



# **Development of Right Based Fisheries Management in Denmark and Greenland**

**Workshop: Value Creation in the Nordic Countries  
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# Outline

- **General observation: Flexibility**
- **The Danish fishery sector: An progress report**
- **The Danish Fishery Management System**
- **The Greenland Shrimp fishery**
- **Reflections on the flexibility of the management system**





# Flexibility

**A system, that is more constrained than another one, can not adjust as easy than the less constrained system, when it is impacted by changes in the market conditions or in the resource situation: Le Chatelier effect.**

**This means that micro based regulation can lead to a series of unintended derived effects, such as discard, illegal landings, low use of vessel and crew and poor quality of landings.**

**Poor economic performance and lack of sustainable ability of adjustment keep the sector in a trap, where short run decisions are taken by both fishermen and the authorities.**



## Illustration - continued

***From ACFM report on cod in Kattegat (2004):***

**The TAC is implemented by period rations for individual vessels. Ration sizes have been low in recent years and may have created incentives to discard (high-grade). As ration size has been higher in the Western Baltic there have been incentives for writing Kattegat catches into the Western Baltic. The recovery plan, agreed in 2004, stipulates strict rules for carrying and landing cod in Kattegat.**

**Discards are not included in the assessments, and their magnitude is unknown. Essential assessment data (70% of landings) are only available from Denmark for 2003.**



## What does this mean?

**A system focusing at the framework instead of focusing on micro regulations**

**A system which handles the fundamental regulation problem (which micro regulation don't)**

**The fishermen decide themselves – within the framework – their production machinery and the use of it.**

**Other supplementary regulations ought to be targeted towards the problem that it is going to solve. (E.g. protection of spawning ground)**



# Observation

- **Paradox: Markets are seen as the course for the overexploitation of the nature, but market based solutions (mixed economy) can play a role as institution between nature and economic activity.**
- **Economic incentives are important for conservation of nature – secure a balanced and more sustainable use. If we wish that the owners shall conserve the nature the owners shall have the incentives to do it.**
- **Therefore the social economic value of the ecosystem services is transformed to income for the owners as payment for their conservation.**
- **Hence, restoring a profitable fishing sector is central in order to secure long term decisions and investments.**



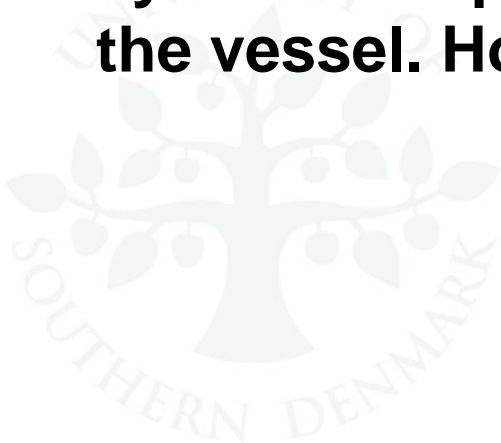
## **The framework condition for the Danish fishery**

- **The basis is determined by the EU's common fishery policy.**
- **Overall, the Danish fishery is subject to the EU TAC/quota system combined with regulation of the number of fishing days (coming from the recovery plans).**
- **In 2009, the Danish catches are limited by 75 quota's (defined by species and fishing area), with 11 quota's to the industrial fishery and 64 quota's to the human consumption fishery.**
- **Around 95% of the Danish fishery is subject to quota's.**



# The right system in Denmark

- **Herring, Mackerel and industrial species are regulated by ITQs.**
- **Species covered by the vessels quota share system from 2007: Cod, sole, plaice, lobster, saithe, haddock, shrimp and some minor important species. In reality the most important species are part of the system. In this system the quotashares can only be sold together with the vessel. However, vesselowners can form co-ops.**





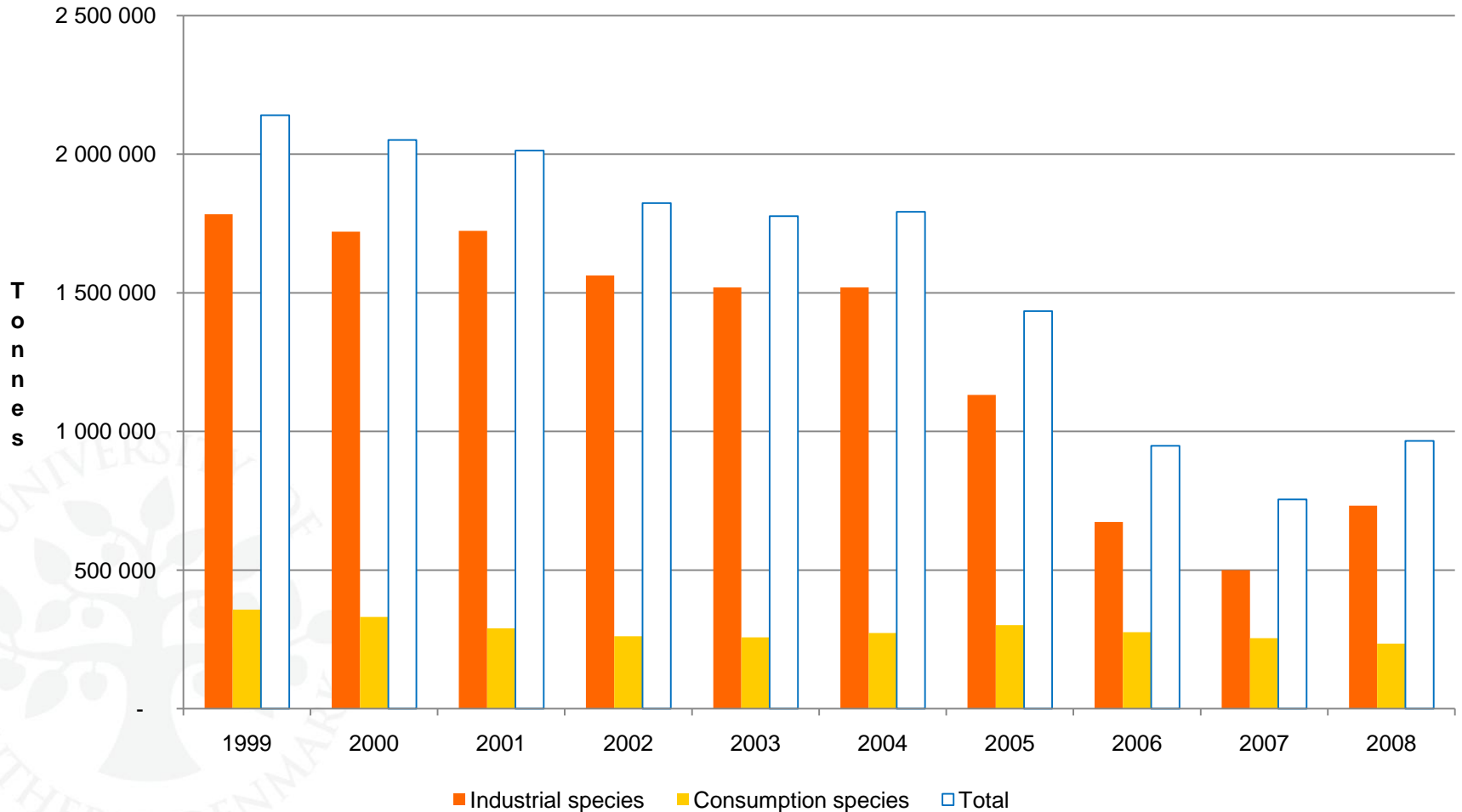


## **The current management system:**

- **The reform is now implemented (in 2009) and only small adjustments remain.**
- **So, the basis is individual catch rights.**
- **In the pelagic fishery after herring, mackerel and industrial species is 10 quota's out of 26 quota's individual transferable (from 2003).**
- **In the demersal human consumption fishery is 27 quota's out of 49 Danish quota's transferable between the fishermen in the form of vessels quota shares (from 2007).**
- **Special fisheries like mussels, oysters and shrimp with Greenland are regulated by licenses.**

