Opening session: **The world of the future is unpredictable: What major differences will we see compared to the past?**

Patrick Artus

In many fields, it seems that the world today gives rise to new situations for which we have no past experience resulting in a high level of uncertainty. This uncertainty makes it difficult to design policies to respond to these developments. We can consider:

1) technological developments (robots, artificial intelligence). Are they destroying jobs? Are they instead contributing to changing job structures, with the bipolarisation of labour markets and the disappearance of middle-class intermediate occupations? Will they create new jobs, like past industrial revolutions? Will they eventually lead to additional productivity and an exit from “secular stagnation"? The answers to these questions all depend on the choices made concerning social protection, changing inequalities and redistributive policies — all choices linked to long-term economic growth (generosity of retirement systems ...).

2) the size of the financial sector: debt ratio, the amount of money offered by the central banks, the size of the financial markets. Does the considerable growth in the size of the financial sector, promoted by expansionary monetary policies, condemn the world to economic cycles led by financial crises (correction of excessive financial leverage, asset price bubbles)? How do we correct today’s excessively large financial sector?

3) relations between China, the United States and Europe. China and the United States seem to want to use the very large size of their domestic markets as a reason for not having to specialise; to produce all their goods and services on their own territories in order to control all technologies, even if this means a certain level of protectionism. Europe has another model: it is open and accepts being part of the international division of labour; moreover, it has not been able to create a large domestic market to generate global companies in the industries of the future. Finally, with the rise of regionalisms and euro-sceptical governments, it today seems threatened with fragmentation. How will a fragmented Europe stand up to the American or Chinese internet giants, which collect personal data, practice tax optimisation and benefit from increasing returns to scale? How can we eventually succeed in the construction of a large market?

4) the climate issue is obviously a new one. Today, the world is not at all on the correct trajectory to meet climate objectives for Co_2 emissions. Should we then resign ourselves to the fact that the temperature of the planet is increasing much more than hoped, in which case should we protect ourselves from the resulting consequences? Should we continue to try to put in place the incentive mechanisms needed to meet these objectives (a single Co_2 price)?

5) the issue of migration is becoming more important. Beyond the effects produced by conflict, a central issue is Africa's economic future. With the demographic dividend,

will Africa benefit from strong growth to help young Africans find employment? Or on the contrary, with governance issues and insufficient public investment, will there be unemployment and mass emigration, in particular to Europe?

Five principal changes, five leading factors of uncertainty

We believe that the world, OECD countries and Europe are going to be faced with five principal changes leading to major uncertainties, and therefore to great difficulty in implementing the necessary policies. These are:

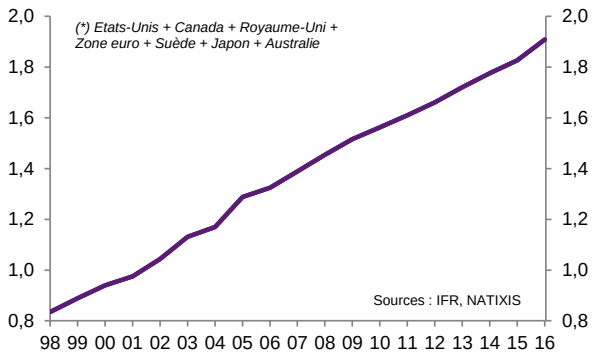
- technological advances;
- the size of the financial sector;
- the position and strategy of Europe in relation to China and the United States;
- the climate;
- migration and Africa;

Let's take a look at these in more detail.

