Exercise Session 1: Monetary Policy

Output, Potential Output, and Output Gaps

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Organizational Issues Regarding the Online Lecture

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Questions during the session will be recorded and uploaded while the recording will be stopped before questions at the end of the session.

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TASK 1: Logs and Levels

Express the following function as log-linear functions, i.e., take the log of the function and simplify as much as possible.

(a) $Y = zK^{\alpha}N^{1-\alpha}$ →

(b) $Z = ce^{rt}\beta^{K}$ →

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$$\ln(Y) = \ln(z) + \alpha \ln(K) + (1-\alpha)\ln(N)$$

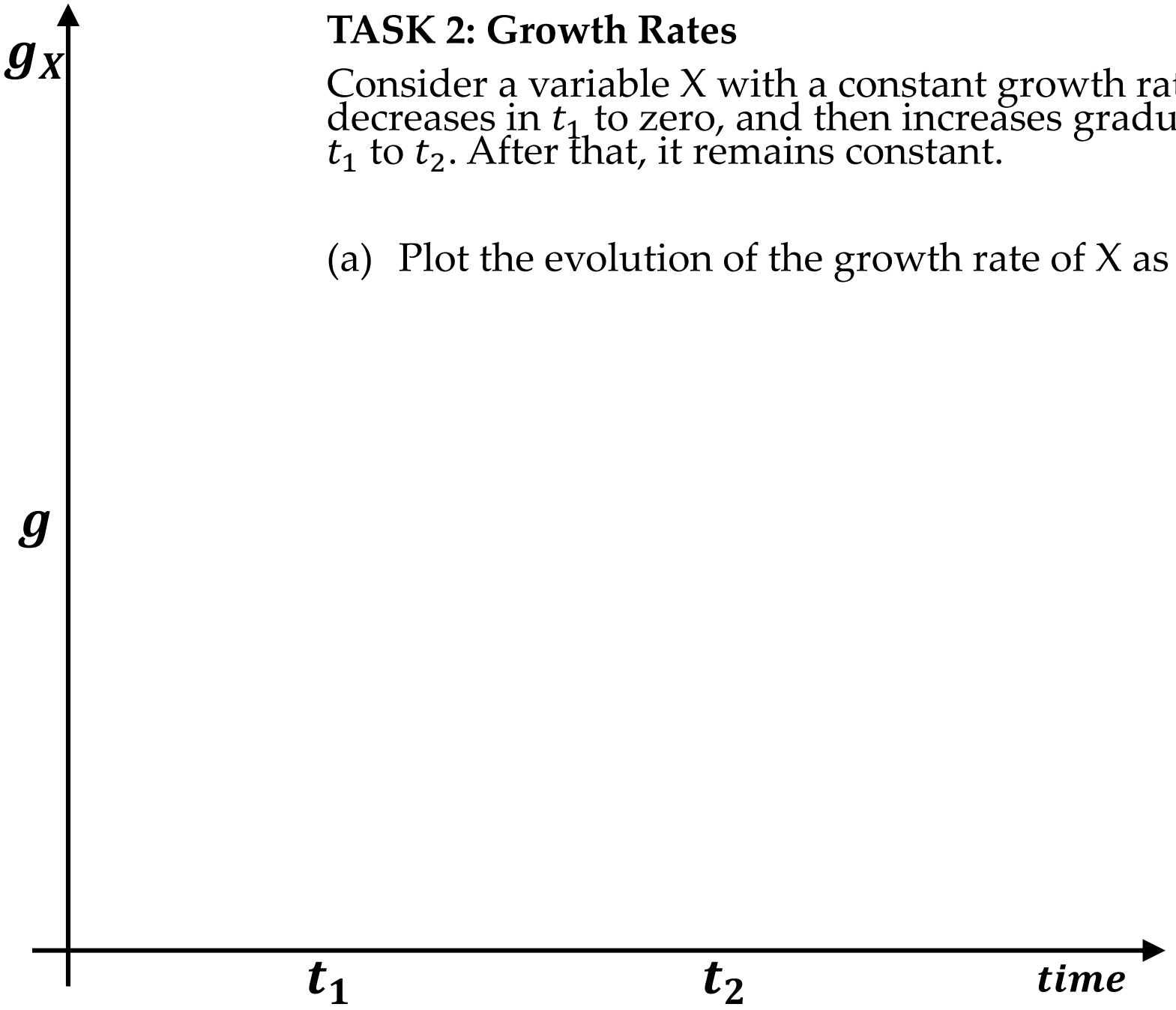
(b) $Z = ce^{rt}\beta^{K}$ →

$$\ln(Z) = \ln(c) + rt + Kln(\beta)$$

TASK 2: Growth Rates

Consider a variable X with a constant growth rate, $g > 0$ for the period t_0 to t_1, decreases in t_1 to zero, and then increases gradually from zero back to g from t_1 to t_2. After that, it remains constant.

(a) Plot the evolution of the growth rate of X as a function of time.



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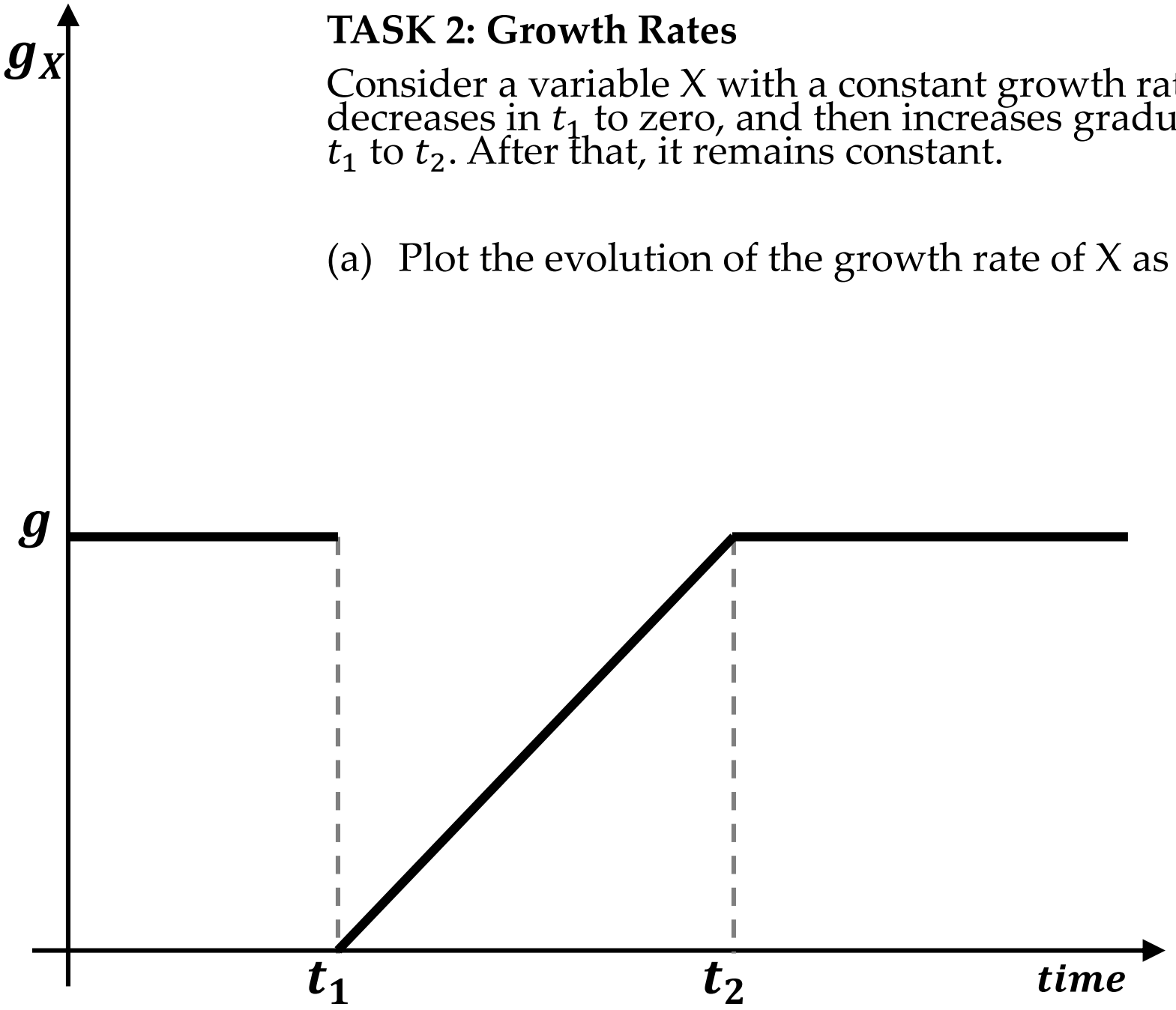

