Name :- Ronak Kumar
Roll No :- 2015080

MA Assignment-2

A1) a)
Given, the equation Y = f(L,K)

Therefore,
Constant returns to scale for ω > 0 would be f(ωL, ωK) = ωf(L,K)
Increasing returns to scale for ω > 1 would be f(ωL, ωK) > ωf(L,K)
Decreasing returns to scale for ω > 1 would be f(ωL, ωK) < ωf(L,K)

where K & L are capital and labour respectively and ω is a constant.

b) Let the constant be c instead of ω.

$Y' = A\,(cL)^\beta\,(cK)^\alpha$

$\to Y' = A\,c^\beta\,L^\beta\,c^\alpha\,L^\alpha$
$\to Y' = c^\beta\,c^\alpha\,A\,L^\beta\,K^\alpha$
$\to Y' = c^{(\beta+\alpha)}\,Y$

If β+α=1, the production function has constant returns to scale. Therefore, Y' = cY
If β+α>1, the production function has increasing returns to scale. Therefore, $Y' = c^x Y$, x > 1
If β+α<1, the production function has decreasing returns to scale. Therefore, $Y' = c^x Y$, x < 1

c) When, $\alpha + \beta$ = 1, we can reduce the Douglas Equation as :-
  $Y = AL^\alpha K^\beta$
  $Y = AL^{1-\beta} K^\beta$
As, β tends to 1, we can say $L^{1-\beta}$ tends to 1, therefore, we have the new form of the equation as,
  $Y = ak^\beta$, where a is the new total factor productivity, β is the new constant, k is the new capital input.

This assumption means that the net income in an economy would only be the results from the capital and the labour.

d) Total Factor Productivity is a variable which accounts for effects in the total output that are not caused by the traditional measured inputs like labour and capital. It cannot be measured directly since it is regarded as a residual value which measures the effects on output which are not caused due to inputs. The part that represents TFP is A in the equation $Y = AL^{\alpha}B^{\beta}$.

e)

consider, the production function
$$Y_t = aL_t^{\alpha}K_t^{\beta}$$

let us take the base case. Therefore, $t = 0$

$$\therefore Y_0 = aL_0^{\alpha}K_0^{\beta}$$
$$= a 2^{\alpha} 2^{\beta} = a 2^{\alpha+\beta}$$

let us take $t = 1$, we have
$$Y_1 = aL_1^{\alpha}K_1^{\beta}$$
$$= a(L_0 + \eta_1)^{\alpha}(\gamma K_0)^{\beta}$$

Since, $\gamma > \pi$ or η & $\eta \in (0,1)$, therefore $\gamma > 1$.
Also, since $\eta \in (0,1)$ we ignore η in the equation.

Hence, $Y_1 = aL_0^{\alpha}(\gamma K_0)^{\beta}$ where $\gamma K_0 > K_0$ as $\gamma > 1$

If, we plot the graph for this type of equation, we would get a straight line. Therefore, it doesn't have the same characteristics as the normal graph which is a curve

A2)

a) The equation for GDP convergence is given as :-
$$GDP_t = GDP_{Current} * (1 + \text{Growth Rate}/100)^t$$