Technological developments

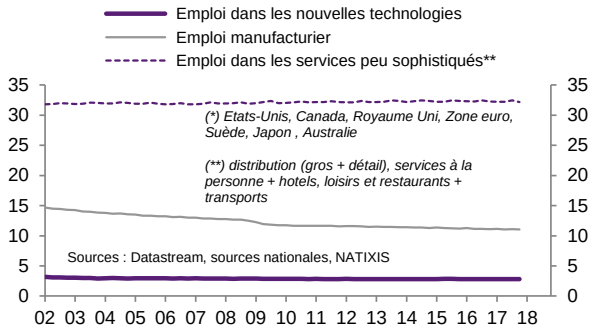
Uncertainties about the effects of robotisation (graph 1a) and artificial intelligence are considerable

Graphique 1a
OCDE* : stock de robots industriels
(en % de l'emploi manufacturier)



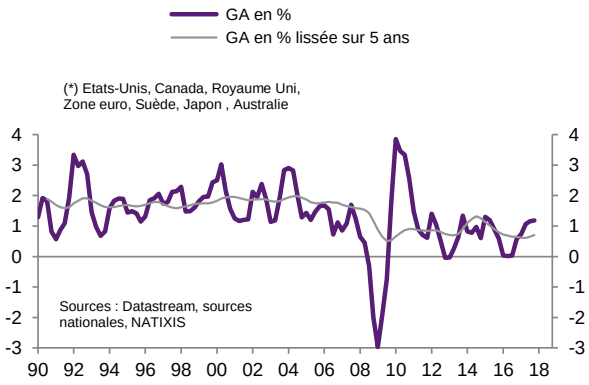
Some analyses predict they will destroy a considerable proportion of jobs (30%, 50%?); other analyses forecast a profound change in the nature of jobs, with intermediate occupations being destroyed and replaced by artificial intelligence and new jobs created around robots. **The risk is that robotisation (artificial intelligence) is contributing to labour market polarisation**: intermediate occupations (especially in industry) are replaced by a small number of jobs in new technologies and many low level human services jobs, as can be seen today **(graph 1b)**

Graphique 1b
OCDE* : emploi dans les nouvelles technologies, dans le secteur manufacturier et dans les services peu sophistiqués (en % de l'emploi total)

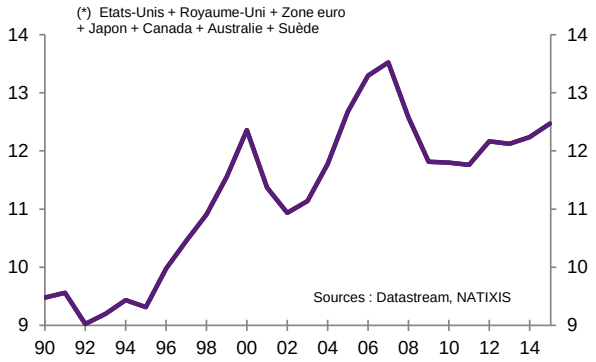


Unlike industrial revolutions of the past, digital technology would create few sophisticated jobs with a high level of productivity and also lower the average sophistication and qualification level of jobs overall. **This would induce the slowing down of overall productivity gains (graph 1c) and the continuation of "secular stagnation".** In turn this will result in income inequalities **(graph 1d)** and the need to maintain redistributive policies and ensure social welfare provision for lower level job holders. But it is not clear at all whether it is this evolution which will continue to dominate.

Graphique 1c
OCDE* : productivité par tête



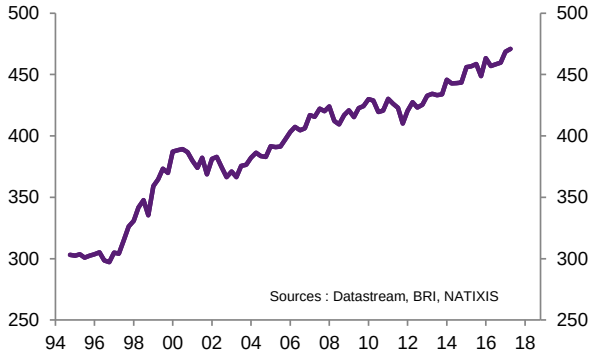
Graphique 1d
OCDE* : proportion du revenu national reçu par les 1% ayant le revenu le plus élevé



