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THE « PRESTON » PATHWAY LINKING ECONOMIC ACTIVITY AND POPULATION HEALTH THE CAMEROON CASE (BANANA INDUSTRY)

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COMPAGNIE
FRUITIERE

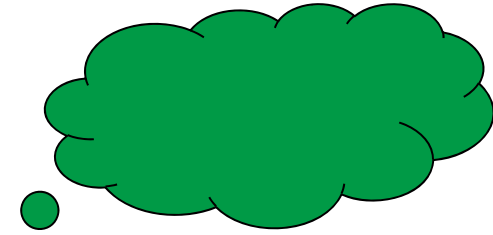
ELSA

Environmental Lifecycle
& Sustainability
Assessment



A SIMPLE IDEA ...

Supported by the preliminary works by Norris (2006) and Hutchins and Sutherland (2008)



- If there is a positive effect of growing economic activity on population health in a given country,
- If one **sector** (farms, craftsmen... or company) contributes to this growing economic activity,
- **Then**, we suggest that the functioning of this sector could contribute to health improvement for population.

We question
this idea



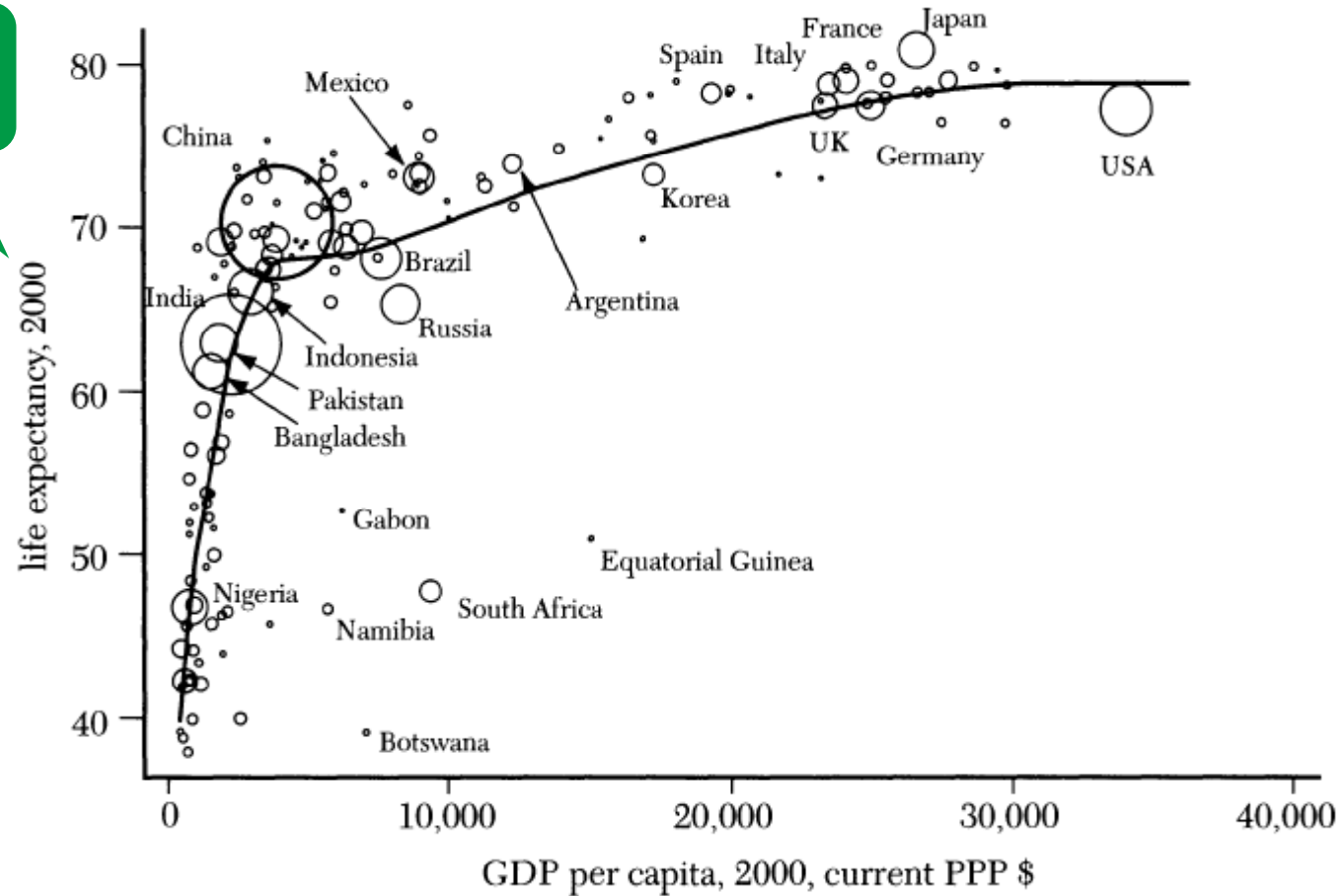
OUTLINES

1. Scientific basis of the Preston pathway
2. Can the Preston relation predict an effect?
3. What conditions allow the implementation of the Preston pathway on a working product chain ?
4. The Cameroon banana case study



1-THE PRESTON CURVE (1)

Life expectancy



Reproduced from Deaton (2004)

GDP per capita in PPP \$

An empirical **cross-sectional** relation identified by Preston (1975)

THE PRESTON RELATION (2) - THE VARIABLES

- **Life expectancy** is the best available proxy for health (Canning, 2010)
