

Midterm Exam I: Answer Sheet

1. (35 %) Suppose that the Board of Trustees of the University decided that graduation rates are too low. To remedy this they impose targets on the administration for graduation rates, and furthermore, they make compensation depend on achieving these targets. Specifically, the compensation for the President in year t , B_t , now equals

$$B_t = \begin{cases} 0 & \text{if } R_t < \hat{R}_t \\ \bar{B} + \alpha(R_t - \hat{R}_t) & \text{if } R_t \geq \hat{R}_t \end{cases}$$

where $\bar{B} > 0$, R_t is the actual graduation rate in year t , \hat{R}_t is the target rate for year t , and $\alpha > 0$ is a positive constant. Draw the President's bonus function in a diagram with B on the vertical axis and R on the horizontal axis. Presumably the President uses a similar incentive system for Deans and Department Heads to achieve his goals.

brief answer The bonus function looks like this figure 1. The key point is the kink at \hat{R} , and the positive slope for $R > \hat{R}$.

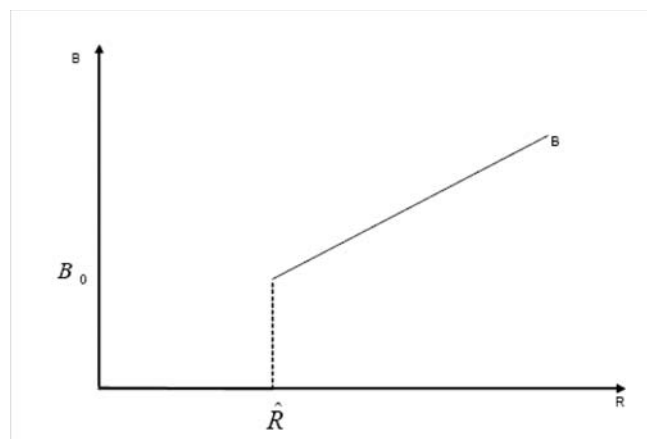


Figure 1:

- (a) How will implementation of this plan affect the quality of teaching at the University? Explain.

brief answer Because the President's reward (and the Dean's and the Head's and the faculties') depends on graduation rates, the quality of teaching will suffer. Resources will go to people who pass students, not people who teach well. There will be pressure to dumb down courses to make sure everyone passes. Notice that faculty faced with this bonus scheme may choose to leave the University if they dislike dumbing down and passing students who do not deserve to pass.

- (b) *How will the implementation of this plan affect faculty hiring at the University, if at all? Explain.*

brief answer It will be difficult to hire faculty who care about teaching. Faculty who have serious standards will go elsewhere. It will be easy to hire faculty who care nothing about teaching.

- (c) *How will implementation of this plan affect the admissions process at the University? What will happen to the average quality of students at PSU? Explain.*

brief answer Admissions would be tightened to prevent enrollment of students who would be unlikely to graduate. This would tend to improve student quality. But this may not be successful, since the decline in the quality of teaching (in part a) would reduce the pool of students who would *prefer to study at* the university. So while standards may rise, the quality of student admissions might still decline. Notice also that the President does not want students so good that they all graduate because that would be a hard act to follow in subsequent years. The President wants a class from which it is easy to hit the graduation target.

- (d) *Why would the trustees ever set $\alpha > 0$? Why not set $\alpha = 0$? Explain.*

brief answer If the trustees set $\alpha = 0$ then the President would never allow $R_t > \hat{R}_t$. Otherwise the target would be set even higher in the future. The President would prefer to have a "safety factor." But if the target is easy to achieve the trustees would want a higher rate of graduation. So they set $\alpha > 0$ to provide some incentive to *reveal* if he is good at raising R .

- (e) *What will be the President's biggest concern when meeting with the Board of Trustees each year? What will he try to argue with the Board of Trustees about? Explain.*

brief answer The President's biggest concern would be convincing the trustees to not raise the target rate, more generally, to set a low \hat{R} . The President wants an easy target that is easy to fulfill. So he will try to convince the trustees that achieving \hat{R} is really difficult.