The size of the financial sector

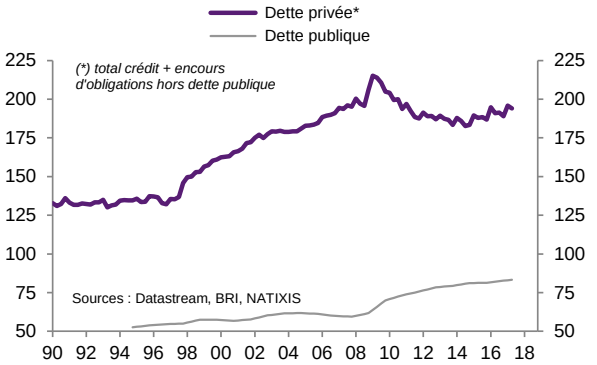
We measure the size of the financial sector by the total currency weight (M2) + credit + outstanding bonds + market capitalisation as a percentage of GDP **(graph 2a).**

Graphique 2a
Monde : masse monétaire M2 + encours d'obligations + encours de crédit + capitalisation boursière (en % du PIB valeur)

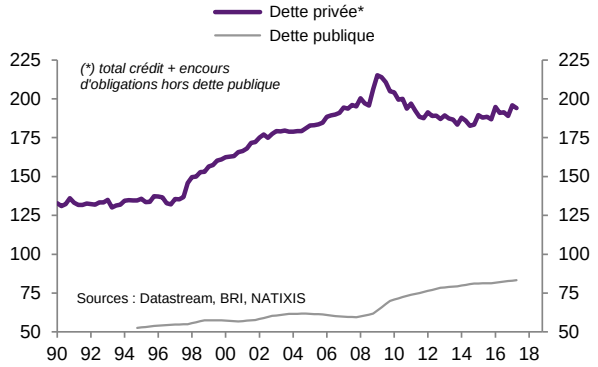


Supported by expansionary monetary policies, with considerable growth in the Central Bank's money supply **(graph 2c),** and an abnormally low level of interest rates **(graphs 2d/e), the size of the finance sector has grown considerably since the 1990s**, as has the level of debt ratios **(graph 2b).**

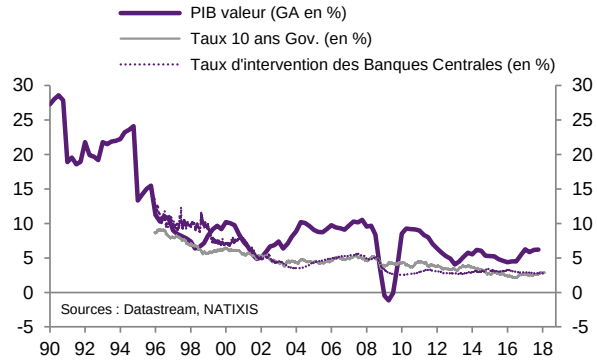
Graphique 2b
Monde : dette privée et dette publique (en % du PIB valeur)



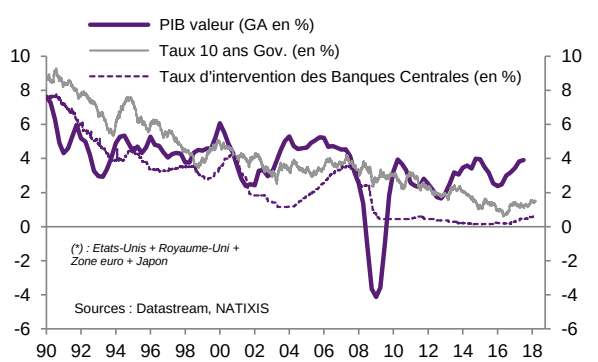
Graphique 2b
Monde : dette privée et dette publique (en % du PIB valeur)



Graphique 2d
Monde : PIB valeur, taux d'intérêt à 10 ans sur les emprunts d'Etat et taux d'intervention des Banques Centrales

