Flash Economics

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Even if it does not lead to an increase in total factor productivity and GDP, artificial intelligence will have favourable effects by making it possible to substitute capital for labour

Demographic ageing will create a scarcity of labour in OECD countries and in emerging countries other than Africa and India, especially if immigration restrictions are introduced.

Even if artificial intelligence (AI) does not increase overall factor productivity, because it requires a great deal of capital and therefore reduces capital productivity, it does increase labour productivity.

The introduction of AI will therefore make it possible to avoid losing production potential despite the scarcity of labour, by organising the substitution of capital for labour.

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Demographic ageing affects all countries except Africa

Table 1 shows the fertility rate in 2022 in the major OECD and emerging countries.

Table1 : Fertility rate (2022)

Country	Fertility rate
Korea	0.78
Spain	1.16
China	1.18
Italy	1.24
Japan	1.26
Thailand	1.32
Canada	1.33
Russian Federation	1.42
Germany	1.46
United Kingdom	1.57
Brazil	1.63
United States	1.67
Malaysia	1.79
France	1.79
Vietnam	1.94
India	2.01
Indonesia	2.15
Morocco	2.30
South Africa	2.34
Egypt	2.88
Subsahara Africa	4.53
Nigeria	5.14

Sources: World Bank, LSEG Datastream

One can see that the fertility rate is well below 2 in OECD countries and in many emerging countries. It is equal to 2 in India, and well above 2 in African countries (for sub-Saharan Africa taken as a whole, it is 4.27).

Outside Africa and India, the medium-term outlook is one of labour scarcity, i.e., all other things being equal, a slowdown in growth due to the decline in the working-age population. This will be exacerbated in OECD countries if these countries introduce immigration restrictions.

What impact will artificial intelligence have on labour productivity, capital productivity and overall factor productivity?

AI requires very substantial investment. Chart 1A shows the sums invested in AI worldwide, while Chart 1B shows the sums invested in the United States, China and Europe (the European Union and the United Kingdom) since 2013.

Chart 1A
World: Private investment in AI (USD bn)

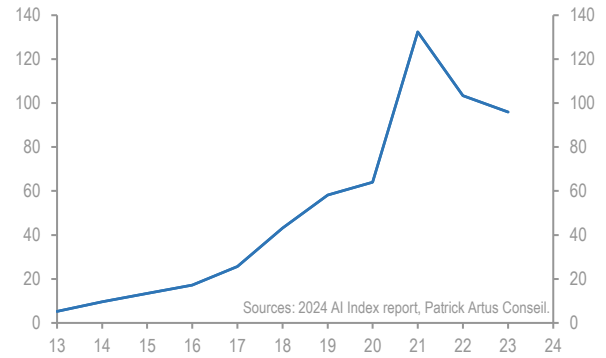
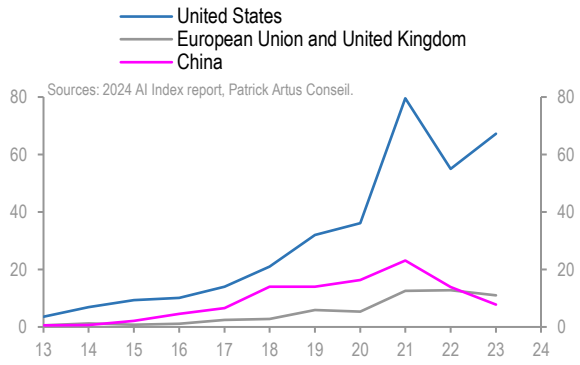


Chart 1B
Private investment in AI by geographic area (USD bn)



From 2013 to 2023, investment in AI accounted for:

- 335 billion dollars in the United States;
- 103 billion in China;
- 22 billion dollars in the United Kingdom;
- 8 billion in France.

AI is therefore a highly capital-intensive activity. It would need to generate $600 billion in annual revenue to be profitable, whereas in 2023 it generated just $241 billion in revenue.

