

## Innovation Systems and Development

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**Training Programme on Research Issues and  
Methods in Innovation Systems and Sustainable  
Development**

**:**  
**CDS**

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- The present crisis
- The SI perspective
- SI and development

## The setting up of Globelics

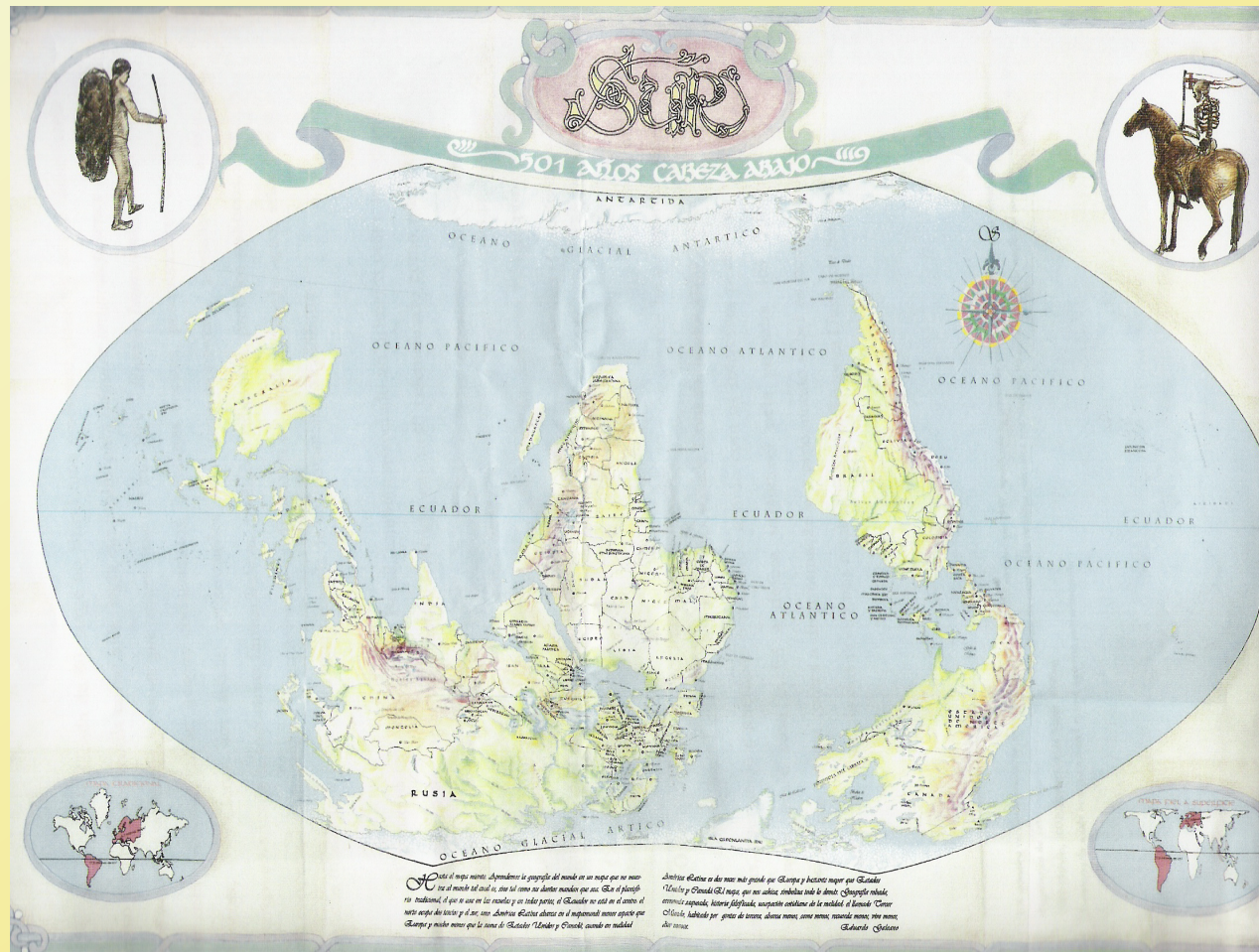
- A network of scholars who use the IS framework as an analytical tool to understand processes of development
- The need to create knowledge
- Appreciative theory & the importance of history versus models, benchmarking, etc
- Innovation as a localized, cumulative and systemic process
- IS framework as a focusing device

## 1 - The focusing device





## 2 - The contextualized knowledge



## A financial crisis?

- Financial crisis, recession, depression ...
- A crisis in the capitalist system
- or a crisis of the capitalist system?
- Crisis has at least three dimensions:
  - 1) Economic
  - 2) Ecological
  - 3) Political

Present economic crisis as a crisis of an accumulation regime which is intensive in the use of oil and other minerals in the mass production and consumption of autos and other consumer durables

- A twofold world context of
  - deep economic and financial crisis with no end in sight
  - an ongoing soon irreversible ecological crisis with climate change at its core
- Crisis as an expression in a specific historical context of the internally created limits ("internal barriers") that capital runs up against
  - these barriers manifest themselves in an interconnected manner
    - by the fall in the rate of profit and
    - in periodic crises of massive overproduction
- Capital devises ways to offset the fall in the rate of profit and also to defer the moment commodities (goods) become impossible to sell and overproduction is manifest