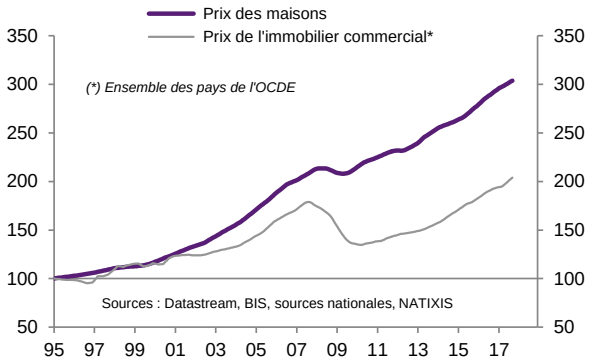


Graphique 2e
OCDE* : PIB valeur, taux d'intérêt à 10 ans sur les emprunts d'Etat et taux d'intervention des Banques Centrales



Such a high level of finance is conducive to the emergence of **financial crises**, with the correction of excessive financial leverage or asset price bubbles **(graph 2f).** Should we therefore accept that economic cycles are linked to financial crises? Should we reduce the size of the financial sector despite the economic contraction which may result? Up until now, only banks have been more strictly regulated.

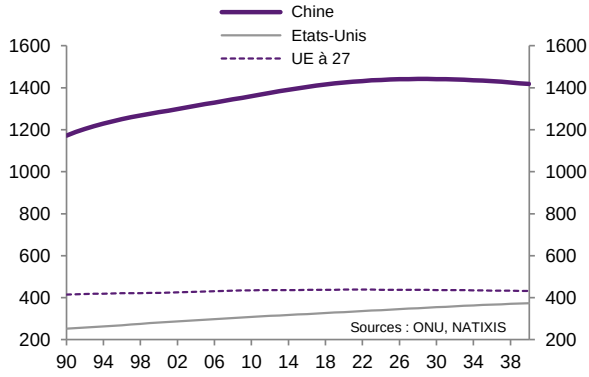
Graphique 2f
Monde : prix des maisons et de l'immobilier commercial (100 en 1995:1)



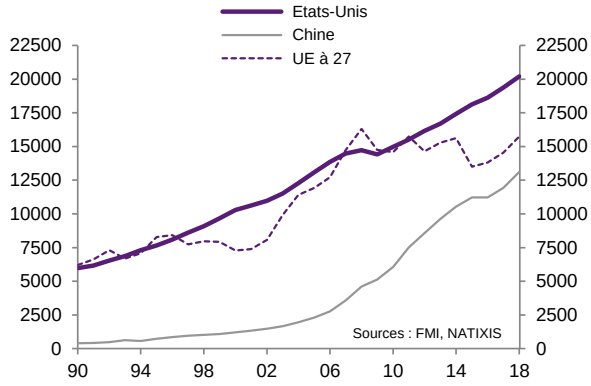
Europe's place between China and the United States

Europe (27), **China and the United States are the three major economic powers (graphs 3a/b/c).**

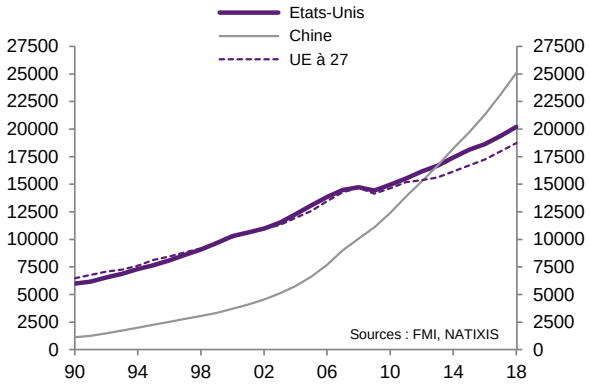
Graphique 3a
Population (en millions de personnes)



Graphique 3b
PIB valeur (Mds de $)



Graphique 3c
PIB valeur (Mds de $ PPA)