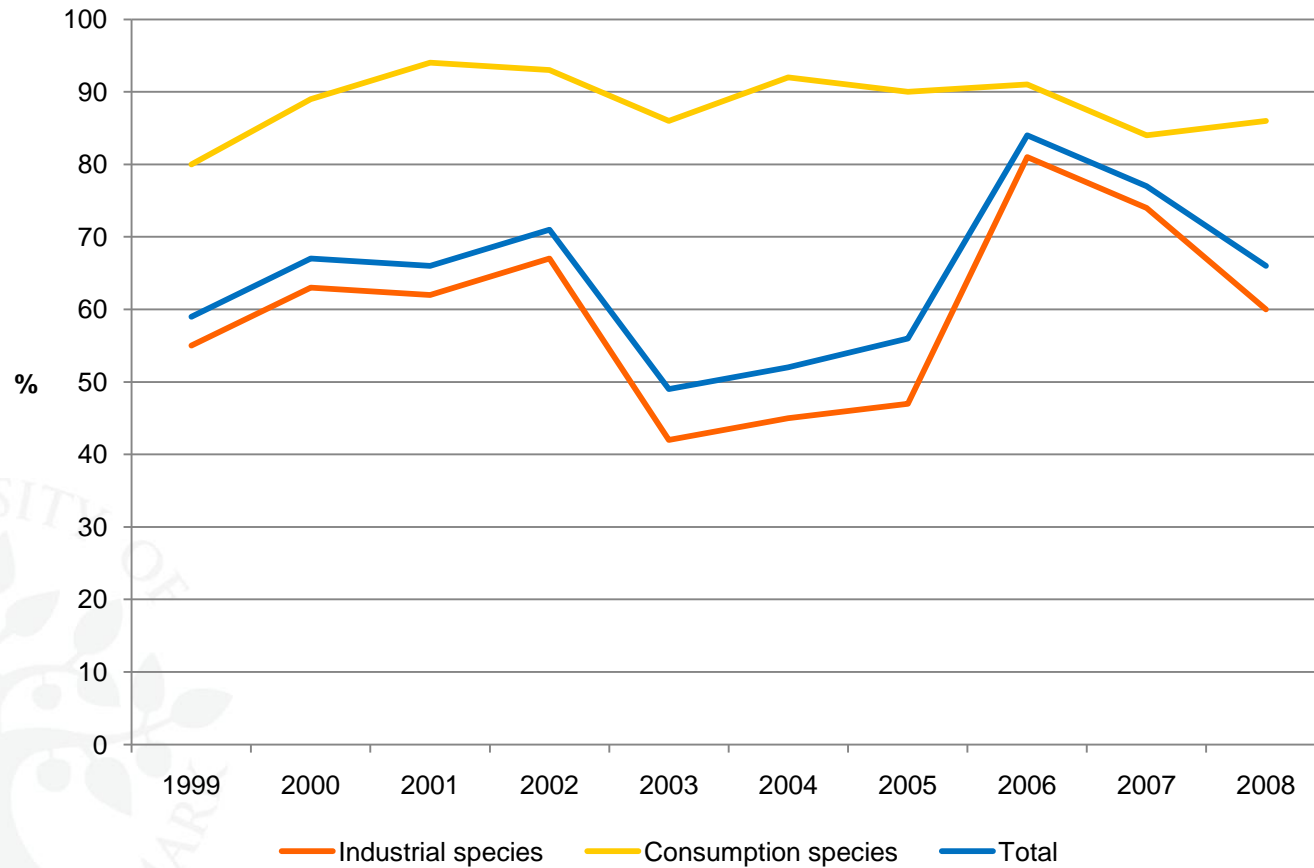


# Total Danish fish quota's



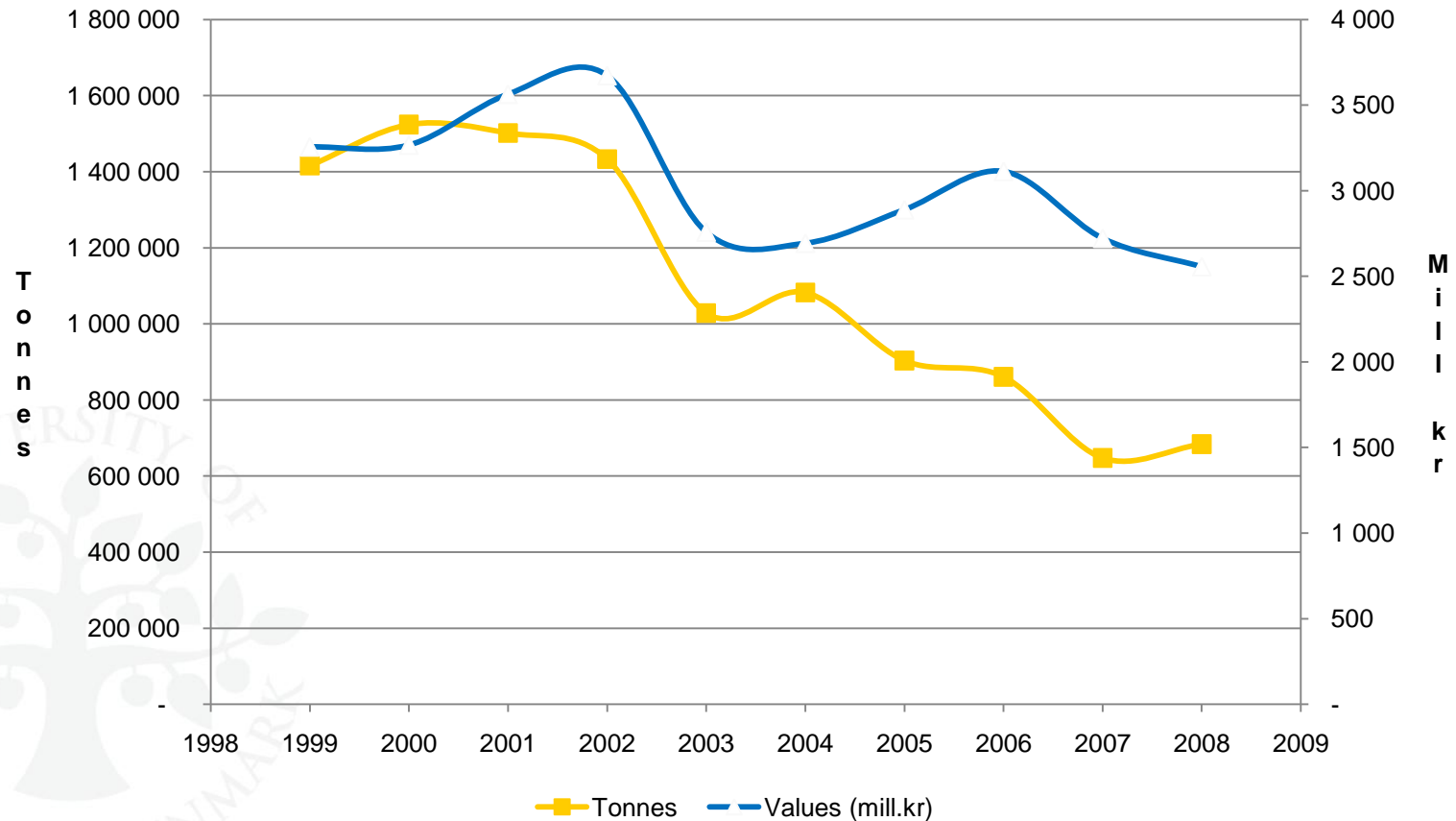


## Utilization of the Danish quota's





## Danish catchvolumes and -value



**Table: Catches of the species (tonnes).**

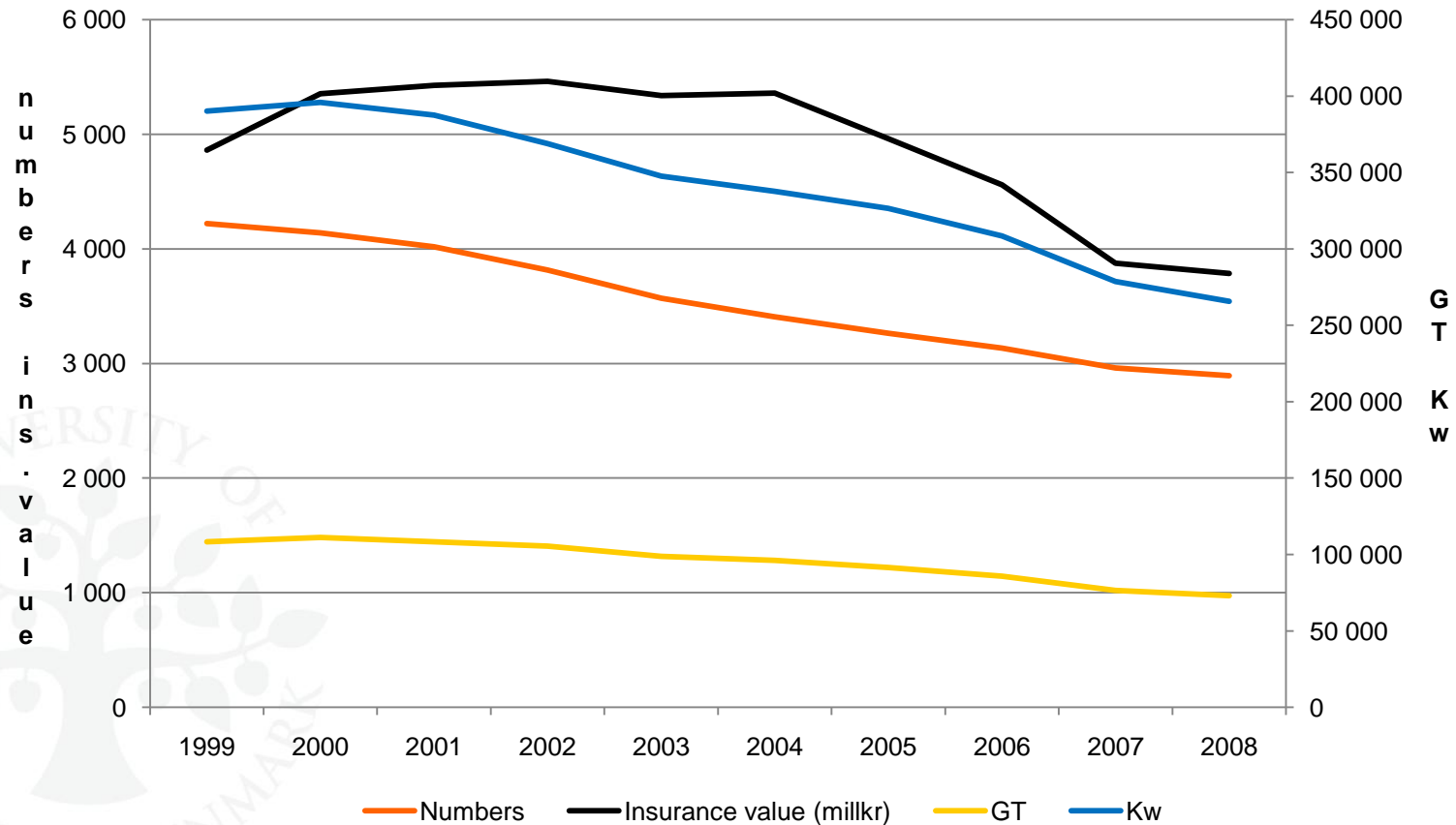
	1999	2002	2005	2008
Cod	70.551	37.867	28.947	23.547
Plaice	23.126	22.996	18.378	17.581
Saithe	4.980	6.150	7.833	8.392
Herring	137.578	112.551	167.456	105.445
Macherel	29.705	33.046	23.214	26.730
Lobster	5.456	5.439	5.303	4.290
Shrimp	4.880	5.540	7.433	6.632
Industrial species	980.636	1.046.819	532.040	439.087
Others	158.982	162.854	112.969	52.163
Total	1.415.894	1.433.262	903.573	683.867

**Table: Catchvalue of the species (1000 kr.).**

	1999	2002	2005	2008
Cod	925.168	609.617	433.083	388.981
Plaice	323.914	294.342	256.823	224.652
Saithe	30.689	36.902	42.763	60.400
Herring	176.375	294.574	352.694	281.974
Macherel	110.887	224.594	297.705	258.376
Lobster	340.179	408.644	311.834	240.308
Shrimp	103.187	94.268	102.588	110.827
Industrial species	609.268	957.602	425.050	441.433
Others	634.287	749.469	665.099	551.870
Total	3.253.954	3.670.012	2.887.639	2.558.821

