From Energy Price Volatility to Macroeconomic Volatility

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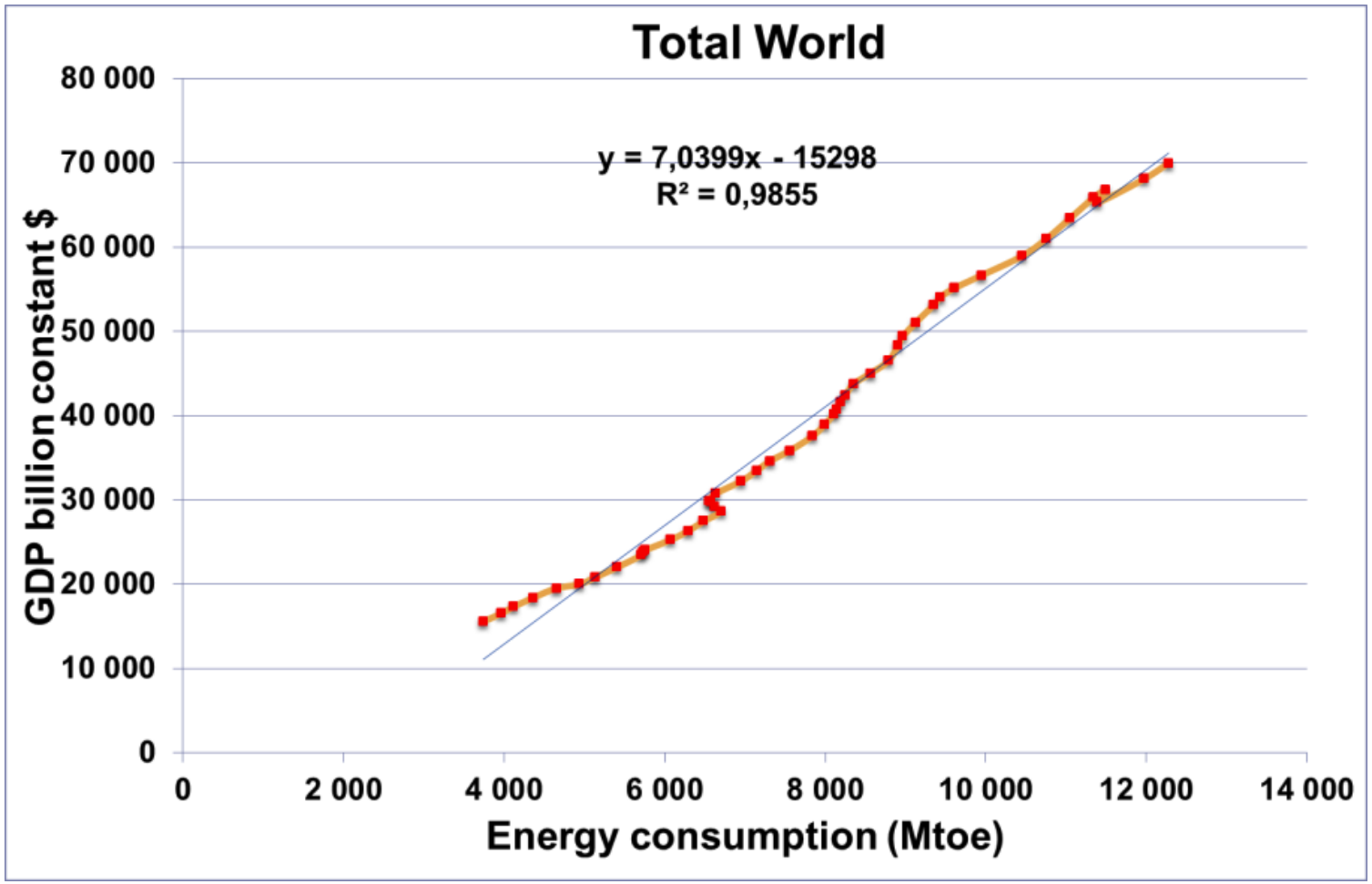
CNRS, PSE, CES, Labex REFI
and
Z. Kahraman, TSP

