GDP: Let y_t be the GDP in year t

- GDP growth rate: $g_t \equiv \frac{y_{t+1} - y_t}{y_t} = \frac{y_{t+1}}{y_t} - 1$

$\Rightarrow \quad y_{t+1} = y_t(1+g_t)$

// Suppose that g is constant: $g_t = g_s, \ \forall t \neq s$

- $y_{t+2} = y_t(1+g_t)(1+g_{t+1})$
- $y_{t+3} = y_t(1+g_t)(1+g_{t+1})(1+g_{t+2})$

$\vdots$

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GDP: Let y_t be the GDP in year t

- GDP growth rate: $g_t \equiv \frac{y_{t+1} - y_t}{y_t} = \frac{y_{t+1}}{y_t} - 1$

$\Rightarrow \quad y_{t+1} = y_t(1+g)$

// Suppose that g is constant:

$g \equiv g_t = g_s, \ \forall t \neq s$

- $y_{t+2} = y_t(1+g)(1+g)$

- $y_{t+3} = y_t(1+g)(1+g)(1+g)$

$\vdots$

WARWICK

GDP: Let y_t be the GDP in year t

- GDP growth rate: $g_t \equiv \dfrac{y_{t+1} - y_t}{y_t} = \dfrac{y_{t+1}}{y_t} - 1$

$\Rightarrow \quad y_{t+1} = y_t(1+g)$

// Suppose that g is constant:

$g \equiv g_t = g_s, \ \forall t \neq s$

- $y_{t+2} = y_t(1+g)^2$
- $y_{t+3} = y_t(1+g)^3$

$\vdots$

$y_{t+n} = y_t(1+g)^n$

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Constant growth rate formula:

$$y_{t+n} = (1+g)^n \, y_t$$

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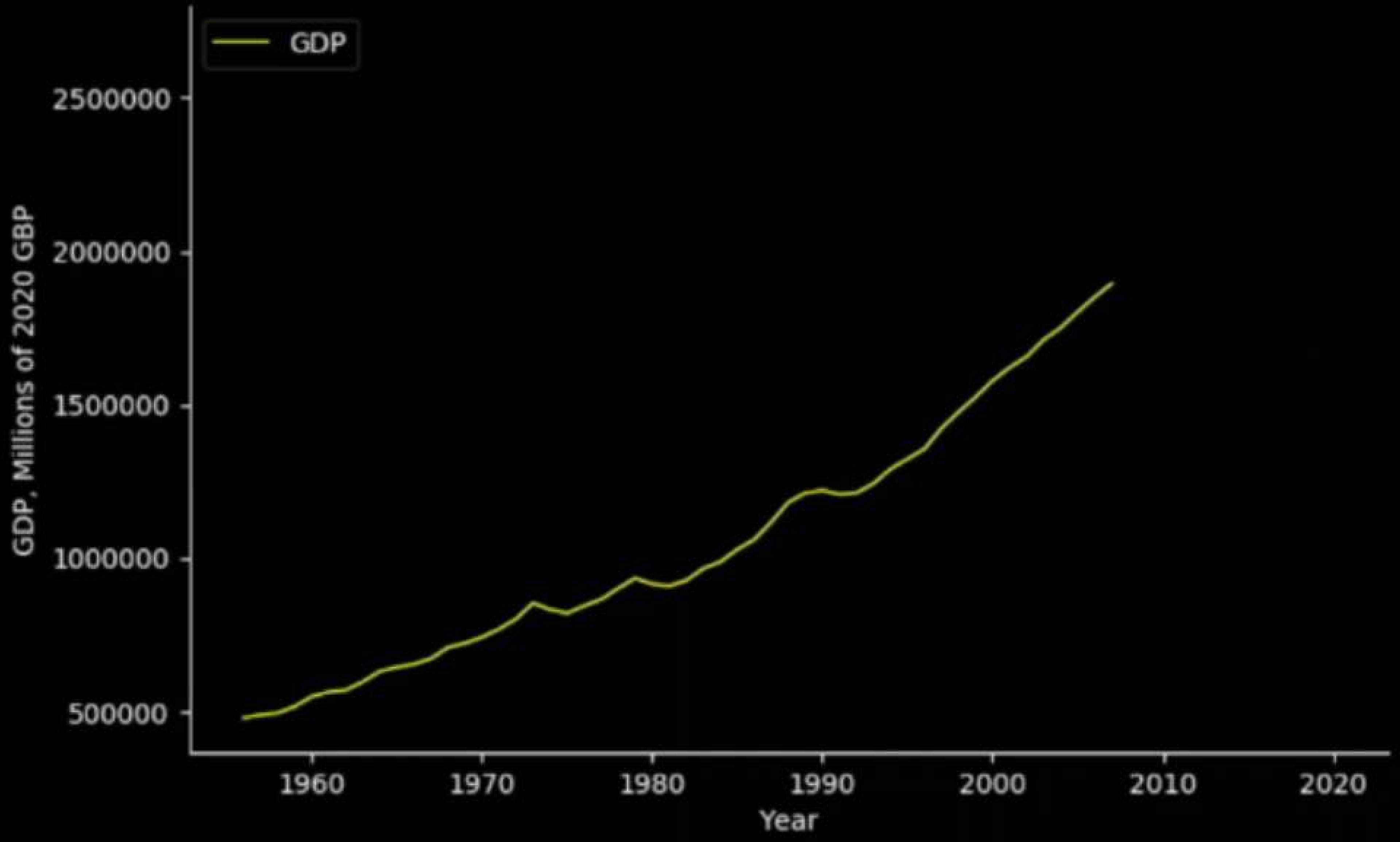

