May 2020

recitation_IS19_20160330_Seg02.pdf

Participants: IS19 (boy, blue sweatshirt), S1 (boy, black vest)

Context: IS19 is teaching a recitation at the whiteboard.

0:00

xxx IS19: and this is the-
xxx the old one?
xxx and this is the new one.
xxx and we can see
xxx um
xxx in the long run there will be a (.)
xxx increase in the output because
xxx uh
xxx the capital in steady state will in-increase.
xxx but currently,
xxx ((pause))
xxx I mean when the-
xxx when the uh
xxx savings rate jumps from this value to that value
xxx the capistal-
xxx the capital stock will be the same.
xxx in will (.) stay in this point.
xxx in the current period.
xxx and that is (.)((pointing to words on whiteboard))
xxx the immediate effect.
xxx but then the capital will change in next period.
xxx and it will converge with this new steady state.
xxx so the capital will (.) only change from the next period.
xxx not this period.
xxx so there is no↑ (.) immediate effect on the capital.
xxx and,
xxx if you understand,
xxx this immediate e- this immediate effect on capital .
xxx it's easy to find out that um
xxx the income
xxx the immediate(.)ly-
xxx there is no immediate effect on um
xxx output↓ because
xxx the output by the production function equals to
xxx uh
xxx equal- I mean (.) only depends on the capital.
xxx so if the capital is the same,

xxx there will be no change in the consumption.
xxx s- I- I mean the- the output
xxx that means the output is also two.
xxx ((pause))
xxx after 1- after the change.
xxx so (.) let me denote it by a (.) different notation↑
xxx so (.) maybe y prime
xxx y prime is the output after this-
xxx after this change immediately.
xxx so it will (.) stay at (.) this level.
xxx but for the consumption,
xxx the (cell) rate is different because
xxx although this- (.) although this income is the same,
xxx we have a new saving rate now.
xxx instead of a point two,
xxx now we have a point five for the saving rate.
xxx so here it is
xxx the new savings rate which is
xxx point five.
xxx and this new output
xxx is- is the same as previous.
xxx so it's two,
xxx and we can
xxx find out
xxx the consumption,
xxx the immediate consumption after this changes
xxx is one.
xxx so for the immediate (.) effect we compare
xxx these numbers with (.) these numbers.
xxx remember these two values are the (.) values bef-
xxx before this change
xxx when the saving rate is point two
xxx and (.) we compare this number with
xxx this number.
3:00
xxx for the immediate effect.
xxx so there's no effect on the output.
xxx both of the values are two.
xxx but
xxx the value of consumption is different.
xxx now it decreases to one.
xxx so although in the long run
xxx the consumption will increase from this-
xxx from one point six to two point five,

xxx but immediately the consumption will actually decrease
xxx ((pause))
xxx so (.) any question about (.) °this°?
xxx ((pause))
xxx and you remember the
xxx key point for this immediate effect is that,
xxx immediately there is no change↓ in the capital stock
xxx whatever the change for the other parameters
xxx as the- as or↓
xxx n or g or delta,
xxx the stock will always stay the same immediately
xxx in this period.
xxx so that's the (.) start point
xxx for our a-analysis of this effect.
xxx and from this-,
xxx from this fact that k is the same
xxx so (.) k prime equals two.
xxx because for this k star,
xxx we can get this-
xxx this output after this change.
xxx in this period. (.) it's also the same.
xxx and then from the definition of this consumption,
xxx we can find out the new value.
xxx the new immediate value.
xxx in this (.) period for the consumption.
xxx and then we compare this-
xxx this-
xxx uh I mean the corresponding numbers
xxx so before and after the change.
xxx ((pause))
xxx so,
xxx ((looking at papers))
xxx well now let's
xxx move to the last question,
xxx question four,
xxx ((pause to erase the whiteboard and get a new marker))
xxx part a,
xxx there is a: decrease in the depreciation rate,
xxx so the depreciation rate decrease,
xxx and let me denote delta one as the depreciation bef-
xxx before this decrease,
xxx and delta two as the
xxx one after the decrease
xxx so delta one is