April 3, 2014

I. Energy drives GDP



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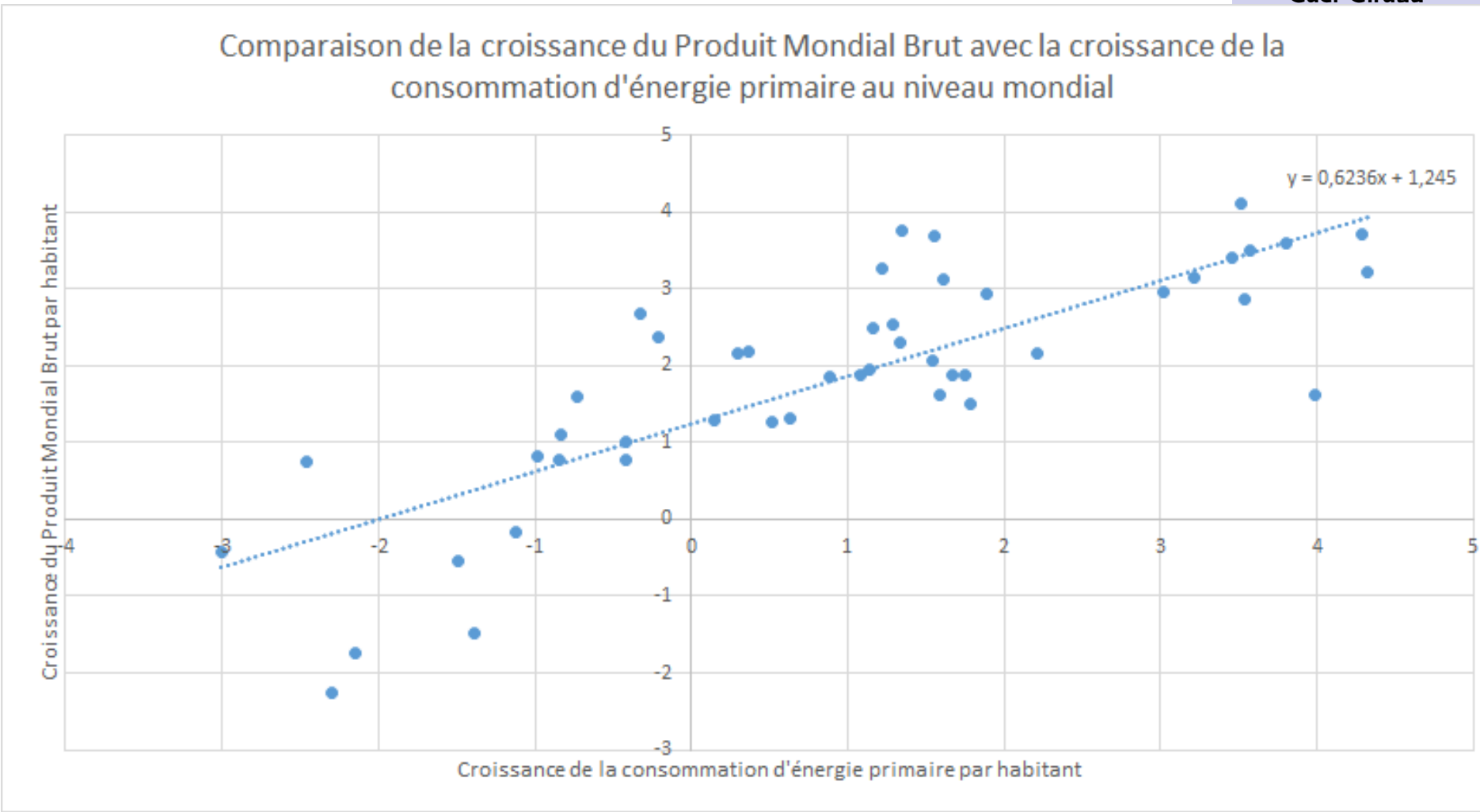
