GLOBAL WARMING - A NEW RISK?

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MONTE CARLO 14/10/91

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SETTING THE SCENE

* Investigate the Stability of
  - Patterns of Natural Catastrophe
  - The Risks in the Market

* Weather Related Hazards

  (i.e. not Earthquake, Tsunami or Volcano)

* Mainly UK, but also some Global Analysis

RECENT COST TRENDS

* In the UK, a major winter event was thought to be around £60M ($100M).

* After the Storms of 1987 and 1990, ABI didn't bother to publish costs of freeze in 1991! (See Figure 1)

* A similar trend is evident on the worldwide scale - as Figure 2 shows.

Figure 1

MAJOR UK WINTER EVENTS

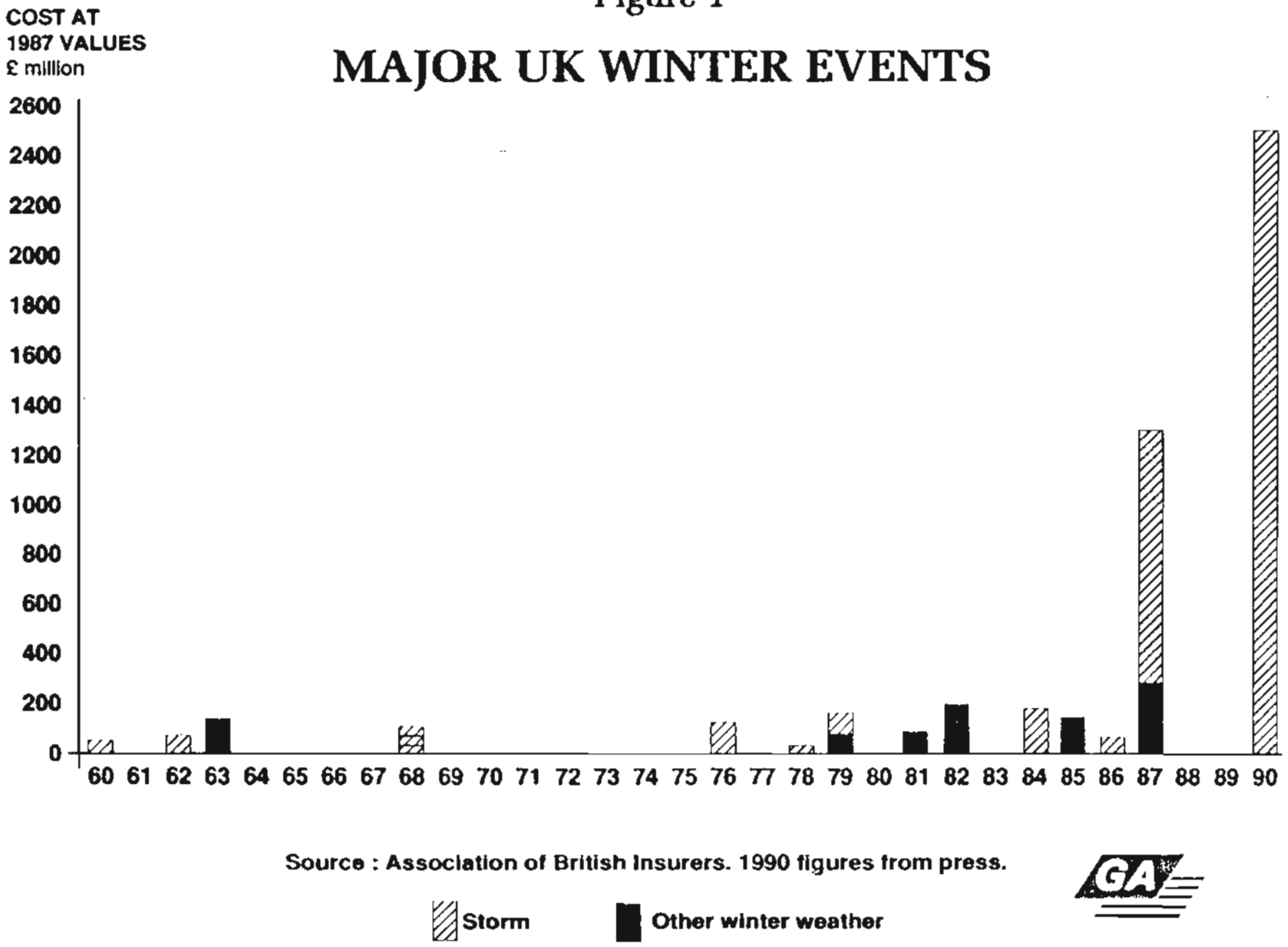

Figure 2

