Comments on
Artificial Intelligence and Economic Growth
by P. Aghion, B. Jones, and C. Jones

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Comment 1

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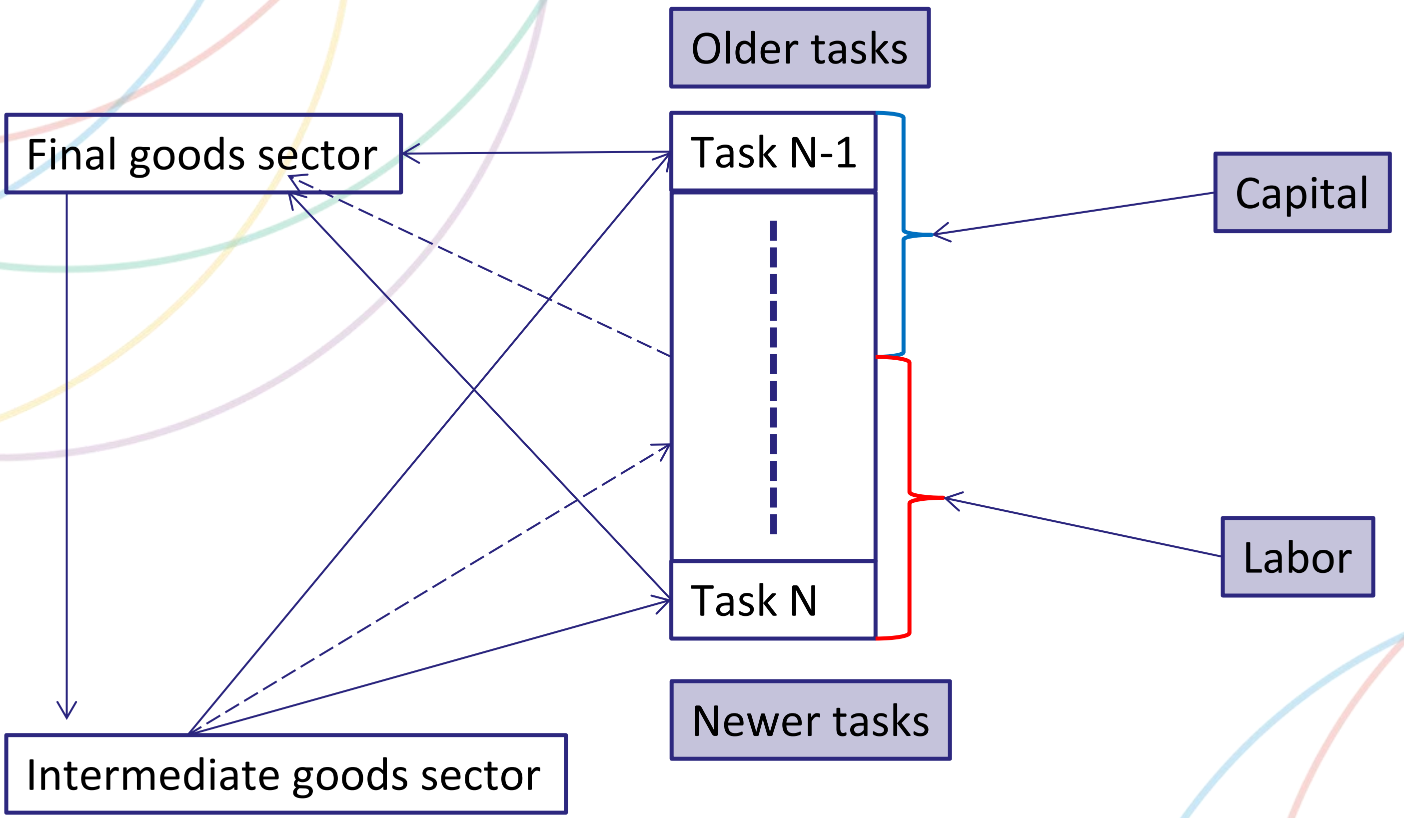
One of famous AIs: AlphaGo

AlphaGO won against GO champion.

This is surprising; however, operating AlphaGo needs lots of electricity.

Therefore, introducing cost effects into the model should be considered.

