

Economic Crisis and the Forest Sector



Sten Nilsson
Forestry Program Leader, IIASA

Global Economy and the Forest Sector, Helsinki, Finland, 13th May 2009



1

Crisis History

- **The Babylon Empire (~700 B.C.) was highly monetarized and encompassed most of the society**
- **We have probably had financial crisis since then**
- **Rich literature on history of financial crisis (e.g., Parker, 2008; Ferguson, 2008; Elliot and Atkinson, 2008; Reinhart and Rogoff, 2009)**
- **The devil of financial crisis has been greed and amnesia**
- **Debt markets have always played a crucial role in the financial crisis**



2

Recent History

Shanghai -12.78% India -19.3% South Africa -8.60% Russia -21.12%

Dow Jones Industrial Average (log scale)

1929: The Wall Street Crash

1907: The Brokers' Panic



Recent History

Spain -19.8% France -21.5% Brazil -22.5% Mexico -12.9%

1973-74: The Oil Crash



Recent History

1987: Black Monday

Bourses across the world experience heavy losses. It would take two years for the Dow to return to pre-crash levels. The market slide was blamed on the rise of computerised hedging strategies. These used futures contracts to give investors a chance to benefit from big equity market gains while limiting any losses with short positions in equity index futures.



1997-98: The Asian Crisis

The third largest one-day points fall on the Dow halted trade at the NYSE for the first time in October 1997 after the Asian financial crisis roiled fears of a worldwide economic slowdown. The upheaval saw sharp contractions in Asian economies and heavy falls in the value of regional currencies. Russia's debt default came in 1998.



The current market rout, which has turned to panic selling in the last two days, began with the collapse of Lehman Brothers four weeks ago. The move led directly to a freeze in money markets, blocking the lifeline of the global financial system. Fears have grown of a long and deep global recession.

The 2008 Crash

Dow Jones Industrial Average (log scale)

Source: Financial Times, 11/12 October 2008

Recent History

- During the last three decades a crisis has appeared every 10 years — so it can be argued that the 2008 crisis was to be expected

The 2008 Crisis

- **Last 20 years tremendous economic growth — driven by Credits, Leverage and Deregulation**
(World Bank, 2009)
- **Deregulation of financial markets began 15–20 years ago — new complex systems traded to third party**
- **Credit excesses** (Roubini, 2009)
- **Excessive consumption**
 - Fuelled by overvalued US\$ since late 1990s
 - Low rate of interest in the US 2001–2003
 - Wrong pricing of money — too cheap

The result was economically unsound consumption

- **Success bred excess**
 - Credit-fuelled loans under stable inflation and stable perceived macroeconomic conditions the greater the excess in consumption (White, 2008)
- **Trade deficits/debts and capital inflows from abroad**
 - Trade deficit of 6% of GDP in 2006 in the US
 - Huge and sustained inflow of foreign lending runs high risks of subsequent financial crisis (Wolf, 2008)
- **Monstrously huge financial sector**
 - The financial sector needed to shrink (Federal Reserve Bank of Minneapolis, 2008; Smirk, 2008)
 - The tail wagged the dog instead of the dog wagging its tail

- **Few had disproportionate financial influence**
(Rothkopf, 2008)
 - **With excess credits and consumption the financial instruments become more complex, toxic and destructive** (Roubini, 2009)
 - Only the financial engineers constructing them understood the instruments
 - **Failure by the risk models used and Rating Agencies**
 - Couldn't keep pace with the explosive growth in the complex engineered financial instruments
 - But still high ratings by rating institutes
 - Moody's systematic overvaluation
- (Rajan et al., 2008; Mayer et al., 2008; IHT, 2008; Pielke Jr., 2008)

- **Globalization, a megaforce in distributing complex engineered financial instruments all over the world** (Rouch, 2009)
- **With globalization, a multiplicative effect of credits was built up**
- **Housing market was the vehicle of the development**
 - Housing was the piggy bank
 - Subprimes
 - Drove the unparalleled consumption excess
- **The subprime/housing bubble started already in summer 2007 and burst in summer 2008**

Early 1990s

Policies on:
Stimulating
Economic
Growth



Measures:
• Credits
• Leverage
• Deregulation



• Credit
excesses
• Excessive
consumption



Excessive consumption
fuelled by:

- Too cheap money
- Overvalued US\$
- Low interest rate in US



Economically
unsound
consumption



Success
breeds
excess
and
greed



Budget
& Trade
Deficits:
• Debts
• Foreign
lending



Monstrously
huge financial
sector
• The tail
wagged the
dog



Few had
disproportionate
financial
influence



More complex
toxic and
destructive
financial
instruments



Failure by
risk models
and Rating
Agencies



Globalization
a megaforce in
distributing complex
engineered financial
instruments



Multiplicative
effect of credits



Housing market
becomes the
vehicle of the
credit spiral
• Housing piggy
bank



Insufficient numbers
of new buyers
• Prices
decreased
below
mortgages



Housing bubble
in summer 2007
• Banking
problems start



Bubble burst in
summer 2008

➤ **Not only one bubble burst but many**

- Real estate, mortgages, credit cards, car loans, government borrowing, hedge funds, industrial loans, etc.

➤ **Wolf (2008) summarizes this string:**

“The lax monetary policies/regulations facilitated the excess credits and spending, while the housing bubble was the vehicle through which it worked”

➤ **Irresponsible banks**

- **Greed and irresponsibility** (Ferk, 2008; Lewis, 2008; Blinder, 2009; Kay, 2009)
- **“Our economy is badly weakened, a consequence of greed and irresponsibility on the part of some....”**
(Obama’s Inauguration Speech, 2009)
- **“Bankers causing an astonishing mess of the financial system”** (Treasury Selected Committee, 2009)
- **“Put modern banking under the same regulations as gambling”** (Centre for the Study of Financial Innovation, 2009)

➤ **Overall System Failure leading to the crisis**

- A string of interacting factors and not a single factor — 20 to 25 years

➤ **Recovery of Economy in a System Failure requires**

- A long string of actions
- Taking a long time

Long Cycles of Innovation Waves

➤ **Schumpeter (1939)**

➤ **Fourth Wave 1996–2000**

The Systems of Systems Crash?