- (f) *Suppose that some faculty develop a new teaching technology that may improve learning. Would the President be more likely or less likely to adopt this technology given the Board's graduation rate policy? Explain.*

brief answer Not likely. Implementing an innovation is costly and could jeopardize graduation rates in the short run as people learn to use it. Faculty may not use it well immediately. Even if learning improves, and graduation rates rise, the trustees will just raise targets higher in the future. So the downside risk falls on the President, but the upside gains will be taxed away by the trustees.

2. (30%) *What is a soft budget constraint (SBC)? What consequences for economic performance arise from the fact that budgets constraints are soft?*

brief answer A soft budget constraint arises when subsidies are provided *ex post*. That is, when bad performance is compensated for after the fact. This has bad incentive effects. If directors know they will be bailed out they have less incentive to work hard in the first

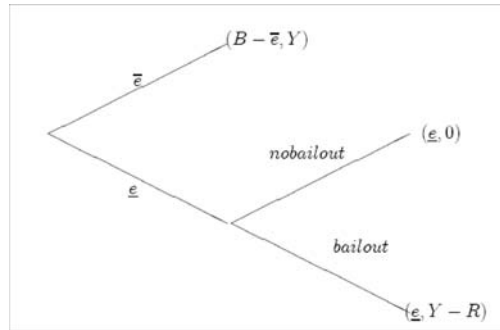


Figure 2:

place. SBC's have many bad consequences. It creates a chronic sellers' market, which, in turn, leads to the deterioration of quality. There is no reason to produce high quality goods in a sellers' market. It leads to the second economy because of the shortages of goods. It induces the system of dual money, as the planners try to prevent the easy credit from the SBC from filtering into the retail market.

- (a) *Why couldn't central planners simply promise not to subsidize enterprises? Why didn't such promises eliminate the SBC? Explain.*

brief answer Of course they tried to promise, but they could not keep their commitments. The reason is that the promises were not credible. Once the enterprises had performed poorly, not bailing them out (providing credits) would lead to a cascade of unfulfilled plans. Recall the simple game we analyzed (here in extensive form): The planner would like to promise no bailouts because if directors *believed* them they would choose high effort and there would never be a need for bailouts. But if directors do choose low effort the planners must choose between no output or giving a bailout, and they prefer the latter. The key reason is that the consequences of failure to fulfill the plan by one enterprise cascade throughout the economy – that is too costly for the planners worried about micro balance.

- (b) *Why is that central planners are unable to stick to their commitments? What is it about the command economy that makes it hard to honor such commitments?*

brief answer The problem is that micro balance is very difficult to achieve with plans are infeasible when implemented. So the planners are focused heavily on preventing a crisis *today*. In effect, their time horizons shrink; they discount the future very heavily. Now, the cost to planners of breaking their commitments is loss of reputation, which causes poor performance in future periods. The benefit is they may prevent a crisis today. If planners discount the future heavily enough they will never honor commitments. This suggests, by the way, that if the planners had built up inventories of inputs to use in case of supply disruptions they would be more likely to honor their commitments. But of course they did not have them because they were trying to maximize output (and if they did have them somebody would have accused them of hoarding or speculating – "wrecking the plan" – and they would be off to some horrible punishment).

3. (35%) "The Soviet Growth Model was effective at extensive growth but ineffective at intensive growth."

(a) What is the difference between the two types of growth? Explain, preferably using the expression for the growth rate of output (in terms of its components), or graphically with a production function.

brief answer Extensive growth refers to growth via accumulation of inputs – mobilization. Intensive growth means growth through greater efficiency. If we start with

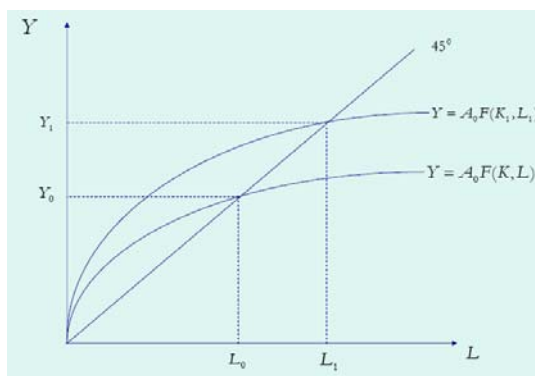


Figure 3: Extensive Growth

$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + \left(F_K \frac{K}{Y}\right) \frac{\dot{K}}{K} + \left(F_L \frac{L}{Y}\right) \frac{\dot{L}}{L}$, it is easy to see that intensive growth means growth via $\frac{\dot{A}}{A}$, while extensive growth means growth via accumulation of inputs, that is $\frac{\dot{K}}{K}$ and $\frac{\dot{L}}{L}$. In figure 3 output rises because K and L rise (to K_1, L_1), but A is unchanged. This is extensive growth. Now compare this to figure 4, where the capital stock and labor force remain at (K_0, L_0) but A rises to A_1 . This is intensive growth.