Comment 2 D. Acemoglu and P. Restrepo AER, 2018



Labor productivities of newer tasks are higher than those of older tasks.

Comment 2

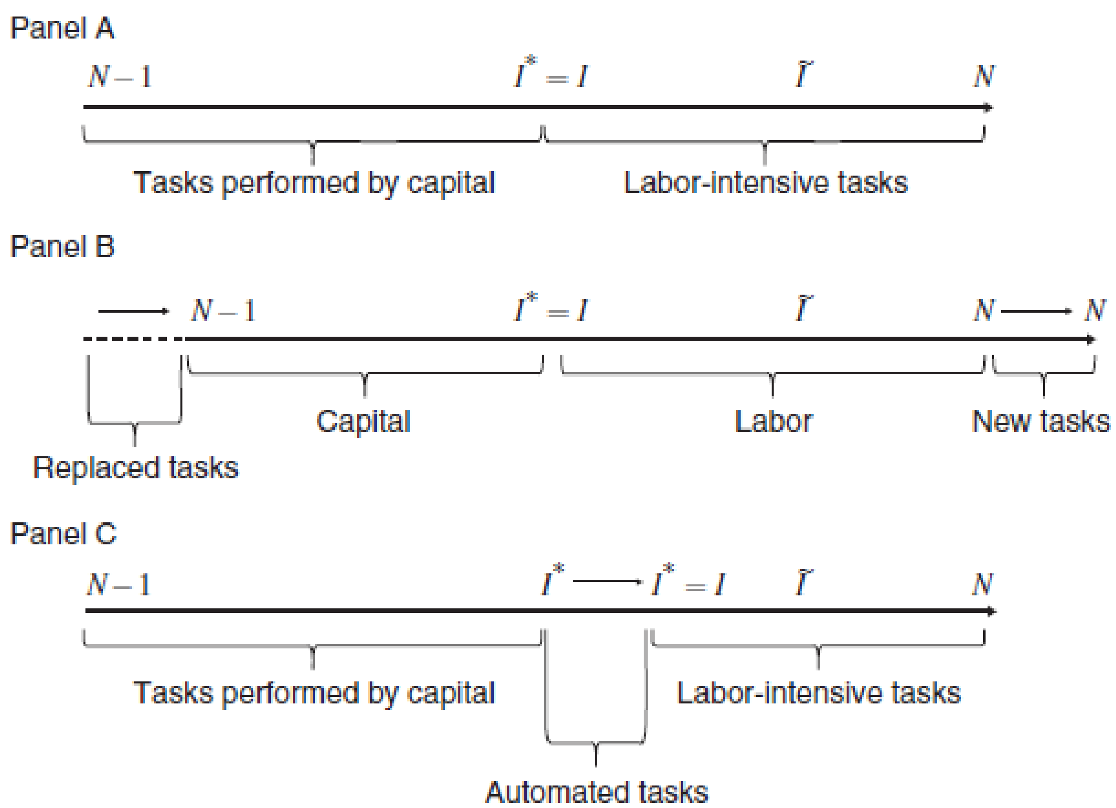
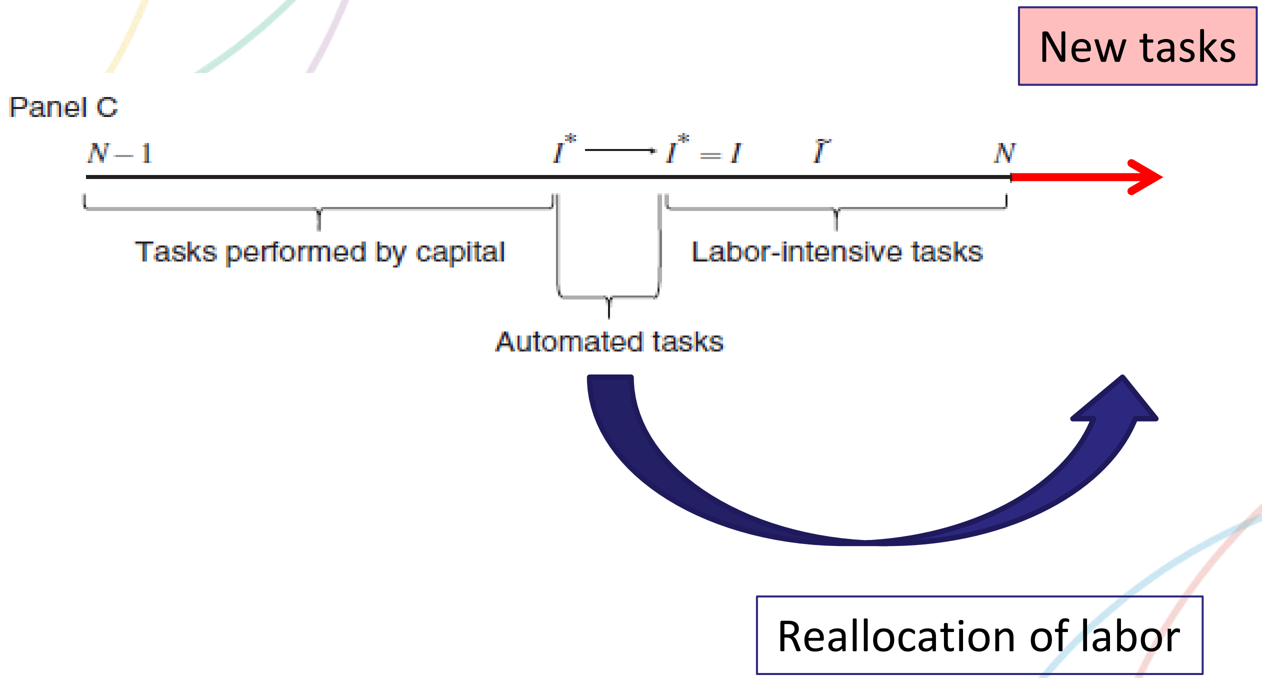


