



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Assessing the economic costs of an outbreak of Foot and Mouth Disease on Brittany:

A dynamic computable general equilibrium analysis

A. Rault, A. Gohin

INRA, UMR 1302 SMART, F-35000 Rennes, France

arnaud.rault@rennes.inra.fr

Selected Poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012.

Copyright 2012 by Arnaud Rault and Alexandre Gohin. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Assessing the economic costs of an outbreak of Foot and Mouth Disease on Brittany: A dynamic Computable General Equilibrium analysis

Arnaud RAULT, Alexandre GOHIN
INRA, UMR1302 SMART, F-35000 Rennes, France
arnaud.rault@rennes.inra.fr

Introduction

- A very **local sanitary hazard** such as a FMD outbreak can cause **large economic disruptions** on the whole market (preventive trade restrictions, consumers scares etc).
- Indirect effects and market consequences poorly studied.
- Most economic analyses focus on epidemic dynamics and assess the direct costs of epidemic outbreaks.
- Because of the multiannual cattle breeding process, even a **very temporary FMD shock may result in lasting consequences** on agricultural productions and markets

Research objectives

- Provide an assessment of the market and welfare impacts of a potential FMD outbreak in a European livestock-intensive region
- Compute its aggregate and dynamic economic costs and their distribution:
 - among economic stakeholders
 - through time

Data and simulation scenario

Data

Social Accounting Matrix for the **French Brittany region**

- 50 sectors of which 23 agricultural activities
- 52 products of which 24 agricultural ones
- Multi-product activities taken into account

Brittany agriculture and livestock:

- 1st rank for milk, veal, pig and poultry production
- 2nd rank in terms of cattle production
- Farm and food processing industries represent 12% of regional total employment (6% at the national level)