- **Income (GDP) per capita** is the best available proxy for real individual income (from work, property holdings etc.)
- GDP in purchasing power parity (**PPP**)



THE PRESTON RELATION (3) - WAY & INTENSITY

-Does wealth improve health or the contrary?

→ The answer is both, but the first relation is much stronger (Pritchett & Viarengo, 2010)

-Relative importance of income on health status?

→ Causal and structural relation (Pritchett & Viarengo, 2010)

→ But multi-criteria approach required: other variables as women education, inequalities, institution system, HIV epidemic

→ Some externalities (war, crisis,...)



THE PRESTON RELATION (4) - VALIDITY

Some counter-examples: Russia, China vs. Tunisia, Costa Rica

In the economics literature, the Preston relation is calculated :

-by cross-section

- Not a dynamic approach of individual behaviors
- Situation at a given time for all countries together, like one “World country”

We have performed another calculation

-by panel (146 countries, 60 periods: 1950-2009)

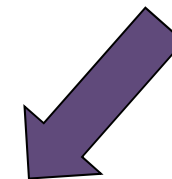
- Accounting simultaneously for the trajectory of each country along time and their possible heterogeneity
- With numerous data the bias and variation of the estimate ≈ 0



Determination coefficient?

$R^2 = 0,8$

$R^2 = 0,7$



Is still high !



2- CAN THE PRESTON RELATION PREDICT AN EFFECT?(1)

Some authors say « no in general »