FIGURE 2. THE TASK SPACE AND A REPRESENTATION OF THE EFFECT OF INTRODUCING NEW TASKS (*Panel B*) AND AUTOMATING EXISTING TASKS (*Panel C*)

Comment 2



This reallocation of labor is not so easy. Thus, there can be unemployment.
We should consider this issue seriously.

Comment 3

Technical comment:

In subsection 9.4.1, the authors propose an example where singularity occurs in finite time (Example 2).

Here, singularity means that A_t goes to infinity.

The model:

Idea production: $\frac{\dot{A}_t}{A_t} = \frac{K_t}{A_t} A_t^{\phi}$

Capital accumulation: $\frac{\dot{K}_t}{K_t} = sL\frac{A_t}{K_t} - \delta$

Comment 3 (continued)

From the model:

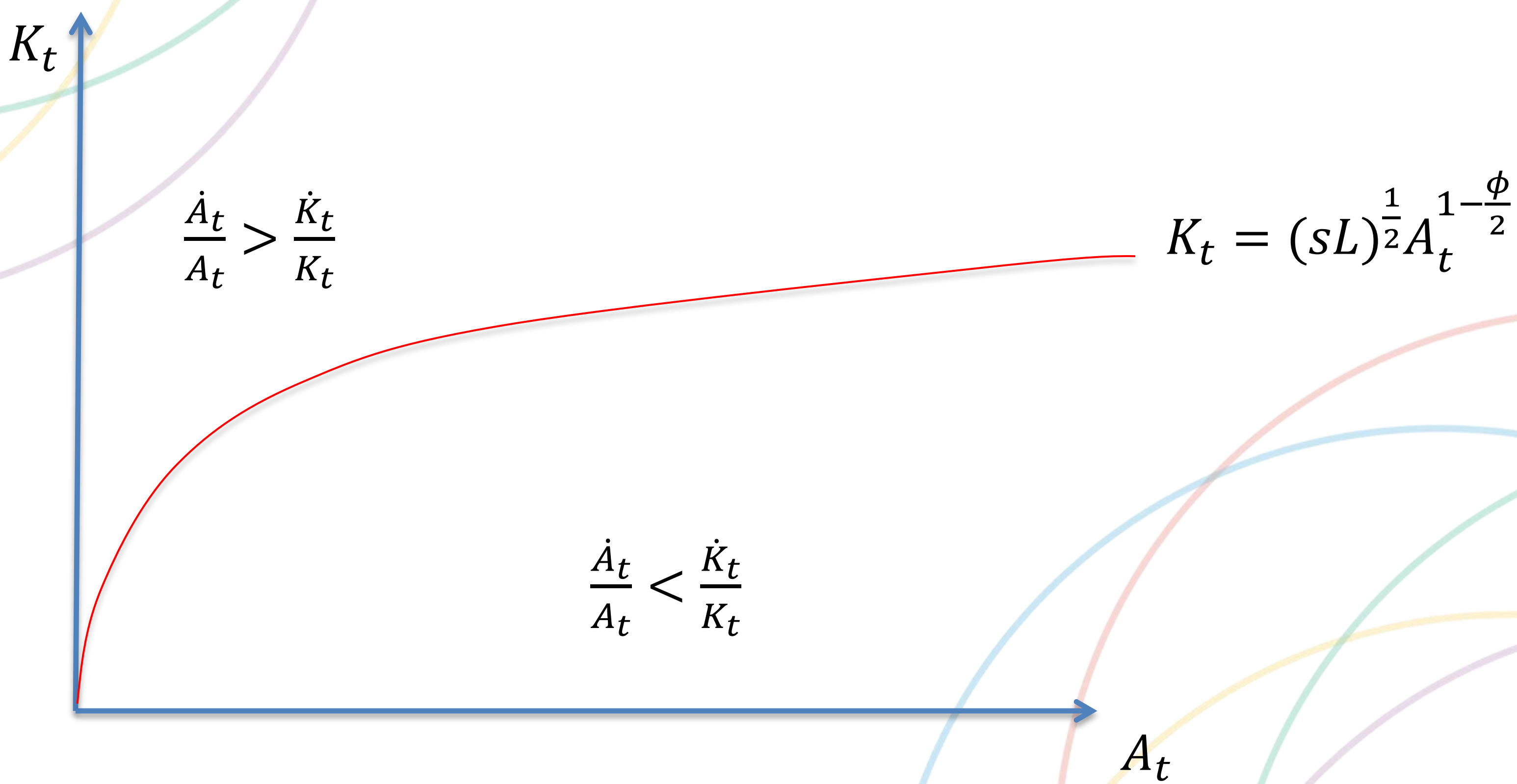
$$\frac{\dot{A}_t}{A_t} - \frac{\dot{K}_t}{K_t} = \frac{K_t}{A_t} A_t^{\phi} - sL\frac{A_t}{K_t} + \delta$$

For analytical simplicity, let's assume $\delta = 0$. Thus, the following obtains:

