A post growth society for the 21st century

Does prosperity have to wait for the return of economic growth?

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Growth in Transitions
Bruxels

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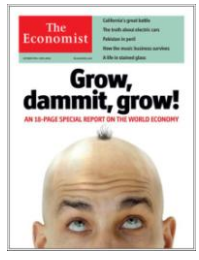
Growth as an obsession

Academia (e.g. LSE « ***Investing for Prosperity: A Manifesto for Growth*** »)

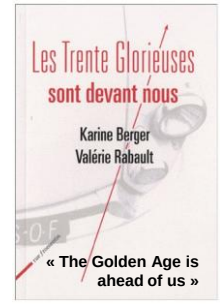


Media (e.g. The Economist « Grow Dammit, Grow »)

Decision makers
(e.g. Lisbon Strategy)

The growth narrative is not audible anymore

- **Expectations for high growth** in the future (from 2% to the return of the golden age)
- **Growth as a sine qua non for prosperity** (employment, inequalities reduction, social protection, happiness).
- **Discourses on economic growth are barely audible for post « Golden Age » generations** who did not experience above 2% growth**.**
- **BUT alternative discourse not satisfying either:**
  - How to be so sure we are condemned to degrowht for environmental reasons given all uncertainties?
  - Research on well-being indicators says too little on role of growth for employments, equality, etc.



« The Golden Age is ahead of us »

This presentation: focus on two key questions

1. Is there a future for growth in developed economies?

2. Does prosperity have to wait for the return of economic growth?

Three key answers

- **The future of growth is uncertain. Low growth rates can occur in the future, whether policy makers want it or not.**
- **Growth and prosperity linkages are much weaker than usually thought by the general public, policymakers and the media.**
- **But managing without growth is not an easy task and requires more political action.**

Is there a future for economic growth in developed economies?

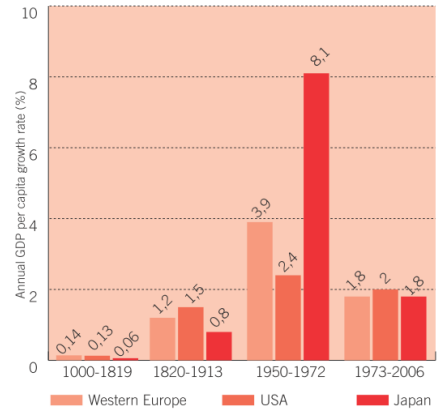
Economic growth : an exception in world history

Economic growth is an exception in world history. Most of human era marked by zero economic growth.

The « Golden Age » of growth (1950-1972) is itself an exception since the Industrial revolution.

Average annual growth rates above 2% have never been seen before, and never after in industrialized countries.

B - Growth rate of per capita output from the year 1000 to the present day



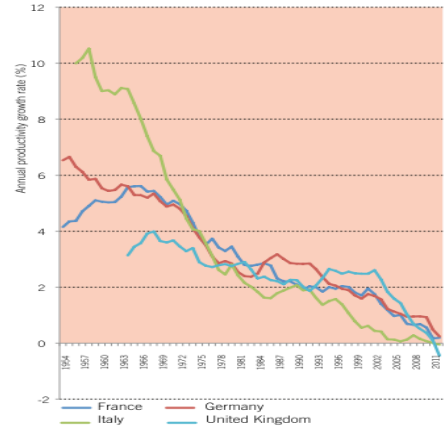
What happened since the « Golden Age »?

GDP growth rates are in decline since the 1960s in most industrialized countries.

The end of economic catch up explain a large share of the trend.

But it is not the only « suspect ».

Figure 1.3. Trends in hourly productivity in the European Union



Note: 10-year moving average. Source: TED (2013). Formatted by the authors.

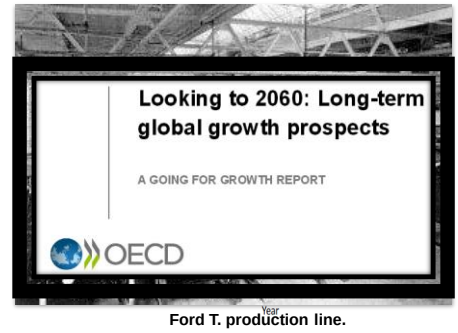
What about the future of growth?

