AI-Generated Inventions: Implications for the Patent System

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There is a debate on whether fully autonomously generated inventions can be allowed patent protection under current patent law(s).

Here, we use economic reasoning to argue that AI-generated inventions should be granted patent protection—not a legal argument.

The case against the patentability of AI-generated inventions

- Economists view the patent system as a policy tool to incentive investments in R&D activities.

- If AI-generated inventions are cheap and fast to produce, there is no need for granting a monopoly on these ideas—“machines don’t need to be incentivized.”

- It suffices to grant patent protection on the AI system (i.e., the invention machines), which are presumably challenging to produce—but no patent on the output of the system.

QED

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The invention machine

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A thought experiment

~ AI software producing inventions that cannot be patented.

Creates inventions at zero cost

Cannot commercialize these inventions itself

invention developers ≠ invention implementers

Inventions are in the public domain

Is societey better off if we allow patent protection?

Going back in time and call the invention machine…

Before the 1980 Bayh-Dole Act, U.S. government would retain title to inventions and would license them only **nonexclusively**.

(Creates inventions at zero cost)

Cannot commercialize these inventions itself

invention developers ≠ invention implementers

Inventions are in the public domain (or at least available for everyone)

→ In 1980, fewer than 5% of the 28,000 patents being held by federal agencies had been licensed.

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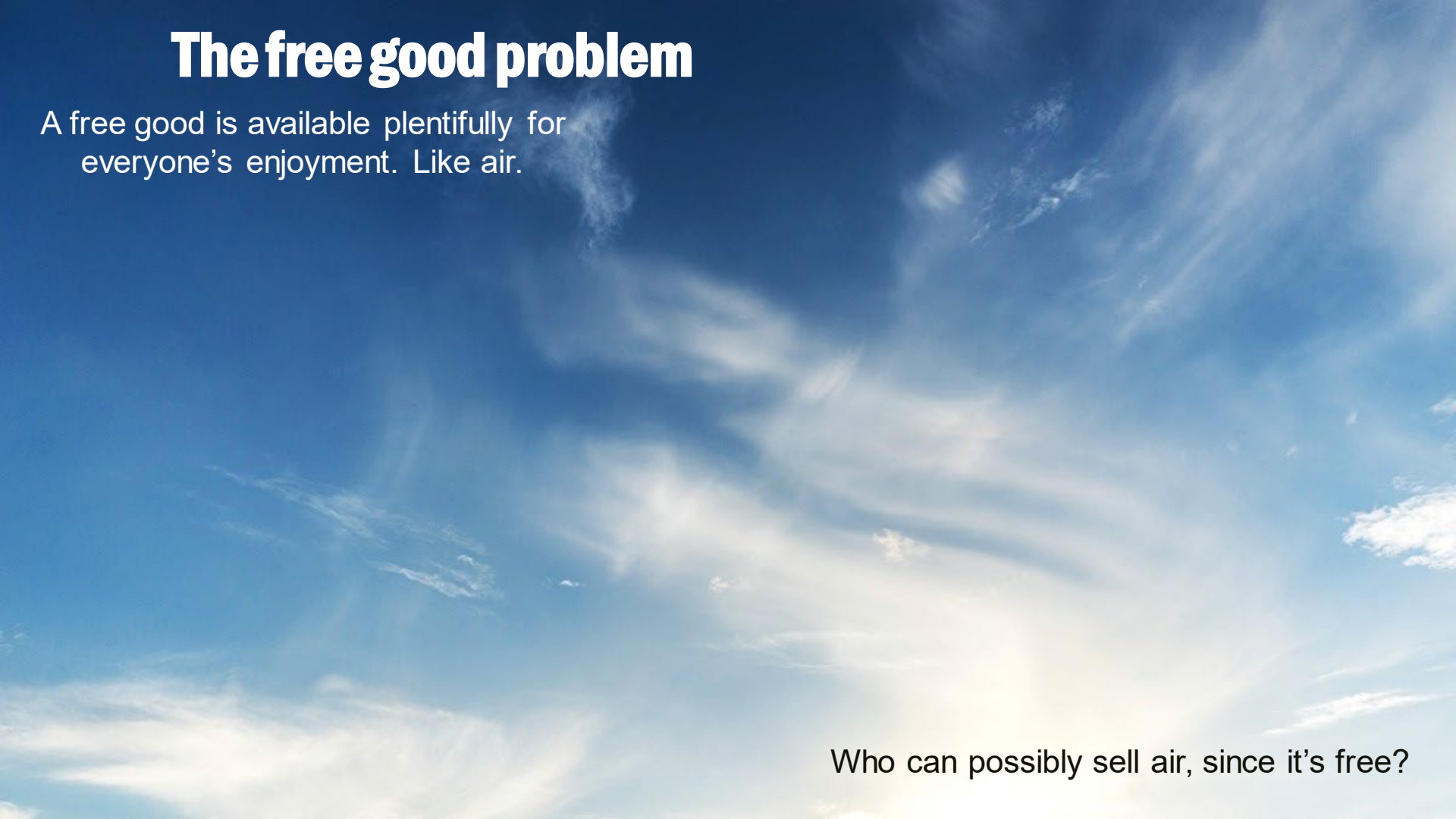
The free good problem