Since, the growth rates converge over time, therefore $(1 + \text{Growth Rate}/100)^t$ becomes equal for both the countries. However, the country with larger initial GDP would always be higher irrespective of the growth rate. Let's say if country 1 has initial GDP of 100 and country 2 has initial GDP of 50. Then, country 1 would always higher GDP at certain time interval if the growth rates are converging, even though country 1 is poor. This can be seen with the graph below :-
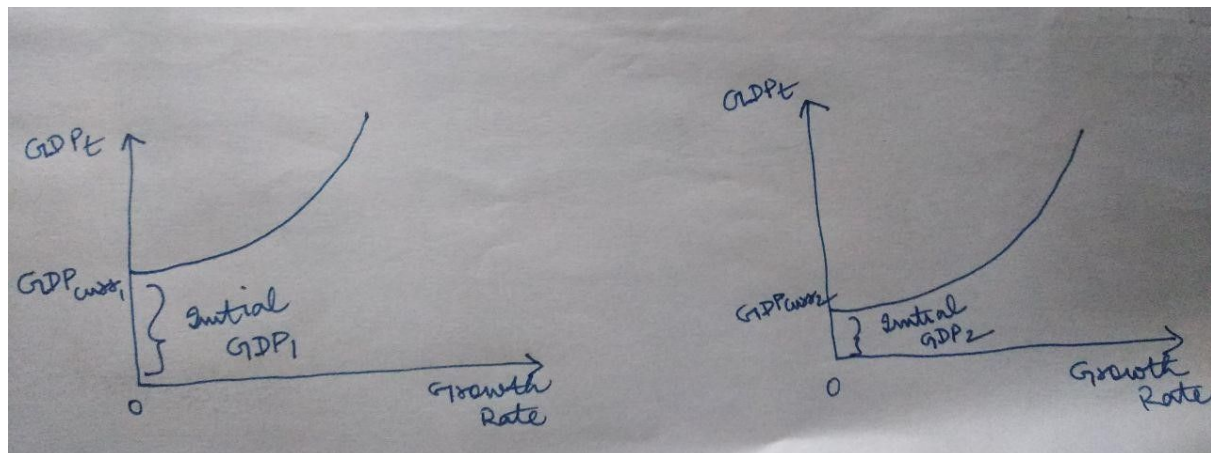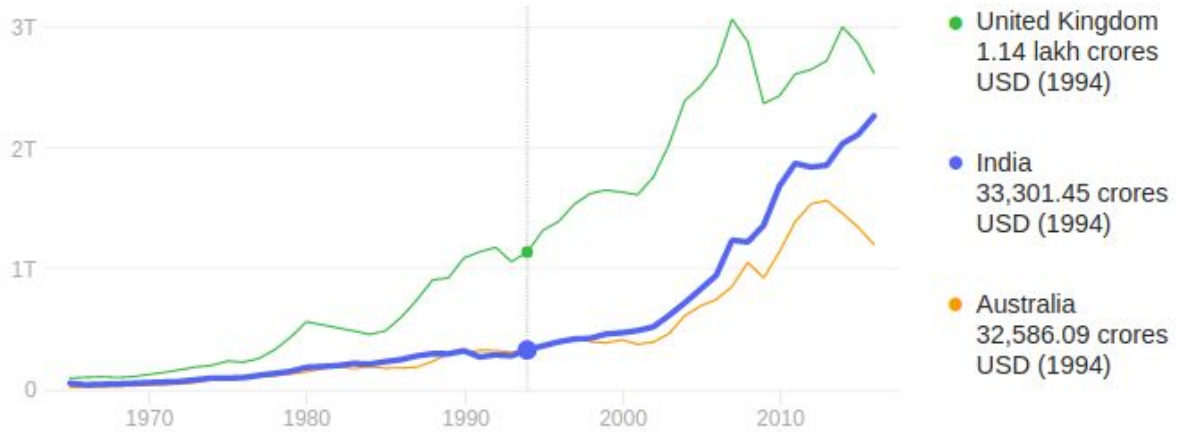

It can be seen that if the growth rate converges, then the country with higher initial GDP when growth rate = 0 would always have higher GDP at any time t != 0. Also, a good example to illustrate this would be the example of USA and India. Even though India has a higher growth rate as US, however the calculations say that the GDP of India is much lower as compared to the US.

b) For the case of weak monotonicity, it can be possible that both GDP's can converge since the growth rate varies for both the countries. However, if we consider the case of strongly monotonic I will explain it with an example. Let's assume that the GDP of Country 1 has a faster growth rate i.e it is strongly monotonic and the GDP of US remains constant due to lower growth rate i.e it is weakly monotonic. In this situation, we may have a convergence of GDP. On the other hand, if Country 1's GDP isn't increasing and the same is the case with US and also the growth rate is not sufficiently high to compete with the GDP of Country 2, then there is no way in which the GDP of Country 1 can converge to Country 2's GDP. We can assume that a general example for Country 1 is India and Country 2 is US. The above graph can also be used here also.