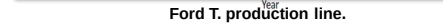
Economic growth is a complex phenomenon, driven by social, technological or energy, dynamics.

Looking at « suspects » explaining decline in growth in the past gives insights on future challenges.

The study focuses on three challenges:

- **tertiarization**
- **innovation**
- **environmental issues**





Ford T. production line.

Gordon, 2012

Challenge 1: « tertiarization » of the economy

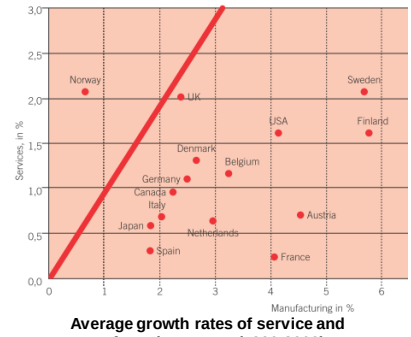
An increasing share of national income devoted to services in developed economies over the years.

Productivity gains in the service sector are generally lower than in the industry. (NB: exceptions and measurement problems.)

The result is less overall GDP growth.

% of industry in national GDP

	1990	2010
France	20	13
Germany	31	24
USA	23	17



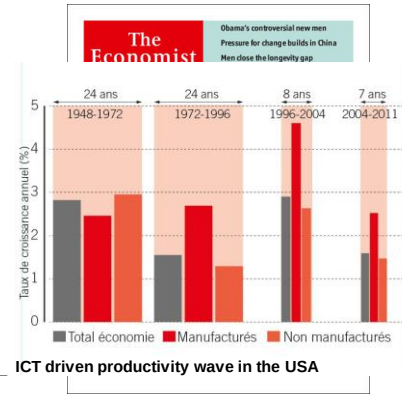
Average growth rates of service and manufacturing sector (1990-2000)

Challenge 2: the nature of technological change

First and second industrial revolutions were associated with high productivity gains.

According to R. Gordon, recent innovation are have less « productivity potential ».

The Solow Paradox: ICT growth cannot be seen in productivity statistics.



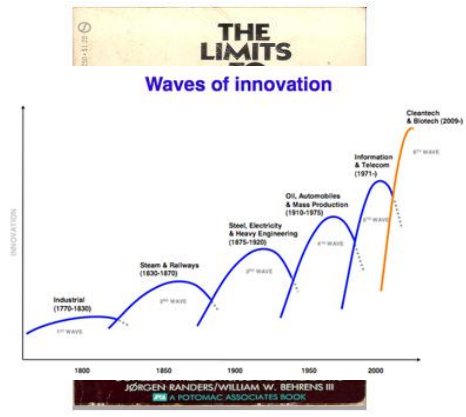
ICT driven productivity wave in the USA

Challenge 3: the environmental issue

Since the 1970s, environment seen by many as a constraint on the economy.

Jackson (2009), Victor (2008) developped an updated version of the discourse.

On the contrary, for authors like N. Stern, a energy industrial revolution is ahead of us and will be a driver of growth.



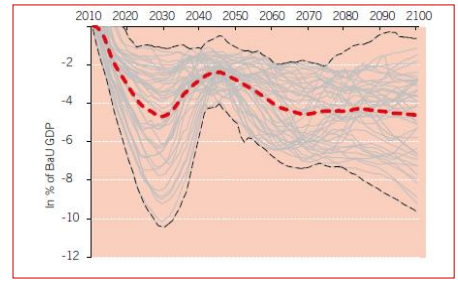
The environmental issue: insights from modeling work

We run **Imaclim** energy-economy model, also used by the **IPCC**.

The model allows us to test 432 world scenarios which vary according to different assumptions: resources availability, lifestyle changes, types of investments, speed of technological change

Results by country, over the 2013 – 2100 timeline, in terms of GDP impact of climate policies.

Main insight: the climate constraint reinforces the idea of uncertainty on future GDP growth.



Under pessimistic but plausible assumptions, climate policies reduce GDP by 0.5 p.p.