GDP
2500000
2000000
1500000
1000000
500000
GDP, Millions of 2020 GBP
1960
1970
1980
1990
2000
2010
2020
Year

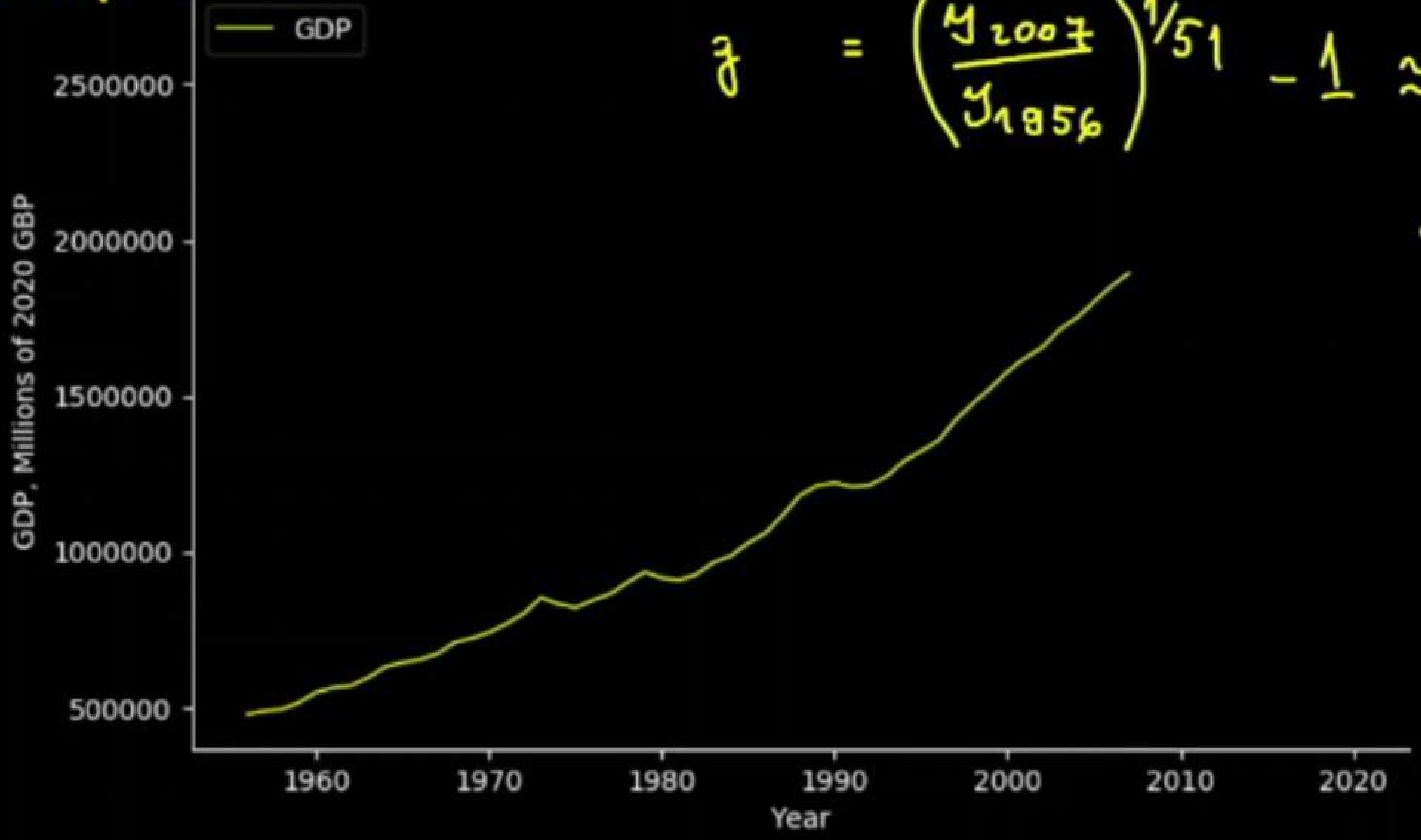
$$y_{1956} = £478\ \text{Bn}$$

$$y_{2007} = £1.894\ \text{Tn}$$