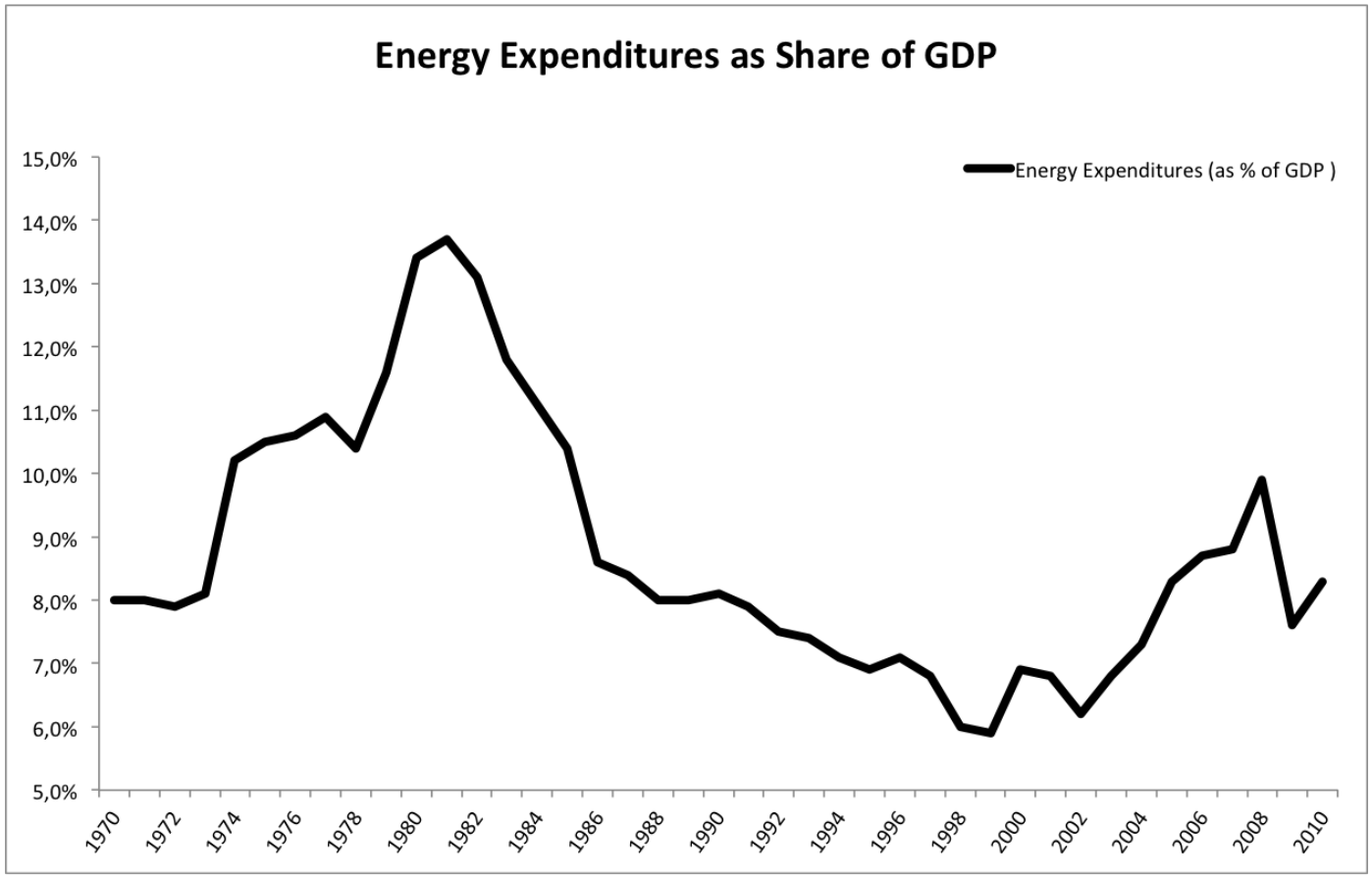