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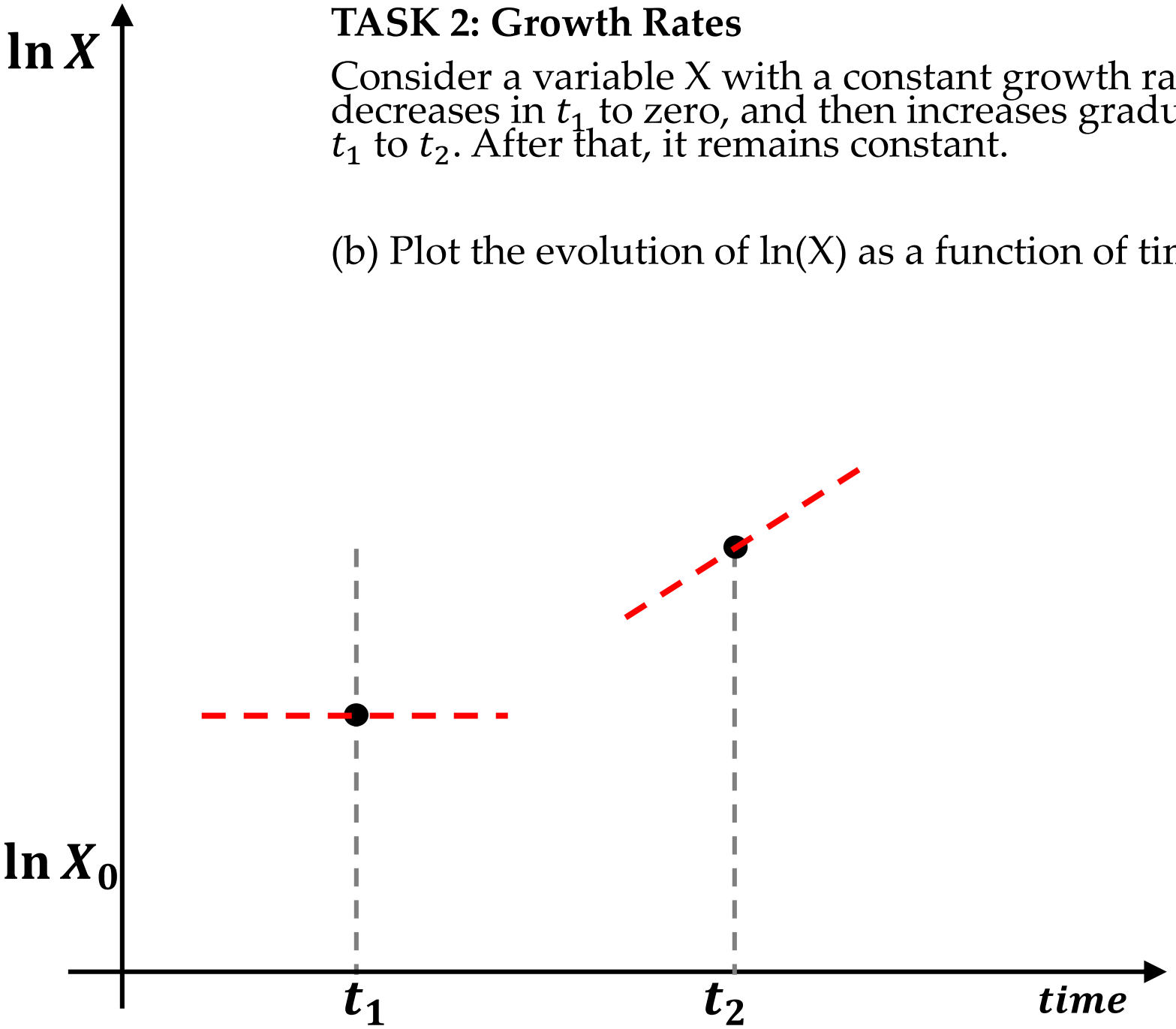