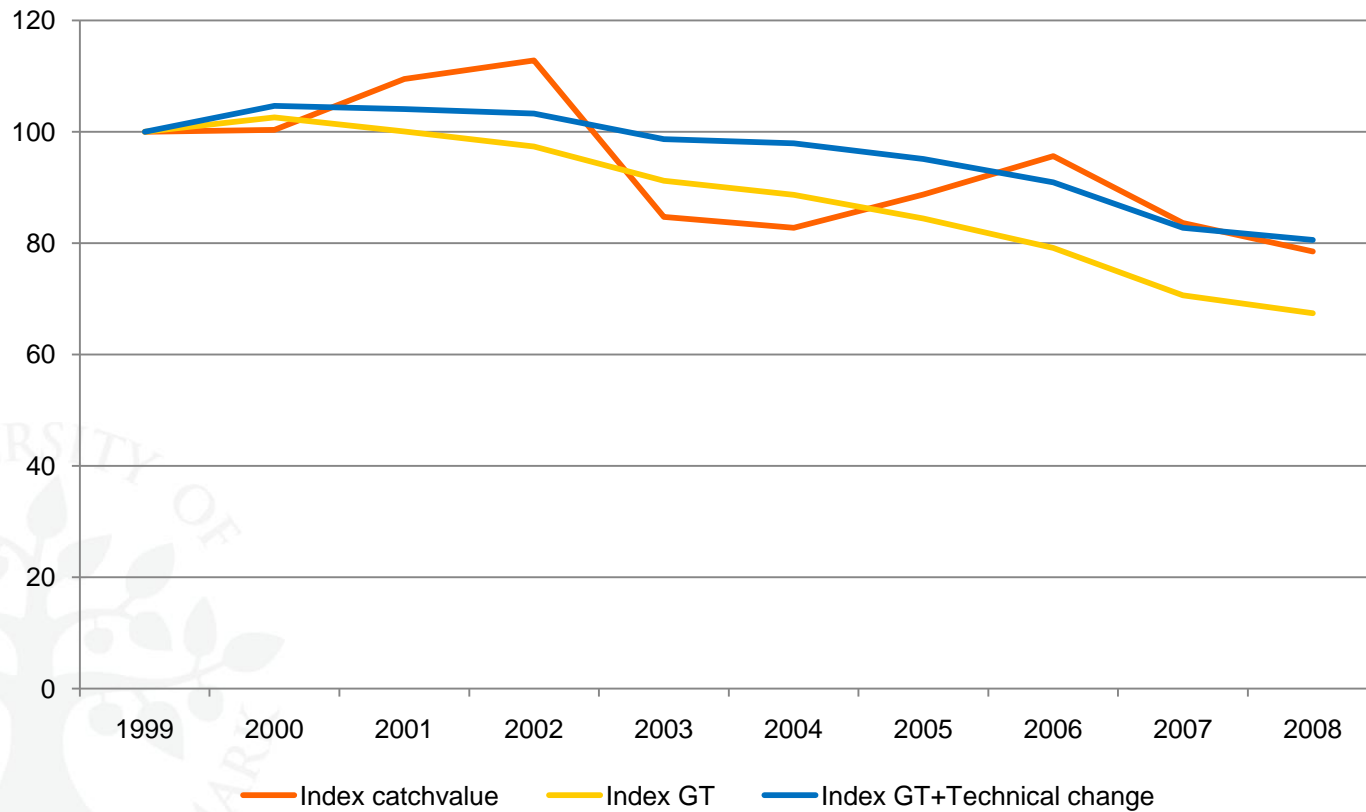


# Development in number of vessels, insurance value, GT and Kw





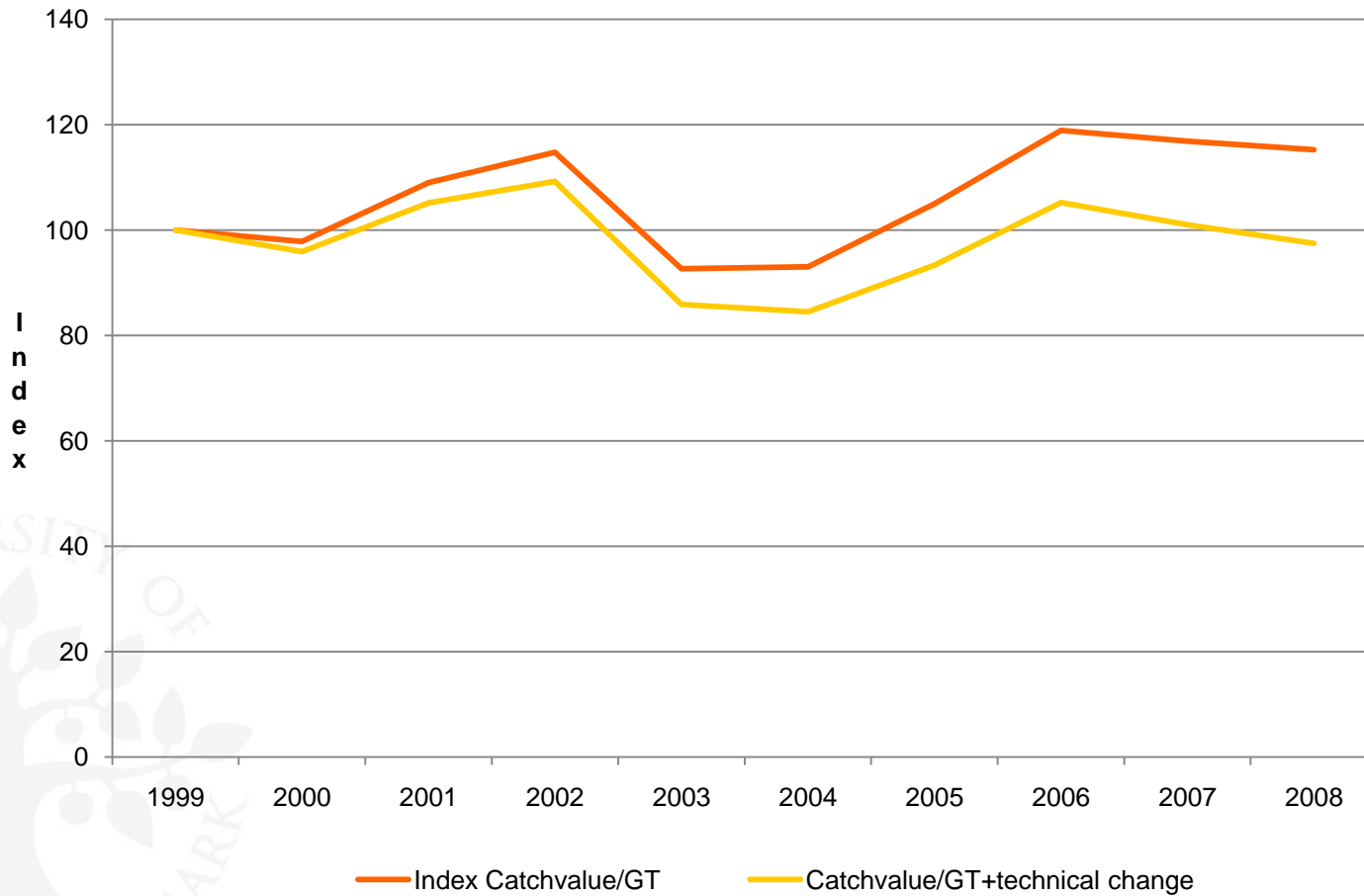
# Index of catchvalue and GT, including technical change at 2% annual.