- A lot of turmoil has taken place before the economic crash — energy, commodities, food, etc.
- Holling (2008) and Homer-Dixon (2006) see that all of these events are interconnected
- The world is moving toward a *major transformation* due to increased vulnerabilities of the system
- We are in a back-loop stage which is causing deep collapses and destruction giving pulses to regeneration
- Strong international cooperation needed
- Sukhdev (2008), Waughray (2009) and Annan (2009) express similar thoughts — there is more than just the financial crisis

How Was It Allowed to Happen?

- 10 year cycle — it was time
- Bubble identified already in summer 2007
- Nouriel Roubini had warned for years of a crash
- Investment bankers like Grantham and Rodrigues warned already in 2004/2005 of a collapse
- Schiff (2007) in his book “Crash Proof” predicted the American recession and the collapse of Fannie Mae and Freddie Mac correctly in time
- Blinder (2009) identified the subprimes as insane and the crisis was a result of avoidable human errors

- **Banks played games with mortgage backed instruments**
- **Banks were irresponsible and greedy**
- **Opinion leaders failed**
- **Economic sciences turned out to be a bubble in itself and delivered “enormous scientific nothing”**
- **Arrogance in the financial sector**
 - “The crisis is due to market turbulence and not bad investments and bad management”
 - Mentally same as 18th century French aristocracy
- **To have trust in the financial sector the leaders must demonstrate competence**
- **Bonus systems are the cancer of the financial sector**

Financial Stimulus Programs

- **Banks and auto producers**
- **Some economists criticize the bank support**
- **The Davos World Economic Forum 2009 express concerns that the financial stimuli programs are not the right ones to mitigate the economic decline (Giles et al., 2009)**
- **The South African Finance Minister stated that the financial stimulus might “lead to nought”**
- **Economists like Blinder (2009) claim that the bankruptcy of Lehman Brothers pulled the plug of the economy**
- **Blinder (2009) also claims that the TARP allocation was misused**
- **An overall system failure? Are policy makers using the right stimulus program?**

Second Wave Crisis. When?

Current Crisis



Less growth
No profitability
Low investments
Increased unemployment
(ILO 50 million; Beijing 30 million)
More toxic papers
Dried up credit markets
Bankrupt countries
(Baltics, Ukraine, Hungary, Iceland, etc.)
Increased budget deficits



Second Wave Crisis

Summary of Crisis Features #1

- The current crisis is a long-term phenomena (20–25 years)
- System failure of the financial system
- Interaction with long-term innovation waves and a system of systems crash
- Huge amounts of toxic papers and assets still out there
- Stimuli programs doubtful in a systems failure
- Increased budget deficits — uncharted territories- \$10 trillion
- Failure by the banking system
- Great reconstruction of the banking system needed
- Worldwide crisis

Multiplier

- **Stimulus package has a multiplier of 1.6 in the US**

(Christina Romer and Jared Diamond)

- **Stimulus multiplier effect in reality 0.4**

(Cogan, J.F., Cwik, T., Taylor, J.B. and Wieland, V., 2009:
New Keynesian versus Old Keynesian Government Spending
Multipliers)

Summary of Crisis Features #2

- **Financial crisis ➤ economic crisis ➤ unemployment crisis ➤ human and social crisis**
- **Second wave crisis**
- **Derailed globalization**
- **Currency rates will be volatile**
- **Economic nationalism**
- **Speed of the slump**
- **50% of stock values lost in 18 months. One year of world GDP lost since mid 2008 in the financial sector**
- **To rebuild trust is a long-term affair**
- **Long-term crisis — 4 to 5 years**

A Tale of Two Depressions

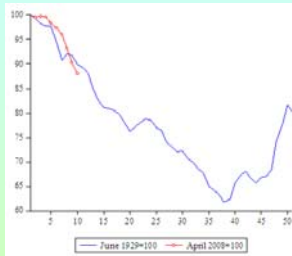


Figure A: World Industrial Output, Now vs Then
Source: Eichengreen and O'Rourke (2009) and IMF.

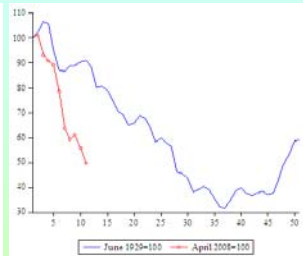


Figure B: World Stock Markets, Now vs Then
Source: Global Financial Database.

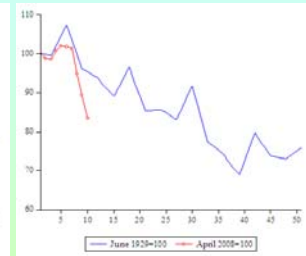
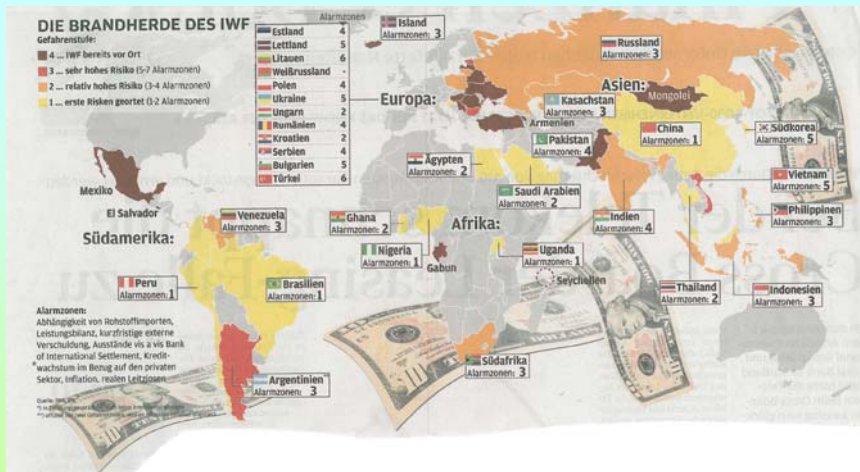