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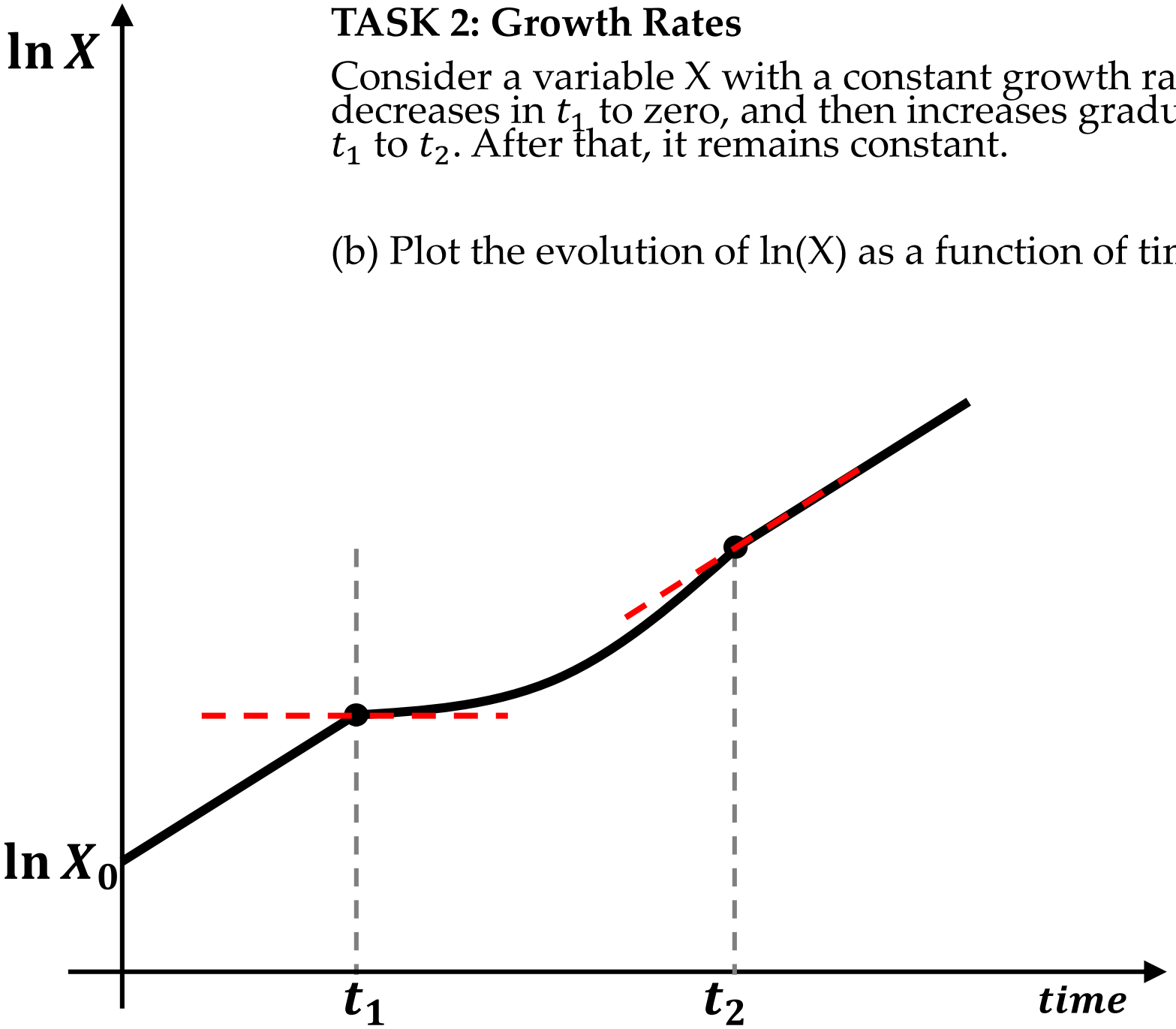

TASK 3: Lecture Review

(a) Why do the different computation methods of GDP yield the same results?