# Development of catchvalue per unit of GT





# Employment

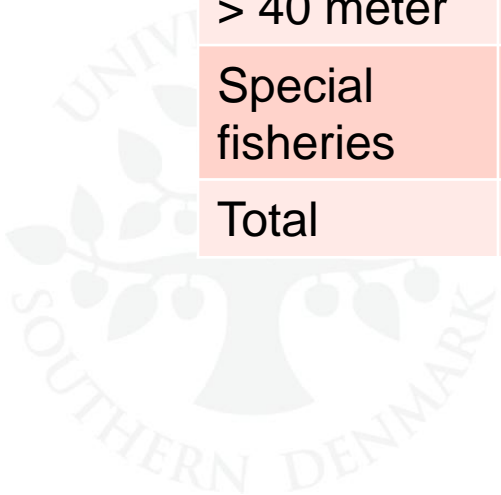
	1999	2002	2005	2008
Employment	6.592	5.968	4.916	3.884





## No of commercial vessels

	1999	2002	2005	2008
< 12 meter		408	403	234
12-15 meter		283	254	165
15-18 meter		188	144	93
18-24 meter		183	142	84
24-40 meter		143	109	55
> 40 meter		44	40	27
Special fisheries		89	87	119
Total		1.338	1.179	777





## Average rate of return for all fishing firms in Denmark:

1996	1997	1998	1999	2000	2001	2002
-0,4%	6,9%	8,6%	0,9%	-3,1%	2,3%	7,0%
2003	2004	2005	2006	2007		
-2,6%	-4,8%	2,9%	7,0%	5,0%		



# The Greenland off-shore Shrimp fishery

- **The fishery covers both West- and East-Greenland, but the main part of the catches are from Davis Strait.**
- **The catches has since 1990 grown from from a level about 40.000 tonnes to a level around 75.000 tonnes today for the off-shore fleet.**
- **Around 75% is produced on board and exported directly to the markets in Europe and Japan. 25% is landed for on-shore production in Greenland.**
- **The vessels costs over 100 Mill.kr each and are larger than 3000 GT. Size of crew is 25-30 persons.**
- **The fishery has been regulated by ITQs since 1990.**



**The picture shows the Shrimp/Prawn trawler, the Polar Nattoralik (2000). It has a length of 69.60m and is 15.40m wide. The Polar Nattoralik accommodates a crew of 33 people, has a freezing hold capacity of 1,342 m<sup>3</sup> and top speed of 16.9 knots. Her factory comprises 3 complete lines for grading, cooking and freezing of shrimps and a dedicated 'Japan Line' for the packing and freezing of raw Shrimps.**





# Greenland off-shore shrimp fishery

## Development in number of vessels:

<b>Number of vessels</b>	<b>1990</b>	<b>2003</b>	<b>2007</b>
Ferskrejetrawlere (small factory trawlers)	17	0	0
Søkogere (factory trawlers)	21	12	11
79-ere (small trawlers)	8	0	0
Ialt	46	12	11



## The value of the Greenland Shrimp fishery

$$NPV = \sum_{t=0}^{20} \frac{B_t - C_t}{(1+d)^t} = \sum_{t=0}^{20} \frac{HV_t - (PC_t + HRC_t + EC_t)}{(1+d)^t}$$

Harvest volume and harvest value.

	2006	2007
Total License/Quotas (tons)*	55.305	70.675
Total catch (tons)*	55.305	64.432
Total harvest value (1000 kr.)**	562.970	679.470
Total Production (tons)**		
Cooked at Sea	23.666	31.286
Raw (Italy and Japan)	7.803	7.208
Industrial	14.049	18.028
Total Harvest value (1000 kr.)**		
Cooked at Sea	283.556	402.692
Raw (Italy and Japan)	132.837	111.509
Industrial	77.167	96.542





## Private cost and the Home Rule cost

		2006	2007
Noncapital costs	Operation expenses	202.240	243.739
	Fuel	118.488	138.595
	Landing, packages	57.925	70.349
	Admin. and crew	25.827	34.796
	Wages	139.954	177.649
	Fixed costs	59.333	68.274
Capital costs		85.755	106.307
Total private cost		487.283	595.970

	2003	2006	2007
Greenland Institute of Natural Resources fisheries related activities	20.000	21.224	21.649
Fishery- and License control	26.000	27.591	28.143
Fees for membership of organizations	1.000	1.061	1.082
Total	47.000	49.876	50.874
Off-shore shrimp fishery		17.089	17.431



## Annual benefits, cost and net benefits generated by the off-shore shrimp fishery. 1000 kr.

	2006	2007	Average
Harvest value	562.970	679.470	621.220
- Private cost	487.283	595.970	541.626
= Private net benefits	75.688	83.500	79.594
- Home Rule cost	17.089	17.431	17.260
= Fishery net benefits	58.598	66.069	62.334
+ Crew rent	46.651	59.216	52.934
Social net benefits	105.250	125.286	115.268