A free good is available plentifully for everyone's enjoyment. Like air.



Who can possibly sell air, since it's free?

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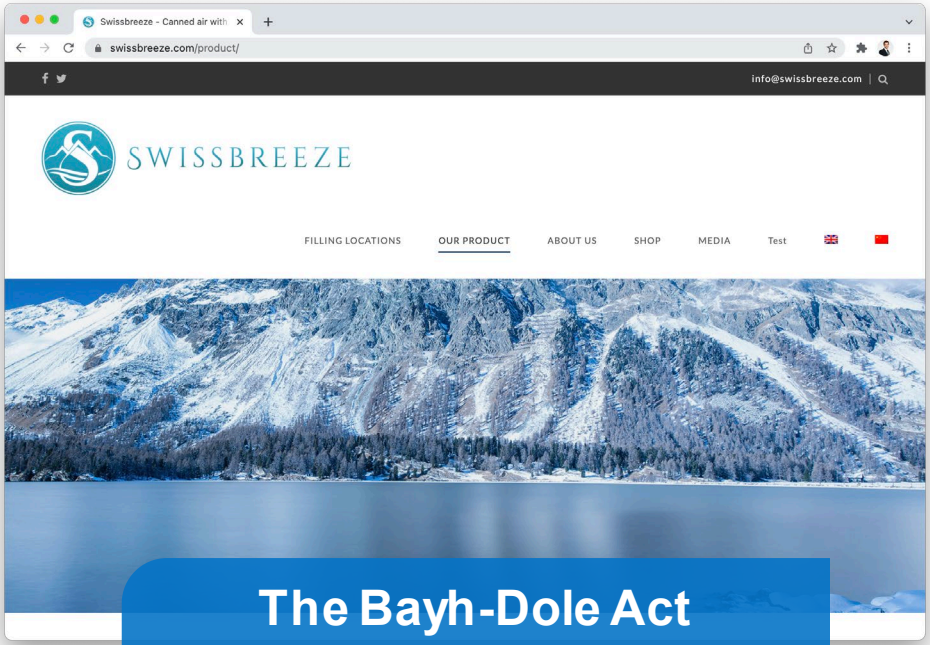
Introducing scarcity



The Bayh-Dole Act introduced scarcity in federal inventions by allowing exclusive licenses

"The best, most pristine and freshest Swiss canned air, gathered in the most beautiful and remote lake and mountain regions"

The arguments so far

1. Without patent protection, few technology implementers would want to invest in follow-on R&D and marketing activities to bring a third-party AI-generated invention to the market.

If firms cannot patent AI-generated inventions, they will simply keep them secret.
This will create scarcity.