## Globalization, Knowledge Society, Innovation, Crisis, Inequality

**Two factors central to the crisis & its persistence**

**Hypertrophy of financial assets and markets: the financierization of the global economy !!!!**

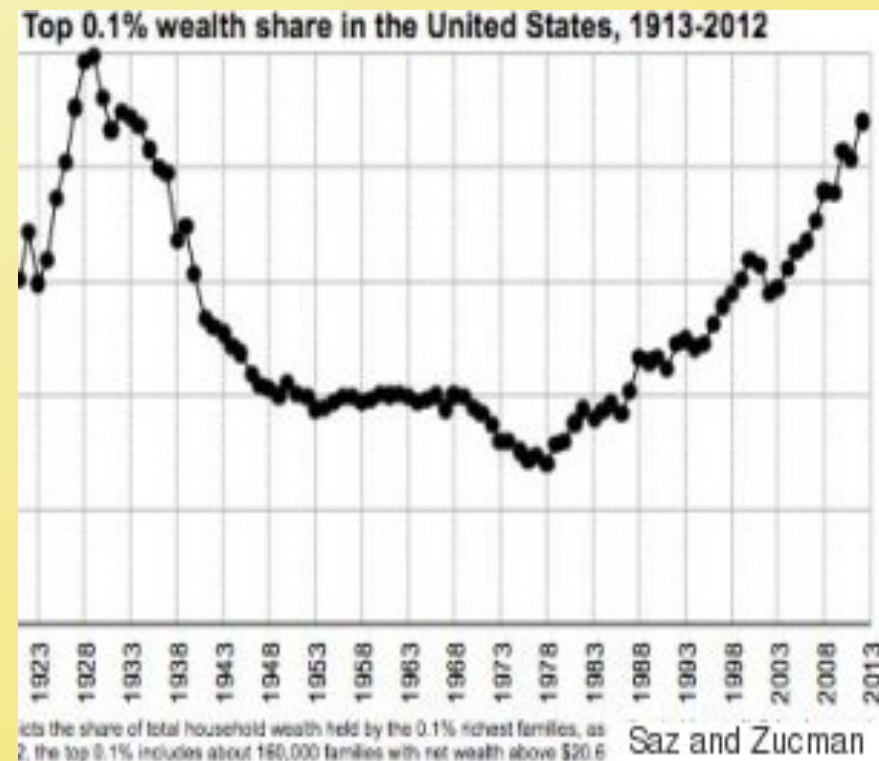
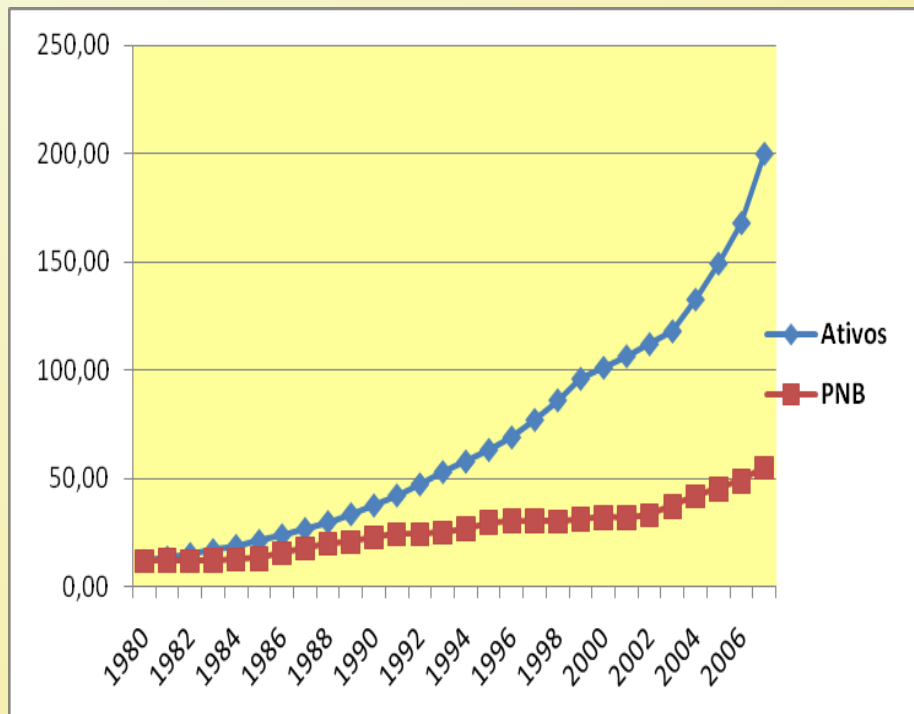
- stark contrast between rate of growth of world GDP and of global financial assets
- 43060 largest TNCs: 737 firms control 80 % of their assets
- 147 TNCs (75% of which are financial institutions) control these 737 firms

**Very strong income distribution inequality**

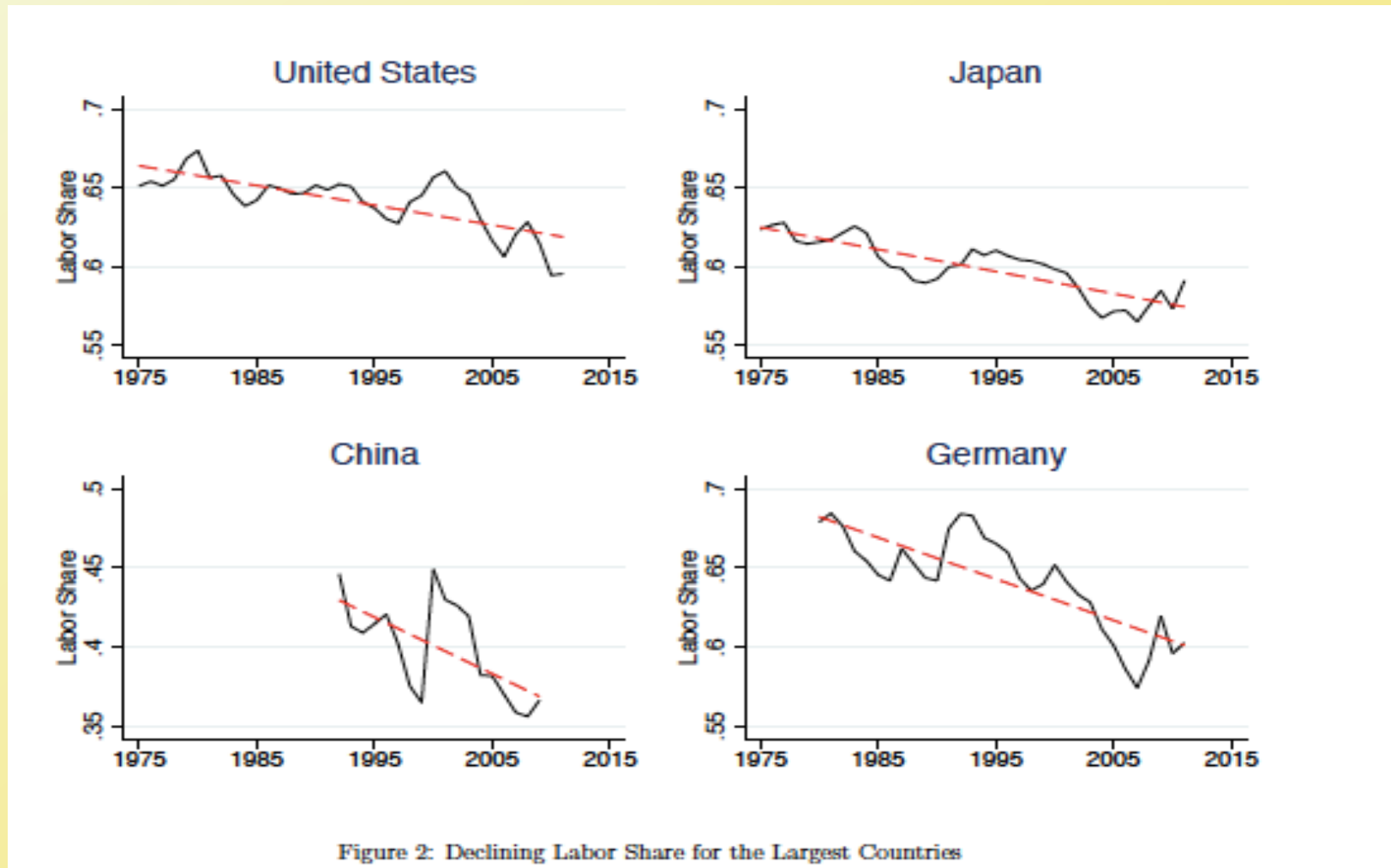
- It has increased at the heart of the system, but also Also in China
- Trend offset a little by policies in a few emerging countries (e.g. Brazil), NOW UNDER SEVERE POLITICAL ATTACK

