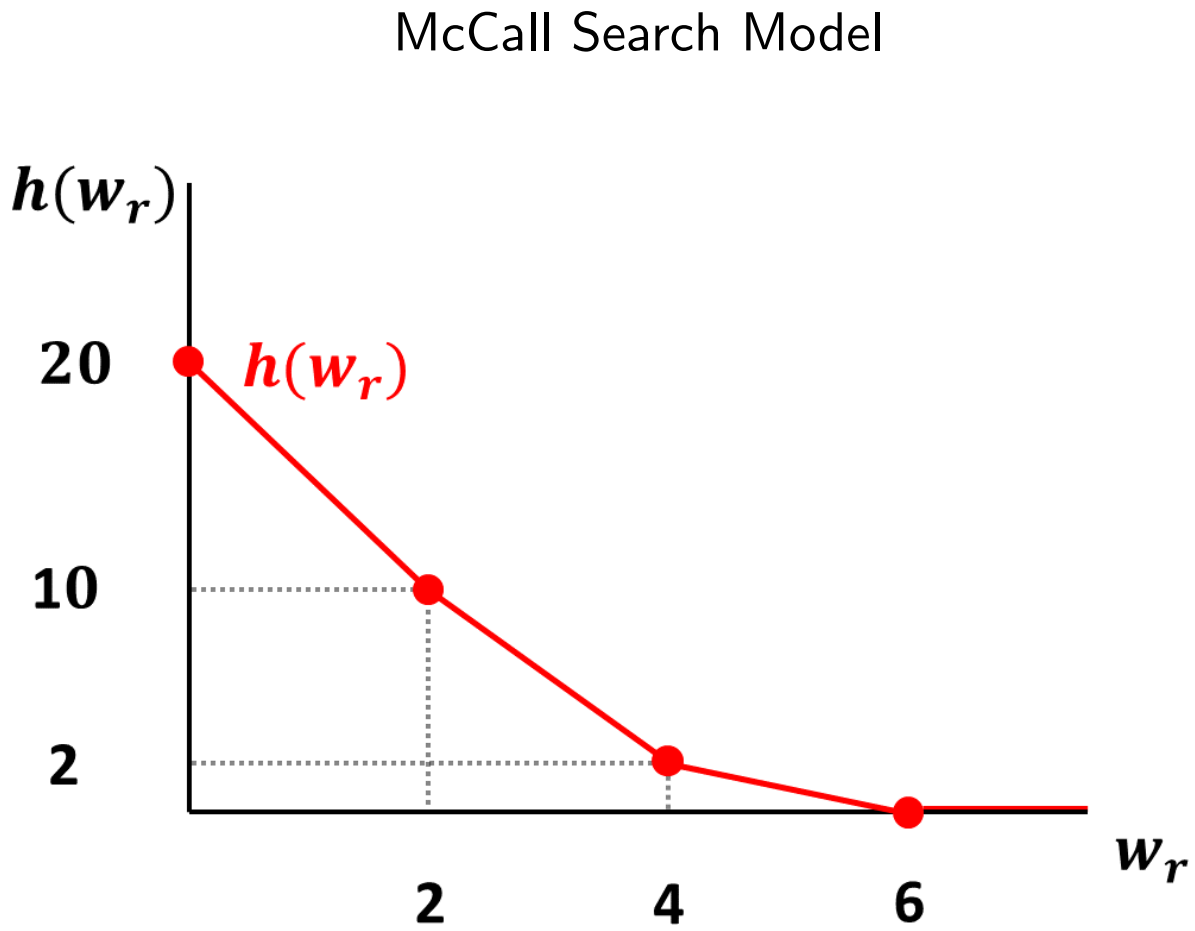
  which is **continuous**, **decreasing** and **piecewise linear**.

- Four regions of interest:

$$h(w_r) = \begin{cases} 20 - 5w_r & \text{if } \ 0 \leq w_r \leq 2, \\ 18 - 4w_r & \text{if } \ 2 \leq w_r \leq 4, \\ 6 - w_r & \text{if } \ 4 \leq w_r \leq 6, \\ 0 & \text{if } \ 6 \leq w_r. \end{cases}$$

Question A2 - (a) Graphical

- Find nodes and carefully draw the $h(w_r)$.