Figure C: The Volume of World Trade, Now vs Then
Sources: League of Nations Monthly Bulletin of Statistics
<http://www.cpb.nl/eng/research/sector2/data/trademonitor.html>



Source: Wirtschaftsblatt, 14 April 2009

Green Shoots and Glimmers of Hope

- **Banks** – unknown value of toxic assets, unknown amounts set aside for future losses, changed fiscal year (forgetting the month of December)
- **Industrial Companies** – stock improvements but the crisis is a synchronized balance-sheet recession around the world and is not stock-cycle based.
- **US** – industrial production 10 year low, low housing starts, housing prices falling, economy has fallen 3 quarters in a row.
- **IMF** – late April – the world has fallen into deep recession. Recession will be long with slow and painful recovery.
- **EU** – on May 4 – slashed earlier economic outlook and states the economic downturn will be deeper and last longer.

Bottoming is not Recovery

Green Shoots – The Week of May 4th, 2009

- **Bank Stress Test**
 - The banking crisis is over
- **Not a rigorous assessment of the banks' assets**
- **Interest rates on bonds and prices of bank credit-default swaps are levels regarded as inconceivable before the crisis**
- **The financial system won't function until the players get much stronger financially**
- **A multi-year period of economic weakness – hard to see where the real recovery will come from**

(Paul Krugman, May 7, 2009)

Green Shoots – The Week of May 4th, 2009

- **Rally on the stock market**
 - The downturn in the financial crisis is over
- **Will have ups and downs**
- **The economic crisis will be worse and it will take substantial time for recovery**

(Chief Economist Swedbank, May 8, 2009)

Green Shoots – The Week of May 4th, 2009

- **US Retail sales rise**
 - American are buying again
- **Overall sales index up 1.2% in April. But excluding Wal-Mart the index fell with 2.7%**
- **Consumers only buy basics**
- **Discount shopping dominates**
- **Retails sales won't pick up in any near future**

(Founder of America Research Group, May 7, 2009)

Green Shoots – The Week of May 4th, 2009

- **IMF reduces the financial risk assessment for Eastern Europe**
 - Correction downwards due to calculation mistake
- **EBRD change its economic growth forecast for 2009 from 0% to -5%**
- **No recovery visible in Asia until earliest 2010 “long and severe recession with weak recovery”**

(EBRD and IMF, May 7, 2009)

Principles for a Black Swan-proof Economy (Modified after Taleb, 2009)

- ***What is fragile should break early while it is still small.*** Nothing should ever become too big to fail.
- ***No socialization of losses and privatization of gains.*** Whatever may need to be bailed out should be nationalized and whatever does not need a bail-out should be free and risk-bearing.
- ***People who were driving a school bus blindfolded (and crashed it) should never be given a new bus.*** The economics establishment (universities, bankers, regulators, government officials etc.) lost its legitimacy with the failure of the system. These people can't get us out of the mess. Find smart people whose hands are clean.
- ***Do not let someone making an “incentive” bonus manage a nuclear plant or your financial risks.*** No incentives without disincentives; capitalism is about rewards and punishments, not just rewards.
- ***Counter-balance complexity with simplicity.*** Complexity from globalization and highly networked economic life needs to be countered by simplicity in financial products.

Principles for a Black Swan-proof Economy (Modified after Taleb, 2009) (cont.)

- ***Do not give children sticks of dynamite, even if they come with a warning.*** Complex derivatives need to be banned because nobody understands them.
- ***Do not give an addict more drugs if he has withdrawal pains.*** Using leverage to cure the problems of too much leverage is not homeopathy, it is denial. The debt crisis is not a temporary problem, it is a structural one. We need rehab.
- ***Make an omelette with the broken eggs.*** The crisis cannot be fixed with makeshift repairs. We will have to remake the system before it does so itself (helping what needs to be broken to break, converting debt into equity, marginalizing business schools, shut down the “Nobel” in economics, banning leveraged buyouts, putting blind bankers where they belong, clawing back misallocated bonuses, etc.)

Source: Nassim Nicholas Taleb, *Financial Times*, 7 April 2009

Commodity Prices and Volumes

- **Demand and prices on non-energy commodities will decrease by 20–30% until the crisis has bottomed**
(World Bank, 2009; Roubini, 2009; Saxo Bank, 2008; McKinsey, 2008)

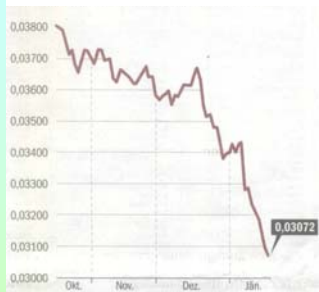
Currency Drop: Mid July–Mid October 2008

Hungary	24%
Bulgaria	15%
Ireland	23%
Estonia	15%
United Arab Emirates	Unchanged
South Africa	18%
Nigeria	Unchanged
Kuwait	Unchanged
Mexico	21%
Argentina	6%
Venezuela	6%
Brazil	31%
Indonesia	7%
South Korea	24%
Pakistan	11%
Australia	33%