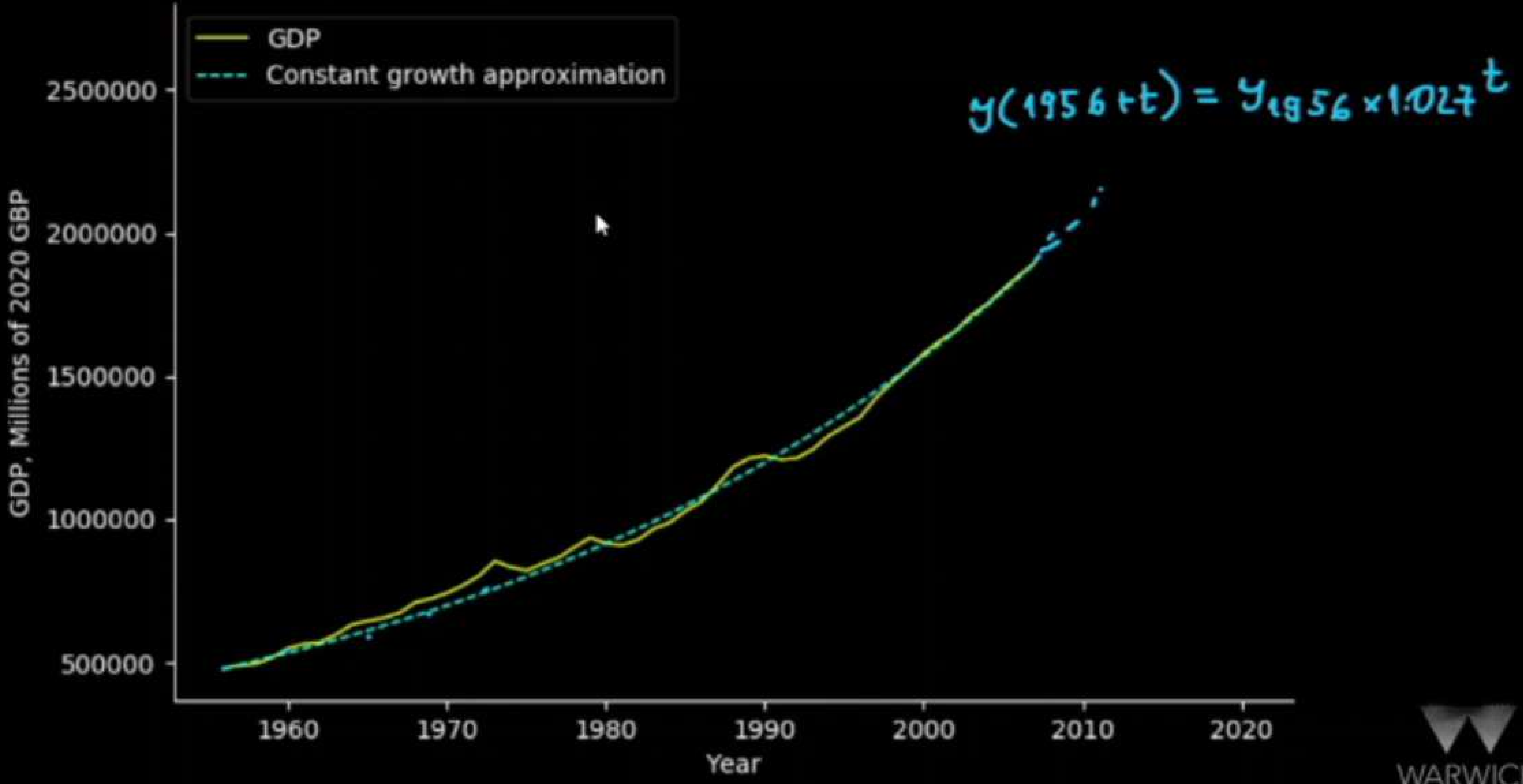
$$y_{2007} = y_{1956}\,(1+g)^{51}$$

$$g = \left(\frac{y_{2007}}{y_{1956}}\right)^{1/51} - 1 \simeq 0.027$$

$$2.7\%$$



$$y_{1956+t} = y_{1956}\,(1.027)^t$$