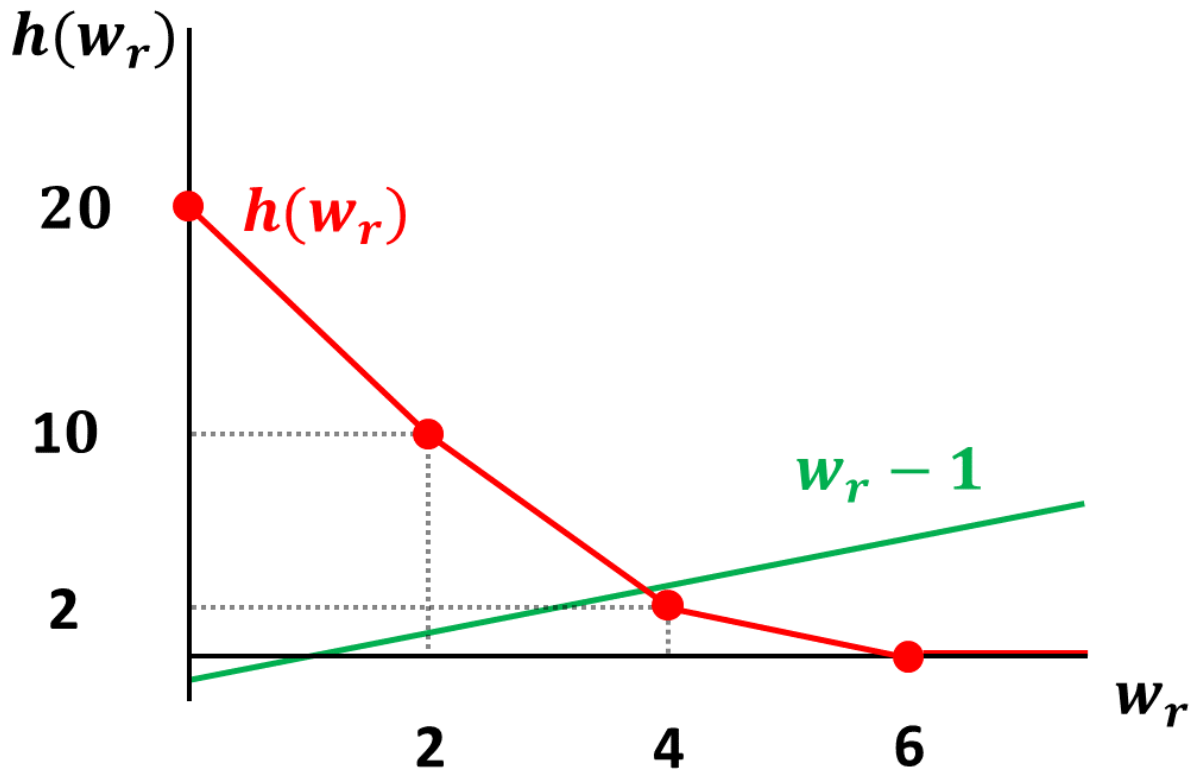


Question A2 - (b) Graphical

- *(b) Suppose that $b = 1$. Compute the reservation wage w_r.*

- Plot $w_r - 1$ on the graph: **likely** intersection $2 \leq w_r \leq 4$.

McCall Search Model



Question A2 - (b) Maths

- Conjecture:

$$\begin{aligned} w_r - 1 = h(w_r) &= 18 - 4w_r, \\ 5w_r &= 19, \\ w_r &= \frac{19}{5} = 3.8. \end{aligned}$$

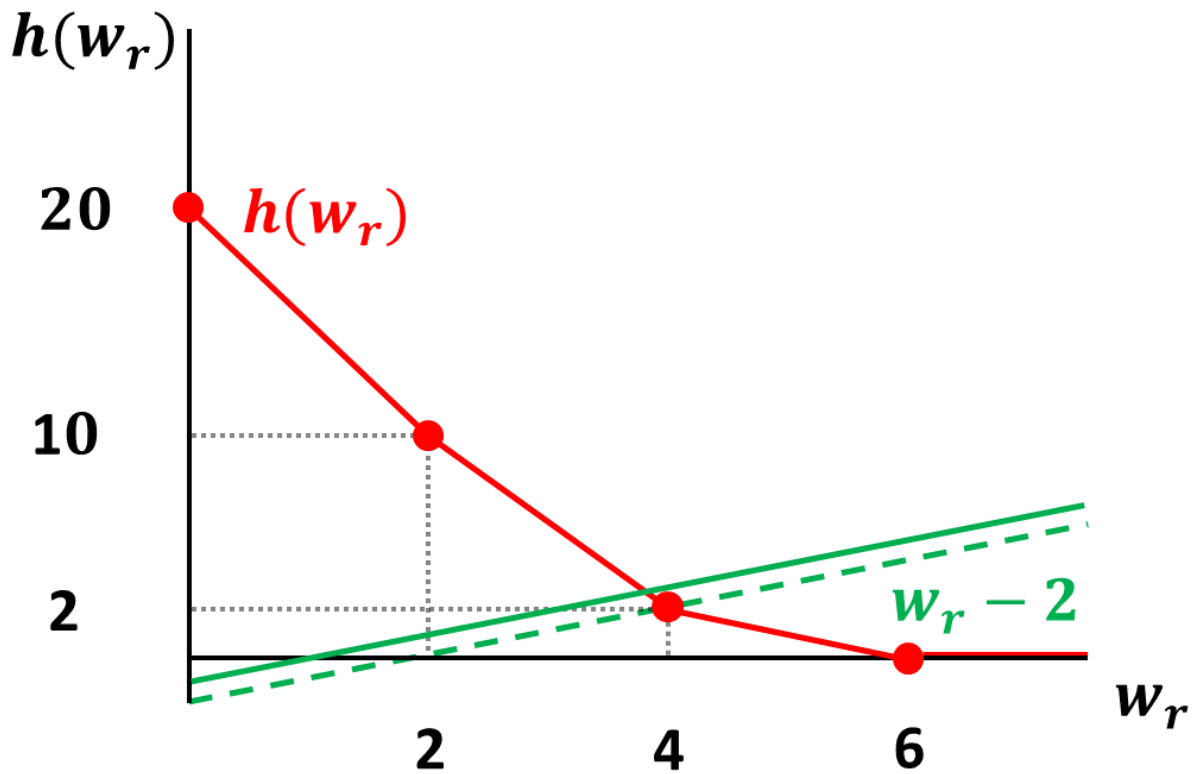
- Since $2 \leq 3.8 \leq 4$, we verify our conjecture correct.
- Note: all other initial guesses lead to **contradictions**.
- Alternative method uses a proof by contradiction.

Question A2 - (c) Graphical

- *(c) Now suppose that unemployment benefits rise to $b = 2$. Explain how that affects the reservation wage w_r.*

- $w_r - b$ line **shifts down**, leading to an **increase** in w_r.

McCall Search Model



Question A2 - (c) Maths & Intuition

- By inspection, or reusing contradiction method, now $w_r = 4$.
- Higher unemployment benefits increase the value of the **outside option**. (Higher value to not working).
- Workers are **willing to wait** longer for a higher wage offer.
- Workers must therefore be compensated at a higher wage level to make the **indifferent** between accepting the job or not.
- The reservation wage, w_r, **rises**.