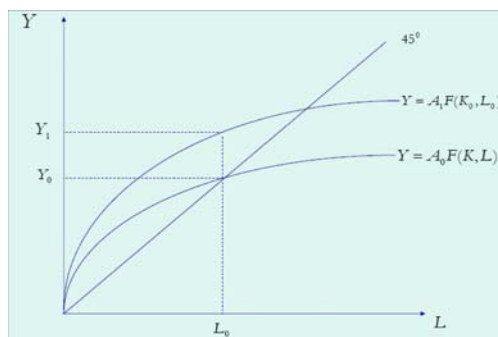


Figure 4: Intensive Growth

(b) Explain why the system was good at achieving extensive growth?

brief answer Command is good at mobilizing resources. It controls the production of consumption goods, so it directly controls savings and hence capital accumulation. Thus it can achieve very high rates of savings directly. It can move people from rural to urban and collectivize to raise L .

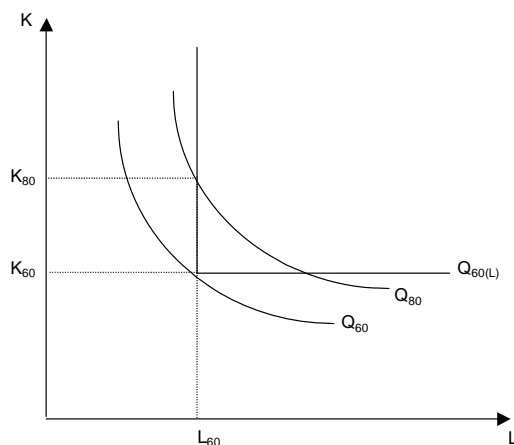


Figure 5:

- (c) *Explain why the system was ineffective at generating intensive growth? Try to focus on fundamental problems.*

brief answer Dynamic incentives problems discourage innovation, more specifically diffusion of innovations. Command ignores trade-offs and creates waste, which is bad for efficiency. SBC's create waste and low quality which is bad for efficiency growth. No incentives to reduce costs because output plans are maximized.

- (d) *Carefully explain how a low elasticity of substitution could be the root of the problem in (c).*

brief answer After a while, labor force cannot continue to grow really fast (all labor has left rural areas and all women work, so only natural fertility is left, which decreases as women work). But capital continues to grow so K/L increases continuously. This is okay if it is easy to substitute capital for labor. But if the elasticity of substitution is low then output will not increase very much even though capital accumulation is high. In figure 5 K/L rises from 1960 to 1980. With a moderate elasticity of substitution output rises from Q_{60} to Q_{80} . But if the elasticity of substitution is zero output does not rise at all. In this extreme case, $F_k = 0$, so $\left(F_K \frac{K}{Y}\right) = 0$, which implies that capital accumulation no longer adds to growth. More generally, it means that the marginal product of capital is falling faster than the capital output ratio is rising, so the effect of capital accumulation on growth is weak. One could also just argue that a low elasticity of substitution makes it hard to substitute capital for labor, and if new technology is embodied in machines this will slow down economic growth.

- (e) *Were there any long-term costs associated with the features you discussed in part (b)? Explain.*

brief answer Yes, we called this a balloon payment. One example, is simply the fertility problem mentioned above. Mobilization led to rapid increases in women's labor force participation, but this lowers fertility so it lowers future labor force growth. Other examples include the environmental costs associated with output maximization, the waste of resources, the legacy of huge uncompetitive enterprises. The command sys-

tem created an environment where technical change is slow due to lack of incentives. This began to bite once extensive growth was less feasible.