## Financeirization and Inequality

### Global Financial Assets and World GDP - 1980 - 2008 (US\$ bil)

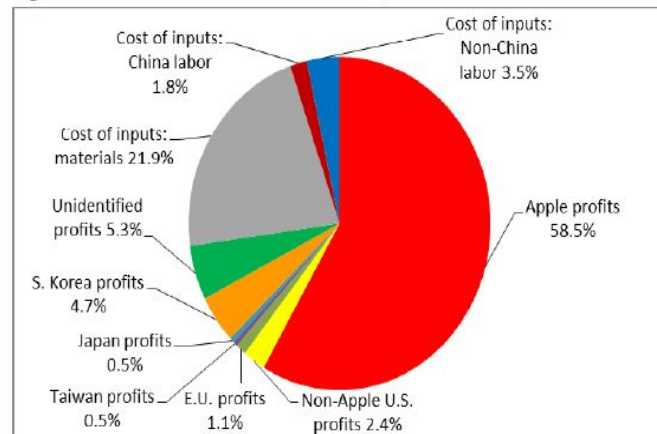


The Global Decline of the Labor Share: Karabarbounis & Neiman, Un. of Chicago, provide **evidence consistent with the idea that markups may have increased in a non-trivial way.**



## The financieriazition of the Global Economy - TNCs, Financial Capital and the Crisis

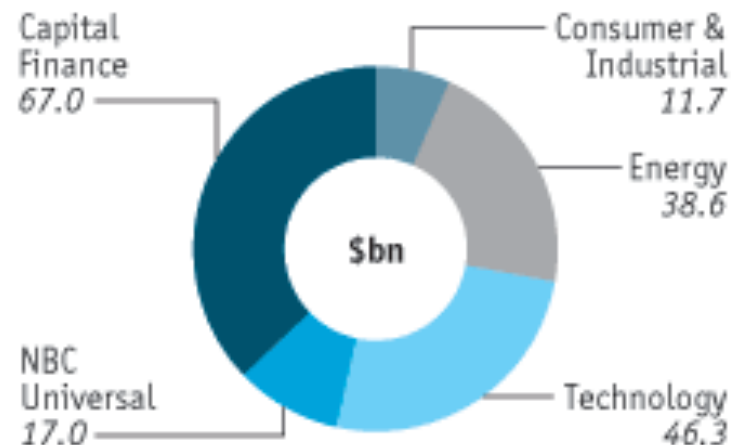
Figure 1. Distribution of value for iPhone, 2010



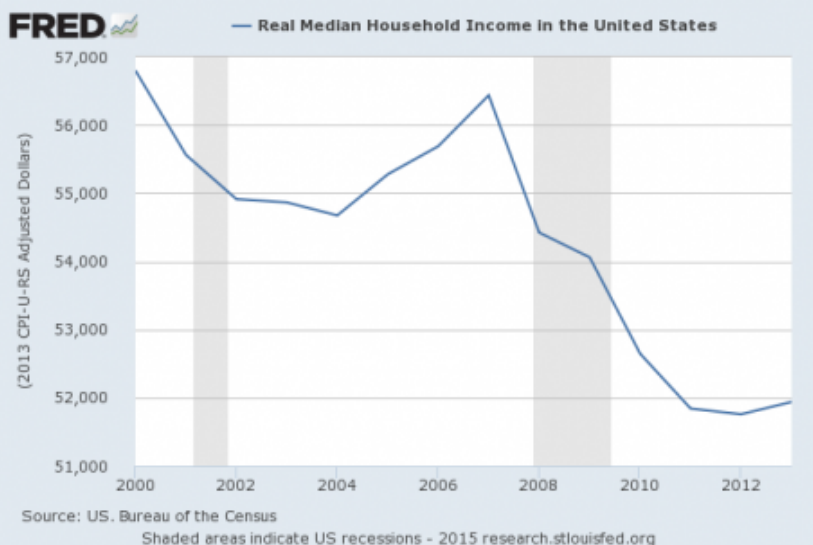
COMPANY	REPORT DATE	TOTAL CASH \$US BILLIONS
Apple	12/31/2012	\$137.1
Microsoft	12/31/2012	\$68.3
Google	12/31/2012	\$48.1
Pfizer	12/31/2012	\$46.9
Cisco Systems	1/31/2013	\$46.4

(Source: Moody's Investors Services)