MAJOR WINDSTORMS WORLDWIDE 1960-90

	1960's per year	1970's per year	1980's per year	1990 alone
No. of windstorms	0.8	1.3	2.9	4.0
Damage $B	2.0	2.9	3.4	14.1
Insured $B	0.5	0.8	1.7	9.8

Values at 1990 prices
Data from Munich Re

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MARKET PRESSURES ON COST

* Population growth/urbanisation

* Greater wealth/more vulnerable possessions
e.g. UK Households

1974	1990	
43%	80%	Central Heating
0	64%	Video

* Wider Cover (All Risks, New for Old)

* Market Penetration

* Claims Awareness

CLIMATIC PRESSURES ON COST

* Frequency and severity of events

  - weather has been unusually quiet

  - warm conditions imply storms

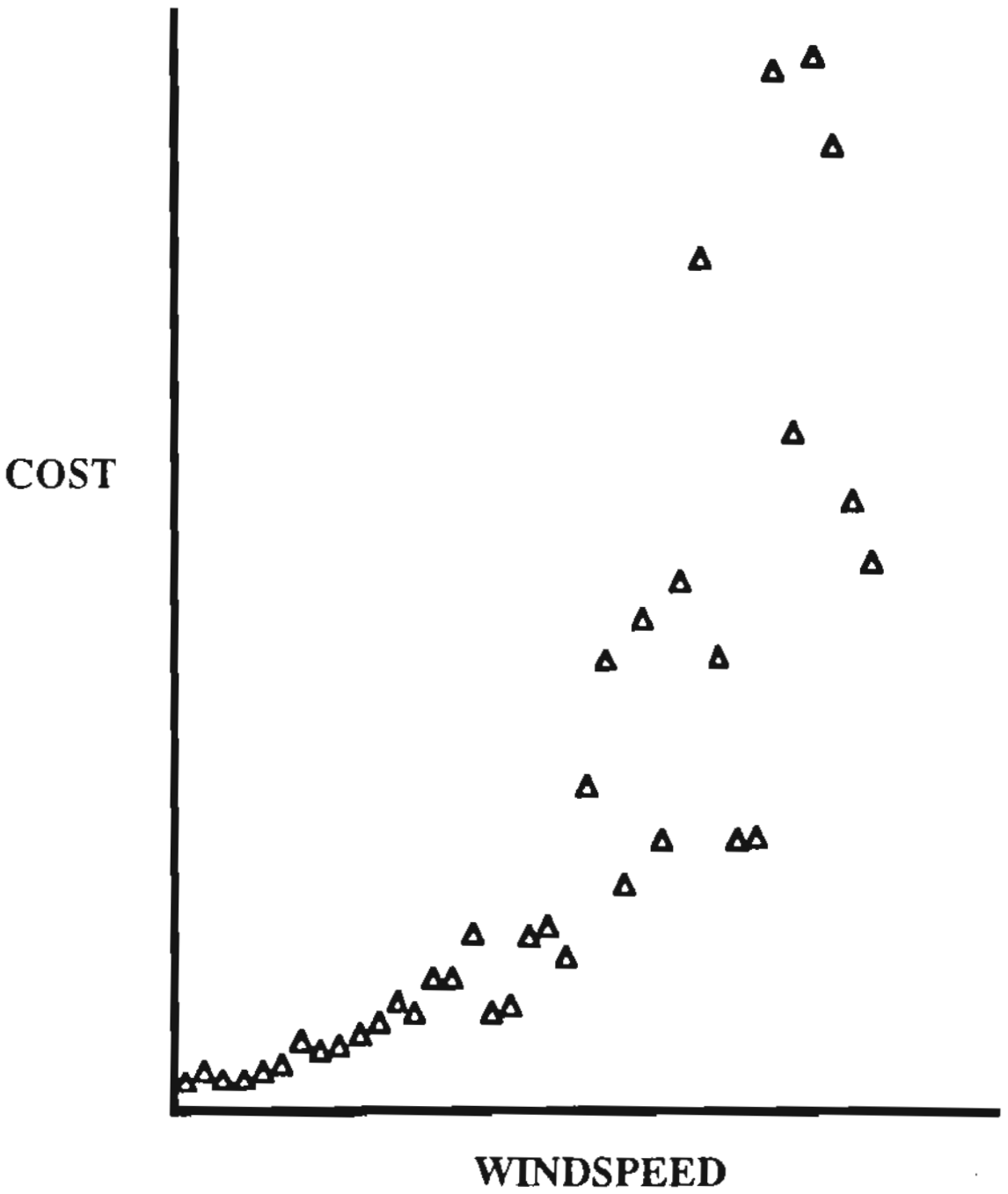
* The climate - to - cost effect is not straight line. (See Figure 3)