Aggregate Production = Aggregate Demand = GDP Distribution

Or put differently: Earnings = Spending = Income

Spending of one economic agent matches earnings/income of another economic agent.

TASK 3: Lecture Review

(b) What is the difference between real and nominal variables?

Nominal variables: valued at current prices; changes can occur due to price ***and*** quantity changes; measures in units of money

Real variables: deflated; valued at constant prices; changes can occur due to quantity changes; measured in units of goods

$$real\ GDP = \frac{nominal\ GDP}{GDP\ deflator} * 100$$

TASK 3: Lecture Review

(c) GDP is an estimate. Describe and discuss the measurement issues that are associated with that.

- Informal sector
- Seasonal patterns
- Revisions: data revisions, benchmark revisions

TASK 3: Lecture Review

(d) Why is real GDP often represented in its log-form?

- Same distance on a log scale shows the same percentage increase. Example: Distance from 100 to 1000 amounts to a tenfold increase, just as an increase from 1000 to 10000.
- Interpretation of regression coefficients as elasticities: $\ln(C)=\alpha+\beta \ln(Y-T)$. A one percent increase in disposable income $(Y-T)$ leads to a increase of β percent in consumption (C).
- Easier to distinguish periods of above and below average growth. If there was a constant growth rate, log GDP would just be a straight line.

- Also recall that $\frac{Y_t-Y_{t-1}}{Y_{t-1}} \approx \ln(Y_t) - \ln(Y_{t-1})$ → log differences reflect growth rates

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$$
\begin{aligned}
Y_t &= (1+g)^t Y_0 \\
\ln(Y_t) &= \ln((1+g)^t Y_0) \\
\ln(Y_t) &= \ln(Y_0) + t\ln(1+g) \\
&\approx const + t * g
\end{aligned}
$$

TASK 3: Lecture Review

(d) How is the business cycle traditionally defined?

5 points by Burns and Mitchell (1946):

1. Aggregate economic activity: GDP, employment, production, financial markets

2. Expansions and contractions: Follow each other in a sequence

3. Comovement: Joint movement in many sectors

4. Recurrent but not periodic: Range from 1.5 to 8 years (recent evidence for importance of cycles beyond that range (e.g. Beaudry et al., 2020, AER))

5. Persistence: Expansions and contractions take a while until the next turning point occurs

TASK 3: Lecture Review

(e) What do potential output and the output gap measure and why is it important to distinguish the two from a policy perspective?

Potential Output: Trend growth in the productive capacity of the economy. Estimate of the level of GDP attainable when the economy is operating at a high rate of resource use; not a technical ceiling on output that cannot be exceeded; rather, measure of maximum sustainable output – the level of real GDP in a given year that is consistent with a stable rate of inflation.

Output Gap: The output gap measures the difference between actual and potential output; if actual output rises above its potential level, then constraints on capacity begin to bind and inflationary pressures build; if output falls below potential, then resources are lying idle and inflationary pressures abate.

Economic activity above or below the normal capacity is typically viewed as being inefficient, so that the output gap is an important target for policy makers.

Policy perspective: Stabilization of long-run growth path and short-term business cycle stabilization require distinct policy measures (e.g., no long-run effect of monetary policy due to money neutrality)

TASK 3: Lecture Review

(f) Explain why evaluating past policy decision based on revised data might be problematic.

- Policy evaluation needs to consider the information set available to the policy maker at the time of the policy decision. Later revisions and hindsight distort such an evaluation.
- If the information was not in the information set, how could have the policy maker known and decided differently?
- The question is, was the decision optimal given the available information set, not was it optimal in hindsight, incl. future information.