The future of growth is uncertain

- **Long term growth is poorly understood by macroeconomists.**
- **Three suspects highlighted highlight controversies at stake within economic and social science literature.**
- **Growth rates much lower than those of the past 150 years are not impossible in the future. They are in fact plausible.**

What does a low growth scenario mean for society ? Does low or zero GDP growth rates herald the end of « prosperity »?

Prosperity without growth ?

Prosperity without growth?

A better understanding of the links between GDP growth and various dimensions of prosperity is required.

Case study on four dimensions of prosperity:

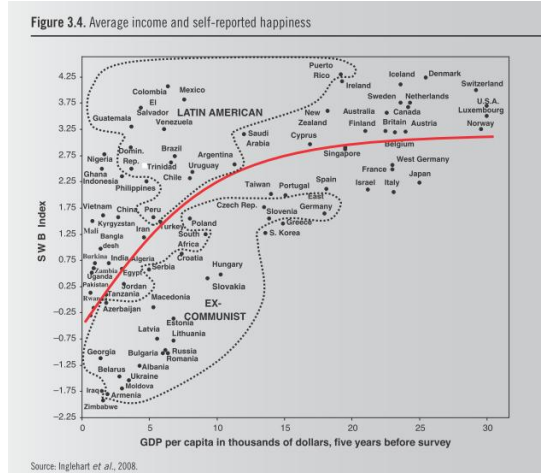
- **Subjective well-being**
- **Employment**
- **Social protection**
- **Inequalities**

Growth and self reported well-being

Growth is relatively well correlated with the rise in self-reported satisfaction in the short run, but unemployment seems key to explain this link.

In the long run, controversial nature of the relationship. Beyond a certain level of income, weak or absence of relationship.

Studies stress the importance of income equality.



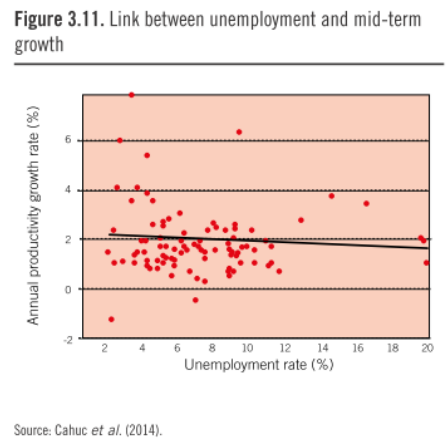
Growth and unemployment

In the short run, growth is highly correlated with unemployment variations.

But the relationship doesn't say anything on *causality*: « chicken and egg » dilemma.

In the mid to long term, absence of relationship between growth and unemployment rate (figure).

Working time reduction can also break the link between growth and employment in the short and long-run.



Growth, pensions & health systems

Low growth challenges the financing of pensions systems (papyboom) and potentially of health care systems.

Need for reforms is reinforced, with traditional options on the table: increase taxes, reduce services or increase "efficiency" (e.g. more intelligent drug reimbursements).

Importance of income equality in maintaining good level of health.

Evolution of pensions 1960-200 (France)

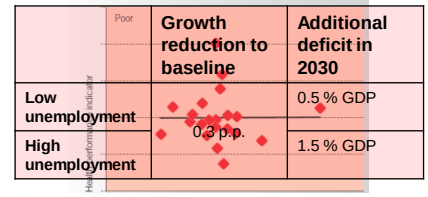


Figure 3.14. Changes in total health expenditure as a share of GDP (1960–2006)

Pays	1960	2006	Variation
France	3,8	11,1	+7,3
Germany*	6	10,6	+4,6
United Kingdom	3,9	8,4	+4,5
Switzerland	4,9	11,3	+6,4
UNITED STATES	5,1	15,3	+10,2
Japan**	3	8,2	+5,2

Source: Dormont, 2009. Country – 1960 – 2006 – Change. France, Germany*, UK, Switzerland, USA, Japan** *Germany: 1970-2006. **Japan: 1960-2005

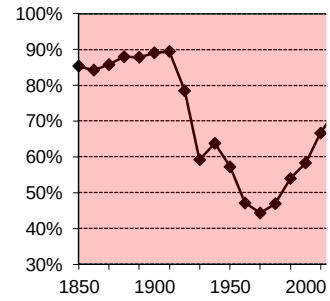
Level of income inequality

Growth and economic inequalities

Economic inequalities tend to increase during times of crisis, largely due to employment variations.