Source: Wall Street Journal, 13 October 2008

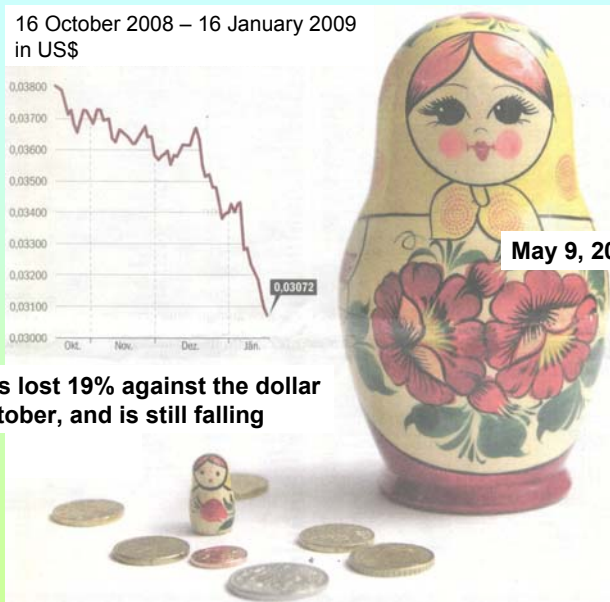
Russia's Ruble

16 October 2008 – 16 January 2009
in US\$



May 9, 2009 ~ 0.0309

The Ruble has lost 19% against the dollar since mid October, and is still falling



Source: Bloomberg (Stand 17:00 hours); Die Presse, 17 January 2009

Euro Against the Dollar and the Yen

May 9, 2009 ~ 1.33



Source: FT, 19 February 2009

Blaming the Economic Crisis

➤ American Car Industry

U.S. market share of Detroit's three carmakers compared with that of foreign-headquartered companies

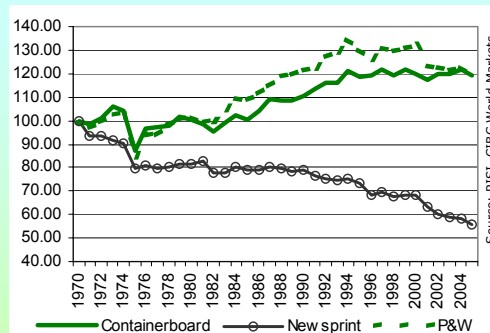


Through October 2008; 2009–2011 are estimates

Source: Center for Automotive Research; The Wall Street Journal, 2 December 2008

Changed Demand Patterns on Forest Industrial Products

Shift in Global Growth Global Consumption Per Unit of Real GDP



- Electronic communication is having a meaningful impact on the consumption of paper
- At the global level, the “intensity of consumption” in the economy has been declining for newsprint since 1970, and started to decline for printing and writing papers in 2000
- Packaging is more associated with overall economic activity, and is “holding its own”

Return on Capital Employed %

The 100 Largest Forest, Paper and Packaging Companies

2003	2004	2005	2006	2007
4.2	5.3	4.9	4.6	4.8

Source: PricewaterhouseCoopers, 2008

ROCE

	2006	2007
Sweden	6.0	5.9
Finland	4.3	2.3

Source: PricewaterhouseCoopers, 2008

ROCE Leaders in 2007

	2006	2007
Setra Group, Sweden	12.3	25.2
Kimberly-Clark, Mexico *	17.7	20.3
Kimberly-Clark, USA *	12.1	15.2
Lee & Mann Paper, China	12.6	15.0
Nine Dragons, China	14.2	13.0
Sino Forest, China/Canada *	12.4	12.6
Arauco, Chile	11.2	11.9
Rayonier, USA	12.5	11.4
The Pack, Japan	10.4	11.0
Votorantim, Brazil *	11.9	10.9
Sonoco, USA	9.8	10.5
Packaging Corporation of America, US	8.5	10.4
Portucel, Portugal	7.4	10.2

* Also leaders in 2002–2006

Source: PricewaterhouseCoopers, 2008

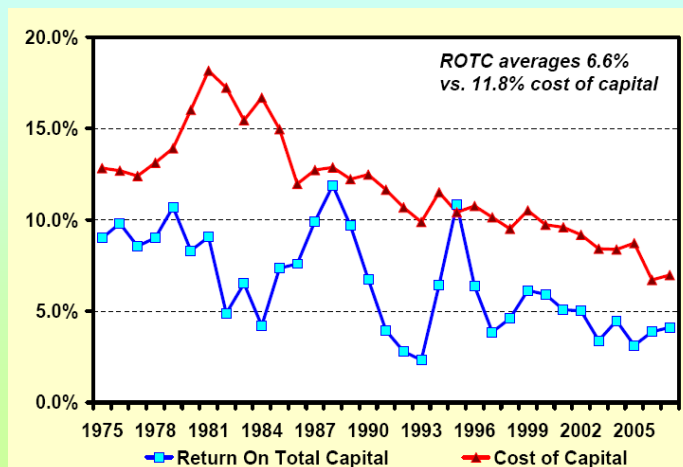


Forestry Program

43

Financial Performance

Returns on Book Value of Total Capital—
Covers Debt But Remains Below Cost of Capital