$$\frac{\dot{A}_t}{A_t} \gtreqless \frac{\dot{K}_t}{K_t} \Leftrightarrow \frac{K_t}{A_t} A_t^{\phi} \gtreqless sL\frac{A_t}{K_t} \Leftrightarrow K_t^2 \gtreqless sLA_t^{2-\phi}$$

This criteria $K_t = (sL)^{\frac{1}{2}} A_t^{1-\frac{\phi}{2}}$ can drawn as follows:

Comment 3 (continued)



Thus, $\frac{\dot{A}_t}{A_t} > \frac{\dot{K}_t}{K_t}$ does not always hold.

Comment 3

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The model:

Idea production: $\frac{\dot{A}_t}{A_t} = \frac{K_t}{A_t} A_t^{\phi}$

Capital accumulation: $\frac{\dot{K}_t}{K_t} = sL \frac{A_t}{K_t} - \delta$

Define a new variable: $x \equiv \frac{A_t}{K_t}$

Then, I can obtain:

$$\frac{\dot{x}_t}{x_t} = \frac{\dot{A}_t}{A_t} - \frac{\dot{K}_t}{K_t} = \frac{K_t}{A_t} A_t^{\phi} - sL \frac{A_t}{K_t} = \frac{1}{x_t} A_t^{\phi} - sLx_t.$$