GE's revenues, 2008



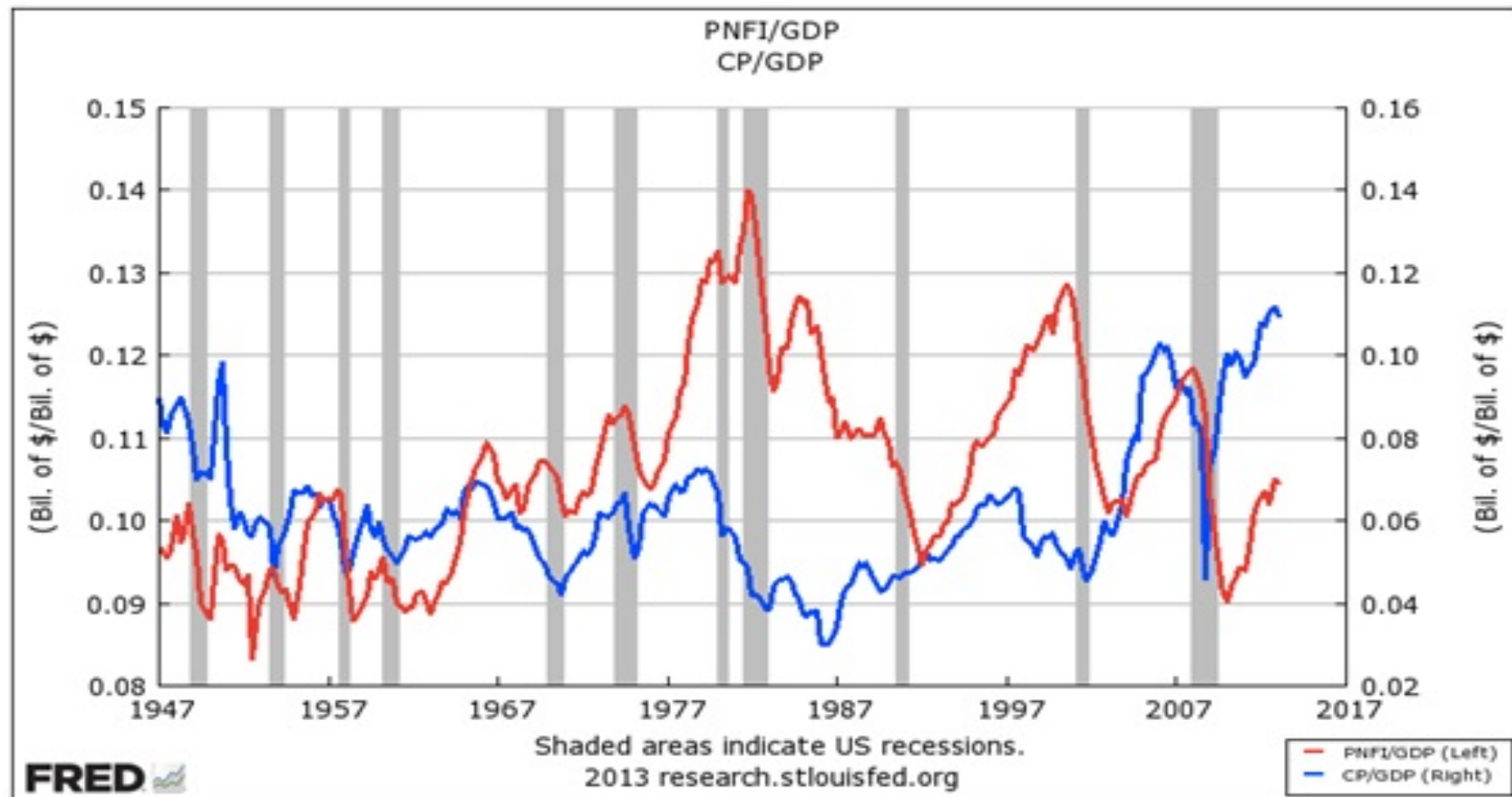
Source: Company report





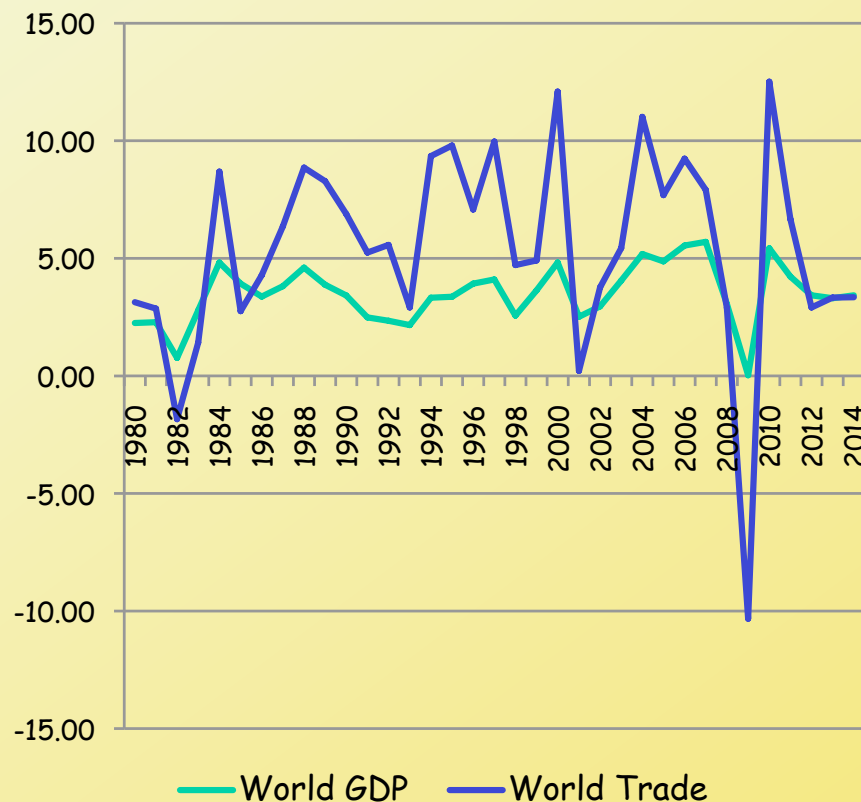
EUA - Private Nonresidential Fixed Investment (PNFI, red) and Corporate Profits After Tax (CP, blue) / GDP

Paul Krugman: there's no puzzle here if rising profits reflect rents, not returns on investment