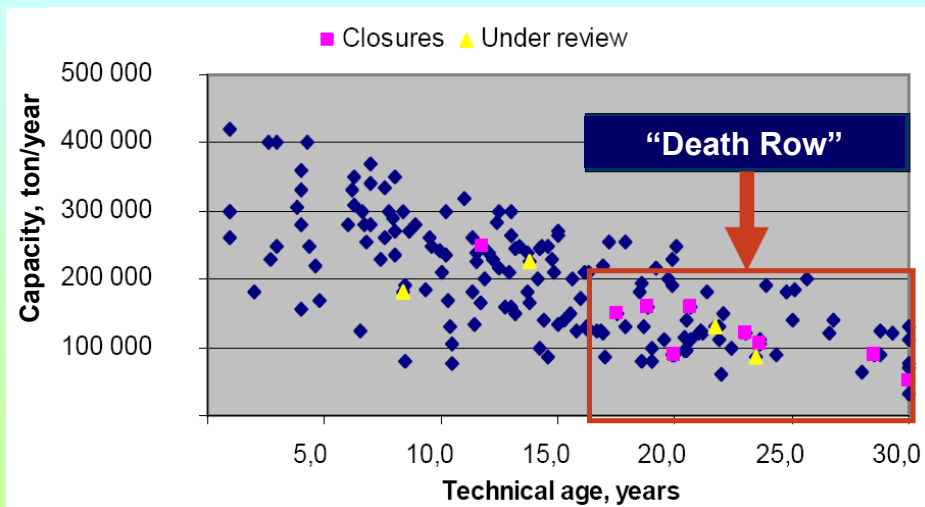
Source: McNutt, CPBIS (2008)



Forestry Program

44

Printing/Writing Machines in Europe



Source: Sundin (2008)



Forestry Program 45

Lack of Visions in the Forestry Industry

- Rantala (2008): Finnish industry has lacked clear visions for years
- Nilsson (1996): Corporate Amnesia? *Swedish Paper Magazine* 9:8
- Nilsson (1996): The Forest Sector Lacks Visions, *The Forest*, No. 8
- Some 70% of the leading executives in the industry state that global trends are increasingly important
- But very few companies have addressed them successfully
- Reasons: “Other priorities, lack of skills, lack of resources, can’t decide what to do, etc.” (McKinsey, 2008)



Forestry Program 46

**Aracruz has lost
\$2.13 billion on
dollar currency
derivates**



Source: Bracelpa/FAO, June 2008



Forestry
Program

47

Even before the onset of the current financial crisis, the global forest sector was experiencing some of the most fundamental changes in markets and public policies since the end of the Colonial Era

For example:

- **Explosion of the Asian wood deficit**
- **Revolution in electronic communication**
- **Prospective pricing of carbon**

Source: Roberts/CIBC, 2009



Forestry
Program

48

Two Crises in One

Threats to the Southern Forest Industry

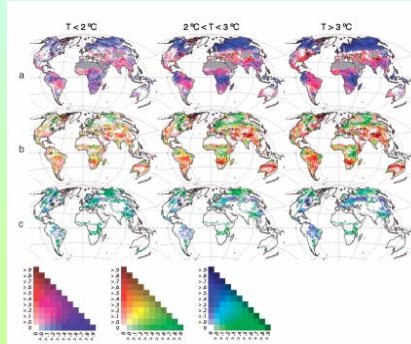
2007/08

Climate Change	Yes
Land Availability/Land Costs	Yes
Water Scarcity	Yes
Social Pressures on Monocultures	Yes
Energy Availability/Costs	Yes
Currency Appreciation	Yes
Long Distance Transportation Costs	Yes
Fast Changes in Consumer Demands	Yes+
Product Substitution	Yes
Production Costs (inflation, wood, energy, water, logistics)	Yes
Capital Availability and Capital Costs	Yes

Economic Growth/Climate Change/Energy

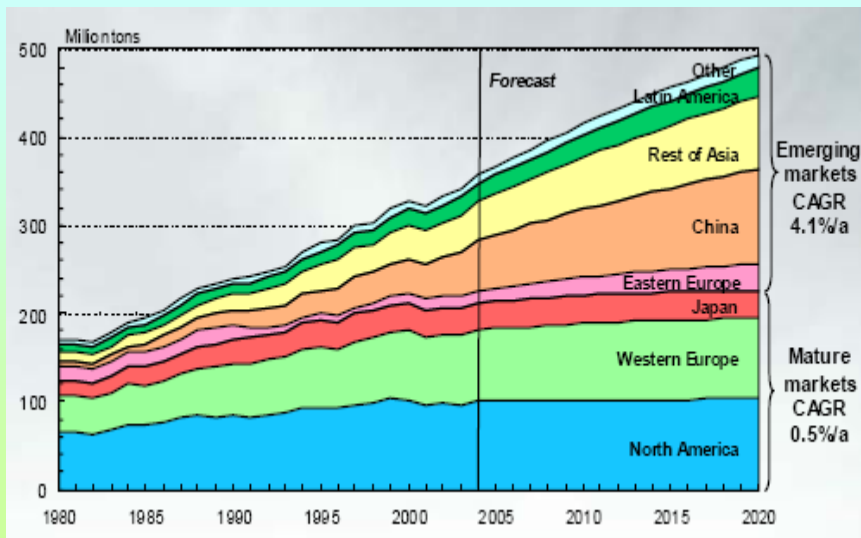
- What are the most plausible land-use structures and forest industry strategies with increased forest raw material costs, energy costs and climate impacts?
- Climate Impacts

Probability of exceeding critical levels of change between 1961–1990 and 2071–2100 for three levels of global warming. For quantitative variables (freshwater runoff and wildfire frequency), critical change is defined where the change in the mean of 2071–2100 exceeds $\pm 1\sigma$ of the observed (1961–1990) interannual variability. (a) Freshwater runoff (blue for increase, red for decrease; mixed colors show cases where different runs produce changes in opposite directions, i.e., there are runs of both exceeding the critical level by $+1\sigma$ as well as by -1σ). Gray areas denote grid cells with ≤ 10 mm·yr⁻¹ mean runoff for 1961–1990. (b) Wildfire frequency (red, increase; green, decrease). (c) Biome change from forest to nonforest (blue or vice versa (green)). For wildfire frequency and biome change, colors are shown only for grid cells with $< 75\%$ cultivated and managed areas



Source: Scholze *et al.* (2006); PNAS 103(35): 13116-13120.