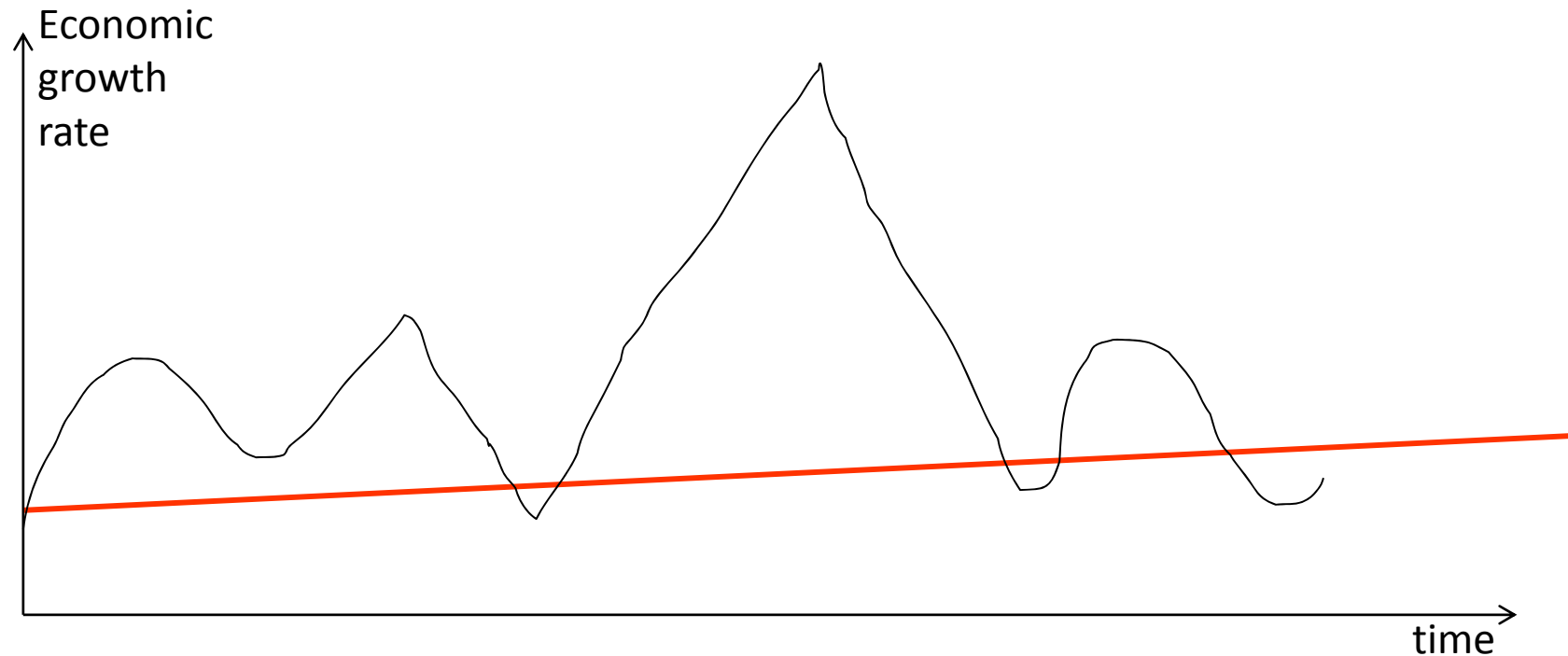
There is **no correlation** between the economic *growth* and *improvements* in health and education, even if there is a **strong correlation** between national *levels* of income and health (**HDR, 2010**).

Others say « yes for poor countries »

- « Focusing on economic growth in developing countries will lead directly to reductions in **infant mortality** rates and improvements in life expectancy » (**Canning, 2010**)
- « If income were one percent higher in the developing countries, up to 33,000 infant and 53,000 **child deaths** would be averted annually » (**Pritchett and Summers, 1996**).
- « Income poverty and health poverty are positively correlated, and those who suffer from **material deprivations** are also those who suffer from health deprivations » (**Deaton, 2007**)
- « In poor countries, where **malnutrition** remains a major issue, there is wide agreement that income has a direct causal effect [on health]» (**Case, 2001, 2002**)



CAN THE PRESTON RELATION PREDICT AN EFFECT? (2)



For predictive use, Easterly (1999) say
« time matters, and regularity matters »



3. PROPOSALS: REQUIREMENTS FOR USING THE PRESTON PATHWAY (1)

1. Poor country:

The **sector** under scrutiny (part of the product chain) is located into a country where the initial GDP is less than **10 000 \$/capita** (Pritchett and Viarango, 2010)

2. Duration and regularity:

The duration of the activity of the **sector** is long enough, and regular to observe a significant statistic change (Easterley, 1999)

Initial life expectancy (years)		Number of years before capturing Preston effect					
		72	65	60	55	50	45
Annual growth rate of GDP (%)	1	72	65	60	55	50	45
	5	14.4	13	12	11	10	9
	10	7.2	6.5	6	5.5	5	4.5

From Pritchett and Viarango (2010)



3. PROPOSALS: REQUIREMENTS FOR USING THE PRESTON PATHWAY (2)

3. No captation:

The poor country takes advantage from the **sector** value-added

- °no captation by foreign or by indoor few people
- °weight of the salaries paid out to poor country workers!