  - a 5 mph increase in windspeed may double costs

  - similar effects exist for freeze, drought and flood

Figure 3

Storm Cost v. Windspeed (Oct. 1987)



INITIAL MARKET REACTION

- Limit the risk
- Control the damage
- Transfer the risk
- Price the product

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INITIAL MARKET REACTION

* Limit the Risk

  - use of deductibles and selective underwriting

  - governments favour wide coverage

* Control the damage

  - 24 hour helplines

  - approved repairers

* Transfer the risk

  - reinsurers are losing money too!

  - liability?

* Price the product

  - reluctance to lose market share

  - "it won't happen again"!

THE LAST 1000 YEARS

* Rainfall, windspeed and other records not available.

* UK climate has fluctuated within 1 oC of today.

* A "narrow" range but major changes -

  - Wine War with France

  - Little Ice Age

  - Family Formation

* Disasters include sandstorms (1695)

  drought (1976)

  coastal inundation (1953)

  volcanic dusthaze (1816)

* 'Decade of Disaster' in Central Europe 1338 - 48

  flood, frost, locusts, plague

LAST 330 YEARS IN UK

* No clear trend in average rainfall

* Definite shift towards 'hot' extremes since 1930 (Figure 4)

* 'Oddball' extremes can occur -

  1660's Great Plague and Great Fire of London

  1981/2 record low temperatures

* Warm winters have great storms

* After a pause in the 60's, the shift is moving quickly upwards. (Figure 5)

* UK trend reflects the global picture (Figure 6) - 1990 was the warmest year observed scientifically