Question A3 - Set Up

- *A3. Last autumn, the United States experienced severe strain in the repo market and interbank market for reserves, such that the overnight repo rate jumped to 10% and the federal funds rate reached the 2.25% ceiling of its target range on 17 September 2019. Against this background, show and briefly explain the effects on the Federal Reserve's balance sheet of each of the following changes (ceteris paribus):*

- *(a) US Treasury issues $55bn in USTs to US private sector.*

- *(b) US companies pay $30bn in tax to US Treasury.*

- *(c) Federal Reserve enacts open market purchase of $75bn of USTs in secondary market.*

- *Explain how these changes affect the federal funds rate.*

Question A3 - Stylised Federal Reserve Balance Sheet

- Recall from lecture notes:

Assets ($bn)	Liabilities ($bn)
Domestic securities (A)	Currency (C)
Foreign securities (F)	Bank's reserves (R)
Loans to banks and gov't (L_{CB})	Government deposits (D_G)

- Largest **asset** component is typically domestic securities, (A).

- Largest **liability** component is typically bank's reserves, (R).

Question A3 - (a) Private Sector Issuance

- *(a) US Treasury issues $55bn in USTs to US private sector.*
- US Treasury deposits increase by $+\$55bn$.
- Private sector balances (held as excess bank reserves) falls $-\$55bn$.
- No change to asset side of balance sheet.

Assets ($bn)	Liabilities ($bn)
Domestic (A)	Currency (C)
Foreign (F)	Bank's reserves ($\Delta R = -\$55bn$)
Loans (L_{CB})	Government deposits ($\Delta D_G = +\$55bn$)

Question A3 - (b) Tax Payments

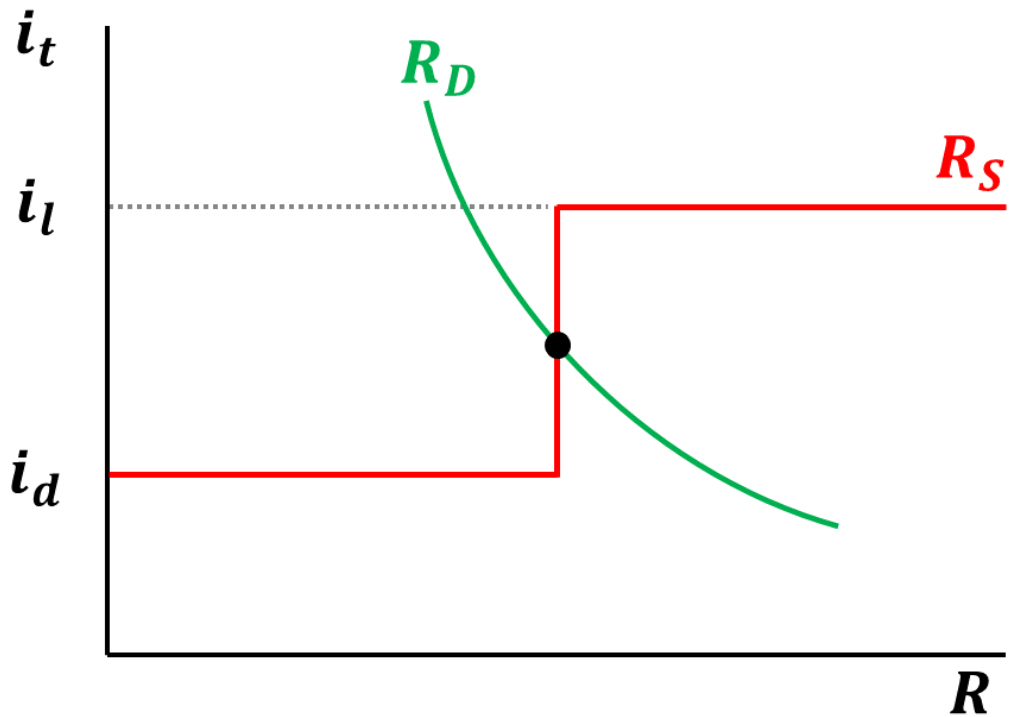
- *(b) US companies pay $30 billion in taxes to the US Treasury by bank transfer.*
- US Treasury deposits increase by $+\$30bn$.
- Private sector balances (held as excess bank reserves) fall $-\$30bn$.
- Again, no change to asset side of balance sheet.

Assets ($bn)	Liabilities ($bn)
Domestic (A)	Currency (C)
Foreign (F)	Bank's reserves ($\Delta R = -\$30bn$)
Loans (L_{CB})	Government deposits ($\Delta D_G = +\$30bn$)

Question A3 - (a & b) Graphical I

- Interbank demand for reserves, $R_D = R_{min} + R_e(\underline{i})$,
- Interbank supply of reserves, $R_S = R_n + R_b - R_d$