But today we are seeing different strategies appear. **The United States and China regard their domestic markets as large enough to not have to choose a productive specialisation; they believe that they can manufacture all their own goods and services and that they must have a dominant position in new technologies,** even if all this means a certain level of protectionism**. Europe, however, has an open strategy, it wants to be integrated into the international division of labour.**

Is Europe's strategy not dangerous? In a world of **increasing returns** and decreasing marginal costs, large companies based in a large **domestic market are becoming more efficient and dominating the global market**. This is the case for Internet companies **(Table 1a)** and renewable energy companies **(Tables 1b/c/d)**: there are **very few European companies featuring in these industries of the future**, which are largely dominated by the United States and Asia. Europe has not been able to create a large internal market.

Tableau 1a : Grandes entreprises de l'Internet (en Mds de $)

		2002	2005	2007	2008	2009	2010	2013	2014	2015	2016	2017
Google	Chiffre d'affaires	0,4	6,1	16,6	21,8	23,7	29,3	55,5	66,0	75,0	90,3	104,6
	Profits	0,1	1,5	4,2	4,2	6,5	8,4	13,4	13,6	16,1	19,7	23,9
	Capitalisation	nc	121,6	216,4	96,9	197,0	190,8	376,4	359,4	527,7	540,2	787,0
Amazon	Chiffre d'affaires	3,9	8,5	14,8	19,2	24,5	34,2	74,5	89,0	107,0	136,0	161,2
	Profits	-0,1	0,4	0,5	0,6	0,9	1,2	0,3	-0,1	0,6	2,4	1,9
	Capitalisation	7,3	19,6	39,9	21,9	59,7	81,2	183,0	144,3	318,3	357,7	623,2
Facebook	Chiffre d'affaires	nc	nc	0,2	0,3	0,8	2,0	7,9	12,5	17,9	27,6	36,5
	Profits	nc	nc	-0,1	-0,1	0,1	0,4	1,5	2,9	3,7	10,2	15,2
	Capitalisation	nc	nc	nc	nc	nc	nc	139,2	218,2	297,8	332,7	524,7
Apple	Chiffre d'affaires	5,7	13,9	24,6	37,5	42,9	65,2	170,9	182,8	233,7	215,1	228,6
	Profits	0,1	1,3	3,5	6,1	8,2	14,0	37,0	39,6	53,5	45,4	47,9
	Capitalisation	5,3	44,4	133,9	113,9	164,1	267,8	434,1	591,0	639,9	601,4	790,1
Microsoft	Chiffre d'affaires	28,4	39,8	51,1	60,4	58,4	62,5	77,8	86,5	93,6	91,2	96,6
	Profits	7,8	12,3	14,1	17,7	15,6	18,6	22,3	22,1	20,0	21,4	25,7
	Capitalisation	293,1	266,0	276,4	251,7	211,7	199,5	287,7	343,6	354,4	399,5	531,3
Baidu	Chiffre d'affaires	nc	0,0	0,2	0,5	0,7	1,2	5,2	8,0	10,6	10,6	11,7
	Profits	nc	0,0	0,1	0,2	0,2	0,5	1,7	2,1	2,8	1,8	2,4
	Capitalisation	nc	2,1	13,3	4,5	14,3	33,6	62,2	80,0	65,4	57,1	88,2
Tencent	Chiffre d'affaires	0,0	0,2	0,5	1,0	1,8	2,9	9,8	12,8	16,4	22,9	31,6
	Profits	0,0	0,1	0,2	0,4	0,8	1,2	2,5	3,5	4,5	5,8	7,6
	Capitalisation	nc	1,9	13,5	11,6	39,3	39,6	118,8	136,0	185,0	231,9	549,7
Alibaba	Chiffre d'affaires	nc	nc	nc	nc	nc	1,0	5,5	8,6	12,3	15,9	23,5
	Profits	nc	nc	nc	nc	nc	0,0	1,4	3,8	3,1	3,7	6,0
	Capitalisation	nc	nc	nc	nc	nc	nc	nc	nc	207,7	195,5	272,7