4. Relevant weight:

The **sector** has a relevant weight into the national economy (about **1% of the GDP**) and/or a **strong influence** (lobbying ...)

→ Necessary to calculate **overall VA : primary direct & indirect** (from company VA and VA of suppliers) + **secondary** (from income distribution)

**When these conditions are met,
we may implement the Preston pathway to the case !**



4-IMPLEMENTATION TO THE CAMEROON CASE

BANANA INDUSTRY (1)



Source: Wikipedia

The product chain under study is one banana industry in Cameroon, lead by the company B

- The functional unit is **1000 tons of Exported bananas** (leaving the Cameroon's harbours)
- Only one part of the Life cycle is assessed, so it is a **well to gate** assessment

Context:

One large company B including cultivation, processing and transportation of bananas

The company B represents a large part of the Life cycle of this bananas industry.

We get all the accountancy data for the company B.



IMPLEMENTATION TO THE CAMEROON CASE & BANANA INDUSTRY (2)

The company B matches the conditions for implementing the Preston pathway:

- 1. Poor country:** The 2009 GDP (PPP) of Cameroon is 43,04 billion \$ and **1 997 \$** per capita in PPP.
- 2. Duration and regularity:** With a GDP average growth rate of 4,2% and LEX of 55 years (1990), the minimum duration to show effect is ≈ 14 years. Company B is set up in Cameroon since **1989**, with a regular banana activity (120 000 t/year)
- 3. No captation:** The weight of salaries paid out to local workers is high (**67% of direct VA**)
- 4. Revelant weight:**

Company B	% of annual GDP 2009 (excluding hydrocarbons products)
Turn over	0.50%
Overall local value-added	0.70%



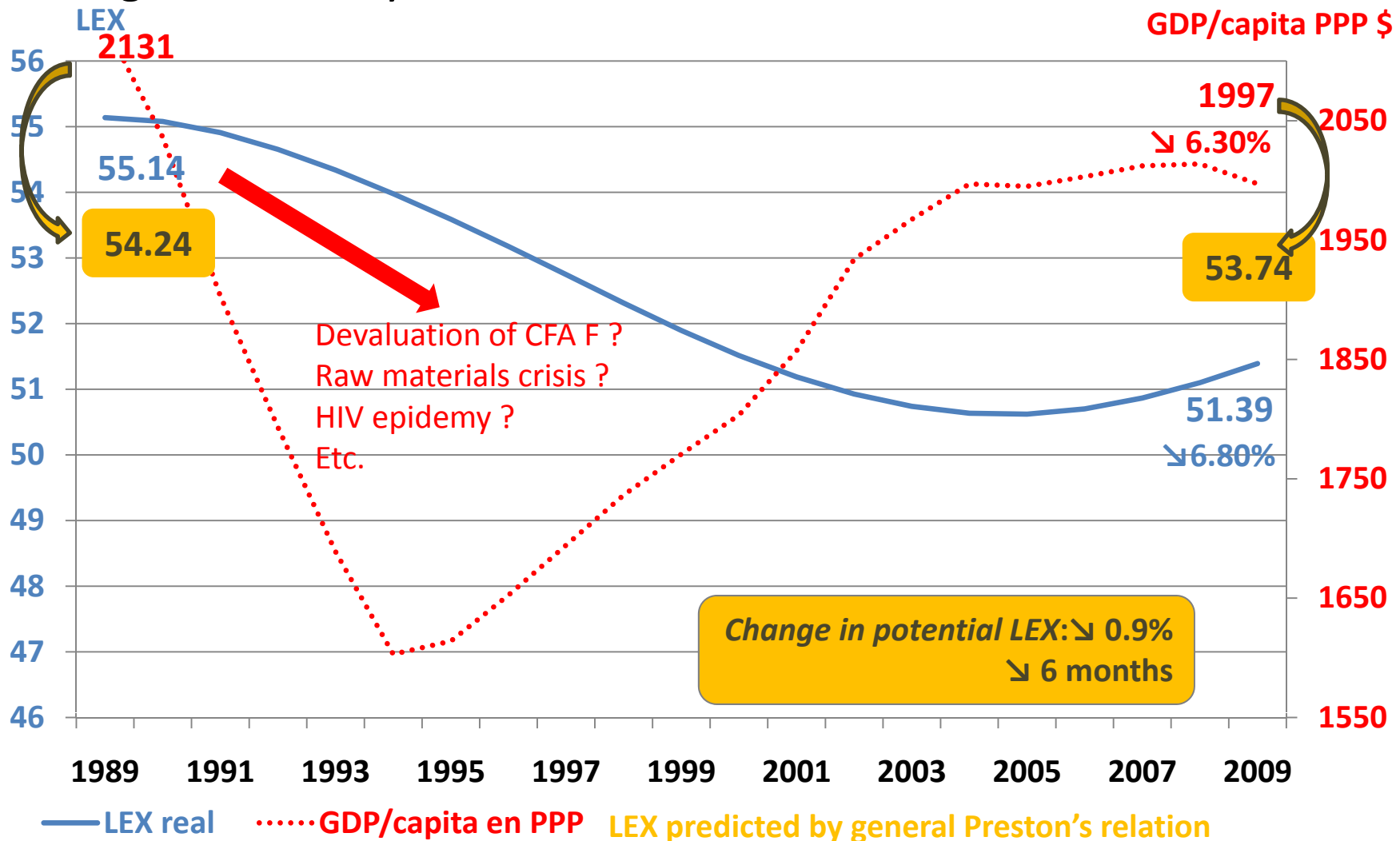
Many details highlight the **political weight & influence** of the company