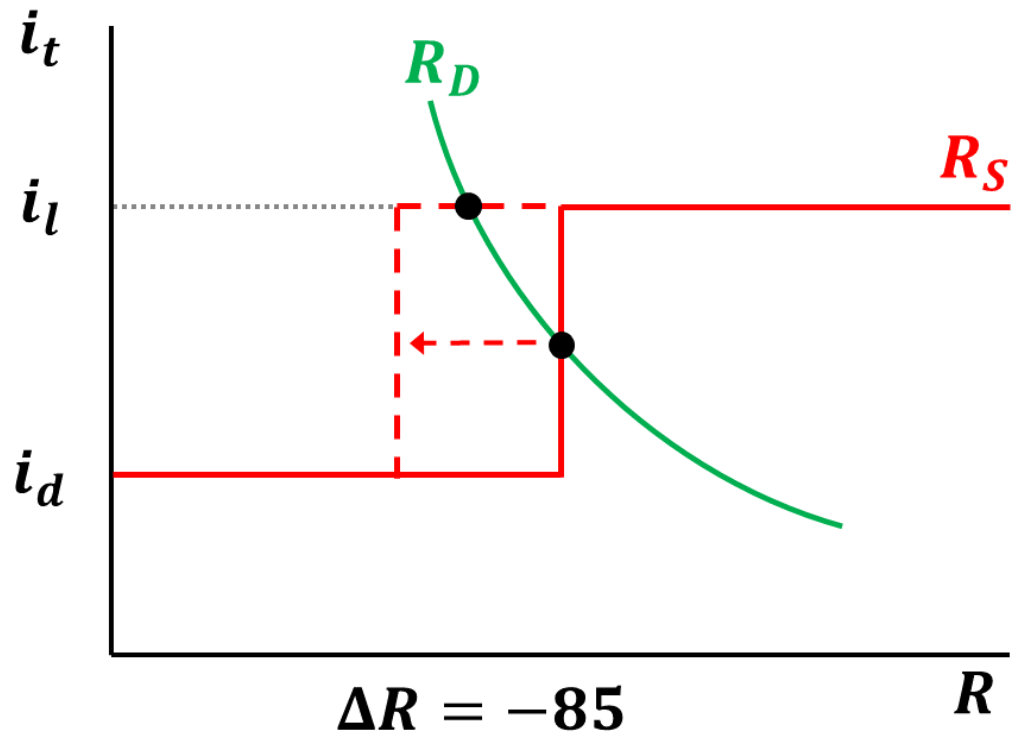
Interbank Reserves Market



Question A3 - (a & b) Graphical II

- Fewer (non-borrowed) reserves, R_n, in interbank market.
- FFR increases until it intersects the discount rate, $i_l = 2.25\%$.

Interbank Reserves Market



Question A3 - (a & b) Discount Loans

- The Fed's discount window **may** be required.
- E.g. as above and the question suggested on 17/09/2019.
- Then the fall in non-borrowed reserves is **partially offset** by a rise in borrowed reserves R_b.

Assets (\$bn)	Liabilities (\$bn)
Domestic (A)	Currency (C)
Foreign (F)	Bank's reserves ($\Delta R = -\$85bn + R_b$)
Loans ($\Delta L_{CB} = +R_b$)	Government deposits ($\Delta D_G = +\$85bn$)

Question A3 - (c) Open Market Operations

- *(c) Federal Reserve enacts open market purchase of \$75bn of USTs in secondary market.*
- Fed's domestic asset holdings increase by $+\$75bn$.
- Banks receive this, so reserves also increase by $+\$75bn$.
- Additional reserves partially offset need for adjustment of borrowed reserves (as overall $\Delta R = -\$10bn$).
- May lead to **fall** in i if discount window no longer required.

Assets (\$bn)	Liabilities (\$bn)
Domestic ($\Delta A + \$75bn$)	Currency (C)
Foreign (F)	Bank's reserves ($\Delta R = \$75bn$)
Loans (L_{CB})	Government deposits (D_G)

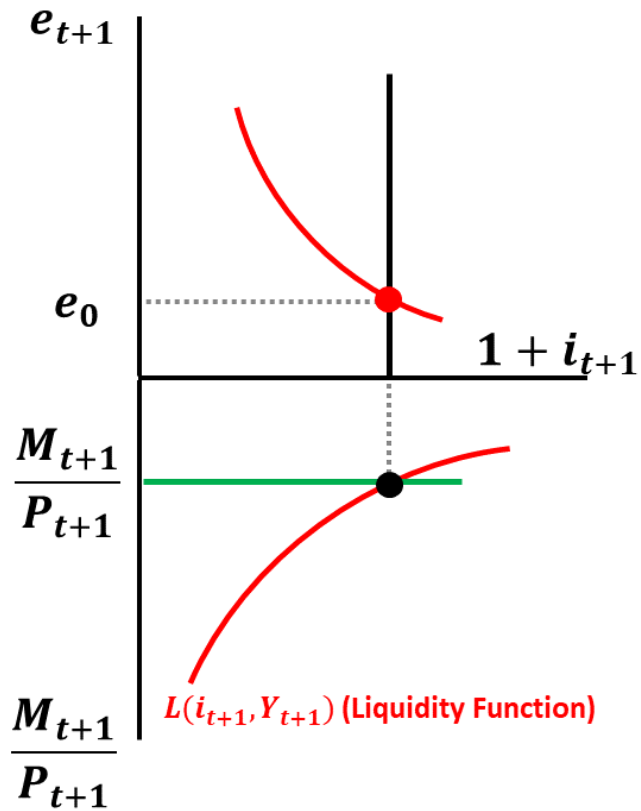
Question A4 - Set Up

- *A4. On 30 January 2020 the Monetary Policy Committee of the Bank of England announced that it had decided to keep Bank Rate at 0.75% and maintain its stock of asset purchases, while significantly reducing its output growth forecasts. In response, the British pound appreciated by 0.4% against the US dollar. Explain whether this could be consistent with the asset market model of the exchange rate.*

Question A4 - Future Period I

- Money and foreign exchange markets jointly determine i_{t+1} and e_{t+1}.
- First assume news about lower future output is **unexpected**.