Globalization



Current Financial Meltdown

Demand Data (January 2001–November 2008)

	CAGR	Year-to-Date 2008 Change	November 2008 YoY Change
Newsprint	-7.4%	-11.0%	-18.6%
Printing & Writing Paper			
• Coated Woodfree	-2.7%	-6.9%	-17.0%
• Coated Groundwood	-3.9%	-15.9%	-33.1%
• Uncoated Woodfree	-5.2%	-7.4%	-18.5%
• Uncoated Groundwood	0.6%	-0.8%	-21.5%

- Since 2000, the growth in N. American demand for paper and paperboard has been anemic at best
- In the case of newsprint and uncoated free sheet paper — the two largest grades of paper — we are now seeing the cyclical contraction in demand reinforce a secular downward trend; expect meaningful price declines in 2009

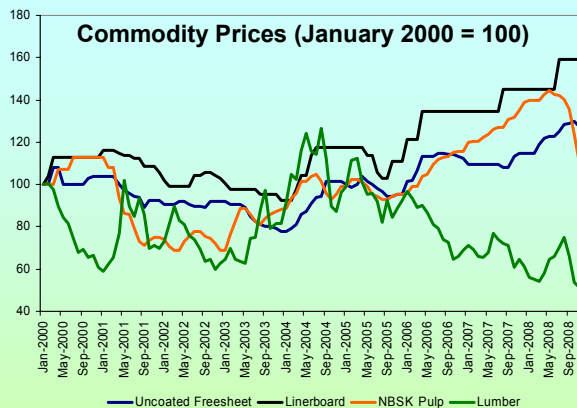
Sources: Roberts/CIBC, 2009; Pulp and Paper Week, PPPC and CIBC World Markets Inc.



Forestry Program

53

Current Financial Meltdown



- Thus far, commodity prices in the forest industry have performed very differently
- Lumber already unsustainably low; Pulp in free-fall; UFS and linerboard are at cyclical peaks, but starting to weaken

Sources: Roberts/CIBC, 2009; RISI, Random Lengths and CIBC World Markets Inc.



Forestry Program

54

Globalization of Fiber Markets

Future Scenario on Wood Fibers

Region	Accessibility of Wood Fiber	Demand Forest Industry Products	Wood Fuel	Balance Supply/Demand Wood Fibers
Nordic	Slight increase	Slight increase	Strong increase	Reduced
EU15	Slight decrease	Slight increase	Strong increase	Reduced
Former East Europe and CIS	Slight decrease	Increase	Strong increase	Reduced
Russia	Slight increase	Strong increase	Strong increase	Unchanged
Africa	Unchanged/Increase	Slight increase	Increase	Reduced
China	Slight increase	Strong increase	Increase	Strongly reduced
India	Strong decrease	Strong increase	Increase	Strongly reduced
SE Asia	Strong decrease	Strong increase	Increase	Strongly reduced
Oceania	Increase	Slight increase	Slight increase	Improved
USA	Slight decrease	Unchanged	Slight increase	Reduced
Canada	Strong decrease	Slight increase	Strong increase	Strongly reduced
Latin America	Increase	Strong increase	Increase	Reduced

Source: Nilsson (2007)



Forestry Program

55

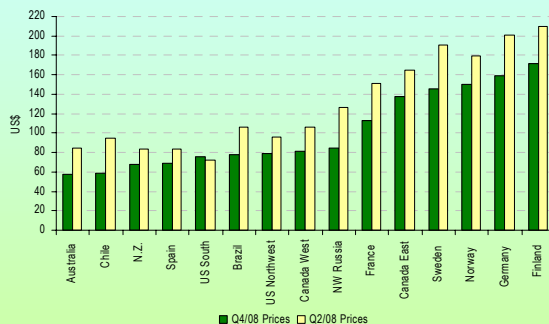
Global Woody Biomass Prices

- Globally, average \$US denominated softwood pulpwood costs fell 12% to \$97/odmt in Q4 – the biggest drop in over 20 years. Reflects lower local costs and stronger \$US.

- Un-even correction across regions.

- The biggest drops have occurred in Brazil, Sweden and Oceania.

Average Delivered Softwood Biomass Prices, US\$/ODMT (Q2/08 average vs Q4/08)



Source: Wood Resources International and CIBC World Markets Inc.

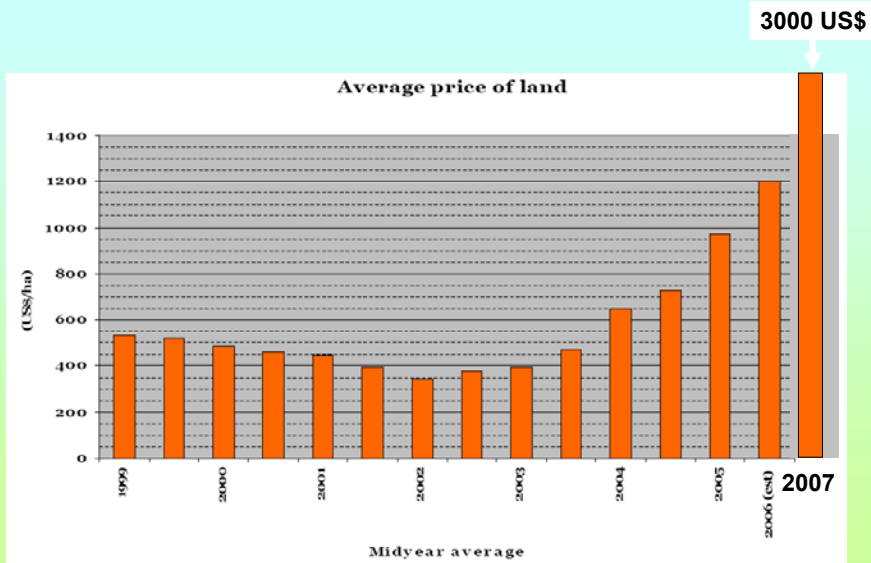


Forestry Program

56

Price Evolution: Uruguay Land Price (\$/ha)