## Distribution of the net benefits generated by the off-shore shrimp fishery. 1000 kr.

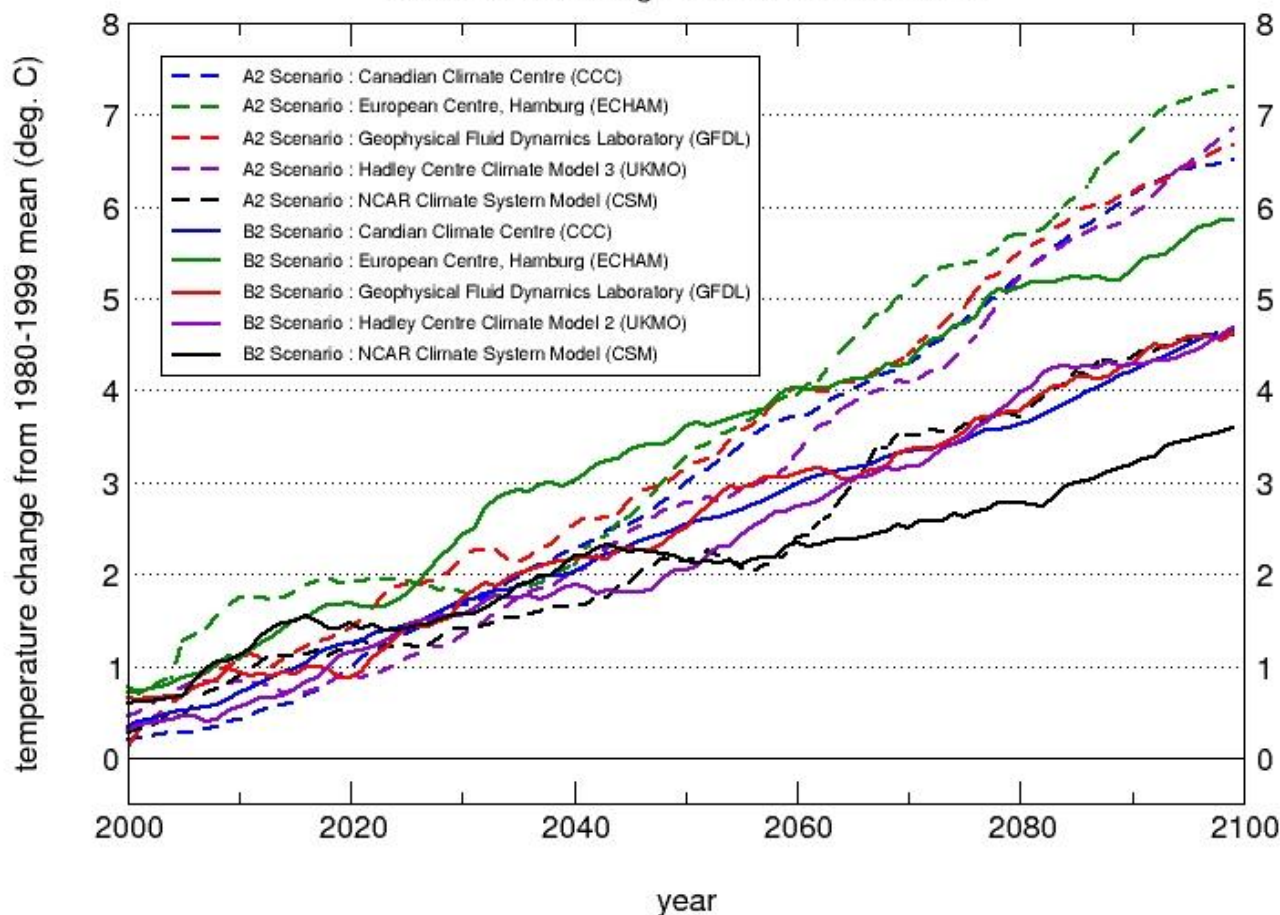
		2006	2007	Average
Private companies	Private rents	75.688	83.500	79.594
	- Tax payments	- 1.599	- 5.434	-3.517
	Private surplus	74.088	78.066	76.077
Crew	Rents	46.651	59.216	52.934
	- Income tax	- 19.594	- 24.871	-22.232
	Crew surplus	27.058	34.346	30.702
Home Rule + Municipalities	Tax revenue	21.193	30.306	25.749
	- Government cost	-17.089	- 17.431	-17.260
	Public sector surplus	4.104	12.875	8.489