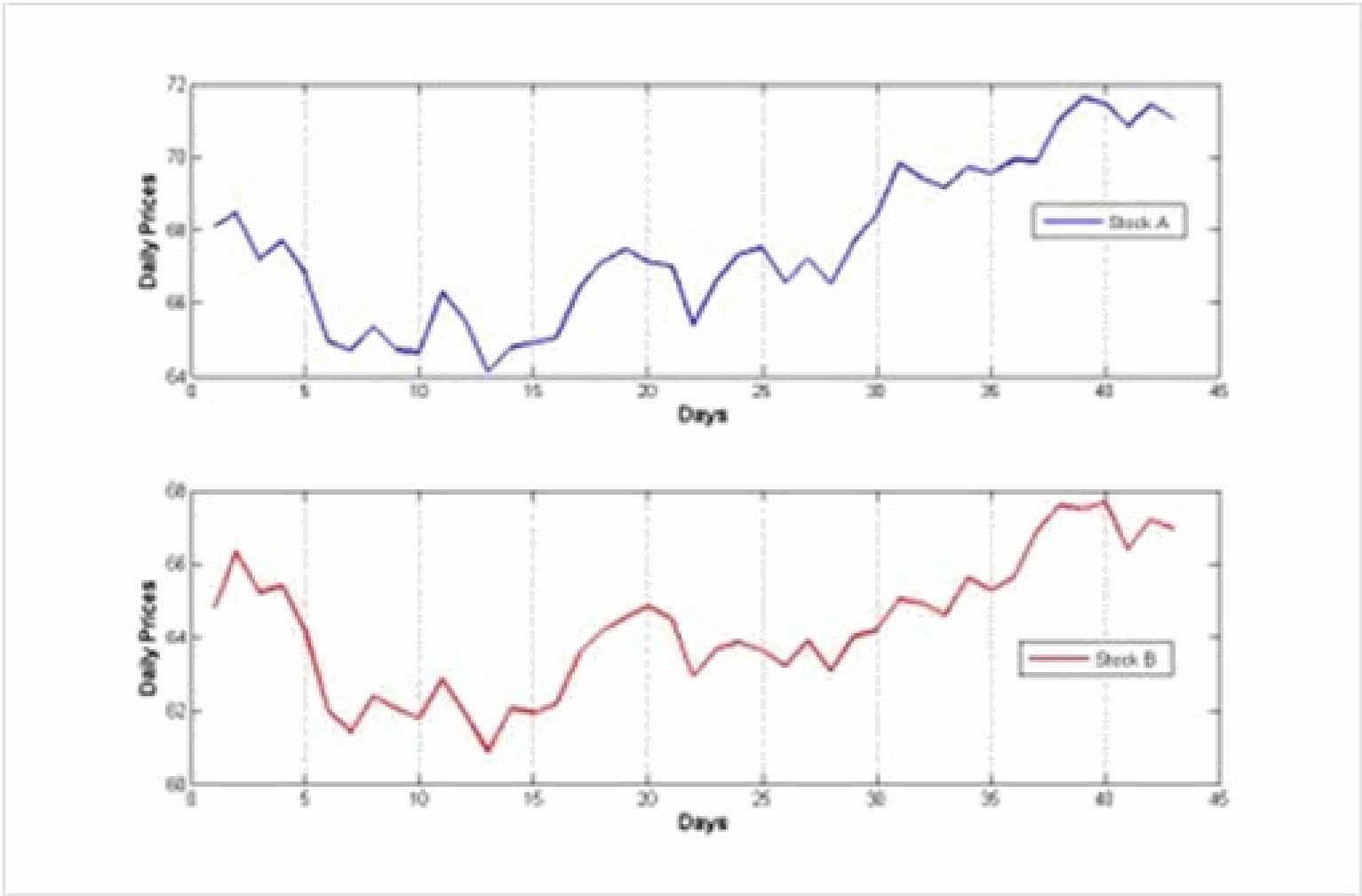
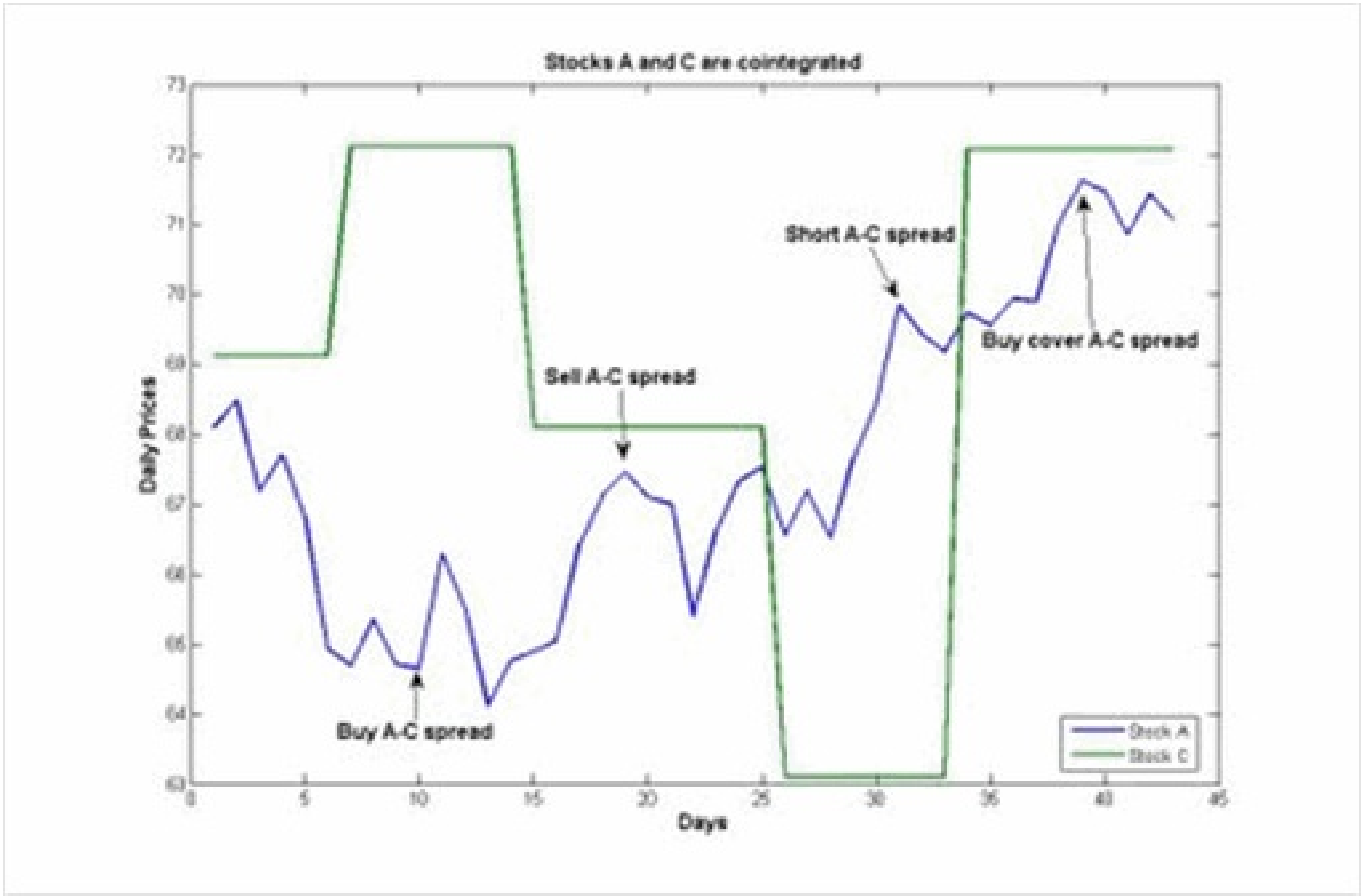