Recent Price Increase on Timberland in US South +40%



Source: Scanfiber (2007)



Forestry Program

57

Implications of the Financial Meltdown for Timberland

- Prepare for a Roller-Coaster Ride with sharp declines in the coming years

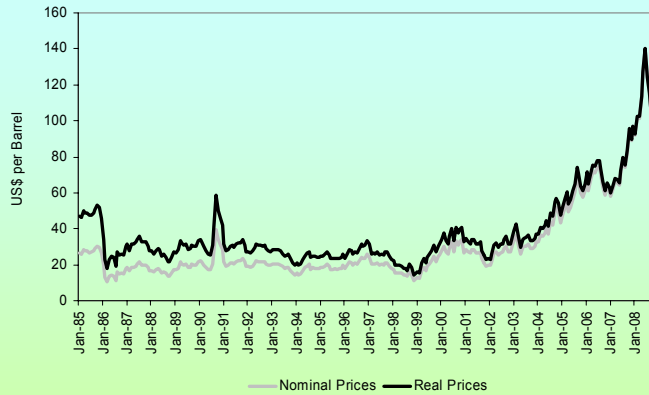
Source: CIBC, October 2008



Forestry Program

58

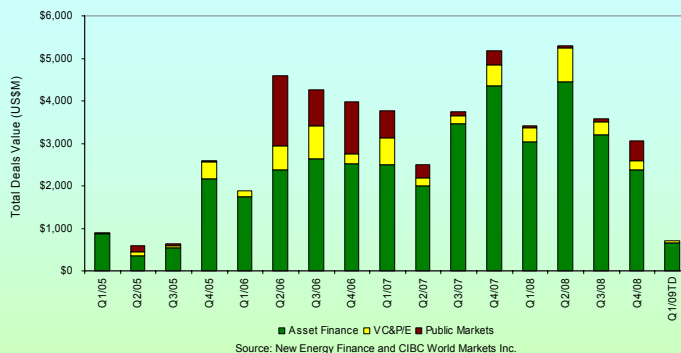
Historical Oil Prices



Oil prices have been a major casualty of the crisis due to decreases in actual (and expected) demand

Sources: Roberts/CIBC, 2009; Bloomberg and CIBC World Markets Inc.

Global Biofuels Investments



Source: New Energy Finance and CIBC World Markets Inc.

Global biofuels investments have dropped an order of magnitude in less than a year. From over \$5 billion in Q3/08 to ~\$0.5 billion in Q1/09.

Asset Finance is clearly the dominant source of financing for the industry ... although the Public Markets did play a meaningful role in 2006.



Currencies: Brazilian Real / US\$

2003	2004	2005	2006	2007	Sept 2008	Jan 2009	May 2009
3.08	2.93	2.44	2.17	1.95	1.59	2.45	2.07

Threats to the Southern Forest Industry

	2007/08	2009
Climate Change	Yes	Yes
Land Availability/Land Costs	Yes	No
Water Scarcity	Yes	Yes
Social Pressures on Monocultures	Yes	No
Energy Availability/Costs	Yes	No
Currency Appreciation	Yes	No
Long Distance Transportation Costs	Yes	No
Fast Changes in Consumer Demands	Yes+	Yes-
Product Substitution	Yes	Yes
Production Costs (inflation, wood, energy, water, logistics)	Yes	No
Capital Availability and Capital Costs	Yes	No

Source: Modified from Claudio-da-Silva, Jr., 2007



Forestry
Program

63

Summer 2008

- **Declining spread in production costs across regions. Other variables will increase in relative importance when assessing location of investments in the forest industry**



Forestry
Program

64

The BC Economy (Before the Crash)

➤ Had too much of too many things

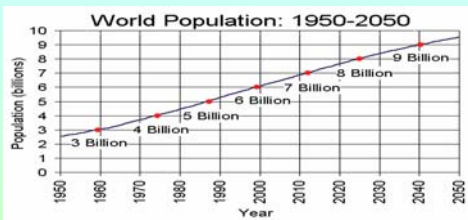
- Too much debt
- Too much consumption
- Too much speculation
- Too much complicated financial instruments
- Too many blind bankers
- Too many bubbles
- Too much greed
- Etc.

This economy is not coming back. This was demonstrably unsustainable.

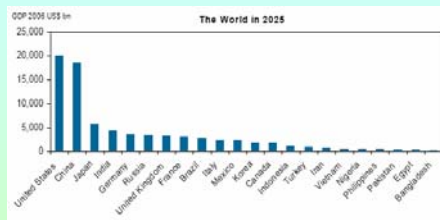
➤ The AC Economy (After the Crash)

- Values for money – value rules
- Less wasteful economy
- Shrinkage of full-price market place
- More saving
- The new Big Three – Government, Healthcare, Education
- Reordering of the economic geography

Beyond the Recession



Graph 1: World Population Growth

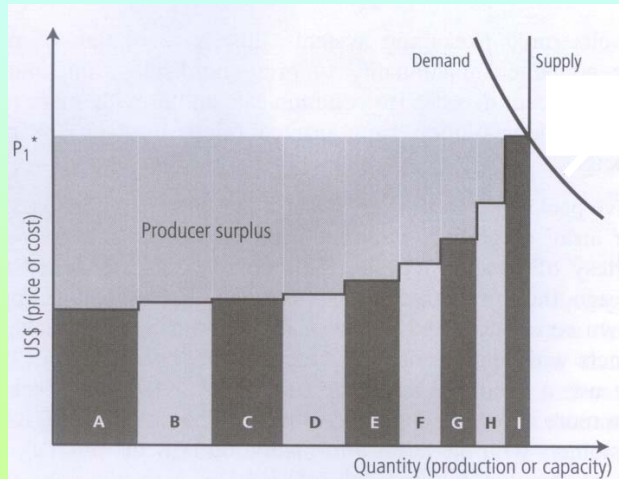


Graph 2: New Economic Players

The world will not be the same as before the crisis.