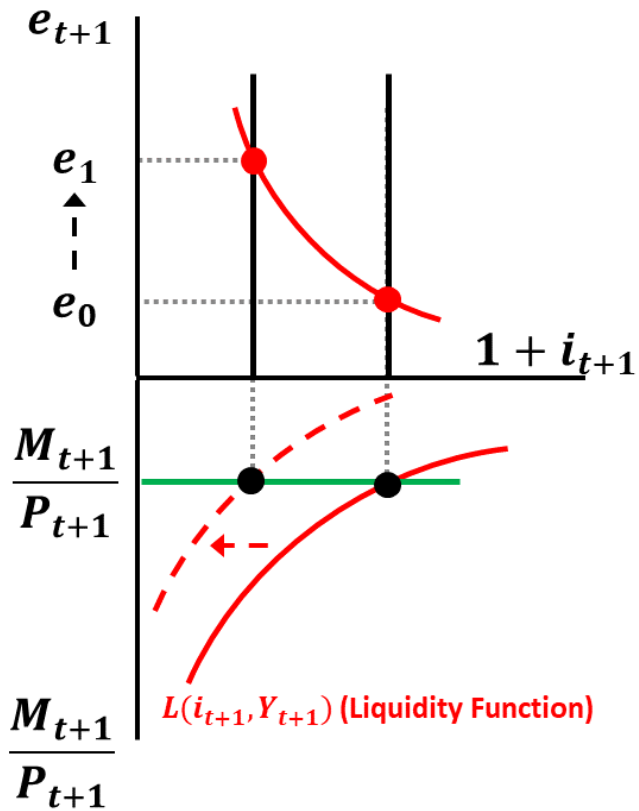
Money and FX Equilibrium.



Question A4 - Future Period II

- Lower **transactions demand** for money reduces future nominal interest rate.
- Anticipate future **depreciation** of the exchange rate (as lower return on domestic currency).

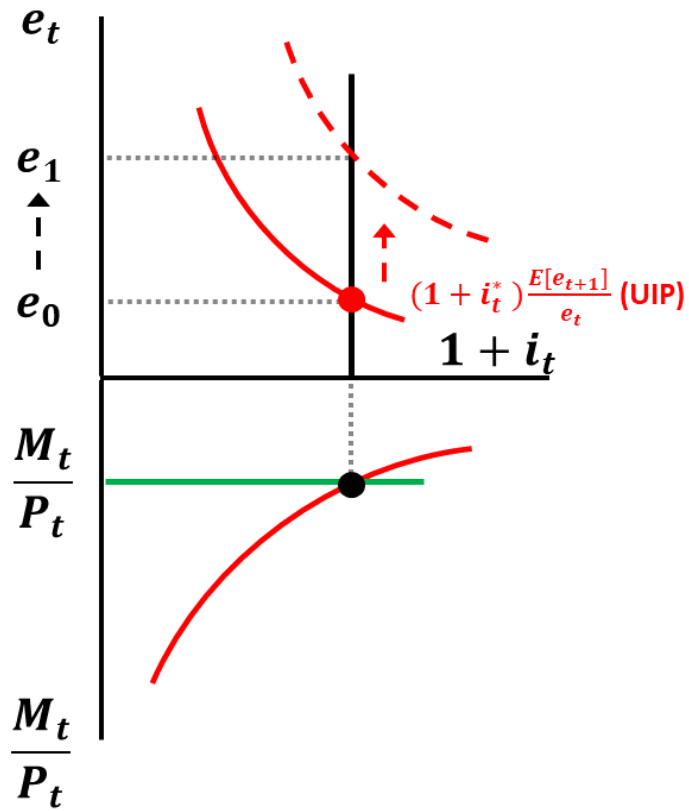
Money and FX Equilibrium.



Question A4 - Current Period

- Anticipation of future **depreciation** leads to current **depreciation**, as lower expected return on domestic vs. foreign currency deposits.

Money and FX Equilibrium.



Question A4 - Reconciliation

- To rationalise the currency **appreciation** we therefore need to appeal to prior beliefs.
- Option 1: Financial markets expected **larger** growth revisions.
- Option 2: Financial market expected **monetary stimulus**.
- Go over each in some detail.

Long Questions

Question B2 - Set Up

- *B2. Consider the following Bernanke-Blinder model. Banks are assumed to hold bonds, B, loans, L, and reserves, R as assets, and have deposits, D as liabilities, so that the representative bank's balance sheet is:*

$$B + L + R = D.$$

Reserves are equal to the minimum reserve requirement $R = \tau D$ with required reserve ratio $\tau = \frac{1}{2}$. The demand for deposits is given by:

$$D^d = Y - \frac{1}{3} i_B,$$

where Y is real aggregate output and i_B the bond interest rate. The demand for loans is described by:

$$L^d = \frac{1}{2} Y - i_L + i_B,$$

where i_L is the loan interest rate. The supply of loans is given by:

$$L^s = \frac{1}{2}(D - R).$$

Goods market equilibrium is described by:

$$Y = 75 - i_L - i_B.$$

Question B2 - (a) Money Market Equilibrium

- *(a) Derive the equilibrium bond interest rate, i_B in the money market in terms of output, Y and reserves R; and derive the equilibrium loan interest rate, i_L, in the loan market in terms of Y, R and i_B. Explain intuitively how i_B and i_L are affected by Y and R.*
- In equilibrium, the demand and supply of **deposits** are equal:

$$\frac{R}{\tau} = D^s = D^d = Y - \frac{1}{3} i_B. \quad \Rightarrow \quad i_B = 3Y - \frac{3}{\tau} R. \quad \text{(LM)}$$

- **Higher** output **increases** money demand (transactions motive), lowering demand for bonds. Bond price falls; $i_B \uparrow$:

$$\frac{\partial i_B}{\partial Y} = 3 > 0.$$

- **Higher** reserves **increase** money supply, via money multiplier, increasing demand for bonds. Bond price increases; $i_B \downarrow$:

$$\frac{\partial i_B}{\partial R} = -\frac{3}{\tau} < 0.$$

Question B2 - (a) Loan Market Equilibrium

- In equilibrium, the demand and supply of **loans** are equal:

$$\frac{1}{2}(D-R) = L^s = L^d = \frac{1}{2}Y - i_L + i_B,$$

$$\Rightarrow \quad i_L = \frac{1}{2}Y + i_B - \frac{1}{2}\frac{(1-\tau)}{\tau}R. \qquad (*)$$

- **Imperfect** substitutes as $i_L \neq i_B$.