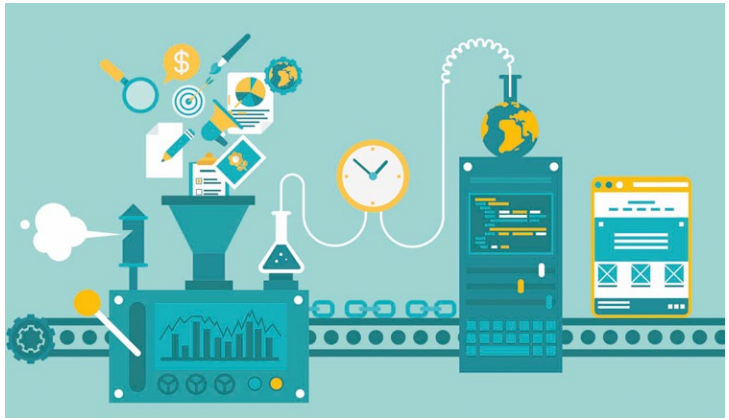
The problems with secrecy

- It is not always an effective protection mechansism (e.g., reverse-engineering)
- Hampers transactions in markets for technology (Gans et al. 2008, de Rassenfosse et al. 2016, Hegde and Luo 2018)
- It limits learning opportunities from patent literature aka ‘knowledge spillovers’ (Cox 2020, Furman et al. 2021)

Secrecy cannot be the only mode of protection. We need something more.

Relaxing the assumptions

Relaxing assumptions of the thought experiment



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Inventions are in the public domain

The invention machine may create inventions cheaply and fast. It does not need to be incentivized. But *creating the invention machine is presumably costly*.

It strengthens the case for patent protection

- Without protection, the output of the invention machine becomes more difficult to transfer, which reduces the incentives to invest in the creation of such machines.
- At the limit, if invention developers are unable to transfer their inventions to third parties, there is no financial incentive in producing these invention machines.

→ **Backward induction**: we need patent protection on AI-generated inventions to incentivize the creation of such machines.

The arguments so far

1. Without patent protection, few technology implementers would want to invest in R&D and marketing activities to bring an AI-generated invention to the market. (Secrecy alone is not an option.)
2. Without patent protection, few technology developers would have the necessary incentives to invest in the creation of such machines.

What if invention developers were also invention implementers ('integrated innovators')?

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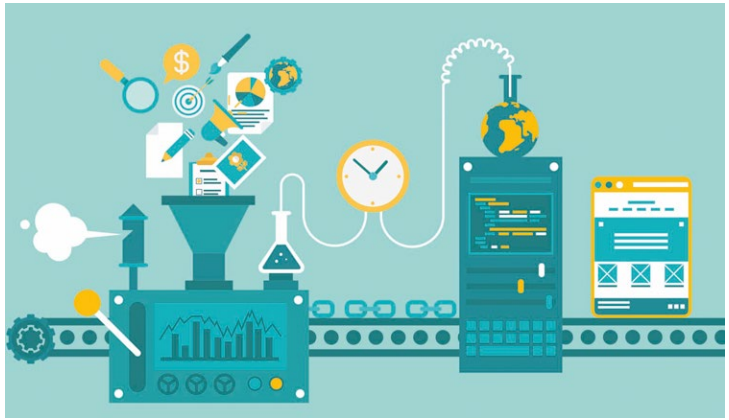
Relaxing assumptions of the thought experiment



Creates inventions at zero cost

Cannot commercialize these inventions itself

invention developers = invention implementers

Inventions are in the public domain

Universities and PROs do not commercialize inventions. But owners of invention machines (invention developers) can also implement them.

It weakens the case for patent protection

If all developers were also implementers, the need for patent protection would be diminished (but not null) since at least some owners would prefer secrecy over patenting.

Not the trend we are seeing

- Open innovation and spcialization into developers and implementers (M4T).
- Transfer rate of 12–16% for EP and US patents.
- AI may reinforce this trend.

The arguments so far

1. Without patent protection, few technology implementers would want to invest in R&D and marketing activities to bring an AI-generated invention to the market. (Secrecy alone is not an option.)
2. Without patent protection, few technology developers would have the necessary incentives to invest in the creation of such machines.
3. The case for patent protection is weaker for integrated developers. (i) But we cannot assume that secrecy alone offers sufficient protection. (ii) And not all innovators are 'integrated.'

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The rest of the paper describes implications of AI-generated inventions for the patent system, including

- Issues around standards for validity
- Ability of offices to keep up with examination burden
- Market power associated with large portfolios
- A differentiated type of IP right?
- FRAND (or other) obligations for AI-generated inventions
- …

Thank you for your attention!