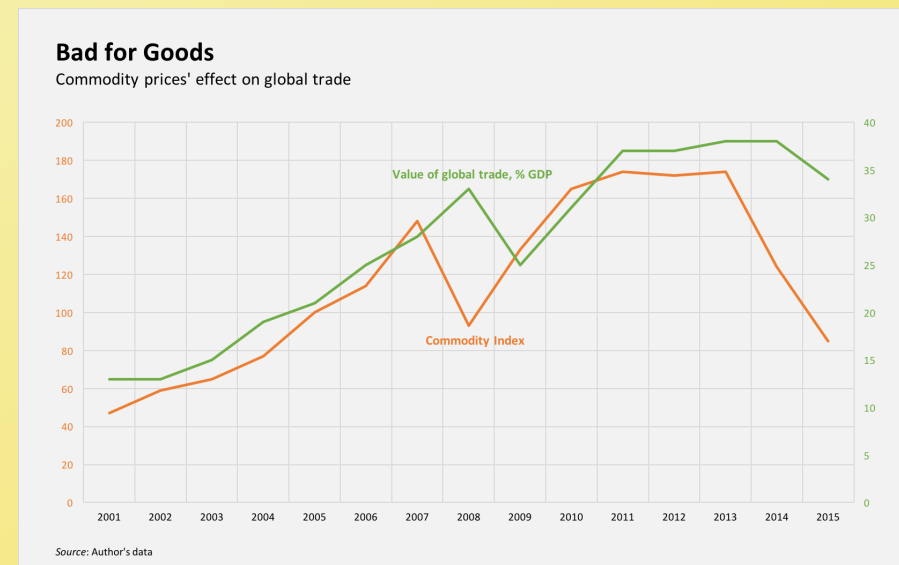


## The end of (Production) Globalization???? -

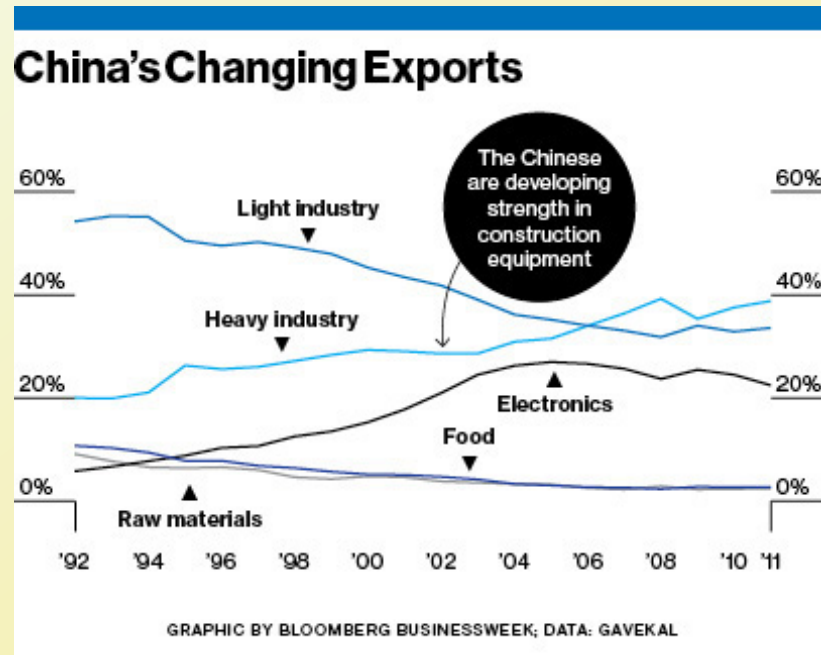
World - GDP and Trade - Rate of Growth - 1990 - 2014



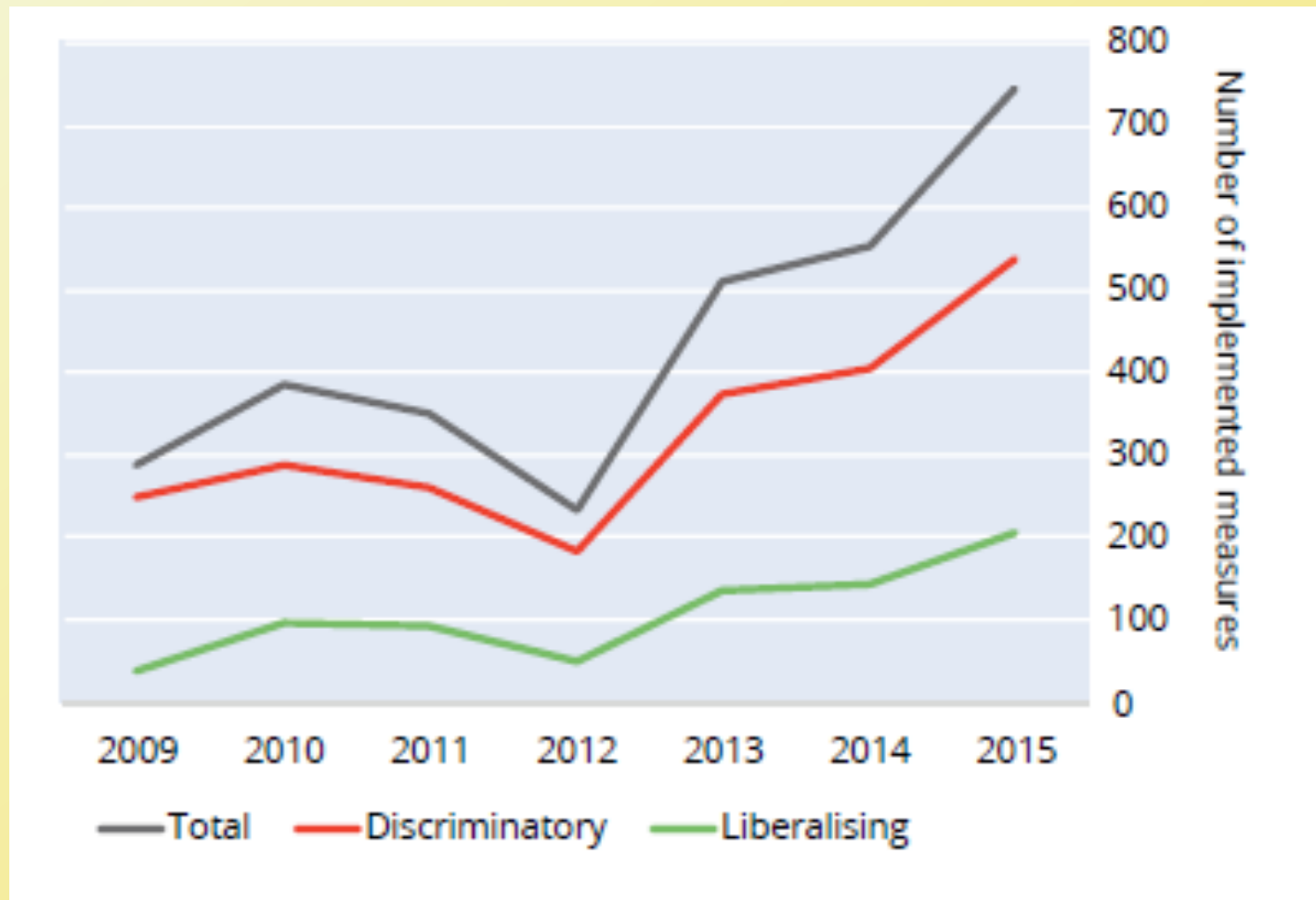
World - Trade - Rate of Growth - 1990 - 2016