In the long run, there is strong tendency for inequalities between "rentiers" and workers to increase when growth declines, as the return on capital less depends on growth

Share of inherited capital in total wealth in France



Historically, only wars and redistribution policies have counteracted this tendency

Low growth makes redistribution goals more difficult to achieve, while they appear essential to subjective well-being and for countries' health performance.

Conclusion: prosperity without growth, a political ambition.

- **European societies need not wait for high GDP growth to ensure prosperity.** Links between well-being, unemployment and growth are weaker than usually thought. Employment or redistribution policies can take over from the growth objective.
- **But more trade-offs are required in a low growth context and hence more policy action.** In particular, low growth complicates inequalities reduction and financing of welfare state. Policy makers must redouble their efforts in these domains… and think outside the box!
- **Unfortunately, a weak-growth context puts a powerful brake on politics**. Since the pie is not growing as fast as it used to, it is more difficult to modify the distribution of wealth.
- **A weaker growth regime thus imposes more arbitration and renders them even more politically sensitive.**

Thank you for your attention

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Additional slides on the modeling exercise

Focus on economic growth and energy linkages A modelling exercise

From the Kaya identity to numerical models

- A rule of thumb to shed light on the magnitude of the environmental challenge
  - Ex: Carbon emissions

$$Emissions = GDP \times \frac{Energy}{PIB} \times \frac{Emissions}{Energy}$$

Environmental Impact	Growth	Energy intensity	Carbon intensity of energy
-85% in 2050 wrt 2000 level ➔-3,7%/year	+2%/year	-5,7%/year (!!)	

- But ...
  - Aggregate representation of techniques extrapolating the past
    - ➢ no break in production processes, consumption patterns, technologies
  - Independence of the determinants of emissions
    - ➢ no induced technical change, rebound effect...

➔ Necessity of numerical models
to capture the complexity of energy-economy interactions

The IMACLIM model
A tool to investigate long-term energy-economy interactions

Figure 2.4. Global oil reserves in 2010

(in years, at the current production rate)

	R/P (years)
Median	47
Mininum	37
Maximum	89

Source: authors' calculations based on 2010 production (IEA, 2011) and the reserves reported by the seven main organisations (ASPO, USGS, BP, IFP, IEA, BGR, WEC) cited by 4D (2013).

What effect on economic growth?

- ➢ Energy = few percent of GDP
- ➢ Energy = non-substituable production factor for many activities

A **tool for dialogue** based on a consistent picture of **physical** and **economic** dimensions

- IMACLIM speaks the language of physics through an explicit representation of
  - material flows, stocks and pollution
  - technological and physical dimensions, including the limited substitutability among production factors
- IMACLIM represents (imperfect) economic adjustments:
  - non-"omniscient" individuals, inertia of capital stocks, partial use of production factors, market imperfections …

On the use of energy-economy models for growth analysis

What models cannot say : absolute growth levels

- "Are we condemned to degrowth , given resource and climate constraints? "

- High uncertainty on crucial non-energy drivers of growth levels
- Bias due to the internal structure of the model and parametric assumptions

What models can say : relative growth levels

- "What is the differential effect of resource and climate constraints on growth?"

- Comparison of scenarios that differ according to a given set of assumptions
- Interpretation of model outcomes
  - **Orders of magnitude of economic effects under energy/climate constraints**
  - **Classification of the determinants of energy-economy interactions, as the levers for action**

Principles of the modelling exercise

Determinants of the decoupling of growth and energy consumption

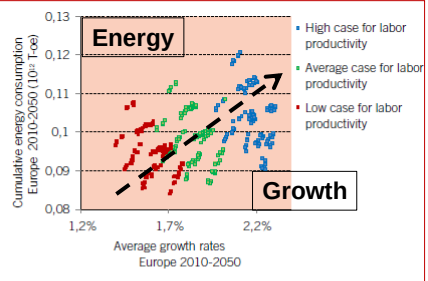
a. Availability of oil and gas
b. Availability of coal
c. Energy-efficiency in production processes
d. Availability of low-carbon technologies
e. Lifestyles and behaviours

