



Could the next long term economic cycle be that of space? Schumpeter applied to space economics

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The next economic long-term cycle could be that of space. It implies three main predictions about space in 2050:

- 1. We will talk about space as we do today about artificial intelligence, digitalization and robotics. Space economics will be debated of, they will fascinate and frighten relative to the issues of employment and taxation. We will wonder which countries will dominate the industry.*
- 2. The space economy will be driven by demand rather than by regulatory logic.*
- 3. Property rights to space will be allocated.*

1 The next Schumpeterian cycle

The starting point of my analysis is the Kondratiev/Schumpeter theory of long-term economic cycles. The current cycle is the one of the convergence of NBIC technologies (nanotechnologies, biotechnologies, computer science and cognitive sciences). Its roots lie in digital since the late 1990s. Very approximately, it will culminate in about ten years, around 2025, and then it will decline. The new cycle will begin around 2040. Obviously, this periodization is not scientific but it helps to think about the future. By 2050, the next cycle will be largely at play.

I think that this next Schumpeterian cycle could be that of space economics thanks to the technological convergence of reusable launchers and new modes of propulsion of energy. We see already today the lineaments, especially in the fields of launchers and satellites. But it seems that

this is only a very timid start because the costs remain high and the technologies are unstable. Space technologies are quite like computers or artificial intelligence in the 1970s.

More precisely, they have five things in common:

1. They are revolutionary (or Schumpeterian or disruptive)
2. They are promising
3. They are becoming attractive for production by private sector
4. They are costly
5. Their ratio efficiency / cost is improving.

A real Schumpeterian wave of innovation arises when there is an explosion of cheap (or not too expensive) applications. This is exactly what we see now with robots and artificial intelligence. It will come with the industrialization of space innovation and the decrease in costs.

2 In 2050: a market pull sector

If these technological and costs predictions are right, it means that in 2050, the space economy will have become market pull. Space exploration will no longer be a horizon of its own right, but rather a mean to solve human problems. The economy of space will be dominated by demand and marketing logics. Technological aspects will always exist but they will be secondary.

Space technology will be "needs oriented". What will these needs be? It is difficult to predict because precisely, it is the demand that will say it. By the late 1990s, the Internet was a technology that would change the economy. But it was impossible to predict the explosion of social networks with Facebook, e-commerce with Amazon, transportation with Uber or streaming video with Netflix. In any case, we must not project the present applications into the future. For sure, the current applications of space technologies are very promising for transport, city management, security, agriculture... But we must understand that space innovation opens applications in an unpredictable way. So, why not imagine, in 2050, hospitals in space or universities?

3 What needs to be done to make space the main topic of 2050?

Space technologies will not automatically trigger the next long term economic cycle. For this to happen, I consider that at least four conditions must be reunited.

1. Making international cooperation more attractive. The rise of populism (far right or

far left) and its recent political success (in a very spectacular way in the USA and the UK) can force multilateralism to retreat. On the contrary, space innovation is based on international cooperation. That is why, in the interest of the space sector, multilateralism must be strengthened.

2. Strengthening cooperation between public and private sector. I am firmly in favor of free markets and private enterprise but countries that do not want to be followers need a public impulsion both in supply and demand. The British economist Mariana Mazzucato talks about States shaping and creating markets (instead of only fixing them).
3. Strengthening cooperation with the non-space world (for example trade unions and employers' federations to adapt life-long training schemes).
4. Allocating property rights in space. In his Treatise on Civil Government (1690), John Locke explains why to exploit a land, one has to own it. Following this principle, the American government gave the land to those who cultivated it in the nineteenth century. In the case of space, the right legal model could be something close to the Lincoln Homestead Act (signed in 1862). It may be especially reliable for Asteroids, Moon, Mars... This is without doubt a great topic for economists, philosophers and lawyers of the 21th century.

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