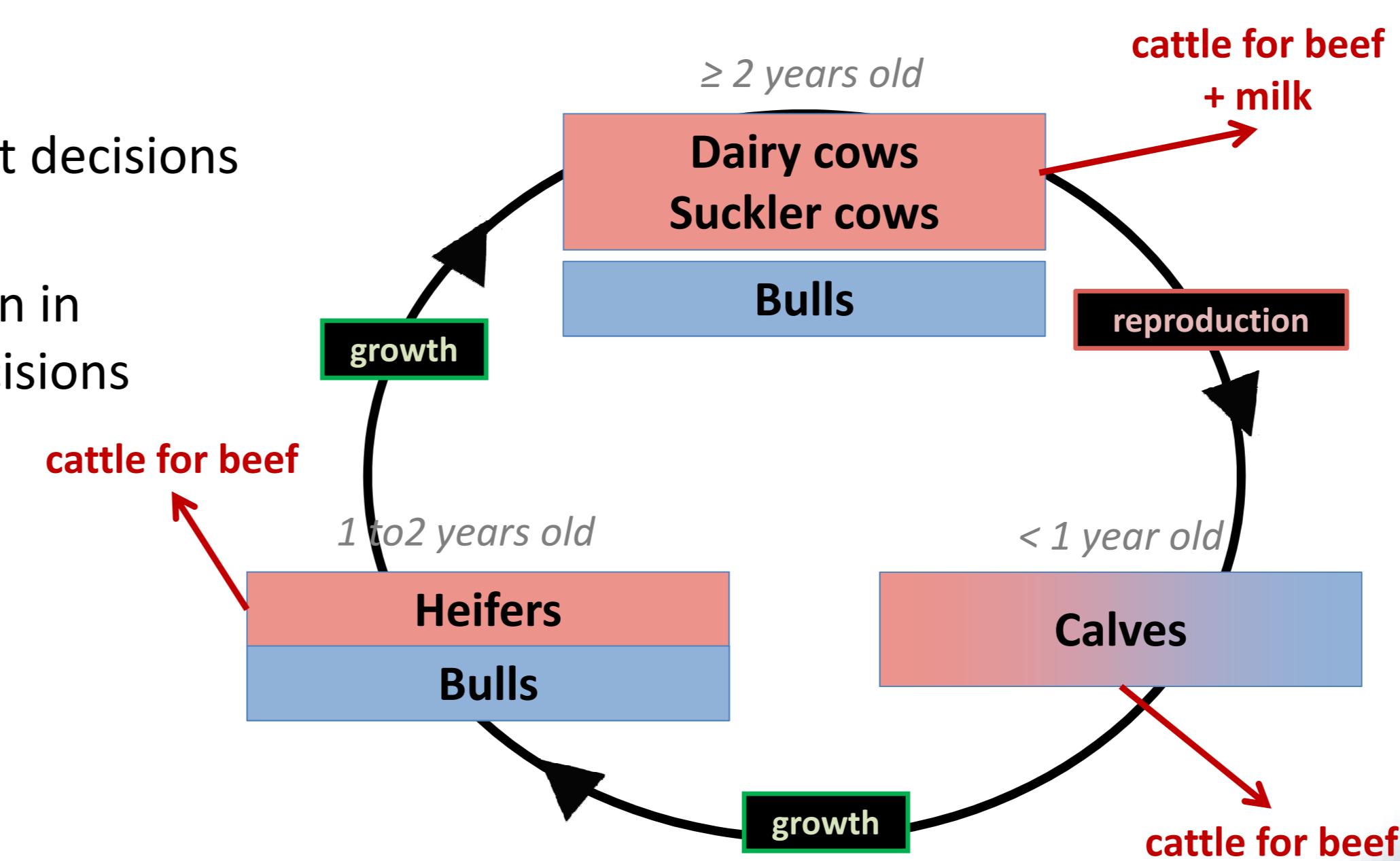
Simulation

- The FMD outbreak is simulated at the initial year of simulation
- How the simulated FMD outbreak alters our economy:
 - 10% culling of the total cattle herd (200,000 cattle) for sanitary reasons
 - Preventive sanitary bans on the movement of live animals
- From the second period, the region is considered as disease free (no more bans or culling)
- Results are computed over a **15-year period**

Modelling framework

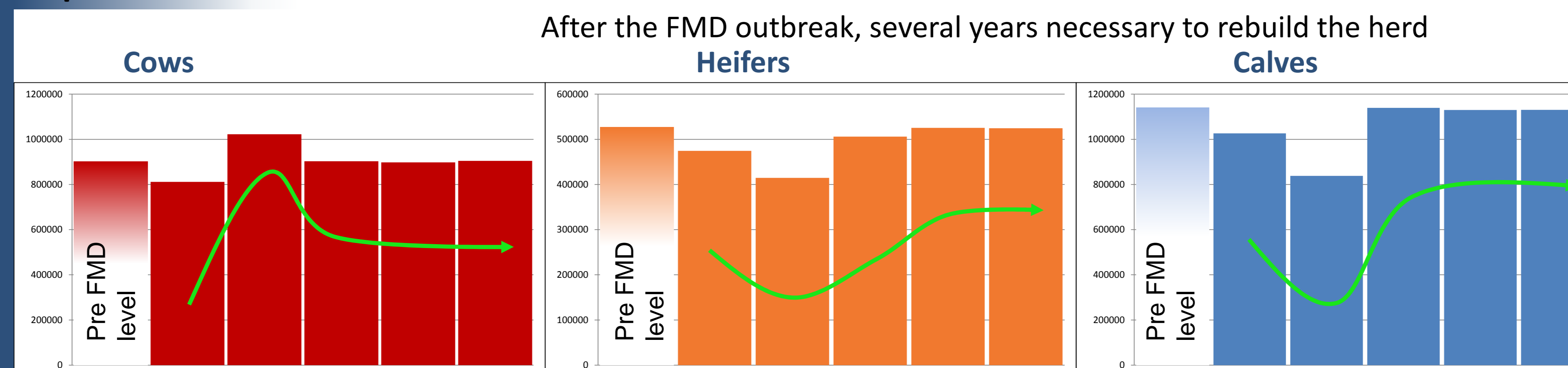
► **Dynamic CGE model** where farmers make their annual decisions of production under **intertemporal constraints**

- Dynamics of **capital** accumulation and investment decisions
- Dynamic **biological cycles** of the cattle herds
The multiannual process of growth and reproduction in cattle herds are integrated in the yearly farmers decisions
- Household maximize intertemporal utility: trade-off consumption / savings
- Rational expectations
- Introduction of **rigidities on factor markets**
 - **Labor market:** existence of minimum wage levels and unused labor endowment
 - **Capital market:** farmers face credit constraints; investment capacity is limited (dependent on their annual capital returns)