Comparaison de la croissance du Produit Mondial Brut avec la croissance de la consommation d'énergie primaire au niveau mondial
y = 0,6236x + 1,245
Croissance du Produit Mondial Brut par habitant
Croissance de la consommation d'énergie primaire par habitant
5
4
3
2
1
0
-1
-2
-3
-4
-3
-2
-1
0
1
2
3
4
5


Energy Expenditures as Share of GDP
Energy Expenditures (as % of GDP)
15,0%
14,0%
13,0%
12,0%
11,0%
10,0%
9,0%
8,0%
7,0%
6,0%
5,0%
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010

- Cointegration $\neq$ Correlation.




Stocks A and C are cointegrated
Short A-C spread
Sell A-C spread
Buy cover A-C spread
Buy A-C spread
Daily Prices
Days
Stock A
Stock C

- "How Dependent is Growth from Primary Energy ? Output Energy Elasticity in 50 Countries (1970-2011)", G. Giraud and Z. Kahraman
  50 countries, 1970-2011.

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- Long-run output elasticity of primary energy use: **0.6 - 0.7**
  Long-run output elasticity of energy efficiency: **0.6**

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- Long-run output elasticity of primary energy use: **0.6 - 0.7**
  Long-run output elasticity of energy efficiency: **0.6**

- Primary Energy use and GDP cointegrate.
  Univocal Granger causality in the long-run from Energy use growth to GDP growth.

II. The trilemma

- Giraud & Pottier (2012, 2013)

  Only 3 kinds of market equilibrium are possible.
  (General equilibrium with collateral constraints and money.)

  Regime 1 : growth + inflation.
  (Incompatible with the eurozone inflation target.)
  Ex : the 30 Glorious Years.

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  Ex: Japan since 1993.

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- **Régime 2 :** Deflation.
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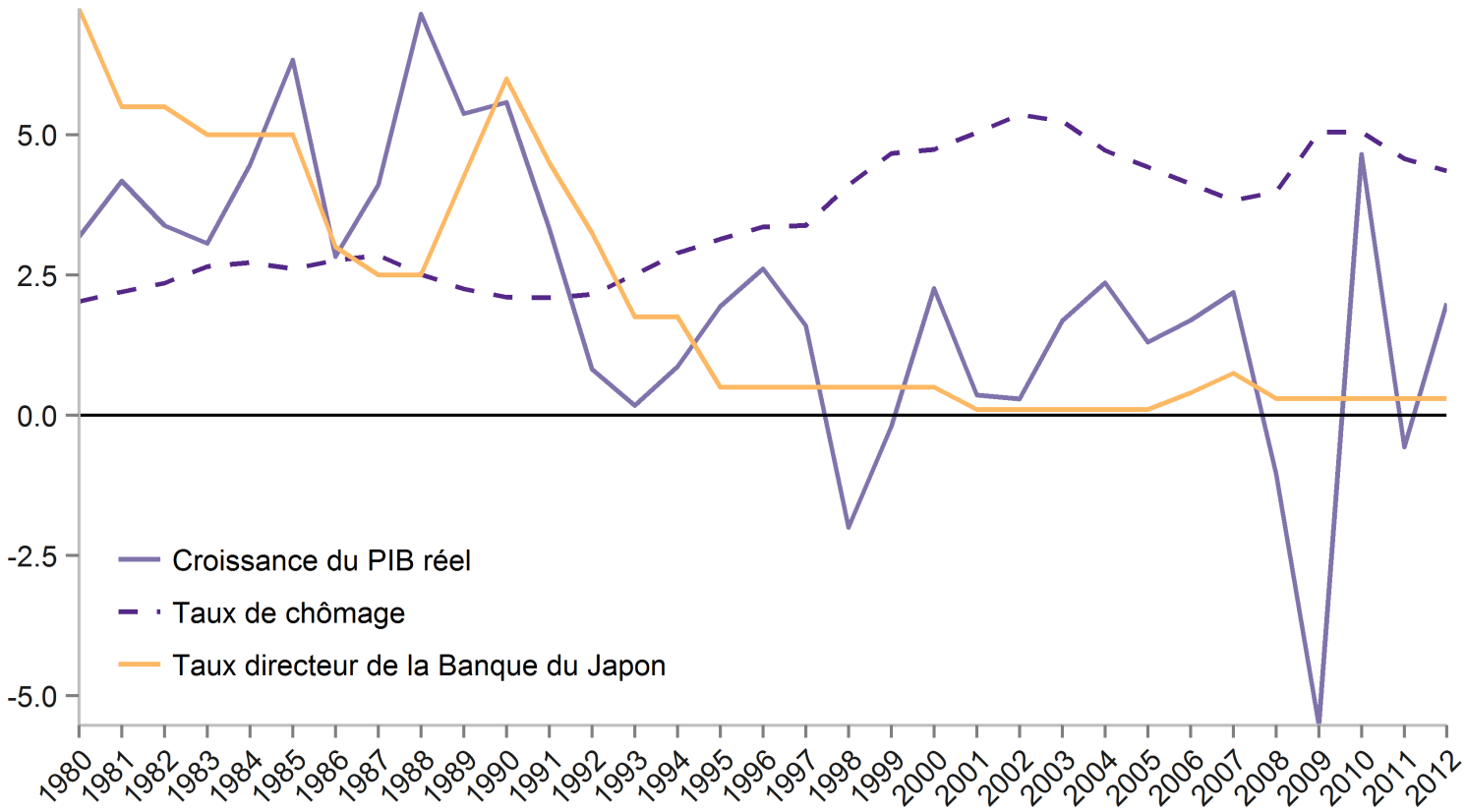
- **Régime 3:** Speculative Bubble whose burst leads to a collapse.
  Ex: Europe since 1980... ?