Figure 4

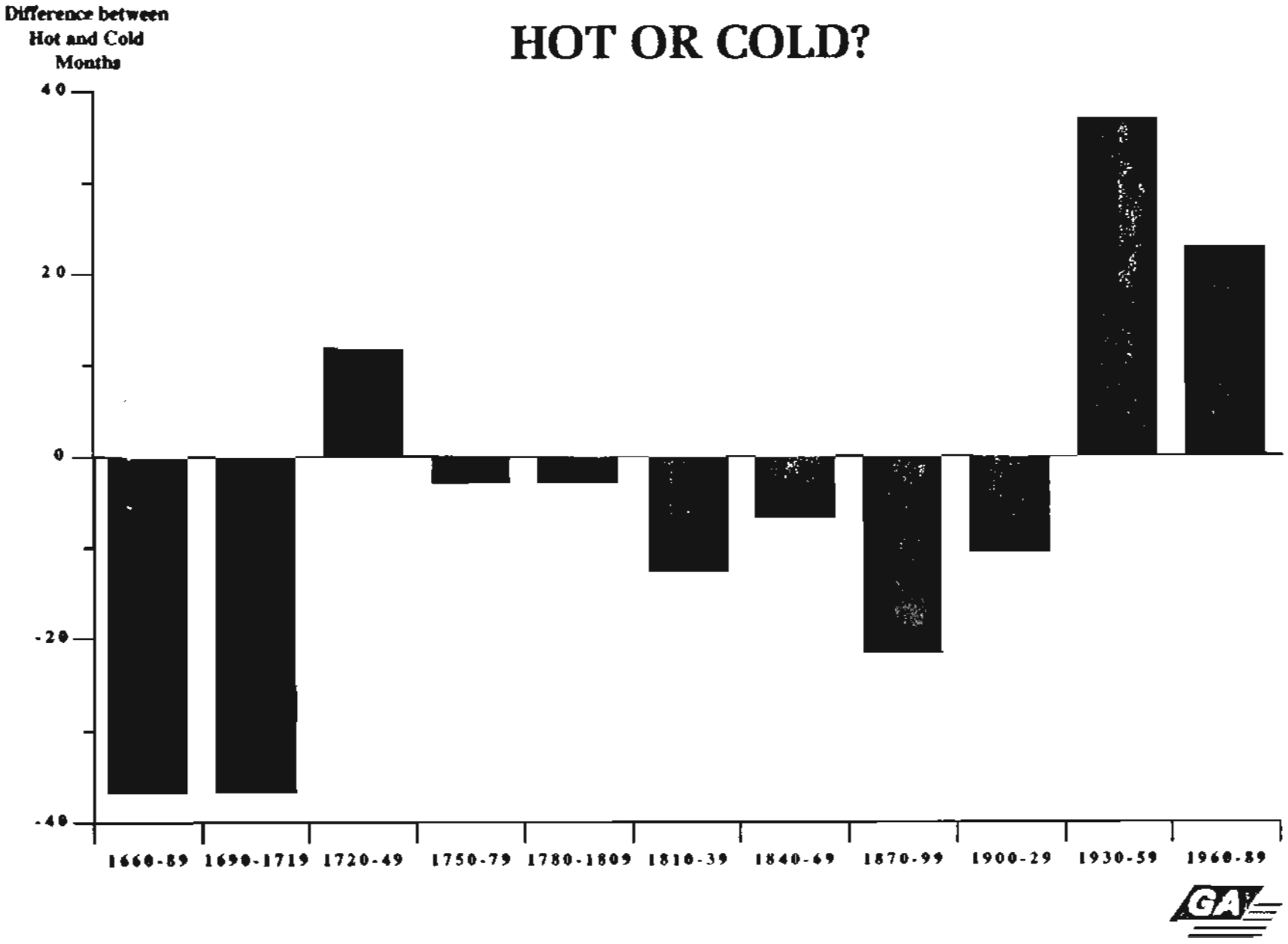

Figure 5

UK SINCE 1960 - ANNUAL FREQUENCY OF EXTREMES

	1960's	1970's	1980's	1990's
Hot months	1.0	1.6	2.1	5.0
Cold months	0.7	0.9	0.8	0.6
Extreme months	1.7	2.5	2.9	5.6