Sources : Bloomberg, Natixis

Tableau 1b : Producteurs de cellules solaires (part de marché, en %)

Compagnie	Pays d'origine	Part de marché
Trina Solar	Chine	10
JA Solar	Chine	8
Jinko Solar	Chine	7
Hanwha Q-Cells	Corée	6
Canadian Solar	Chine	5
Yingli Solar	Chine	5
First Solar	Etats-Unis	4
Shungfeng-Suntech	Chine	3
Motech Solar	Taïwan	2
NeoSolar	Brésil	2
Autres…	Reste du Monde	48

Sources : Statista 2016, Natixis

Tableau 1c : Producteurs d'équipement éolien (part de marché, en %)

Compagnie	Pays d'origine	Part de marché
Goldwind	Chine	12,5
Vestas	Danemark	11,8

GE energy	Etats-Unis	9,5
Siemens	Allemagne	8
Camesa	Espagne	5,4
Enercon	Allemagne	5
United Power	Chine	4,9
Mingyang	Chine	4,1
Envision	Chine	4
CSIC Haizhuang	Chine	3,4
Autres…	reste du Monde	31,4

Sources : Statista 2016, Natixis

Tableau 1d : Les plus grands producteurs de batteries électriques (2015)

Compagnie	Pays	Production (MWh)
PANASONIC	Japon	4552
BYD	Chine	1652
LG Chem	Corée	1432
AESC	Japon	1272
Mitsubishi / GS Yuasa	Japon	600
Samsung	Corée	504
Epower	Chine	489
Beijing Pride Power	Chine	397
Air Litium (Lyoyang)	Chine	283
Wanxiang	Chine	268

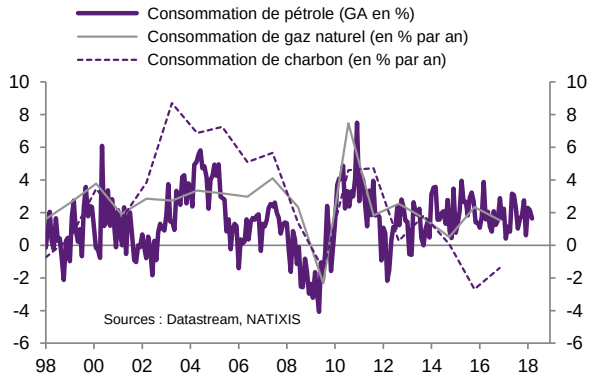
Sources : FT, EV, CleanTechnica, Natixis

In which case, how will Europe react to the domination of these multinationals specialising in new technologies, which also control data and localise their earnings where they wish? We are also seeing **difficulties related to the process of European integration**, with a rise in nationalisms, regionalisms, euro-sceptic governments (Brexit, Catalonia, Poland, Hungary, Austria ...)

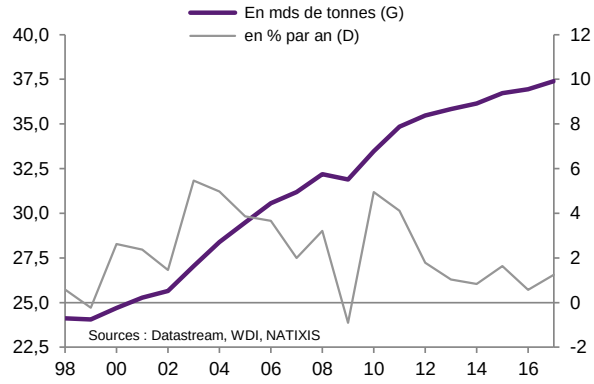
The climate

The world is not at all on the correct trajectory when it comes to respecting climate objectives. The increase in the consumption of fossil fuels **(graph 4a)** and Co_2 emissions **(graph 4b)** now place the planet on a trajectory of growth of between 3.5 ° C to 4 ° C by the end of the century, and not 2 ° C as planned **(graph 4c).**