- **Higher** output **increases** loan demand (transactions motive), hence increasing loan interest rates; $i_L \uparrow$:

$$\frac{\partial i_L}{\partial Y} = \frac{1}{2} > 0.$$

- **Higher** reserves **increase** loan supply, via money multiplier. Loan interest rates fall; $i_L \downarrow$:

$$\frac{\partial i_L}{\partial R} = -\frac{1}{2}\frac{(1-\tau)}{\tau} < 0.$$

Question B2 - (b) Goods and Loan Market Equilibrium

- *(b) Derive the level of output, Y, in terms of R and i_B, such that there is equilibrium in both goods market and loan market. Explain how this level of Y depends on i_B and R.*
- Simultaneous equilibrium in goods **and** loan markets requires:

$$Y = 75 - \underbrace{\left[\frac{1}{2}Y + i_B - \frac{1}{2}\frac{(1-\tau)}{\tau}R\right]}_{i_L} - i_B,$$

$$\Rightarrow Y = 50 + \frac{1}{3}\frac{(1-\tau)}{\tau}R - \frac{4}{3}i_B. \qquad \text{(CC)}$$

- **Higher** i_B **reduces** output (typically investment). (1) directly via i_B and (2) indirectly through i_L:

$$\frac{\partial Y}{\partial i_B} = -\frac{4}{3} < 0.$$

- **Higher** reserves **increase** output (I), by indirectly reducing i_L:

$$\frac{\partial Y}{\partial R} = \frac{1}{3}\frac{(1-\tau)}{\tau} > 0.$$

Question B2 - (c) Overall Equilibrium

- *(c) Assume that "quantitative easing" by the central bank leads to an increase in reserves from $R = 15$ to $R' = 30$. Compute the initial and new equilibrium levels of output, Y, the bond interest rate i_B and the loan interest rate i_L. Give an intuitive explanation of the effects.*

- Equilibrium in **all** markets when "Liquidity-Money" (LM) and "Commodities and Credit" (CC) curves intersect:

$$Y = 50 + \frac{1}{3}\frac{(1-\tau)}{\tau}R - \frac{4}{3}\underbrace{\left[3Y - \frac{3}{\tau}R\right]}_{i_B},$$

$$\Rightarrow Y = 10 + \frac{13-\tau}{15\tau}R.$$

Question B2 - (c) Analytical Results

- Then, using (LM):

$$i_B = 3\underbrace{\left[10 + \frac{13-\tau}{15\tau}R\right]}_{Y} - \frac{3}{\tau}R,$$

$$\Rightarrow i_B = 30 - \frac{2+\tau}{5\tau}R.$$

- Finally, using $(*)$:

$$i_L = \frac{1}{2}\underbrace{\left[10 + \frac{13-\tau}{15\tau}R\right]}_{Y} + \underbrace{\left[30 - \frac{2+\tau}{5\tau}R\right]}_{i_B} - \frac{1}{2}\frac{(1-\tau)}{\tau}R,$$

$$\Rightarrow i_L = 35 + \frac{4\tau-7}{15\tau}R.$$

Question B2 - (c) Calibration & Intuition

1. Use $\tau = \frac{1}{2}$. Gives the (LM) and (CC) curves as:

$$i_B = 3Y - 6R, \tag{LM}$$

$$i_B = \frac{75}{2} + \frac{1}{4}R - \frac{3}{4}Y. \tag{CC}$$

2. Use $R = 15$ & $\tau = \frac{1}{2}$.

3. Use $R' = 30$ & $\tau = \frac{1}{2}$.

	Analytical	(1)	(2)	(3)
Y	$10 + \frac{13-\tau}{15\tau}R$	$10 + \frac{5}{3}R$	35	60
i_B	$30 - \frac{2+\tau}{5\tau}R$	$30 - R$	15	0
i_L	$35 + \frac{4\tau-7}{15\tau}R$	$35 - \frac{2}{3}R$	25	15

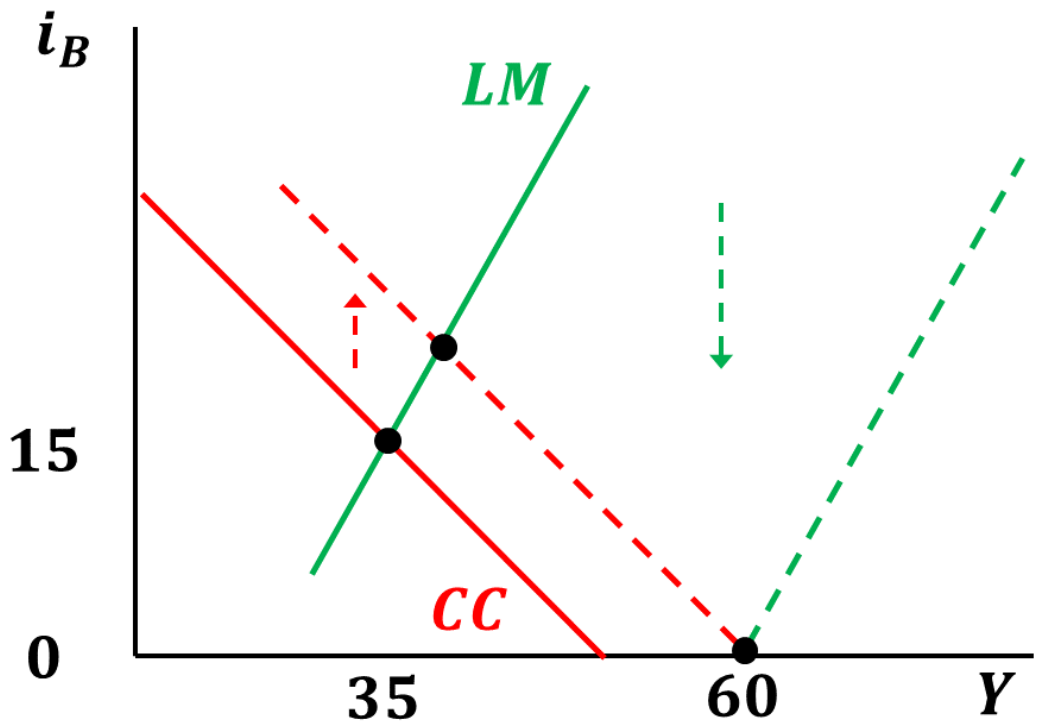
- "QE", through higher bank reserves, **causes higher output**.
- As, overall, $i_B \downarrow$ Keynesian interest rate channel dominates.