Sources: World Bank, Company B accountancy

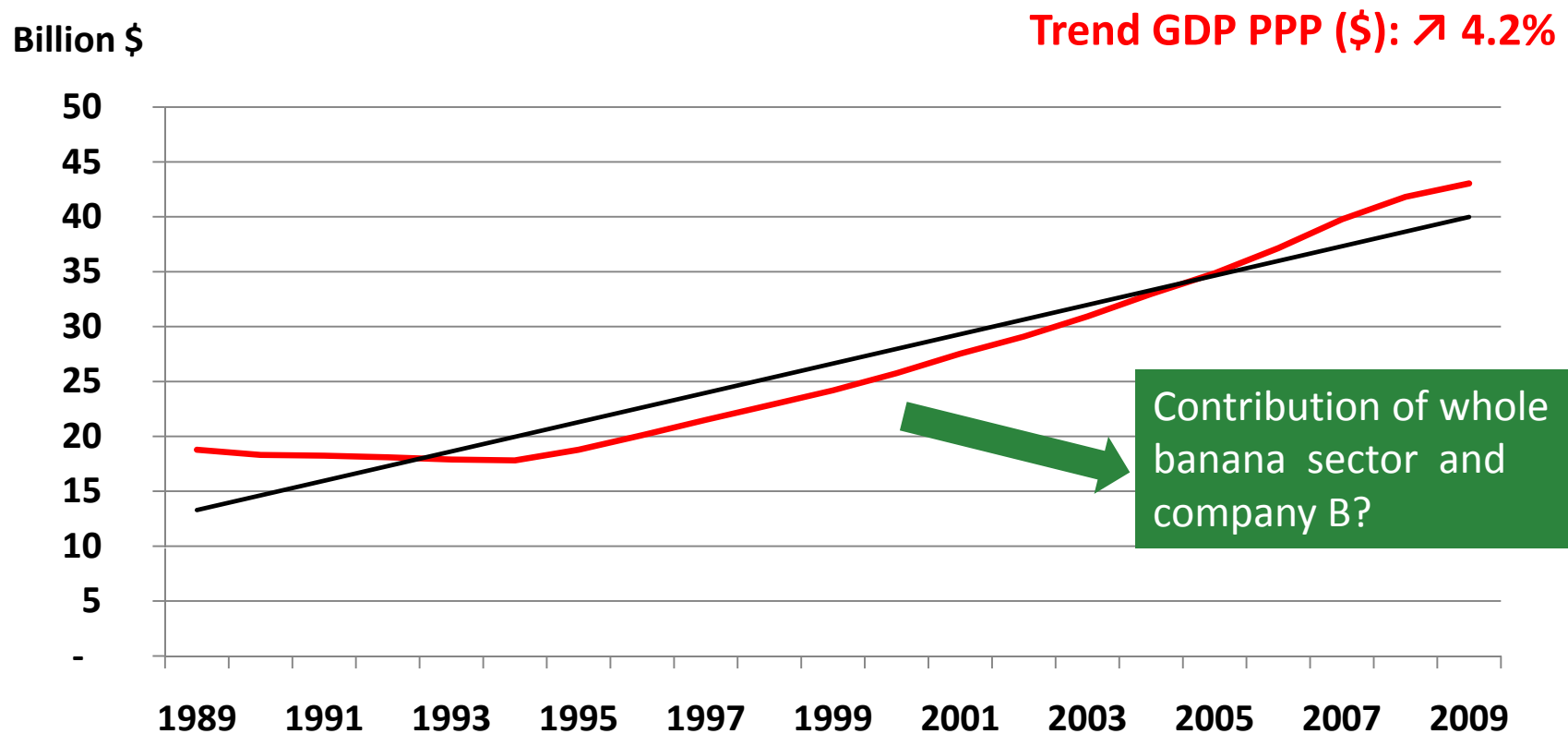
IMPLEMENTATION TO THE CAMEROON CASE & BANANA INDUSTRY (3)