Simulation results

Impacts on the herd structure

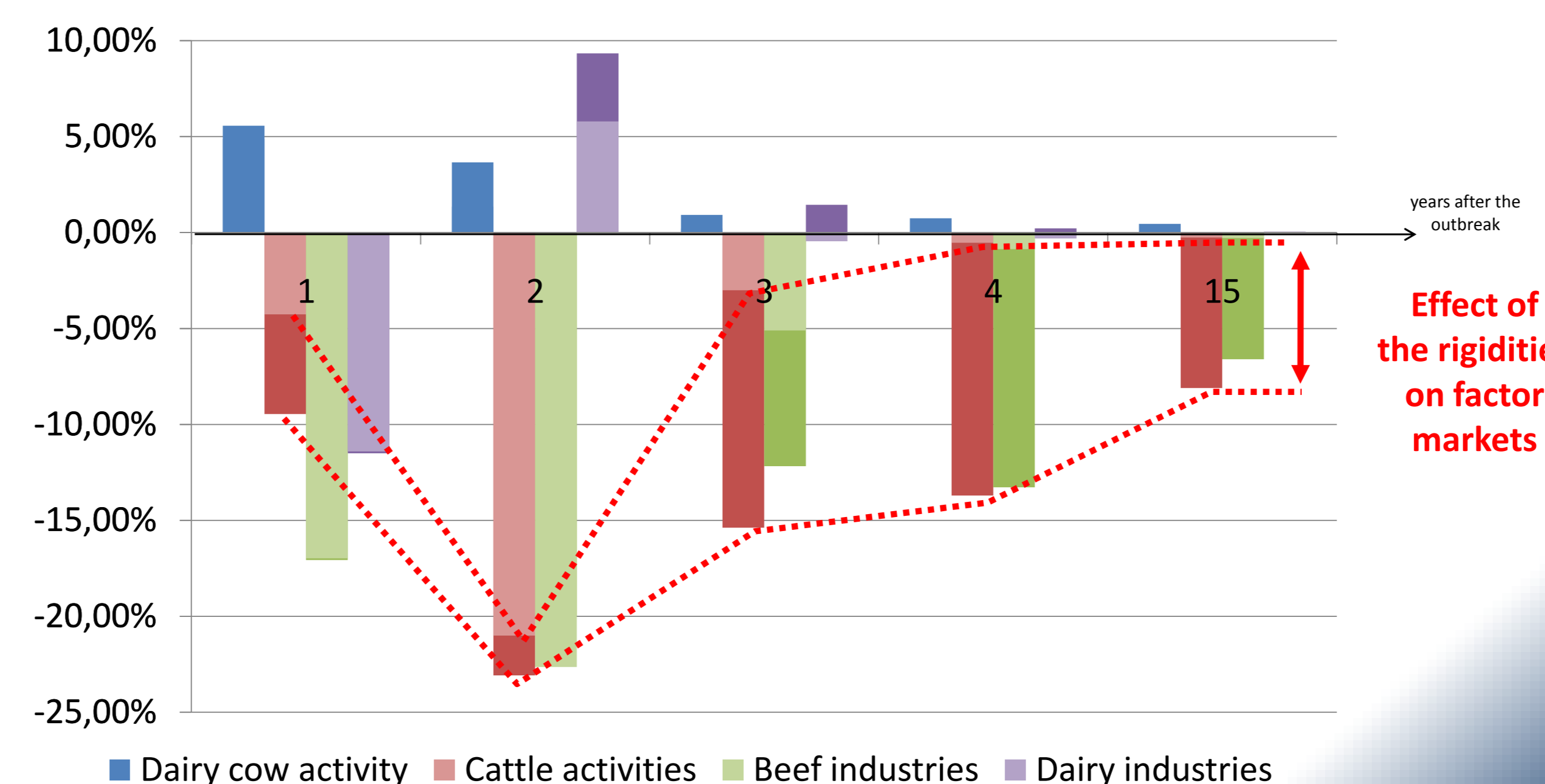


Trade bans on exports → increasing cow herd

Trade bans on imports + multiannual biological cycle → lasting lack of heifers and calves

Impacts on the value added

- Apart from the dairy sector, severe and lasting economic losses
- The whole food chain suffers losses from a brief FMD outbreak and relative sanitary measures
- Time needed to rebuild the herd → increasing losses in time on both agriculture and food industries
- Realistic constrained markets of labor and capital → increased losses on the long run



Welfare consequences

(in M€)	Perfect factor markets	Constraints on investment and wages
Value of land	-2.9	-85.4
physical capital	6.4	-367.5
cattle herd	1.6	-70.3
foreign debt	273.8	226.3
Discounted welfare	-168.9	-1276.9

- At the regional level the economic shock resulting from a FMD outbreak results in **significant losses on the long run**.
- Rigidities on labor and capital market induce **huge losses on factor markets**:
 - Difficulties to rebuild the herds
 - Decreasing value of land
 - Losses of physical capital due to investment constraints and expenditures on wages
- In the end of simulation, the overall welfare loss is more than 7 times higher when labor constraints are taken into account.
- **From an initial shock representing a 150M€ loss, the global economic consequences can be 8 times greater.**

Conclusions

- Catastrophic nature of economic shock due to a FMD outbreak, particularly in presence of rigidities on factor markets
- Lasting market effects for the whole livestock sector
- **Non parallel effects in the agricultural sector and in the food industries**
- Importance of the biological cycles of the herd in the economic dynamics
- **The whole regional welfare is lastingly and significantly affected by a brief health hazard**

Linked publications

- Arnaud Rault, S.Krebs (2011). Livestock epidemics and catastrophic risk management: state of the art and prospects on economic dynamics. *Working paper WP11-05 INRA SMART-LERECO*
- A.Gohin, J.Cordier, S.Krebs, A.Rault (2012). Dynamic impacts of a catastrophic production event: the foot-and-mouth disease case. *Risk Analysis [in press]*
- A.Gohin, A.Rault (2012). Assessing the economic costs of an outbreak of foot-and-mouth disease on Brittany: a dynamic computable general equilibrium analysis. *EAAE 123rd seminar, Dublin.*
- A.Rault (2012). On the effectiveness of mutual funds to cope with lasting market risks: the case of FMD in Brittany. *EAAE 126th seminar, Capri*