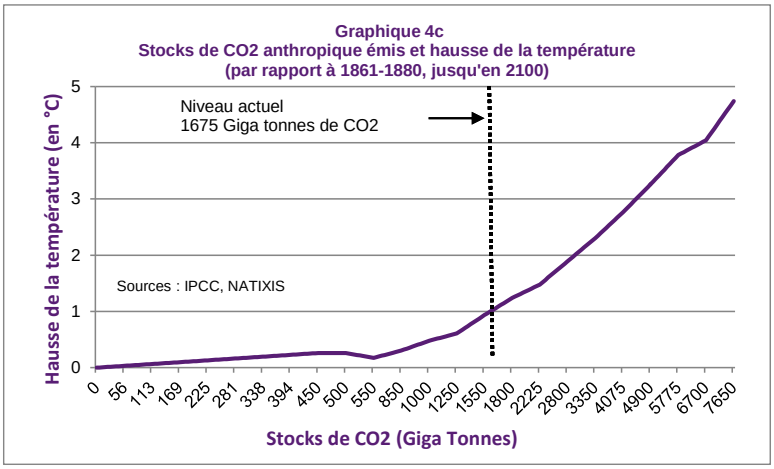
Graphique 4a
Monde : consommation de pétrole, de gaz naturel et de charbon



Graphique 4b
Monde : émissions de CO2



Graphique 4c
Stocks de CO2 anthropique émis et hausse de la température (par rapport à 1861-1880, jusqu'en 2100)

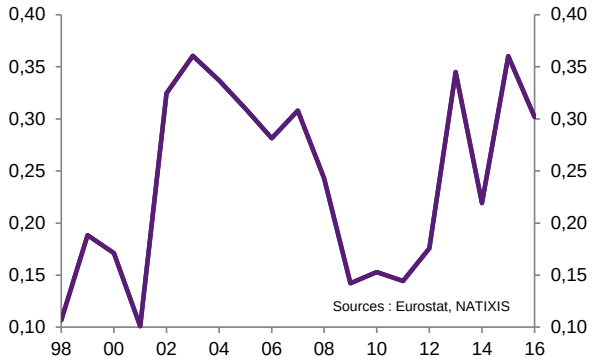


In which case, should we just think about incentive policies to reduce the use of fossil fuels (a single Co_2 price, transport regulations) or should we also draw up defensive policies in case we cannot prevent a sharp increase in temperature (organised population displacements ...)?

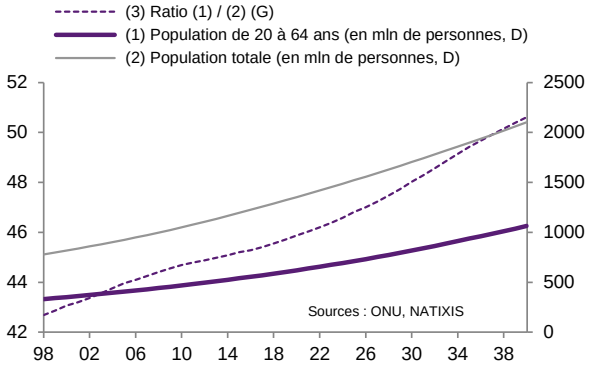
Migration and Africa;

Today, Europe in particular is faced with the issue of migration **(graph 5a).** Questions on **the Development of Africa** are therefore central. Africa benefits from a **"demographic dividend"**, i.e. a working age population that is growing faster than the total population **(graph 5b).** Normally, with the resulting drop in the tax burden on assets, a demographic dividend is conducive to growth **(graph 5c).**