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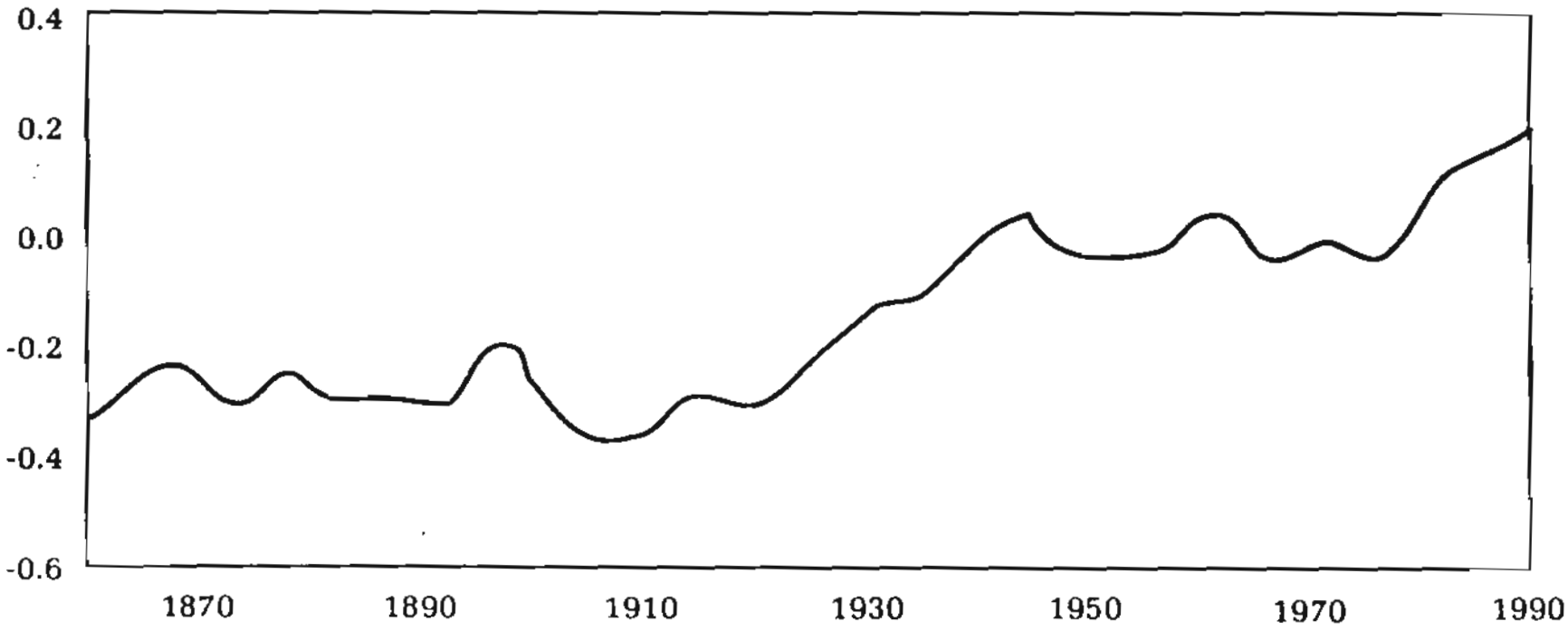
Figure 6

GLOBAL TEMPERATURE 1861 - 1989
RELATIVE TO THE AVERAGE FOR 1951 - 1980



CAUSES OF CLIMATE CHANGE

(A) RANDOM

- Circulation in atmosphere and ocean never repeats itself exactly (Butterfly Effect)

- Violent events (e.g. volcanoes) affect weather

(B) NATURAL TRENDS

- Sunspot cycle (11 years)

- Planetary orbit and tilt vary (189 years and longer cycles)

- Continental drift (million years +)

(C) ECONOMIC ACTIVITY

- Local pollution (smog, salinity)

- Vegetation cover (albedo, runoff)

- Water table

- Manmade gases (global warming?)
  (ozone hole)

THE GREENHOUSE EFFECT (FIGURE 7)