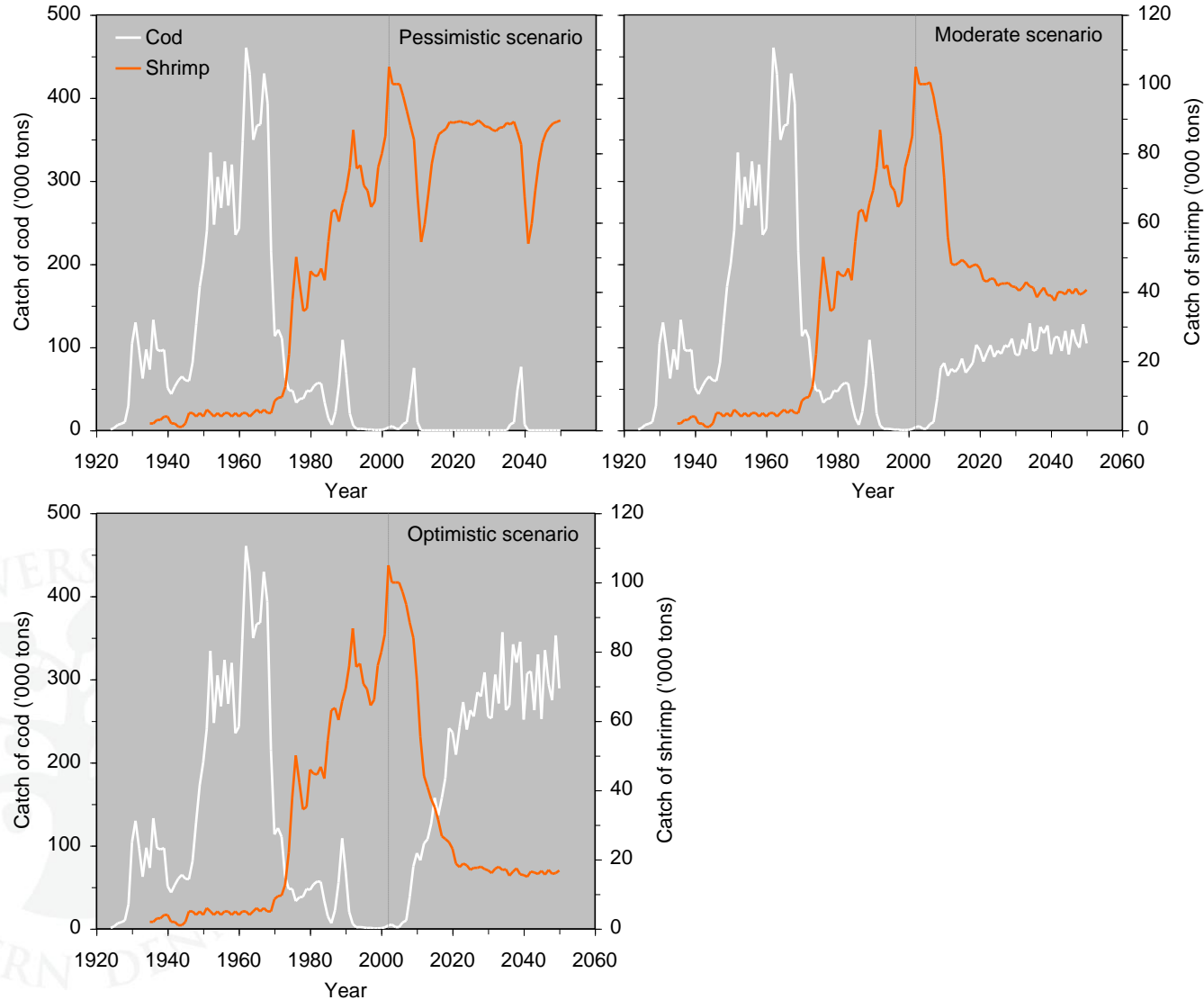


# Arctic Climate impact assessment

## GCM Projections - Arctic Surface Air Temperature

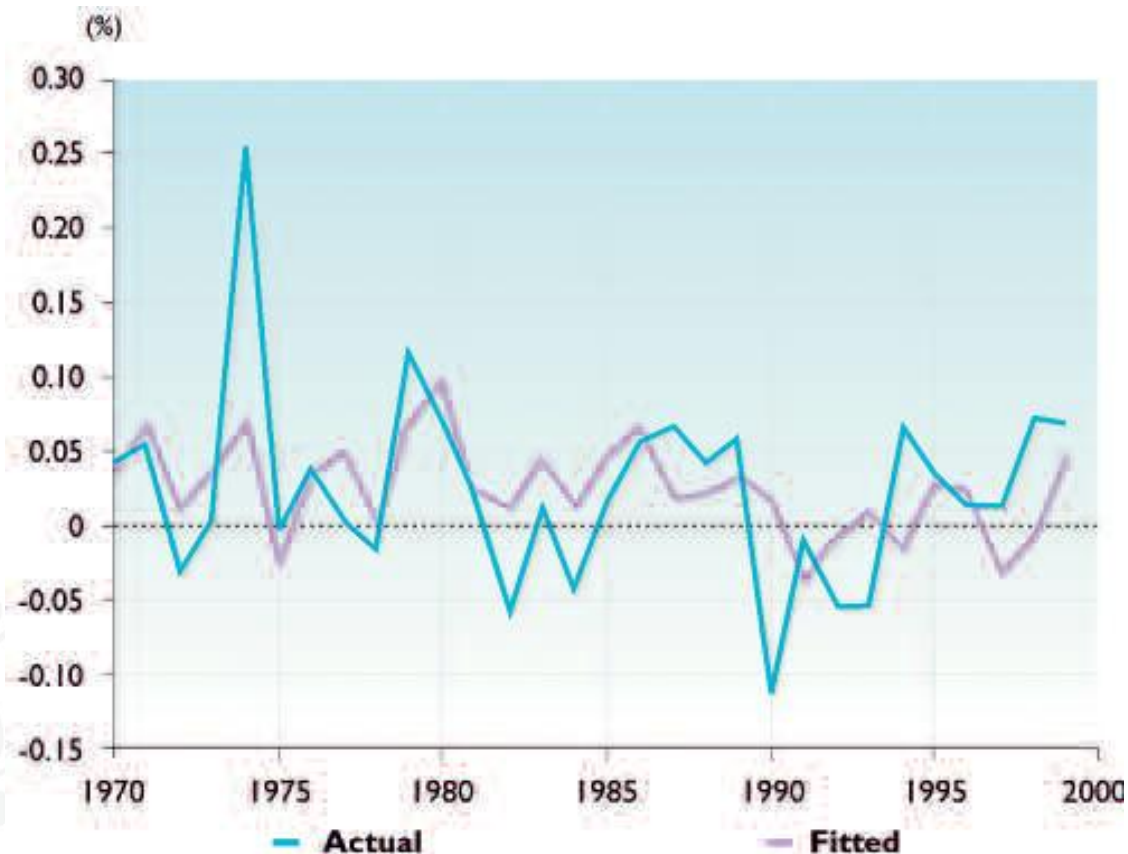
60N - Pole : Change from 1980-1999 mean







**Fig. 13.21. GDP in Greenland, 1970–1999: Actual and fitted values.**

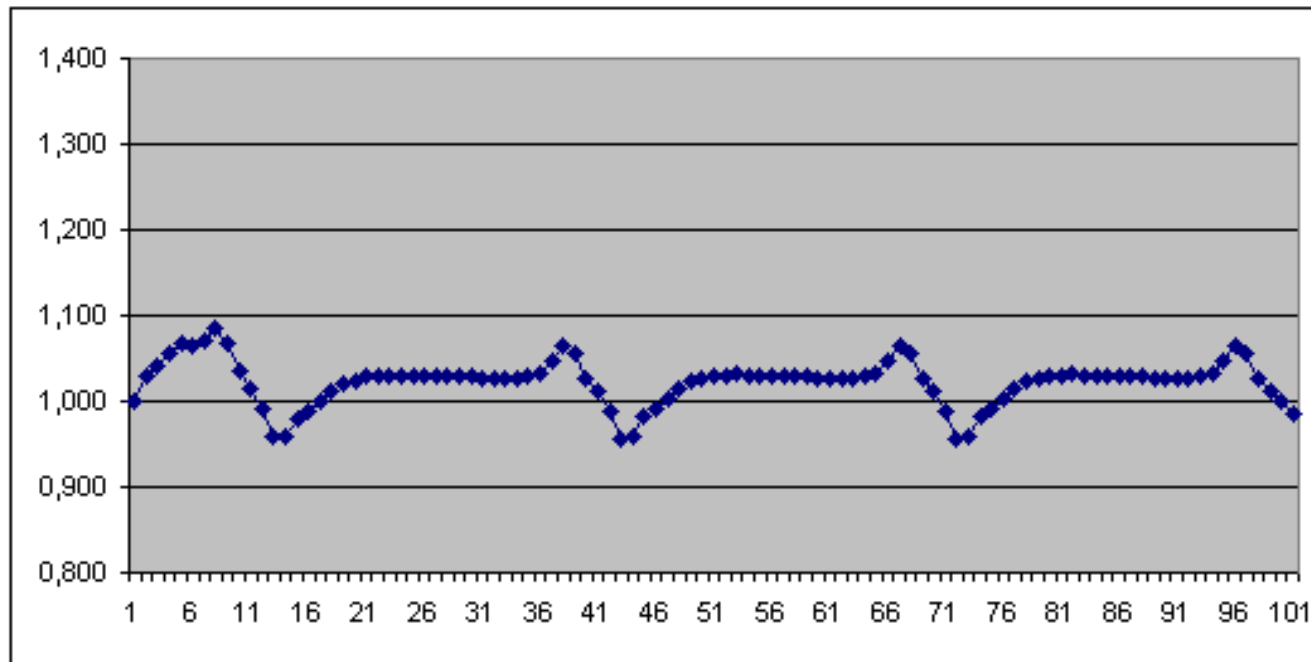


**If fish exports increase permanently by 1%, GDP would increase permanently by 0.286% due to that change.**



**Figure 12.3.31**

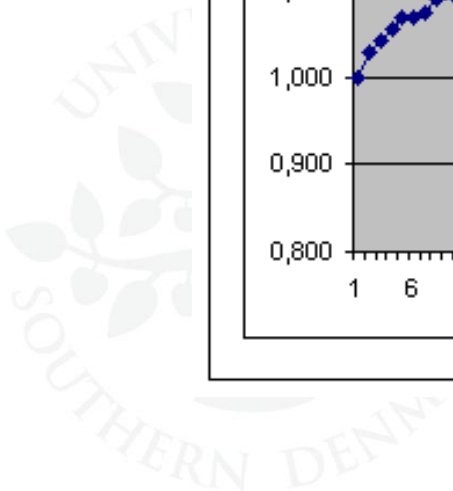
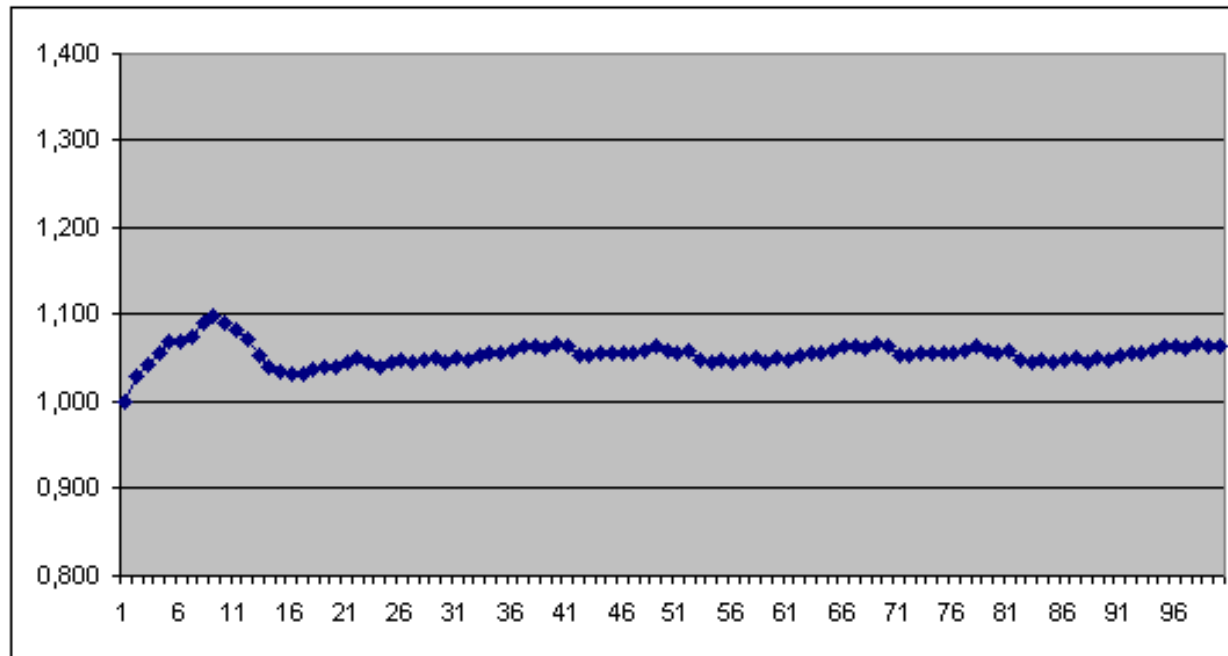
**Pessimistic Scenario: GDP path relative to the one without global warming (Index)**





**Figure 12.3.32**

**Moderate Scenario: GDP path relative to the one without global warming (Index)**

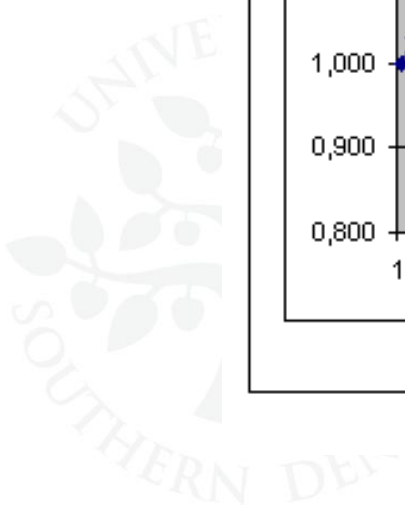
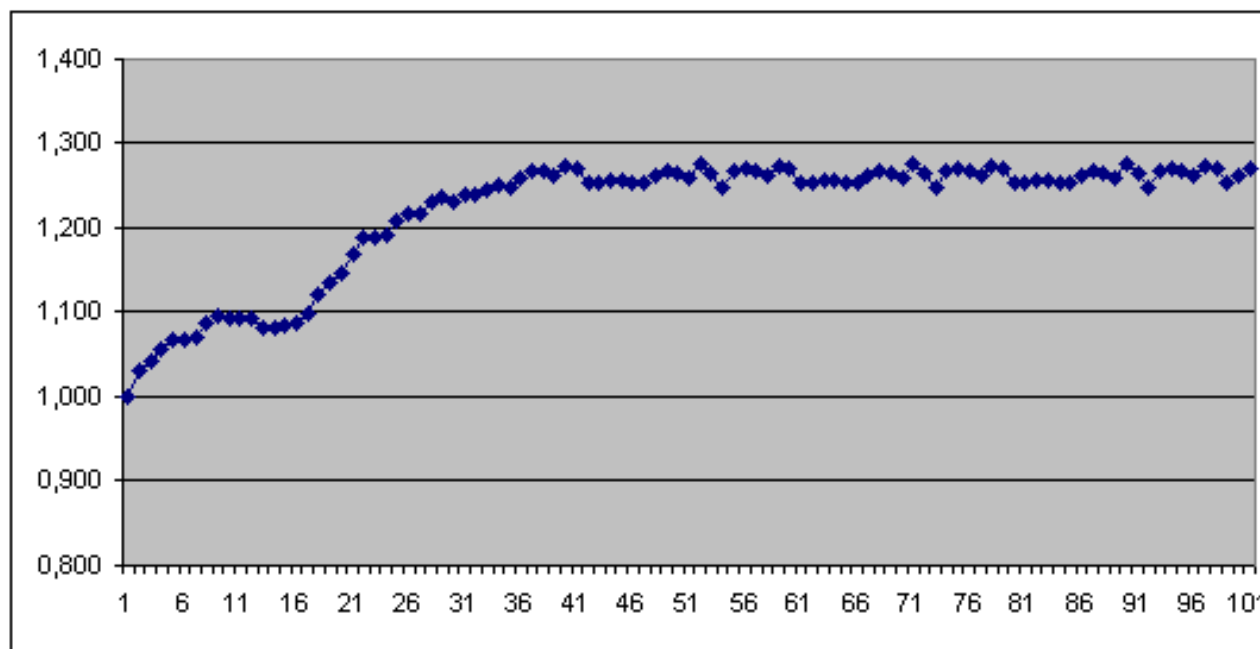






**Figure 12.3.33**

**Optimistic Scenario: GDP path relative to the one without global warming (Index)**





## ACIA Conclusions

- **Available projections suggest that climate change over the next 100 years is very likely to benefit the most valuable fish stocks at Greenland. This is particularly likely to be the case for the cod stock, which could experience a revival to a level, where it could yield up to 300000 t on a sustainable basis.**
- **Climate change and increased predation by cod could lead to a dramatic fall in the sustainable harvest of shrimp by up to 70000 t.**
- **The value of the increased cod harvest would greatly exceed losses due to a possibly reduced harvest of shrimp. In fact, this change could lead to doubling or even tripling of the total production value of the Greenland fishing industry.**
- **Thus, the projected climate change could have a major positive impact on the Greenland fishing industry. However, this is highly uncertain.**



## Economic effects

- **The economic and social impacts of changes in fish stock availability depend on the direction, magnitude, and rapidity of these changes.**
- **The economic and social impacts also depend, possibly even more so, on the ability of the relevant social structures to adapt to altered conditions.**
- **Good social structures facilitate fast adjustments to new conditions and thus mitigate negative impacts. Weak or inappropriate social structures exhibit sluggish and possibly inappropriate responses and thus may exacerbate problems resulting from adverse environmental changes.**
- **One of the most crucial social structures in this respect is the fisheries management system. This determines the extent to which the fisheries can adapt in an optimal manner to new conditions.**



## **Closing remark**

**"Getting the economics of fisheries right" is one of the preconditions for achieving the objectives of the Common Fisheries Policy, namely, the effective conservation of the resources and a sustained employment and a decent standard of living for those who work in the sector. To put it more bluntly, we won't be helping those who work in this industry if we continue to ignore economics, as the Ugly Sisters ignored Cinderella.**

**Steffen Smidt 2000 Former Director in DGFish in EU**