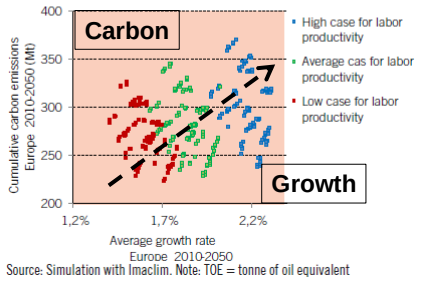
Different sets of realistic parametric assumptions for each determinant

a. Amount of reserves, geological inertias, rent-seeking behaviors
b. Sensitivity of coal price adjustments, profitability/diffusion of Coal-To-Liquid
c. Energy intensity dynamics in industry, freight transport and buildings
d. Capital costs, pace of diffusion, ultimate potentials of EV, CCS, RW
e. Housing surface, motorization rate, demand of industrial goods, freight transport intensity of production processes

- **432 scenarios** reflecting counterfactual visions of the long-term drivers of energy-economy interactions

Overview of the scenarios

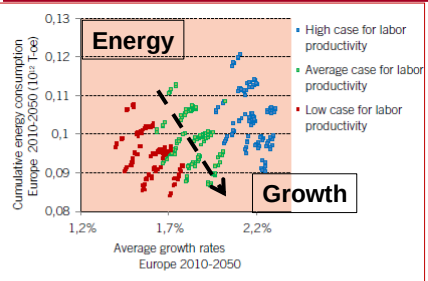


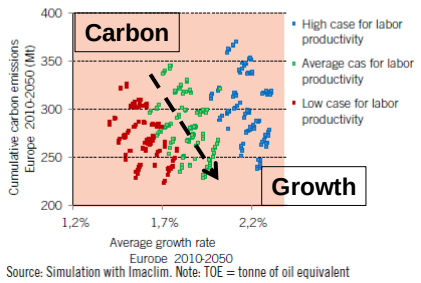


Source: Simulation with Imaclim. Note: TOE = tonne of oil equivalent

- **Labor productivity** = dominant driver of growth rates and environmental impact
  - Higher productivity causes both more economic activity and more environmental impact

Overview of the scenarios





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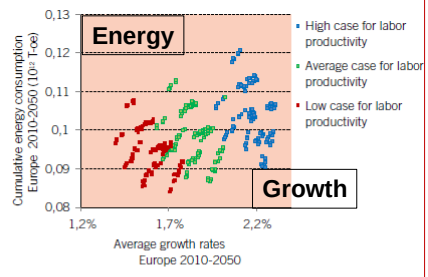
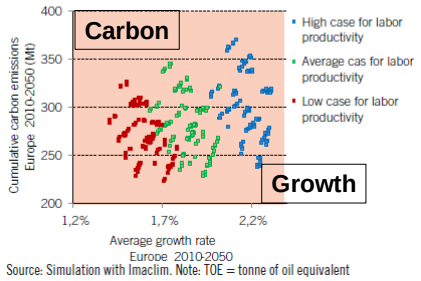
- **Labor productivity** = dominant driver of growth rates and environmental impact
  - Higher productivity causes both more economic activity and more environmental impact
- **In a given productivity regime ...**
  - The fastest growth scenario has lower environmental impact

(+0.1pt of average growth gives -6 GToe of energy demand and -30Mt of CO_2 emissions)

Overview of the scenarios





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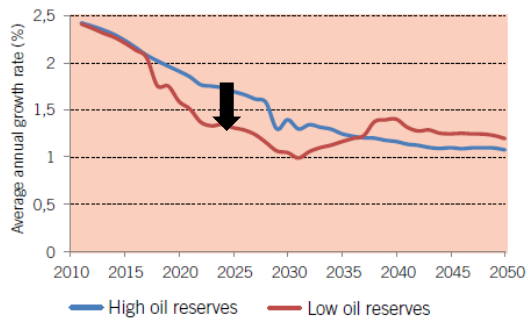
To go further ...