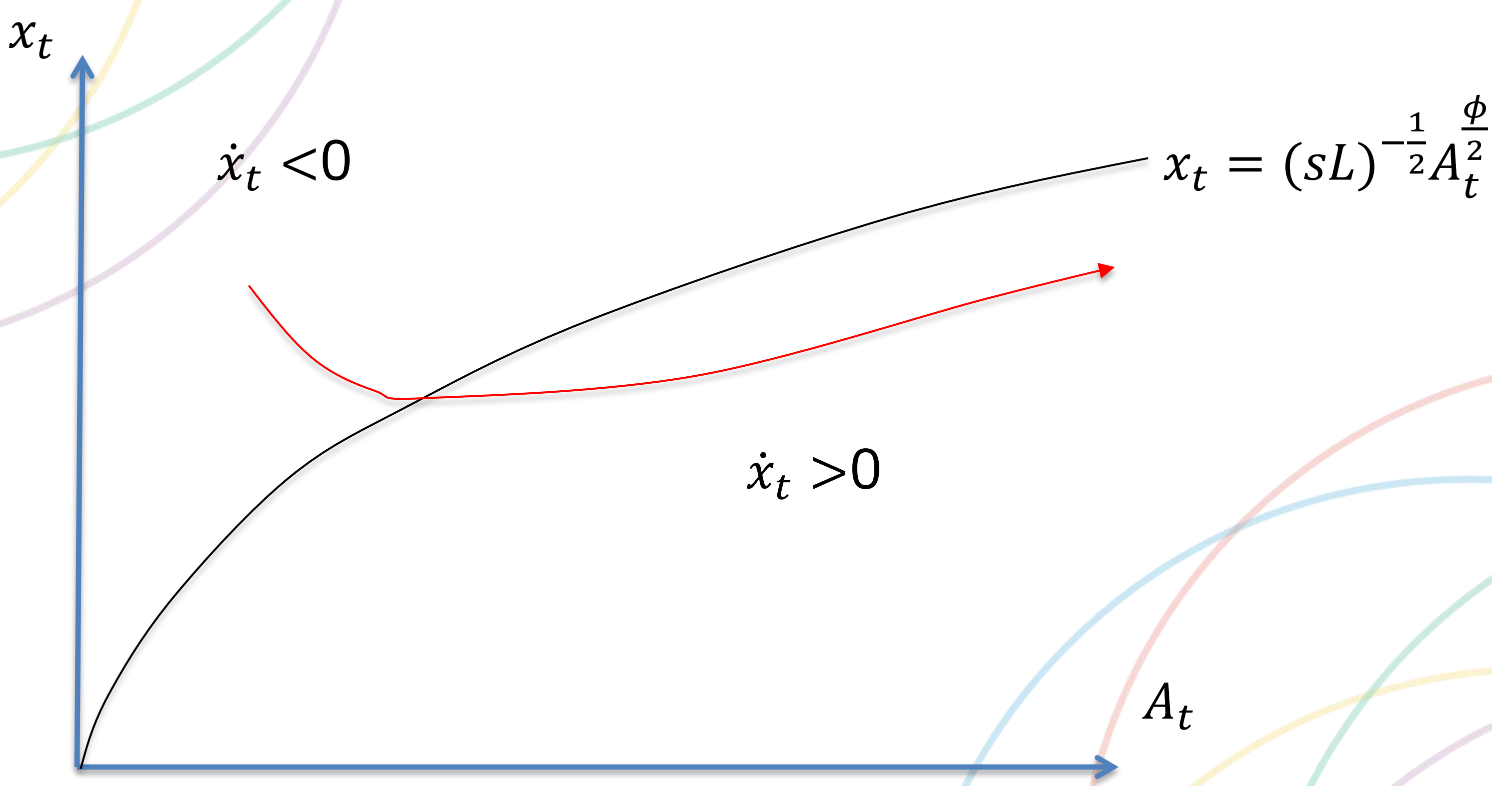
That is;

$$\dot{x}_t = A_t^{\phi} - sLx_t^2.$$

We have one more differential equation as follows:

$$\dot{A}_t = K_t A_t^{\phi}.$$

Comment 3 (continued)



So, we can draw a solution path. Does A_t explode in a finite time? Please remember that x_t goes to infinity.

Comment 3 (continued)

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To reconsider this issue in a different point of view, let us define a new variable: $z_t \equiv 1/A_t$, $w_t \equiv K_t z_t (= 1/x_t)$.