The sun's rays - enter the atmosphere

- reflect off Earth
- part are absorbed
- part escape

On Mars the atmosphere is too thin

- All rays escape
- No life

On Venus the atmosphere is too thick

- Few rays escape
- No life

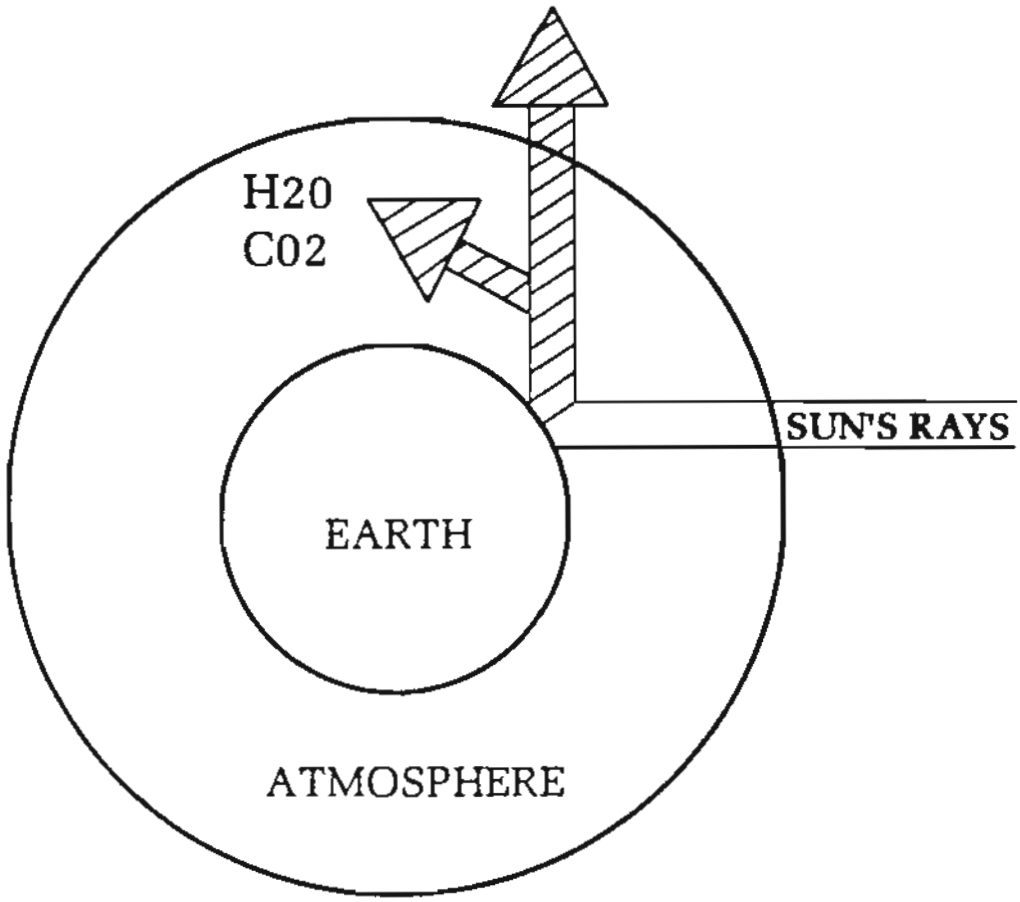
On Earth the air is warmed by 33 oC to 16 oC

- Water vapour and tiny % of CO2
- Just right for life

The Goldilocks Parallel

Figure 7

THE GREENHOUSE EFFECT



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GLOBAL WARMING
(or the enhanced Greenhouse Effect)

* Manmade gases are increasing rapidly (CO2,Methane, CFC's, NOX etc.)