Question B2 - (c) Graphically

- **Keynesian** interest rate channel: greater money supply shifts (LM) down ($Y \uparrow$ and $i_B \downarrow$).

- **Bank lending** channel: higher loan supply, reduces i_L and shifts the CC curve up (further $Y \uparrow$ but $i_B \uparrow$).

Bernanke-Blinder



Question B2 - (d) Higher Reserves

- *(d) Suppose CB wants to raise the required reserve ratio, τ, to improve financial stability in the banking system. Analyze how a higher required reserve ratio, τ, would affect the equilibrium levels of output, Y, and the bond interest rate i_B, and the effectiveness of "quantitative easing" in this model.*

- Consider the impact of changing τ on (LM) and (CC):

$$i_B = 3Y - \frac{3}{\tau}R, \quad \Rightarrow \quad \frac{\partial i_B}{\partial \tau} = \frac{3R}{\tau^2} > 0, \quad \text{(LM)}$$

$$i_B = \frac{75}{2} + \frac{(1-\tau)}{4\tau}R - \frac{3}{4}Y, \quad \Rightarrow \quad \frac{\partial i_B}{\partial \tau} = -\frac{R}{4\tau^2} < 0. \quad \text{(CC)}$$

- Thus (LM) shifts **upwards**, while (CC) shifts **downwards**.

Question B2 - (d) Endogenous Variables

- Now consider the impact in **general equilibrium**.
- **Unambiguously** this leads to lower output:

$$Y = 10 + \frac{13 - \tau}{15\tau} R, \quad \Rightarrow \quad \frac{dY}{d\tau} = -\frac{13}{15} \frac{R}{\tau^2} < 0.$$

- In this particular case, the change always leads to **higher** i_B:

$$i_B = 30 - \frac{2 + \tau}{5\tau} R, \quad \Rightarrow \quad \frac{di_B}{d\tau} = \frac{2}{5} \frac{R}{\tau^2} > 0.$$

Question B2 - (d) QE Effectiveness

- Let us **define** the effectiveness of QE as the ability of the central bank to change Y and i_B by shifting R.
- Then QE would be **less** effective if a **given** shift in R leads to a smaller change in Y and i_B.
- Seen using the cross-derivatives (either on results or curves):

$$\frac{\partial^2 i_B}{\partial \tau \partial R} = \frac{3}{\tau^2} > 0, \tag{LM}$$

$$\frac{\partial^2 i_B}{\partial \tau \partial R} = -\frac{1}{4\tau^2} < 0. \tag{CC}$$

- A higher τ:
  1. **Reduces** the **downward** shift in (LM) (as smaller money multiplier).
  2. **Reduces** the **upwards** shift in the (CC) (due to smaller rise in loan supply and thus smaller decline in i_L).

Essays

Question C1 - Set Up

- *C1. In the early 1980's both Europe and the United States experienced a marked decline in inflation and a pronounced increase in unemployment. The unemployment rate in the United States subsequently fell back towards its long-run average, while the European unemployment rate remained high. To which extent is this pattern consistent with the NAIRU theory, and which other explanations may contribute to our understanding of this period?*

- What is the NAIRU theory?

- Does NAIRU explain these facts?

- Any other explanations?

Question C1 - What is the NAIRU Theory?

- The Non-Accelerating Inflation Rate of Unemployment (NAIRU) describes the **negative relationship**:

$$\pi_t - \pi_{t-1} = -\alpha(u_t - u_n).$$

where u_n is the **structural** or **natural** rate of unemployment.

- Whenever $u_t < u_n$, this implies $\pi_t > \pi_{t-1}$ (*accelerating*).
- An ad hoc relationship, with few micro foundations.
- Nonetheless empirically relevant and a useful **rule of thumb**.

Question C1 - Does NAIRU Explain These Facts?

- **Yes**. The 1980's provide evidence of a **negative** relationship.
- US and Europe experienced a **fall** in inflation ($\pi_t < \pi_{t-1}$) alongside an **higher** unemployment ($u_t > u_n$).
- Subsequent pattern in the US (stabilising inflation and falling unemployment) is also consistent with NAIRU.
- **Problem**: persistently high European unemployment.

Question C1 - Any Other Explanations

- Adapt the theory to explain the facts. Allow time-varying $u_{t,n}$
- Labour market **hysteresis**.
- **Institutional** differences between US and Europe (e.g. unions, welfare provision).
- If expectations matter... perhaps anything goes!

Question C2 - Set Up

- *C2. A dollar spent by the government is a dollar taxed, either in the present or in the future. How can then government spending stimulate the economy, let alone private demand? Discuss to what extent this argument is correct, and to what extent it is not.*

- **Already discussed** this answer as part of the mock exam.

- Recap: Ricardian equivalence (particularly failure due to credit constraints) and PIH, permanent vs temporary spending, distortion taxation.