Certain graphs for India and US GDP and Growth relation :-

India / Gross domestic product

2.26 lakh crores USD (2016)

- United Kingdom
  1.14 lakh crores
  USD (1994)

- India
  33,301.45 crores
  USD (1994)

- Australia
  32,586.09 crores
  USD (1994)

United States of America / Gross domestic product

18.57 lakh crores USD (2016)

- United States of
  America
  12.27 lakh crores
  USD (2004)

- China
  1.96 lakh crores
  USD (2004)
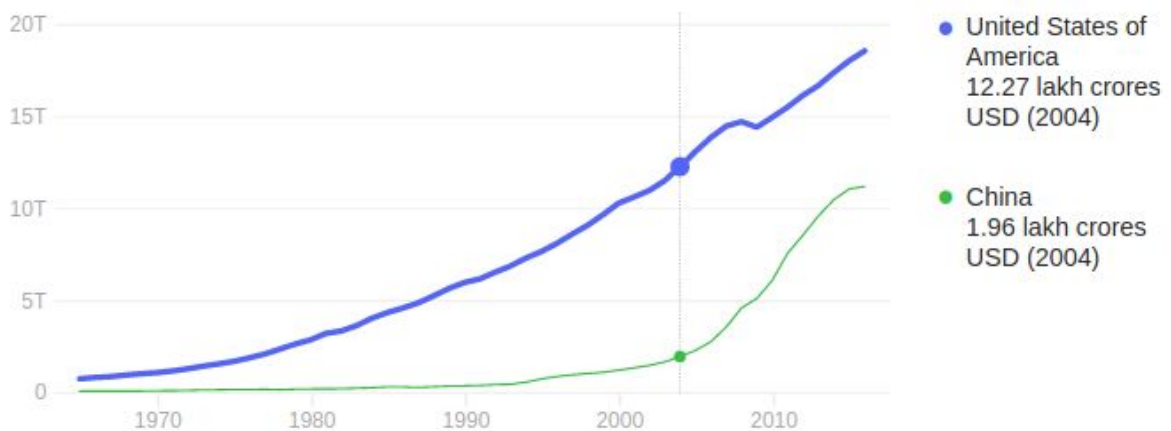
India / GDP growth rate

7.1% annual change (2016)

India
4.8% (1986)

Pakistan
5.5% (1986)

United States of
America
3.5% (1986)
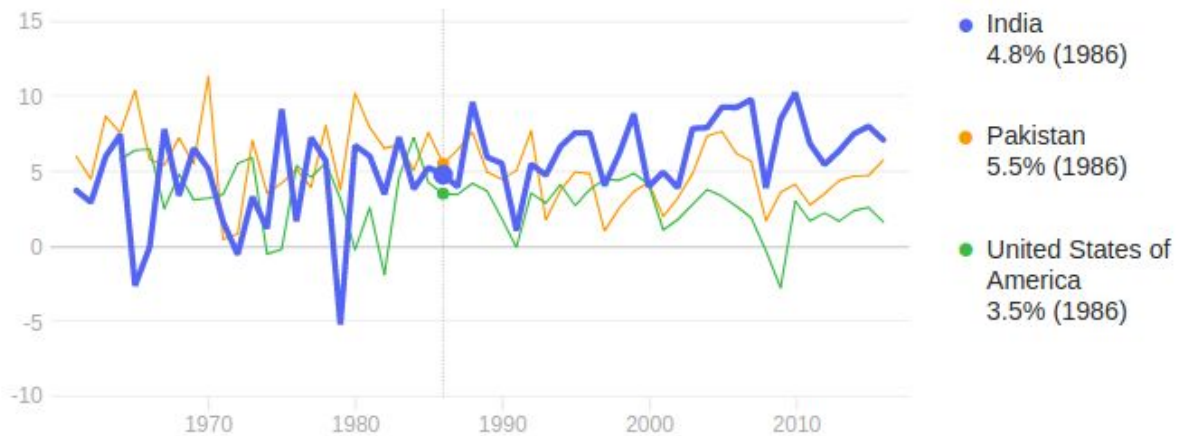
United States of America / GDP growth rate

1.6% annual change (2016)

India
6.9% (2011)

United Kingdom
1.5% (2011)