Static Equilibrium Model of the Forest Industry for Different Regions (letters) having Varying Capacity (x axis) and Production Costs (y axis)

- Demand: 25–30%
- Prices: 25–30%
- Currencies
- Inflation
- Capital
- Cash
- Social unrest and political upheaval



Source: IUFRO, 2005

Beyond the Crisis and the Forest Sector

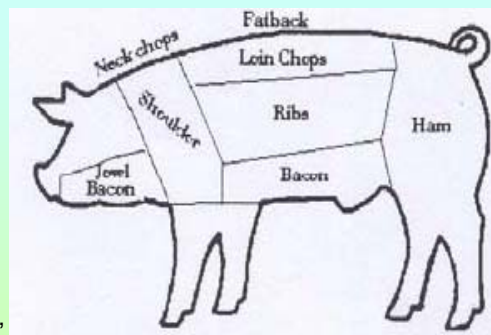
- A slimmed down sector
- Sweeping changes in financial sector which will expand to corporate governance
 - More governments
 - More scrutiny, oversight and bureaucracy
- Harder and more expensive to get investment capital. Slowed down investments.
- Destruction of certain forest products markets
- The maturing debt will put a number of companies under stress
 - AbitibiBowater, Canada
 - StoraEnso, Finland
 - Hansoi, Korea
 - Nine Dragons, Lee & Mann, and Chenming, China
 - Some Indian majors
 - Some majors in Mexico
 - Aracruz

Beyond the Crisis and the Forest Sector (cont.)

- Exchange rates will be crucial for the development and especially the US dollar. US dollar longer-term slide in value.
- High to super inflation after the crisis in high debt/deficit, high degree of foreign debts, and raw material based economies.
- The financial stimulus programs will generate bio-based products including bioenergy.
- Prices of yesterday artificially high, swelled by excessive leverage
- Two crises in one. After recovery the first crisis still in place. There is doubt the forest sector can return to strong growth after recovery from the second crisis.
- Bold restructuring sooner than later. The “old rules of money” will not work. It is a new game. “What”, “Who” and “How”

Pig Farm — Joint Product Industry

Water filters, insulation, rubber, chalk, antifreeze, plastics, floor waxes, crayons, chalk adhesives, fertilizers, enzymes, toothpaste, crafting supplies, phosphorus, gelatin, sweets, shaving cream, chewing gum, chocolate, biscuits, cornflakes, canned foods, fruit tins, medications, food additives, cosmetics including **lipstick**, insulin for diabetes, valves for human heart surgery, suede for shoes and clothing, buttons, glass, brushes, biofuels, glue, footballs, etc.



- Referenced studies assess 270 to 500 commercial by-products
- Nearly 100% of the pig used for value added products
- Enormous by-products markets

Forest Industry — Joint Product Industry

- Lumber
- Pulp
- Engineered products – plywood – particleboard, etc.
- Energy
- Biorefinery – biofuels – solvent spun – stable fibers (textiles) – filament (threads) – nitro cellulose (esters for lacquers) – micro crystalline cellulose (carrying active substances) – acetates (cigarette filters) – derivative ether – lignin for superplasticizers – cellulose carbonate
- Limited by-products market developments

Profitability

Pig Filets

- Loin chops, ribs
- Acceptable Profitability

Forest Filets

- Saw logs and pulp logs
- Non-acceptable Profitability

Take the Lipstick Off the Pig and It's a Different Swine

Subsidies:

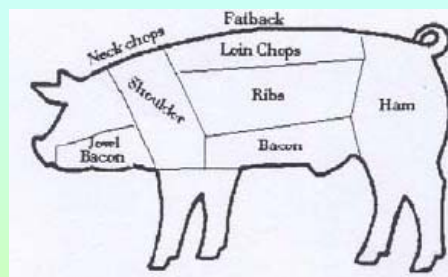
- Pig feed
- Breeding
- Slaughter
- Packaging of meat
- Export
- Land stewardship



- In 2001, Western Europe, Japan and Korea supported pig farmers with US\$7.3 billion (OECD, 2002; RIRDC, 2003)
- There is around 16–40% so-called Producer Support Estimate (PSE) subsidies around the world. These subsidies are in relation to the value of the pig at farm-gate prices

Joint Product Industries Forest Industry — Pig Farms

- New and improved materials integrated in current industrial structure
- Synergy effects
- Rest products flows
- What are these magic new products?
- Biorefineries? EWPs?



Something More is Needed

- **Ecosystem Services**
- **Ecotourism**
- **Bioenergy**
- **Biofuels**
- **Biorefineries**

New Commercial Material Products

- Relied on the “filets” too long
- Based on wood fiber
- Using existing industrial structure
- Physics, material science, chemistry, biotechnology, nanotechnology
- Industry and governments to start bold and wide programs investigating new value added commercial products to be produced from wood within a reconstructed forest industry.

For A Happier Life Shake Off Your Misplaced Optimism

“You say: I did not think it would happen. Do you think there is anything that will not happen, when you know that is possible to happen, when you know that it has already happened.....?”

Source: Seneca AD 62

Thank you

Visit IIASA's website:

www.iiasa.ac.at

for further information