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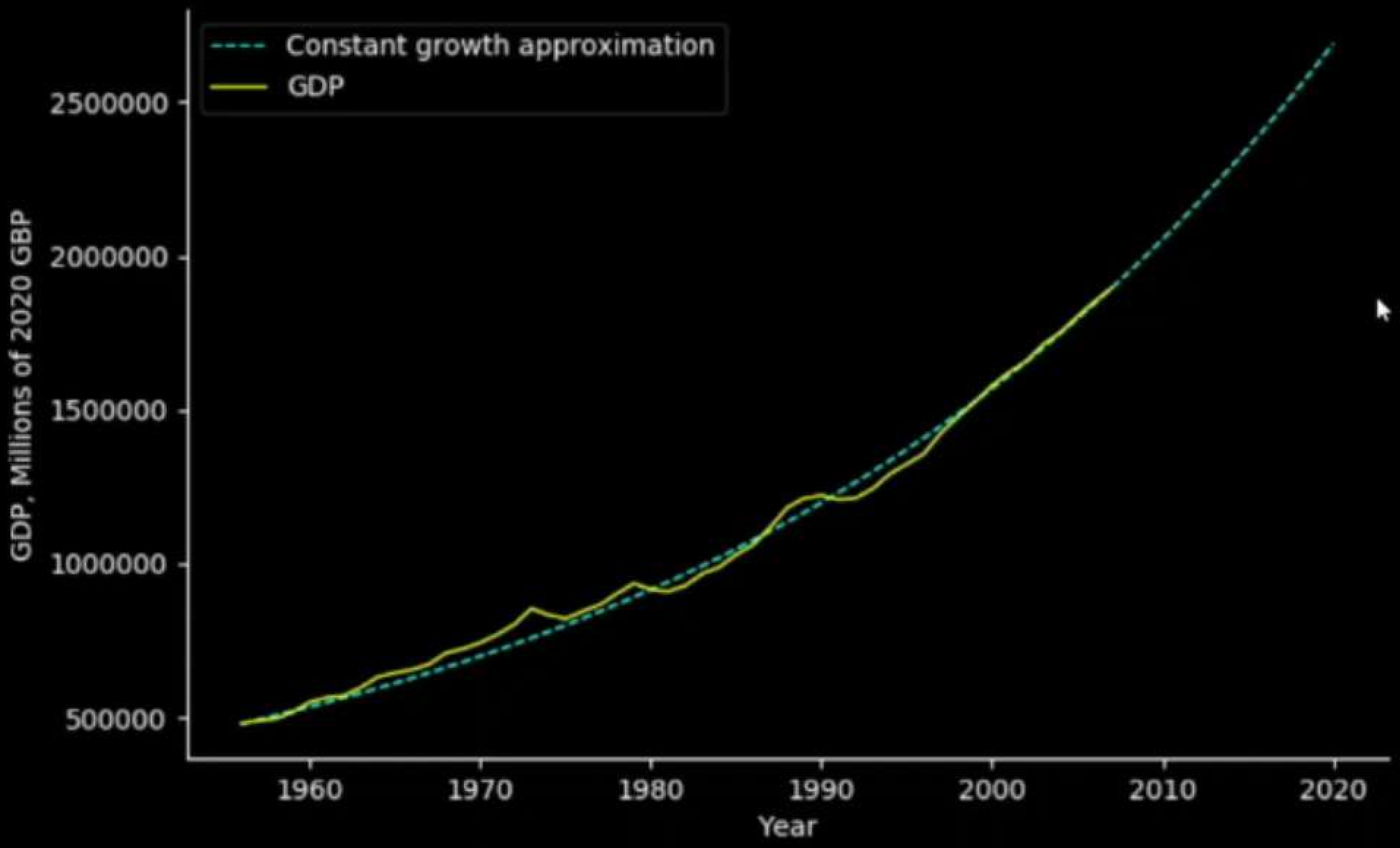
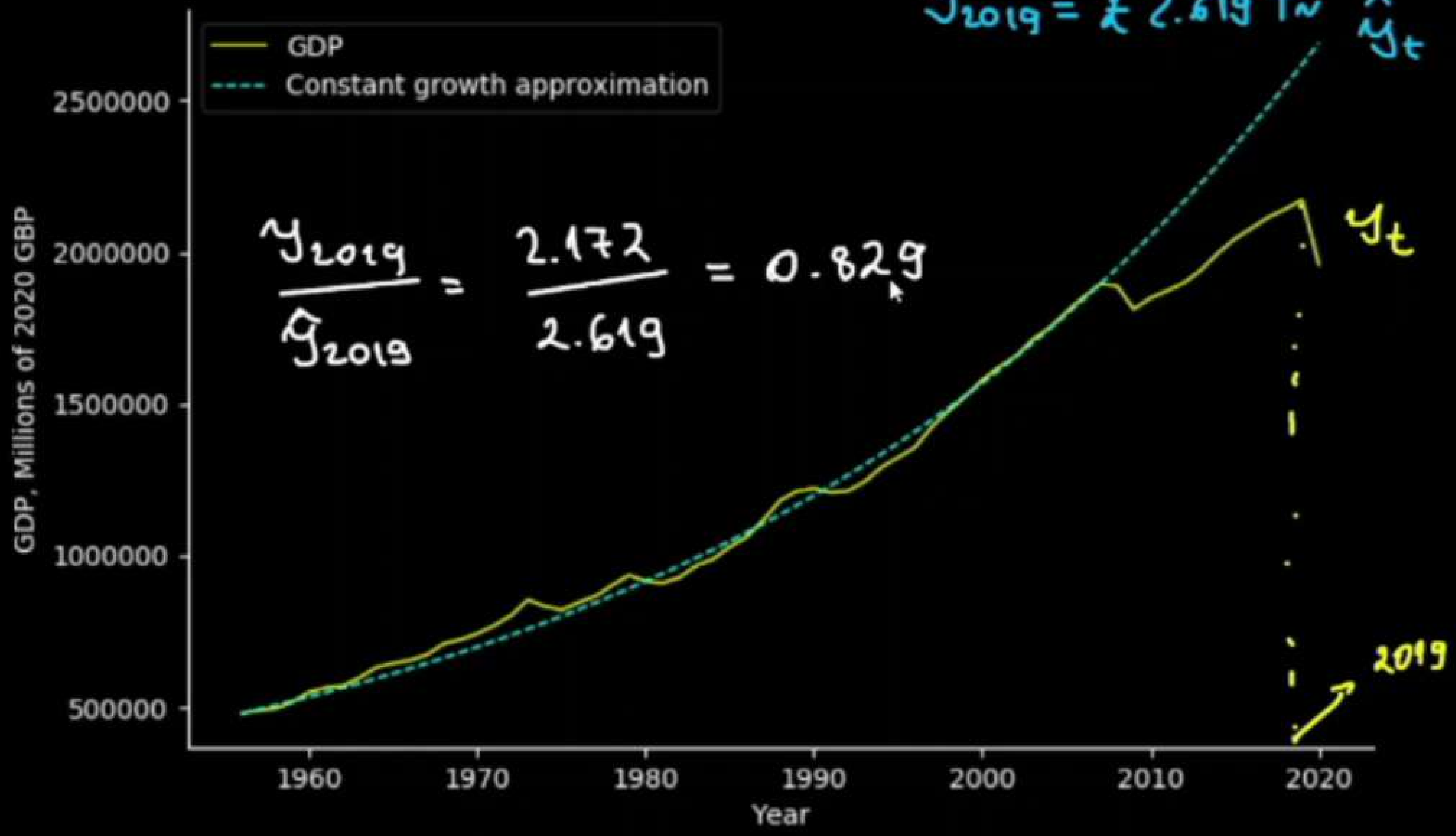

Constant growth approximation
GDP
GDP, Millions of 2020 GBP
2500000
2000000
1500000
1000000
500000
1960
1970
1980
1990
2000
2010
2020
Year

WARWICK

"UK productivity slowdown"

$$y_{2019} = £2.172\ \text{TN}$$

$$\hat{y}_{2019} = £2.619\ \text{TN}$$



$$\frac{y_{2019}}{\hat{y}_{2019}} = \frac{2.172}{2.619} = 0.829$$

WARWICK