Croissance, chômage et taux d'intérêts au Japon



Sources : IMF International Financial Statistics, IMF World Economic Outlook

III. The curse of Volatility

- The curse of volatility.

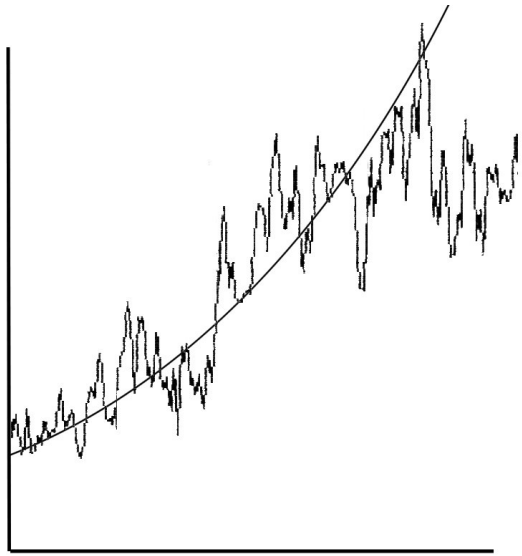


figure 2

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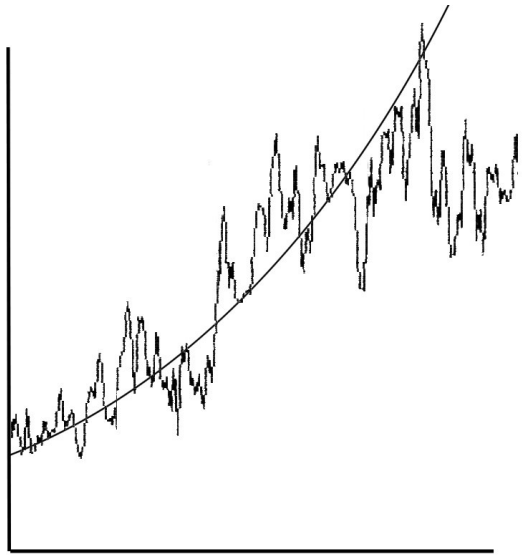

figure 2

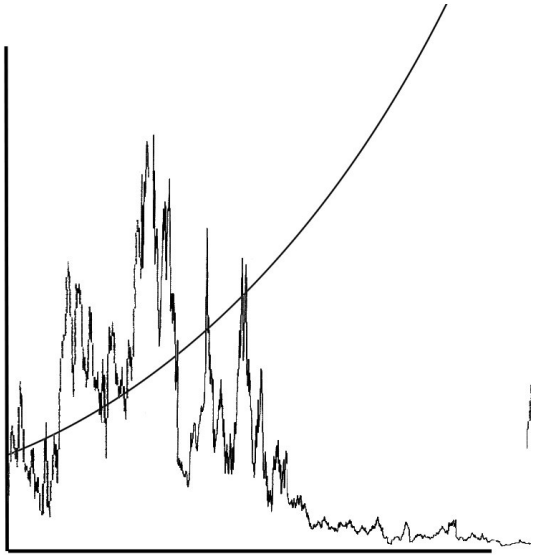

figure 3

- Suppose you invest in an asset whose ROI= 4.5%.
  Volatility $\geq 3\%$ $\Rightarrow$ in every trajectory, you will go bankrupt !
  Although your gains follow a > 0 martingale.