## The changing role of China

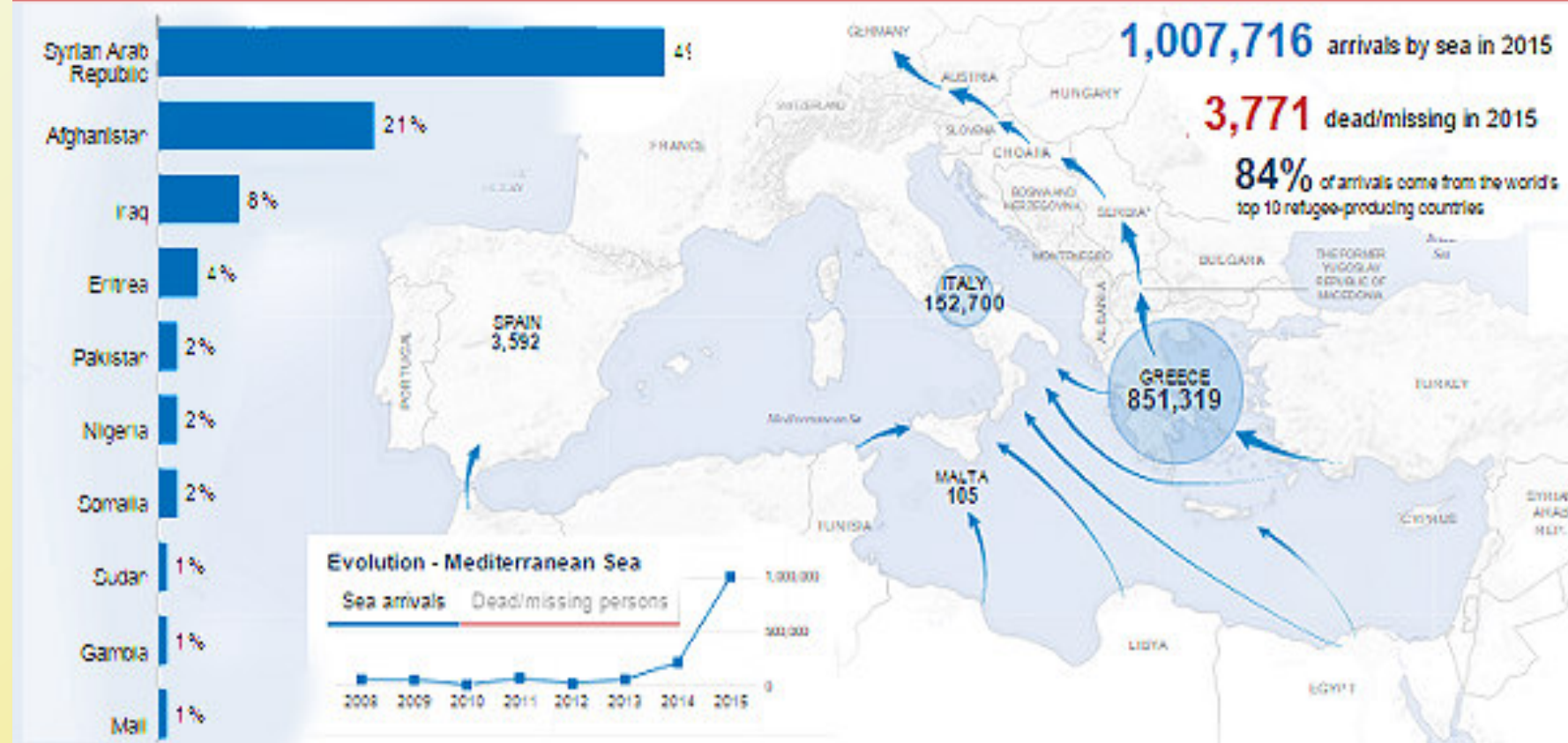


## World - Increase in Non Tariff Barriers, 2010-2015



## Political Crisis

### 1 milhão de refugiados entrou na Europa por mar em 2015



1 million of refugees entered Europe by sea in 2015



## Ecological crisis

- There is little evidence of the emergence of a new production paradigm
  - to be centered on a low carbon economy and renewable energy
  - with economic behaviour based on the respect of natural reproduction processes
- At any rate no emergence at the speed required given the dimension and speed of the threats

Globalization, sustainability, inequality .....crisis

If there is something called 'progress' and 'modernization', globalization has brought with it the opposite: many are experiencing 'retrogression' and 'primitivization'.

- Neo-Schumpeterian economics has developed more towards the micro level than towards addressing the big issues that equally open up when one has grabbed the torch of technology and innovations as explaining not only economic growth in general, but also why this process is so uneven.
- Reinert, E. (ed.) (2004) *Globalization, economic development and inequality*. Edward Elgar, Cheltenham, UK Northampton, USA



More than a “knowledge society”, we are witnessing the emergence of a “capitalist knowledge society”  
“Knowledge-based inequality prevails in contemporary world” (Charles Tilly, 2005)



Illustration: Carlos Latuff (2011)

## Development & Structuralism: 1950s-1970s

- shaped the debate on underdevelopment
- underdeveloped countries are significantly different from industrial advanced ones.
  - and could not follow the same "paths" towards development
- one of the main causes of underdevelopment were related to structural inequalities in international economic and geo-political relations
- Structural changes, specific knowledge of the different realities and respective policies were necessary to overcome backwardness
- Structural changes would require government intervention

Agenda changed dramatically in the late 1970s -  
CRISIS

- difficulties remained in understanding
  - the nature of the crisis,
  - the specificities of the IT revolution
  - the acceleration of globalization
  - conceptualizing the problems and in formulating policy prescriptions to cope with it
- 'counter-revolution in development theory and policy' introduced a radical neo-liberal agenda in which
  - "development practically disappears as a specific question (remaining) only as the welfare achieved by the elimination of obstacles to market functioning" (Arocena and Sutz 2005, p. 16).

- Neo-liberalism to the South
  - underdevelopment is simply the result of bad allocation of resources and that is virtually exclusively caused by government intervention
  - reduced the complex problem of underdevelopment to a matter of simply following some simple economic "recipes" (get prices, property rights, institutions right, governance right, competitiveness right)
  - based on replicating Anglo-American institutions throughout the world and orthodox textbook ideas about liberalization of international trade and investment, privatization, and deregulation (Chang 2005)

## In the North: The Co-evolution

- At the beginning:
- Co-evolution of Ideas about (National) Innovation Systems and Industrial and Technology Policies
- Later on
- Financial Capital dominates the Agenda with results in deepening inequality all over the world



## Systems of Innovation approach

- increasingly used in different parts of world
- Latin American countries it is being applied and understood in close connection with the basic conceptual ideas of the structuralism approach developed in the region since the 1950s.
- since the mid-nineties, the work of RedeSist based at the Economics Institute of Rio de Janeiro, Brazil - has used this dual frame of reference.

# The development of innovation studies as a field rests on

- Rejection of
  - the neo-classical growth model,
  - implicit neo-classical ideas concerning knowledge, and
  - the linear model of innovation.
- (Something that has attracted far less attention is the fact that much empirical innovation research has also challenged the innovation ideas of Schumpeter)



## The concept of (national) system of innovation)

- The context of its creation

- We were fighting neo-liberalism. We were doing this at the start of the Uruguay round [of trade talks]. We were doing this in spite of Margaret Thatcher and Ronald Reagan so we were saying 'national' when the trend was already saying governments must bow out . . . the importance was political, really, and it became one of the rallying flags for people who continued to say that national economic systems are not just markets, they are institutions, there are systemic relations, there are linkages (Chesnais)
- " Technological accumulation is a long and very difficult process, and market forces can disrupt and destroy them extraordinarily quickly" (Chesnais).

- The National Dimension

- 'national' domain better accommodates the policy dimension of the concept. As long as nationstates exist as political entities with their own agendas related to innovation, it is useful to work with national systems as analytical objects.