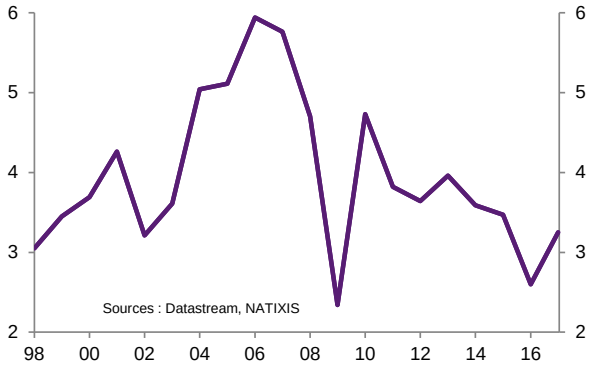
Graphique 5a
UE à 28 : immigration nette (en % de la population)



Graphique 5b
Afrique : population de 20 à 64 ans et population totale

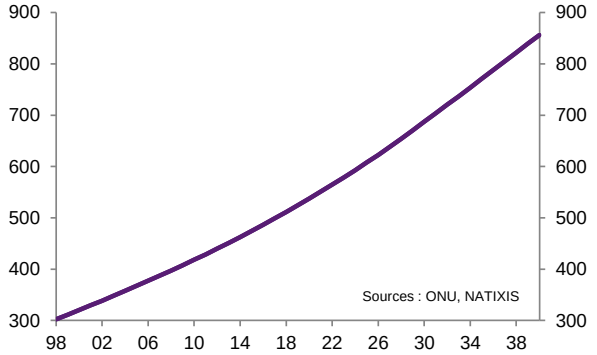


Graphique 5c
Afrique : PIB volume (en % par an)

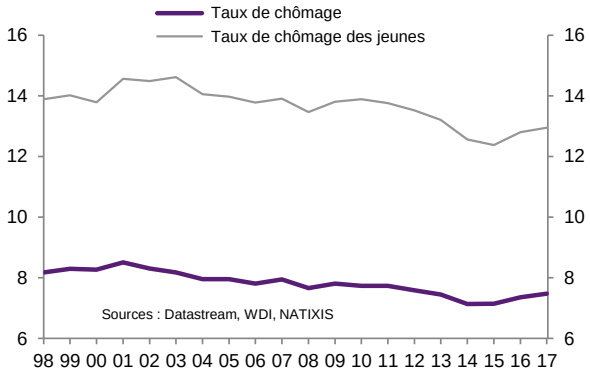


Strong growth in Africa would make it possible to give young Africans employment **(graphs 5d/e)** and help avoid mass emigration to Europe.

Graphique 5d
Afrique : population de 15 à 39 ans (en mln de personnes)

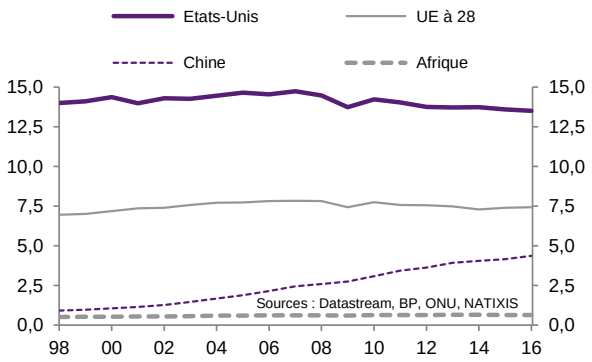


Graphique 5e
Afrique Subsaharienne : taux de chômage (en %)



But poor political governance leads to a lack of infrastructure (for example, **graph 5f** shows the weakness of electricity production in Africa), which hinders growth and increases the risk of mass unemployment.

Graphique 5f
Production d'électricité
(en Megawatt heure / habitant)



Summary: what is most striking is our inability to predict the future

We must be honest enough to recognise that there are a lot of uncertainties about:

- the effect on employment and the growth of the digital economy;
- how the size of the financial sector and debts affect economic stability;
- the place of Europe and its model in relation to the United States and China;
- the ability to meet climate commitments;
- the economic future of Africa and migration;

However, many policies (redistributive, training, monetary and macroprudential, industrial and migratory) crucially depend upon these mechanisms.

It seems that these changes are indeed new (technological, financial, related to China's importance, climate, migratory) for which the past may not offer us much enlightenment.