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- Suppose your cash yields 10% return per annum.
  Each year you toss a coin for half of your wealth. (+ 50%, -50%).
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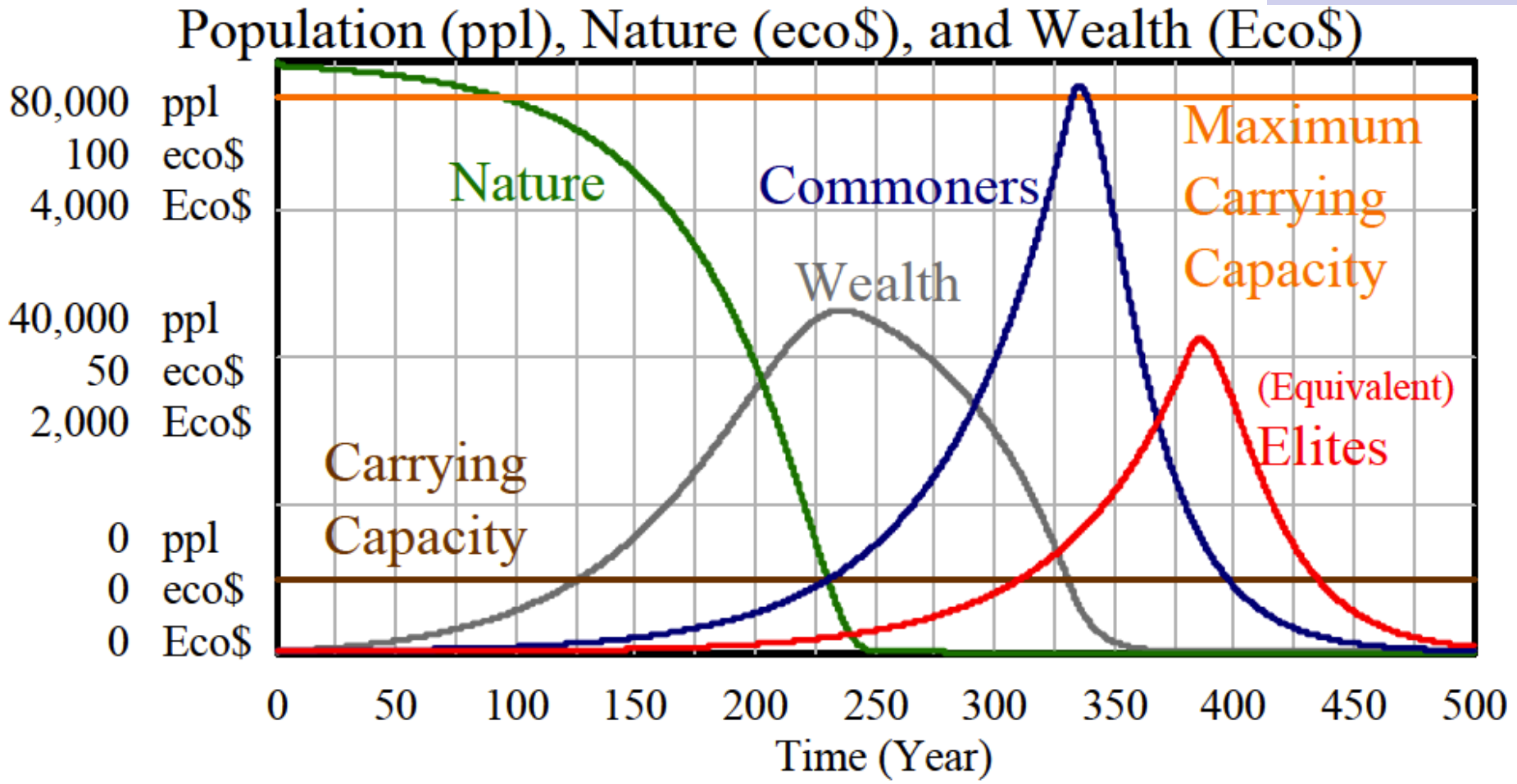
- Nicolas Bouleau, "Finance et environnement", forthcoming.



"A Minimal Model for Human and Nature Interaction"
Motesharrei et al. (2014). Forthcoming *Ecological Economics*.