## The focus of the NSI concept

- The NIS concept was introduced explicitly to compete with, indeed to replace, traditional neoclassical **macroeconomic** theory.
- most people working on innovation systems prefer to work at the micro level and they are a bit frightened still of the strength of the neoclassical paradigm at the macroeconomic level, and I think that's where they have to work. You have to have an attack on the central core of macroeconomic theory. It is happening but not happening enough, not strongly enough argued." (Freeman)

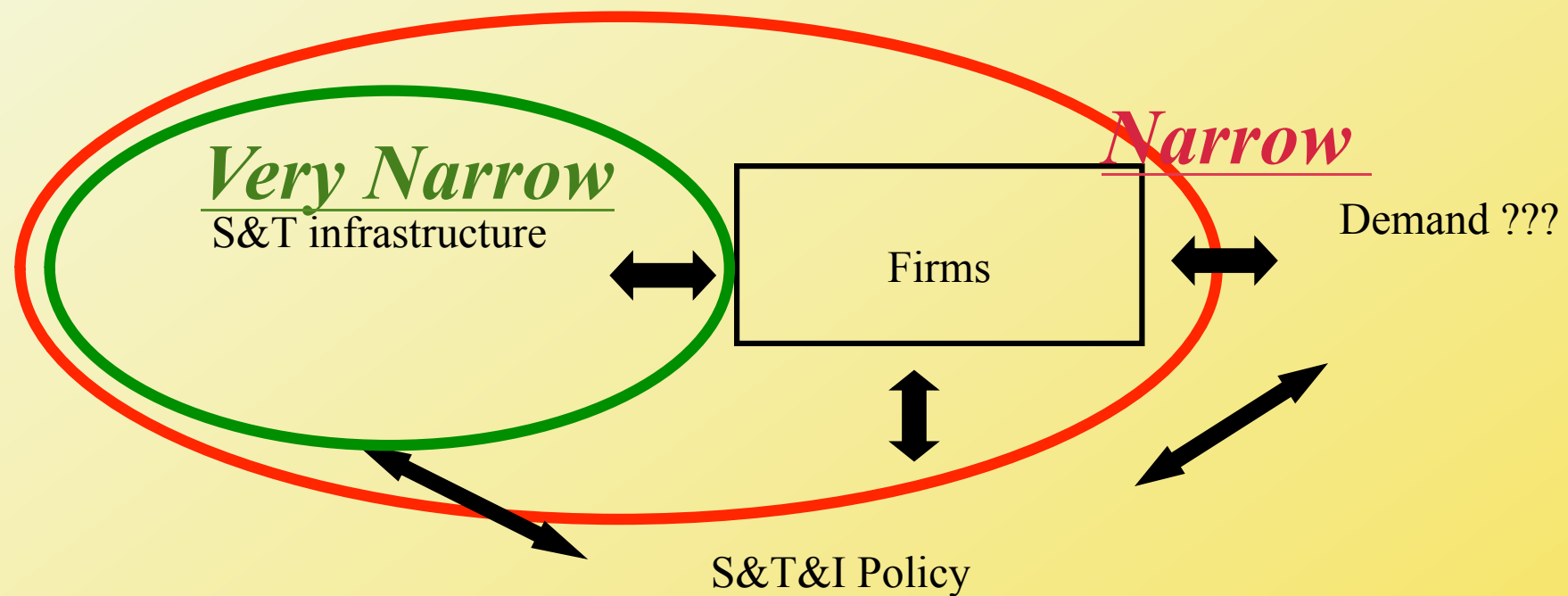
## The concept of (national) system of innovation)

- Theories and concepts that work wonders in countries with an industrial tradition dating back centuries, may, however, become much less productive—if not downright destructive—in the context of developing countries unless filtered through a historical lens.
- Identifying the necessary conditions for the successful implementation of innovation systems in impoverished nations is a project distinct from understanding how to stimulate long-industrialized economies.
- Reinert & Reinert (2003)

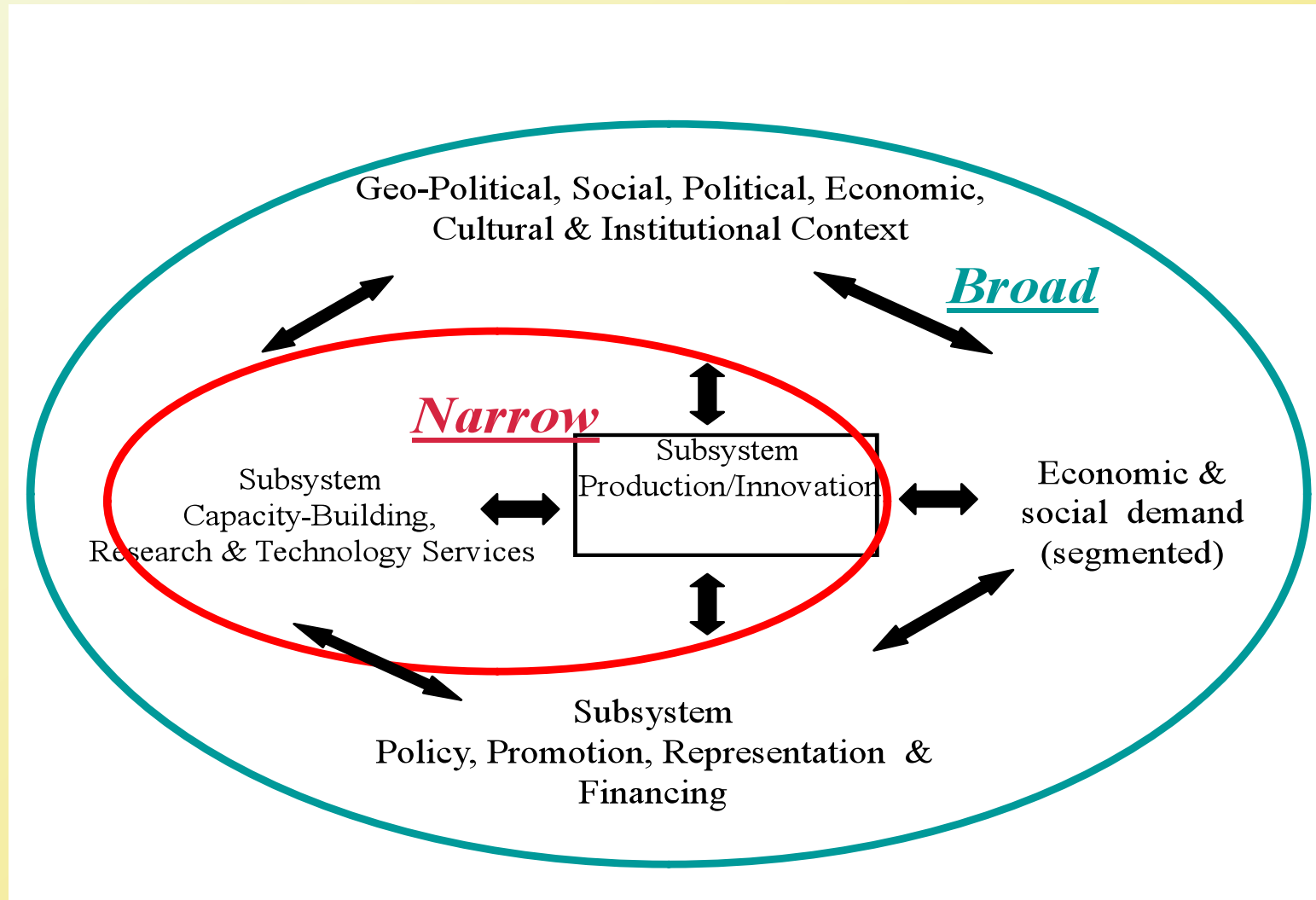
# Diffusion of the IS concept

- National innovation system – historical roots List (1841)
  - A critical response to Adam Smith
  - Innovation as important as allocation – Active state to promote 'mental capital'
- Freeman 1983 and 1987
  - Unpublished OECD-paper 1983
  - Book on Japan 1987
- Handy, dialectical and useful concept – and a synthesis of modern innovation research