* The natural proportions of these gases are tiny, or zero (0.028% CO2 in pre-industrial air)

* These gases have a huge capacity to absorb solar radiation

* The mathematical models of atmospheric and oceanic systems are highly complex general circulation models (GCM'S)

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CONCLUSIONS

WEATHER DAMAGE HAS INCREASED

* Only part is due to market dynamics

* Small climate changes have big social economic effects

* The insurance market is already reacting

GLOBAL WARMING WILL CONTINUE

* Immediate impact will be property damage

* Within 5 years politicians will start to enact further 'green' laws

* Climate change will impact consumer demand and international relations

* Business strategy must recognise these developments.

WEATHER DAMAGE HAS INCREASED

- Part market-driven
- Small climate changes have big effects
- Insurance market is reacting

CLIMATE CHANGE WILL SPEED UP

- Further property damage
- Green laws
- Consumer demand
- International relations

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WIDER IMPLICATIONS

- Changes in consumer demand
- Energy policy
- 'Green' issues e.g. CFC's
- Health
- Conflict over resources
- Demand for capital
- New frontiers

WIDER IMPLICATIONS

- consumer demand
- 'Green' issues e.g. CFC's, energy policy
- health
- conflict over resources e.g. water, capital
- new frontiers

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DIRECT EFFECT ON PROPERTY

* MORE subsidence?

  flood? - snowmelt, rainstorm, inundation

  storm? - cyclonic, convective

  forest fires?

* LESS freeze?

* COASTAL PROBLEMS!

* NEW METEOROLOGICAL RECORDS!

DIRECT EFFECT ON PROPERTY

More - subsidence?
- floods?
- storms?
- heath fires?

Less - freeze?

COASTAL PROBLEMS!

METEOROLOGICAL RECORDS!

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Figure 9

U.N. FORECASTS (YEAR 2030)

	Temperature (°c)	More Drought
US Prairies	+3.0	Yes
India	+1.5	No
Sahel	+1.5	?
Mediterranean	+2.0	Yes
Australia	+2.0	?

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Figure 8

GLOBAL WARMING IN THE UK

YEAR	2010	2030	2050
Temperature (° C)			
Summer	+0.7	+1.4	+2.1
Winter (South)	+0.9	+1.5	+2.2
Winter (North)	+1.1	+2.1	+3.5
Sea Level (cm)	+10	+20	+30
Chance of 1976 drought	60:1	10:1	3:1

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GCM PREDICTIONS

* Figure 8 shows the best current predictions for the UK. By 2030, temperatures will be beyond historic levels.

* Figure 9 presents the UN forecasts for five major regions in the year 2030.

* These are mid-range predictions, consistent with 0.5 oC warming since 1860.

* The realised (transient) temperature change is roughly two-thirds of the eventual (equilibrium) change, because of the cooling effect of the oceans.

* Also it's impossible to change energy use or to remove the greenhouse gases quickly, even if we wanted to. So the equilibrium temperature keeps moving up.

* The 2010 scenerio is unavoidable. To modify the 2030 ones will require enormous political change.

* These projections ignore natural trends, which look like reinforcing the warming before 2010.

THE SCIENTIFIC DEBATE

* The instrumental data is poor - NATURAL DATA CONFIRMS THE WARMING

* The GCM's cannot reproduce today's climate, let alone next century's - THE MODELS ARE CLOSE ON TEMPERATURE

* Some mechanisms (negative feedback) are not included (cloud cover, highlevel dryness) - THERE MAY BE EVEN GREATER POSITIVE FEEDBACK MISSING (CLATHRATE, PERMAFROST)

* The timing of global warming and industrialisation is coincidence (natural fluctuations) - ON GEOLOGICAL TIMESCALES, CO2 LEVELS AND TEMPERATURE HAVE MOVED IN TANDEM

* Plants will grow better in high CO2 - OTHER CHANGES MAY NEGATE THIS (HEAT STRESS, DROUGHT)

* Milleniumitis (disasters get headlines and research funds) - THE ENERGY LOBBY WANTS STATUS QUO FOR PROFITS

* We need more evidence - IF WE WAIT IT MAY BE TOO LATE