United States of
America
1.7% (2011)
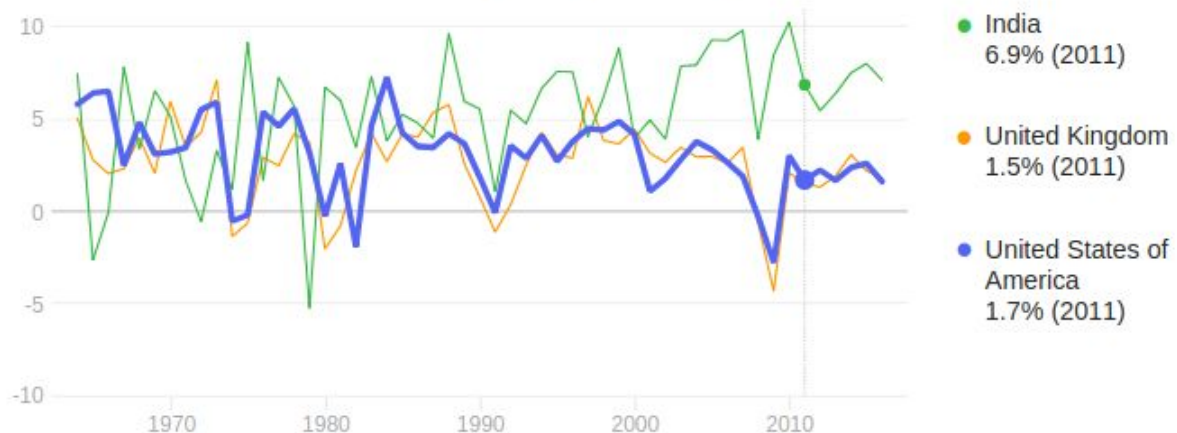
Source :- Google

A3)

There are three types of unemployment that occurs in an economy :-
1. **Structural Unemployment :-** It is a form of unemployment which arises when there is a mismatch found between the skills which the workers possess and the required skills which are being demanded by the employers. This situation usually arises due to various changes in

technological innovation, reorganization and demographics. A long recession can be a good example as it often creates structural unemployment in an economy. To adapt to the changes in the economy, firms need to constantly look for workers which have adapted to those new skills.

2. **Cyclical Unemployment :-** It is a form of unemployment which relates to changes found in the business cycle. Whenever the economy of a country contracts or in a case of recession, the level of unemployment increases as firms have to terminate or suspend workers in order to reduce their costs. However, this unemployment is temporary as any form of recession is temporary in an economy. It tends to create more unemployment as workers have now less money to buy things they need thus decreasing the demand level.

3. **Frictional Unemployment :-** It is a form of unemployment which results from imperfect information and the difficulties faced while matching the qualified talent for the jobs. This type of unemployment is almost impossible to avoid, as neither job-seekers nor employers can have perfect information. Hence, it is not seen as a problem to an economy. It is usually short-term and is considered as a natural part of the job search process. It is in fact it is even good for the economy as it allows the workers to move to jobs where they can explore more. A good example would be when people wander to get job but aren't able to get due to lack of resources and information.
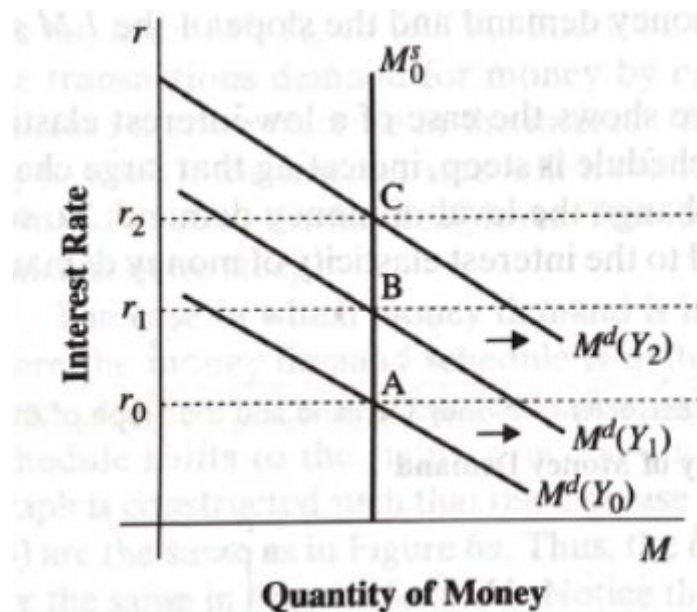
A4)

We know that, $Y = C + I + G + (X - M)$. Since, we are considering taxes, hence $Y_D = Y - T$ where $T > 0$. Also, $M = u + vY$ and $C = a + bY_D$

Since, taxes need to included in the equation, therefore $T \neq 0$,
Putting, in the above equation, we have

$Y = a + bY_D + I + G + (X - M)$
$Y = a + b(Y - T) + I + G + (X - u - vY)$
$Y = a + bY - bT + I + G + X - u - vY$
$Y(1-b+v) = a - bT + I + G + X - u$
$Y = (a - bT + I + G + X - u)/ (1-b+v)$

Hence, Proved.