- Resource, climate and growth : time profiles and orders of magnitude
- Determinants of growth and energy/carbon interactions: the levers for policy action

Resource availability and growth profiles

We compare two scenarios differing only through the assumption on the amount of recoverable reserves

- High reserves: R/P=52 for conventional oil
- Low reserves: R/P=35 for conventional oil

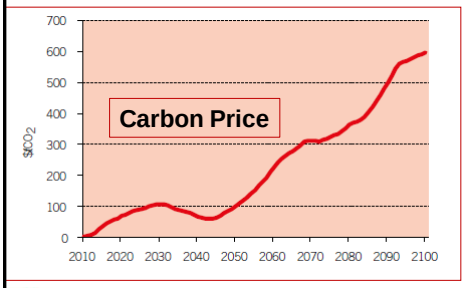


- 0.5pts of growth differential during two decades
  - Early oil scarcity and vulnerable economy *vs.*
  - Later oil scarcity and resilient economy
- Partial catch-up in the long-term (0.2 pts)
  - Accelerated technical change under strong scarcity

Source: Simulation with IMACLIM.

Introducing the 2° C climate constraint
World level estimates

GDP losses



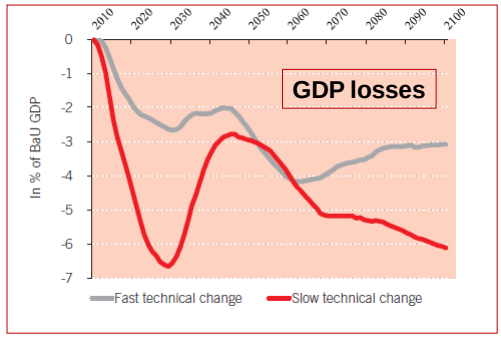
- A cost time profile robust to uncertainties
  - 2010-2030: transitory costs (up to 0.5 pts)
  - 2030-2050: partial recovery co-benefits of the climate policy
  - 2050-2100 : long-term losses control of transport emissions

➢ Role of technical change
➢ Role of lifestyles and behaviors

Climate policy cost and technical assumptions

We compare two sets of scenarios differing only through the assumption on the potentials of technical change

- Energy intensity dynamics in industry, freight transport and buildings
- Capital costs, pace of diffusion, ultimate potentials of EV, CCS, RW and Nuke

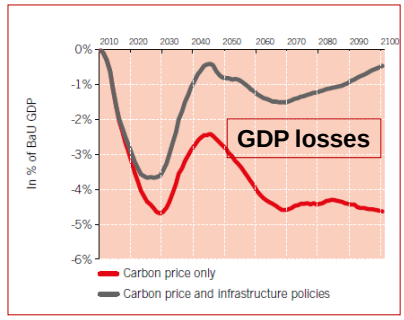


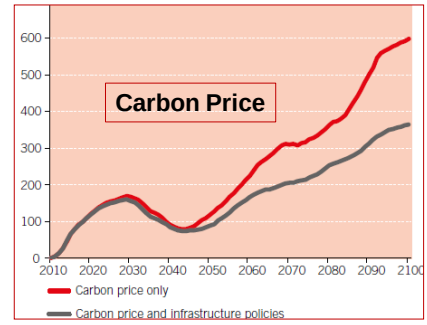
- Crucial role in short-term costs
  - Renewal of capital and equipments : technical change on new vintages vs. inertia of installed
- In the long-term, crucial assumption on electric vehicles
  - Fossil-free option for transport

Climate policy costs and lifestyles/behaviors

We compare two sets of scenarios differing only through the assumption on the direction of investments in infrastructure affecting

- Urban planning (compact vs spread-out cities)
- Modal breakdown (public transport facilities vs roads)
- Logistics organization (freight transport intensity)





Crucial role in long-term costs: mobility dependence of the economy

The levers for action on growth and energy/carbon interactions

- **Lifestyles and behaviors → infrastructure policies**
  - most influential on energy and growth trends
  - can favor growth while preserving energy/carbon
    - Households' Energy burden (housing, transport)
    - Firms' production costs (just-in-time, logistics organization)
- **Technical and technological dimensions → R&D, norms**
  - influential on energy and growth trends (energy efficiency)
    ... but strong uncertainty
    ... and important rebound effect
- **Resource availability**
  - Moderate effect on average growth rates
    ... but crucial for time profiles

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