Furthermore, productivity will reduce employment (increase labour productivity) in certain sectors: finance and insurance, advertising, professional services, translation, coding, education and pharmaceuticals.

One can see that the introduction of artificial intelligence will result in:

- **A substitution of capital for labour**;
- **A fall in capital productivity**;
- **An increase in labour productivity**.

The introduction of AI will therefore have an ambiguous effect on total factor productivity (rise in labour productivity but fall in capital productivity).
Charts 2/3/4 show **labour productivity, capital productivity** and **total factor productivity** since 2002 in the United States and the euro zone.

Chart 2
Labour productivity (2002.Q1 = 100)

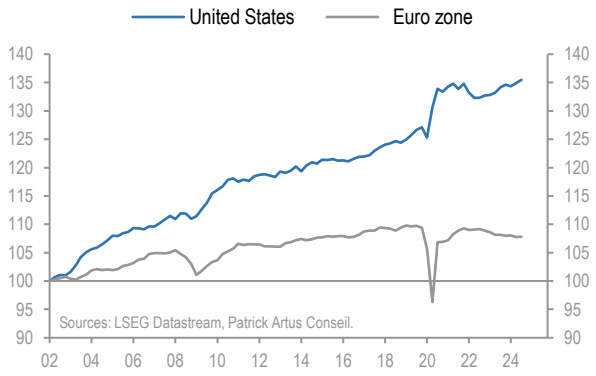


Chart 3
Capital productivity (2002.Q1 = 100)

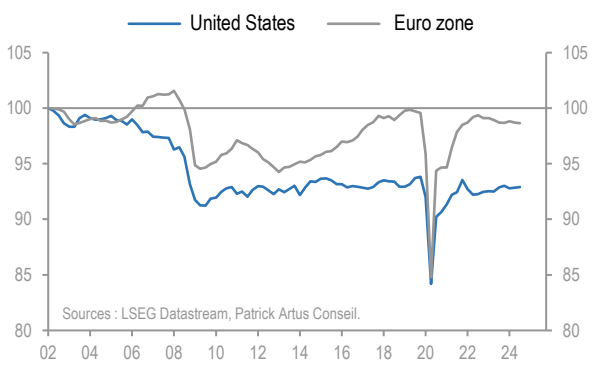
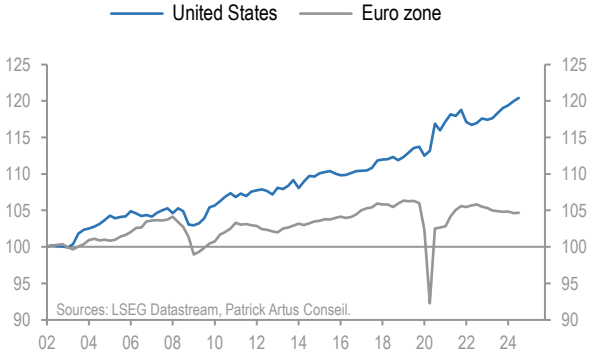


Chart 4
Total Factor Productivity (2002.Q1 = 100)



This shows that:

- Labour productivity is rising steadily in the United States and stagnating in the euro zone;
- Capital productivity fell sharply between 2006 and 2009 in the United States, while remaining stable over the long term in the euro zone;
- Overall, total factor productivity has risen by 20% since 2002 in the United States, but by only 4% in the euro zone.

We can therefore expect the development of AI to result in

- Faster growth in labour productivity;
- A fall in capital productivity;
- An ambiguous and probably weak effect on overall factor productivity.

Summary: a favourable trend if there is a scarcity of work

In countries where demographic ageing is creating a scarcity of labour (OECD countries, South American countries, South-East Asian countries, Japan, China), the development of AI will have favourable effects, since it will make it possible to substitute capital for labour:

- It will reduce the need for labour;
- And it will make it possible to maintain the level of production (if overall factor productivity is not significantly modified, with a rise in labour productivity and a fall in capital productivity) despite the fall in the working-age population.

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