6:00

xxx greater than delta two.
xxx and use the graphs to illustrate
xxx how the steady state and golden rule change.
xxx so first let me do the steady state one.
xxx so for the graph to illustrate steady state,
xxx we first draw (.) the break even line
xxx which is
xxx n plus g plus delta one.
xxx because now there is a change in the depreciation rate
xxx times k.
xxx and then draw (.) the line for (.) savings,
xxx which is s times f k.
xxx so there's that for this a- analysis of the-
xxx uh steady state,
xxx this curve is s times f of the production function
xxx and this curve will be different for the golden rule.
xxx analysis.
xxx and this intersection,
xxx is the steady state level.
xxx so it's k star.
xxx and now we have a decrease in the-
xxx in the depreciation rate.
xxx that means (.) the slope of this break even line
xxx will be smaller.
xxx so this line will go downward.
xxx ((pause to draw a line on the board))
xxx sorry.
xxx ((pause to replace dried out marker))
xxx so this is the new break even line.
xxx it's n plus g plus delta two,
xxx times k.
xxx because this delta two is (.) less than delta one.
xxx so this line is below the- the previous one.
xxx and we can get a n-
xxx new intersection,
xxx which implies the new
xxx steady state.
xxx so from this graph
xxx uh it's obvious that
xxx the level in steady state (.) increase
xxx for the capital.
xxx ((pause))
xxx and for the golden rule,

xxx we use a slightly different curve.
xxx and
xxx so notice that this horizontal axis is
xxx capital,
xxx is k,
xxx and this vertical axis is- can be
xxx output or investment or savings.
9:01
xxx because all these variables has the same units.
xxx so we can
xxx use this (.) same axis to denote
xxx uh several uh variables.
xxx ((IS19 pronounces the word variable like the word
xxx reliable))
xxx and this is k.
xxx so (.) again we draw this (.) break even line.
xxx it's n plus g plus (.) delta one.
xxx ((pause))
xxx but here notice that this curve is the production
xxx function.
xxx there is no s before this (.) function.
xxx so these two are different.
xxx and also we do not
xxx uh care about this intersection.
xxx we care about
xxx our tangent point.
xxx at which the tangent line is-
xxx ((pause))
xxx is parallel to this (.) break even line.
xxx ((pause))
xxx and this (.) tangent point
xxx is the golden rule level.
xxx so it's the k g r.
xxx so why we have this point in the graph
xxx because remem- remember for the steady state
xxx the condition is s times
xxx f k↑ equals the break even level.
xxx and in graph,
xxx uh it is just the intersection
xxx of these two line because
xxx this line is the break even line and
xxx this is the savings.
xxx but for the (.) golden rule level,
xxx the condition we use is m p k equals to

xxx m plus g plus delta,
xxx and m p k is the (.) slope,
xxx or the tangent line of this production
xxx function,
xxx and the m plus g plus delta is the,
xxx slope of this break even line.
xxx and this condition means that
xxx these two lines are parallel.
xxx because from the equation
xxx they are equal to each other.
xxx so that's why this tangent point (.)
xxx is the golden rule level.
xxx and now again
xxx this depreciation rate decrease.
xxx so the
xxx new break even line is flatter than the previous one.
xxx this is n plus g plus delta two,
xxx times k.
xxx and again we draw a
xxx tangent- tangent line that is
xxx parallel to this line.
xxx to this new line.
xxx ((pause))
xxx so maybe this is the tangent point
xxx and this is the
xxx new golden rule level for capital.
xxx and again from the (.) graph it
12:00
xxx increase.
xxx because of the decrease in the (.) depreciation rate.
xxx ((pause))
xxx so it goes from this value to this value.
xxx and for the steady state it goes from here to there.
xxx ((pause to look at papers))
xxx and,
xxx also what is the effect on the long run growth rate,
xxx of income ((undecipherable))
xxx so
xxx you should notice (.) two words,
xxx the first one is the growth rate
xxx and the income ((undecipherable))
xxx and you should be very clear that
xxx the growth rate and level are two different things.
xxx because all the values you calculated here,

xxx the k one or the k star y star and c star
xxx all that values are (.) levels.
xxx and- but the growth-
xxx but for the growth rate you should refer to the
xxx table, that the i-instructor gave you in the class,
xxx so,
xxx ((pause to erase whiteboard))
xxx remember that the gr- the growth rate
xxx ((pause))
xxx of uh
xxx ((pause))
xxx of output
xxx per capita,
xxx or per worker,
xxx which is (.) y over l
xxx equals to g.
xxx the growth rate of technology.
xxx right,
xxx it is (.) in your notes,
xxx in the- in a table.
xxx so (.) and here under the assumption
xxx there is only a decrease in the depreciation rate.
xxx and
xxx this (.) small g is-is constant.
xxx so there is no effect on the growth rate of the
xxx output per worker.
xxx ((pauses to correct a spelling mistake on the board))
xxx so (.) for part two there is-
xxx the answer is no effect.
xxx because this g (.) doesn’t change.
xxx and
xxx for part b,
xxx now suppose there is a
xxx decrease in the population growth rate.
xxx so now the n decrease
xxx that means (.) n one
xxx the growth rate before the change is
xxx greater than n two.
xxx and
xxx actually the result is the same because
xxx uh
xxx now what i- what (we) have is
xxx the delta is the same.
xxx but,