A5)

From the interest rate and the quantity of money graph, we can easily see that as the interest rate increases the quantity of money decreases. This is because as the interest rate increases, you want to hold more bonds or less liquid funds and hence you require less money. This results in less quantity of money required in the economy. Consequently, as interest rate increases, people want to hold lesser money and invest more in the other forms. Also, this is because at higher rate of interest, the opportunity cost of holding money is high. The shift in this graph for the money demand can be explained through these terms :-
   a) When the real GDP of an economy increases, the income for the citizens of the country would increase and hence the demand curve shifts upwards for that economy.
   b) When the prices for the commodities increase, this increases the requirement of money as more money is required for purchasing the same amount of goods which shifts the demand curve upwards.
   c) Expectations about the future price of the bonds or stocks and certainty of taking risk would shift the money demand curve

A6)

Liquidity Trap is considered a situation in which the present interest rates are low and the savings rate are high which makes the monetary policy of the country ineffective. In this case, people choose to avoid keeping their money in the form of bonds and instead keep them in the form of savings which have a inverse relationship with the interest rates. One marker to know that an economy is in liquidity trap is the case when the interest rates are pretty low. These low interest rates affect the bondholder behaviour and without changes in the interest rates, consumers become demotivated in investing their funds in other options. Also, there has to be a lack of bondholders which are willing to keep their bonds along with a limited supply of investors who are available in the market to purchase them.

Here is a diagram for explaining the area of liquidity trap :-
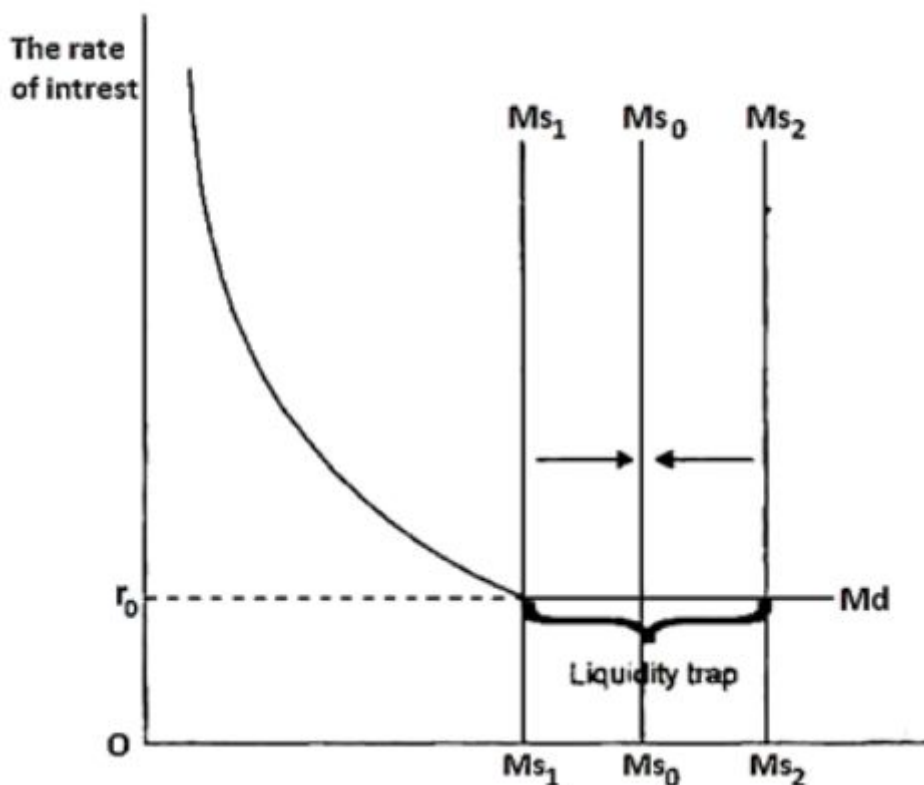
There are various ways to help the economy recover out from liquidity trap :-
1. The Reserve Bank can raise interest rates and maintain a fiscal policy so that people invest their funds more and more rather than just storing them.
2. A big drop in prices which increases the demand curve.
3. An increase in the government spending.

Citations

http://www.economicsdiscussion.net/interest/liquidity-trap/concept-of-liquidity-trap-with-diagram-interest/25862
https://www.investopedia.com/terms/l/liquiditytrap.asp
https://quickonomics.com/three-types-unemployment/