From the model:

$$\frac{\dot{z}_t}{z_t} = -\frac{\dot{A}_t}{A_t} = -\frac{K_t}{A_t} A_t^{\phi} = -K_t z_t^{1-\emptyset} = -w_t z_t^{-\emptyset}$$

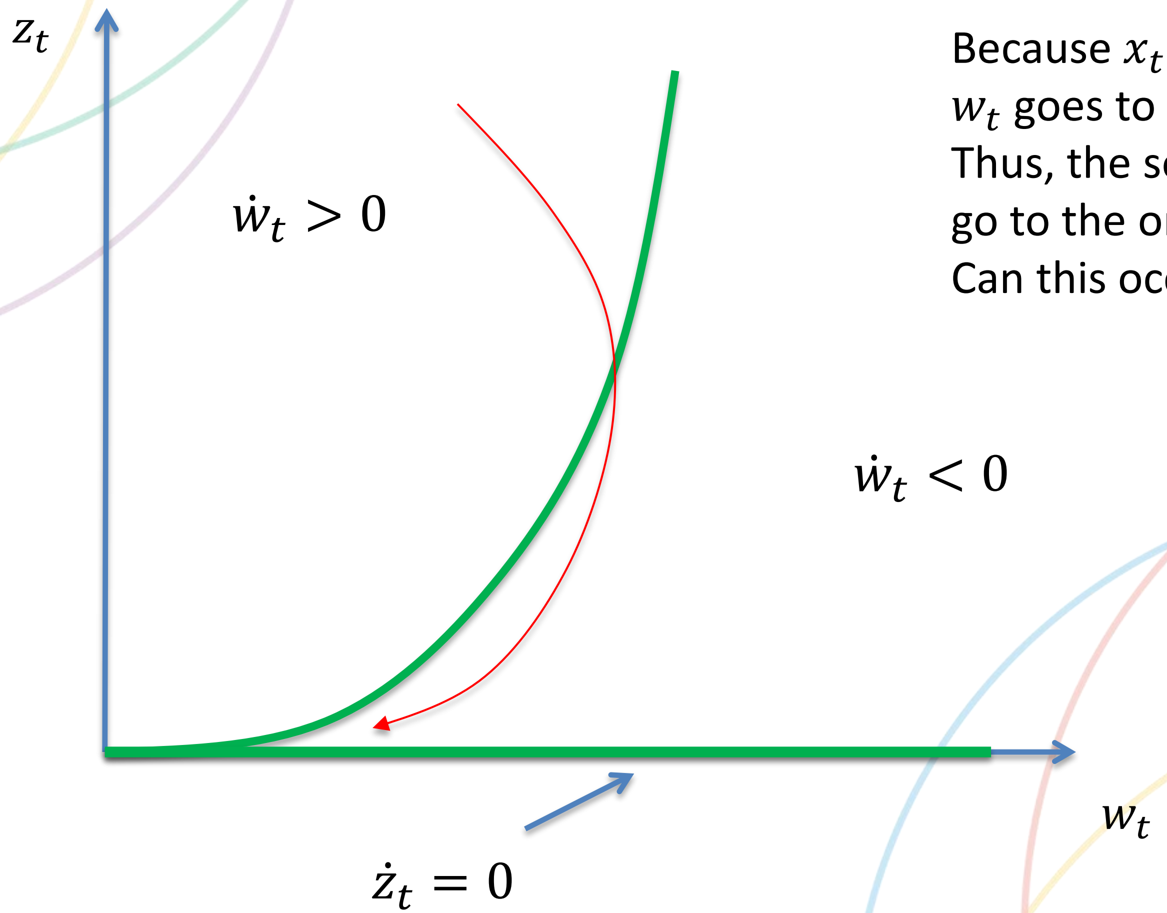
$$\frac{\dot{w}_t}{w_t} = \frac{\dot{K}_t}{K_t} + \frac{\dot{z}_t}{z_t} = sL\frac{A_t}{K_t} - w_t z_t^{-\emptyset} = sL\frac{1}{w_t} - w_t z_t^{-\emptyset}$$

Therefore, we obtain:

$$\dot{z}_t = -w_t z_t^{1-\emptyset},$$
$$\dot{w}_t = sL - w_t^2 z_t^{-\emptyset}.$$

We can draw the phase diagram of this system.

Comment 3 (continued)



Because x_t goes to infinity,
w_t goes to zero.
Thus, the solution path must go to the origin.
Can this occur in a finite time?