Question C3 - Set Up

- *C3. The outbreak of the new coronavirus during the first few months of 2020 had sizeable effects on financial markets, including: (a) Sharp drops in equity prices (e.g. more than 10% in late February). (b) Government bond yields hitting record lows and the global amount of negative-yielding debt rising significantly (e.g. to more than $14 trillion in early March). (c) A significant depreciation of Asia-Pacific currencies (e.g. the Australian dollar and Thai baht depreciated around 4.5% during the first six weeks of 2020). Use economic theory to analyze the short-run impact of bad news about the coronavirus outbreak on equity prices, bond prices and exchange rates, and explain the three empirical facts above.*

- Extremely clear 3-part structure.

Question C3 - (a) Equity Prices

Dividend Discount Models

Simple	Generalised	Gordon Growth
$p_t = \frac{D^e_{t+1}+p^e_{t+1}}{1+\tilde{i}}$	$p_t = \sum_{n=1}^{\infty} \frac{D^e_{t+n}}{(1+\tilde{i})^n}$	$p_t = \frac{D^e_{t+1}}{\tilde{i}-g}$

- Lower production reduces expected future dividends, $D^e_{t+1} \downarrow$.
- Potentially persistent impact, $D^e_{t+n} \downarrow$ and hence $g \downarrow$.
- Heightened uncertainty increases the risk-adjusted interest rate, $\tilde{i} \uparrow$.

Question C3 - (b) Government Bond Yields

- Bond market model may be summarised using:

$$B^d\begin{pmatrix} p_t; & p^e_{t+1}, & RR^e_{t,o}, & \sigma_B/\sigma_O, & liq_B/liq_O, & W_t \\ - & + & - & - & + & + \end{pmatrix} = B^s\begin{pmatrix} p_t; & \pi^e_t, & \Pi^e_t, & G_t - T_t \\ + & + & + & + \end{pmatrix},$$

- Already discussed falling equity prices. As **relative riskiness**, $\sigma_B/\sigma_O \downarrow$, of bonds falls, "safe haven" demand for government bonds increases.

- Bond prices increase, and their yield to maturity falls.

- QE anticipation, $p^e_{t+1} \uparrow$?

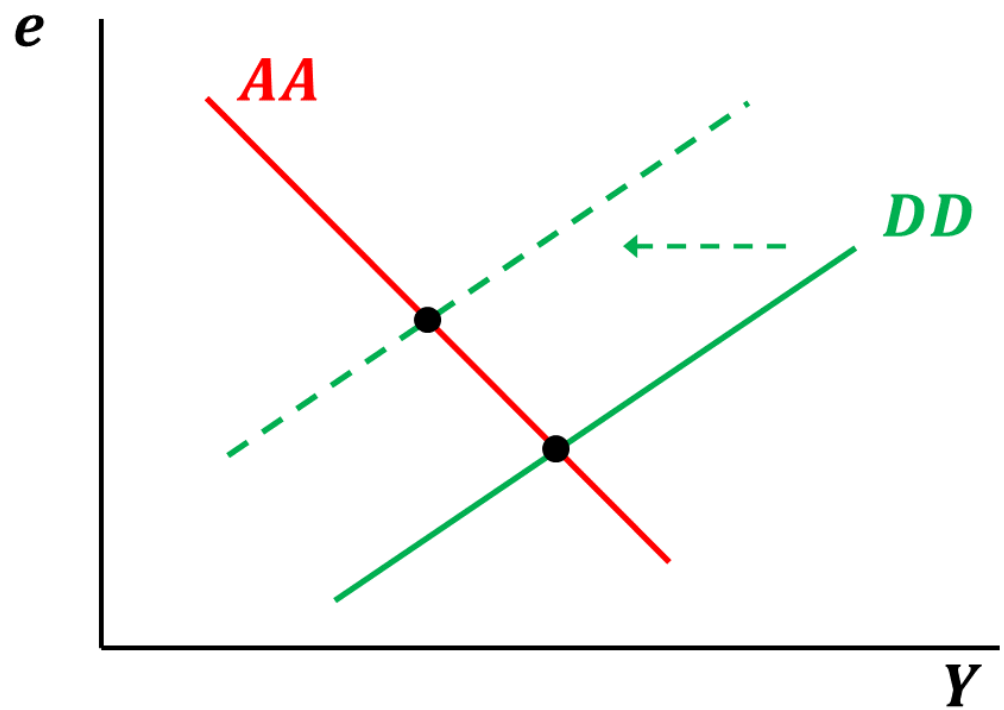
- If effects are strong enough, yields actually turn negative!

- Note: supply may be **fixed** in the short-run.

Question C3 - (c) Depreciation of Asia-Pacific Currencies

- Lower global activity reduces Asia-Pacific export demand (given e). DD curve **shifts inwards**.
- Then, movement **along** AA curve as lower transactions demand for money $L(i, Y \downarrow) \downarrow$, causing interest rates to fall, $i \downarrow$, and an exchange rate **depreciation**, $e \uparrow$.

DD AA Model



Question C4 - Set Up

- *C4. After the exit of the United Kingdom (UK) from the European Union (EU) on 31 January 2020, the UK government has stated that the UK will no longer be able to engage in frictionless trade with the EU after the transition period that lasts until the end of 2020. Analyze the short-run effects that this is likely to have on the UK economy in 2021, including aggregate output, consumption, investment, the current account, the nominal interest rate and the nominal exchange rate. In addition, analyze the likely short-run effects on the EU economy in 2021, taking into account international macroeconomic interdependence. Carefully explain the effects, specifying and discussing the assumptions you make for your analysis.*

- Nobody attempted this question.

Final Thoughts

Final Thoughts

- Enjoy the remainder of the summer.
- Do start to think about dissertations early.
- See you next term!