Calculation of the **change in potential LEX** caused by economic growth during the 20 last years in Cameroon:



IMPLEMENTATION TO THE CAMEROON CASE & BANANA INDUSTRY (4)

Change in natural LEX in Cameroon = Σ of progress in LEX caused by economic growth/capita and others effects (HIV, war, crisis, etc.)



IMPLEMENTATION TO THE CAMEROON CASE & BANANA INDUSTRY (5)



- Given its constant involvement in the national economy, the **whole banana sector** has had a **positive affect on LEX**, avoiding a loss in LEX
 - We calculate the **contribution of company B** on the **change of the potential LEX** from its contribution to GDP in PPP
 - For an average activity of **120 000 tons of exported bananas/year**
 - For an average **overall local value-added of 0.70% of the GDP in PPP**
- Company B is responsible for 0.70% of the change in potential LEX

1 day of life per 1000 tons of exported bananas since 2002.

Contribution of the company B to the potential change in LEX since 2002	
Annual average contribution (years of LEX)	0.35
Potential change in LEX per 1000 tons of exported bananas (in day)	1.06



IMPLEMENTATION TO THE CAMEROON CASE & BANANA INDUSTRY (6)



If the activity was the same but:

- Regarding only the **primary VA** of the company: H1
- Letting **half** of actual VA in Cameroon: H2
- Letting **double** actual VA in Cameroon: H3

Potential change in LEX per 1000 tons of exported bananas (in day)	H0	H1	H2	H3
	VA=0.7%	VA=0.23%	VA=0.3%	VA=1.4%
	1.06	0.37	0.53	2.26



CONCLUSION (1)

On the case study:

The « **potential life expectancy change** » per ton of exported bananas result is interesting but not meaningful in itself,
it may be compared with:

- **Other scenarios**

- Potential LEX changes caused by bananas in **another country**

(Ghana, Ecuador)

- Potential LEX changes of **another banana industry in Cameroon**



CONCLUSION (2)

Others theoretical limits and improvements required:

Conditions of validity and basis for calculation are proposals, submitted to be improved !

- We can't interpret the potential LEX in itself → useful ONLY in a comparison perspective
- Necessity of a multi-criteria approach (others factors than income)
- Real incomes of individuals insufficiently reflected by GDP per capita
- Informal economy insufficiently reflected by GDP

Multicriteria + potential/predictive impact + comparison



Social Life Cycle Analysis of Pathways



THANK YOU FOR YOUR ATTENTION ...

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