## SI: The Narrow Version



## The Broad SI





## Different delimitations of innovation systems

- The narrow version:
  - Extended R&D-systems - linking knowledge institutions to production (Nelson and Mowery).
- The broad version:
  - Extended production systems - focus on learning by doing, using and interaction in the production system (Freeman and Aalborg).
  - Importance of non S&T factors for the explanation of innovation outcomes
    - geopolitical, historical, social and cultural factors.
    - -patterns of competition, role of Western TNCs.
    - POWER





## Theoretical perspective on innovation and learning: as socially embedded processes

- Innovation is a process that is:
  - Cumulative - From Babbage to .....
  - Path dependent - Making electronics components smaller
  - Context dependent - Different innovation styles in UK and Japan and between sectors and regions
  - Interactive - Firms do seldom innovate alone
- Innovation and learning
  - You learn from what you do
  - Learning is a socially embedded process - social capital matters!!



## Historical evolution of Leaders - NSI from X Century to XXI Century

- From China & India .....
- To Genoa - Venice
- To Portugal
- To Holland
- To UK
- To USA
- To ????



## Advantages of the SI framework for development

- Main building blocks– focus on diversity of social, economic and political actors; on context specificities; on micro, meso & macro relationships etc. – allow for local specificities to be considered.
- Complement – with advantages – the focus on sectors and production chains.
- Emphasis on historical, political, national & local trajectories.
- Treatment of innovation as cumulative, context specific and socially determined process
- Contextualization of the analysis of learning and capacity building processes (the context matters)

## The IS literature and development

- The SI literature explicitly acknowledges that some of its most important conceptual pillars are rooted in the development discussion (Freeman, Chesnais, Lundvall).
- IS perspective was inspired by ideas "concerning the interdependence between different sectors from Hirschman (1958) ... (and)...of positive and negative feedback, of cumulative causation, of virtuous and vicious circles and of the importance of institutions from Myrdal (1968)" (Johnson et al 2003 p. 2).

The role of technology was an important part of the post-war debate on development

- . Schumpeter's (1937) concept of development contributed with two central ideas for this debate.
  - connecting technology with production generating new products, new processes or the establishment of new markets.
  - emphasis on the disruptive character of development.
- These two notions shaped the subsequent contributions, particularly in the UN, with Prebisch's (1949), Singer's (1950) and Myrdal's (1958) analyses of the long-term deterioration of terms of trade for primary products and of the distribution of gains between developed and developing countries.



## LASA - Latin American Structuralist Approach

- “underdevelopment is ... an autonomous historical process, and not stages that, economies that already achieved a superior degree of development have necessarily to go through” (Furtado 1961, p. 180)
- development
  - neither linear nor sequential,
  - unique process
  - depends on several aspects related to political, economic, historic and cultural specificities that occur from long-run structural changes that generate ruptures with historically established patterns.
- Theory and policy recommendations are highly dependent on each particular context.

# Structuralism in the 1950s

- Express relation between economic development and technological change
- Growth was based on the accumulation of knowledge and
- Development to be understood within a systemic, historically determined, view.
- Self reliance in India from the 1940s

## LASA – Structuralist Approach

- Is based on a systemic and global perspective regarding the “peripheral condition” and the growth restrictions in less developed countries.
- Therefore,
  - the dynamics of local productive and innovation systems are seen as dependent on their international insertion
  - analyses of economic phenomena also takes into consideration their social, political and historical complexity
  - policy prescriptions are based on the assumption that the process of development is influenced by and reflects the particular environment of each country, rather than to recommendations based on the reality of advanced countries

## Challenges of a new global framework

- Transformations in the global production (and innovation) system
  - The casino has limits !!! And the world will not be the same ...
  - Changes on the main axis of the global economy
  - The relative exhaustion of markets in advanced countries and the importance of markets in the developing world (the Chinese strategy of innovations for local markets and sustainability)
  - The unemployment problem ....
  - The State is back and the importance of policies

Reinert, E. (ed.) (2004) *Globalization, economic development and inequality*. Edward Elgar, Cheltenham, UK • Northampton, MA, USA.

- The crucial link between innovation and finance, which was so important to Schumpeter himself, has been largely ignored by his followers.
- Neo-Schumpeterian economics is the happy story of innovations and increasing returns.
- However, we tend to forget that when the synergies of increasing return activities are destroyed ... the gloomy Malthusian mechanisms of diminishing returns are still alive and well. These mechanisms explain why a large percentage of the world population still lives under the spell of David Ricardo's 'dismal science': wages tend to hover around subsistence level. ...Myrdalian 'vicious circles' and 'perverse backwashes'
- there is a risk today that the rich Schumpeterian vision boils down to a 'Schumpeterian variable' in mainstream equilibrium models, as a Schumpeterian icing on the thoroughly neoclassical cake.



## Conclusion

- In LA - several attempts to use this framework
- At RedeSist, LASA and IS:
  - attempt of developing a framework of thought to understand and orient learning, production and innovation capacity in different regions of Brazil
  - focus on the localized (and national) nature of the generation, assimilation, use and diffusion of innovation
  - observance of the systemic nature of innovation
  - the need of taking into account the productive, financial, social, institutional and political spheres, as well as micro, meso and macro dimensions.

# The analysis of local production and innovation systems of RedeSist

- **International and national context**
  - Analysis of main characteristics of productive activities, focusing on:
    - Competition pattern
    - Technological regimes
    - Supply structure
  - Análise dos contextos geopolítico, econômico e tecnológico relacionados, constituindo, assim, a ponte entre o local, o nacional e o global.
- **Profile of the local system**
  - Description of actors
  - Performance
  - Competitive strategies
  - Institutions and policies.
- **Production and innovation capabilities**
  - Development of indicators and analysis of
    - Formal and informal learning mechanisms,
    - Learning dynamics internal to the firm,
    - Learning processes within the local system
    - Linkages with local, national and global systems.
- **Perspectives and policy proposals**

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