xxx but the growth rate of ca- of population is different.
xxx and because n two is less than n one
xxx so again this break even line
xxx the slope of that line
15:00
xxx is smaller.
xxx and the-
xxx the analysis and the result are actually the same.
xxx and this is the old one when the (.) population growth
xxx rate decrease
xxx and this is the (.) new one.
xxx ((pause))
xxx and you can
xxx also figure out that
xxx this steady state value increase.
xxx because no matter,
xxx what the
xxx w-what no matter whether it's the
xxx uh population growth rate decrease
xxx or the depreciation rate decrease,
xxx this- the slope of this line will-
xxx will both be- uh will both decreasing.
xxx so (.) that means
xxx that the result of the (analysis) is the same.
xxx so you can draw two,
xxx I mean y-you draw the two, same graph.
xxx but pay attention to this (.) break even line.
xxx because now there is a change in n not delta.
xxx ((pause))
xxx and there are two main difference in the (.) graph
xxx of the steady state and the golden rule.
xxx the first one is that in steady state
xxx here this curve is s times (.) f k and
xxx in the golden rule (.)
xxx analysis this is a production function.
xxx there is no s.
xxx in the front.
xxx and (.) the other one is that
xxx for the steady state,
xxx you care about this intersection.
xxx but for this (.) golden rule
xxx you care about this tangent point.
xxx the tangent point is golden rule value
xxx and this intersection is (.) steady state value.

xxx so- and what is the effect on the long run level
xxx we have talk about it it increase.
xxx and (.) now for the ↑income.
xxx so as we know
xxx the capital-
xxx uh the capital increase
xxx and so does the income because
xxx by the (.) production function,
xxx y equals to f k.
xxx so if k increase
xxx y must increase.
xxx because this is an increasing function.
xxx and the third line is what is the effect on the long run
xxx growth rate of real gdp.
xxx so
xxx ((pause))
xxx so the growth rate
xxx of
xxx real (.) gdp
xxx or (.) total output.
xxx they have the same meaning.
xxx equals to n ↑plus g.
xxx and you can also find this result in the table.
xxx and now the g,
xxx is the same.
xxx it is constant but
xxx there is a decrease in-
xxx in the- in the population growth rate.
xxx u-under the assumption.
xxx so this whole thing (.) will decrease.
xxx and so does this growth rate of (.)
xxx real gdp or total output.
18:01
xxx ((pause to look at papers and check watch))
xxx so.
xxx yes that’s the answer for
xxx question three and four,
xxx and for
xxx ques-
xxx for the first two question you can refer to the (.) notes?
xxx and (.) i just want to talk about
xxx uh question two for the (.)
xxx first part so what is relationship,
xxx of these four policies with (solo) model.

xxx so as we know there are four policies the first one is
xxx to increase- um-
xxx to inc- uh to increase the savings rate,
xxx and it is related to the (solo) model because
xxx the saving rate (.) is s in this model.
xxx so if there is a policy,
xxx uh to increase the saving rate.
xxx you can illustrate (.) the fact of the policy
xxx using this (.) graph.
xxx and- I mean- in the framework of the (solo model).
xxx yeah and the second one is the
xxx allocating of the investment.
xxx and the assumption of that (.) policy is
xxx there are many kinds of in-in-
xxx I- I mean many kinds of capital stock.
xxx which is (.) not included in the solo model.
xxx so.
xxx that policy is
xxx unrelated with this solo model.
xxx because in solo model we only have one kind of capital.
xxx which is k.
xxx yeah and the third one is
xxx to establish some institution,
xxx again that factor is not (.) considered in the solo model.
xxx and the last one is the policy to promote
xxx the technology growth.
xxx and that policy will
xxx influence the (.) value of g.
xxx so it will (.) have a-
xxx I mean have a impact on the growth rate of-
xxx of the (.) output per worker and the total output
xxx so it is related to the solo model because
xxx that factor is included in this-
xxx in this small g.
xxx so
xxx that’s all I want to talk about
xxx for this recitation.
xxx and (.) good luck to your exam
xxx S1: ((speaks to IS19 in chinese))