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Fish as a heterogeneous product.

Decomposing the price of fish

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Introduction

Fishing is an economic activity aimed at satisfying the wishes of consumers to consume fish.

Fish is heterogeneous with a number of attributes

Consumers have preferences for attributes and the value of fish is to a large extent determined by its attributes.



Freshness - a valuable attribute



The value of fish

What determines the value of fish?

- consumer preferences
 - species, freshness, size, color...
- properties affecting processing
 - size, firmness...

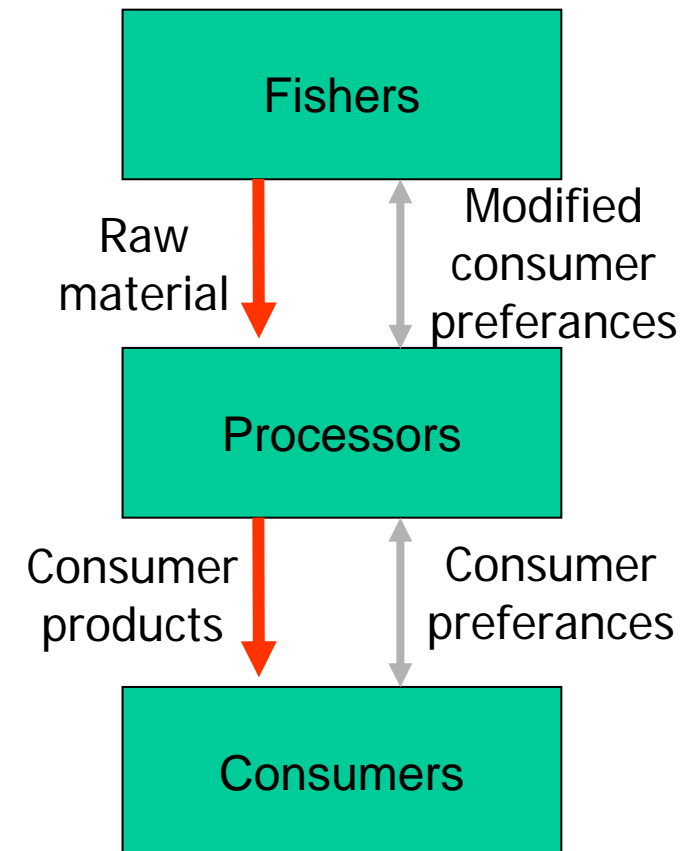
Demands flow of information from consumers and processors to fishermen



The value chain

In theory the market pricing mechanism should pass on information up the value chain from consumers, through processors to primary producers.

The value chain



Problems associated with fish attributes

Market failure due to information asymmetry

- used car syndrome => a market for lemons

Incentives to affect catch attributes

- attempts to limit catch to most valuable individuals
- attempts to limit landings to most valuable individuals - highgrading



First problem - information asymmetry

Inaccurate description of attributes and costly confirmation of quality lead to an information asymmetry in the market.

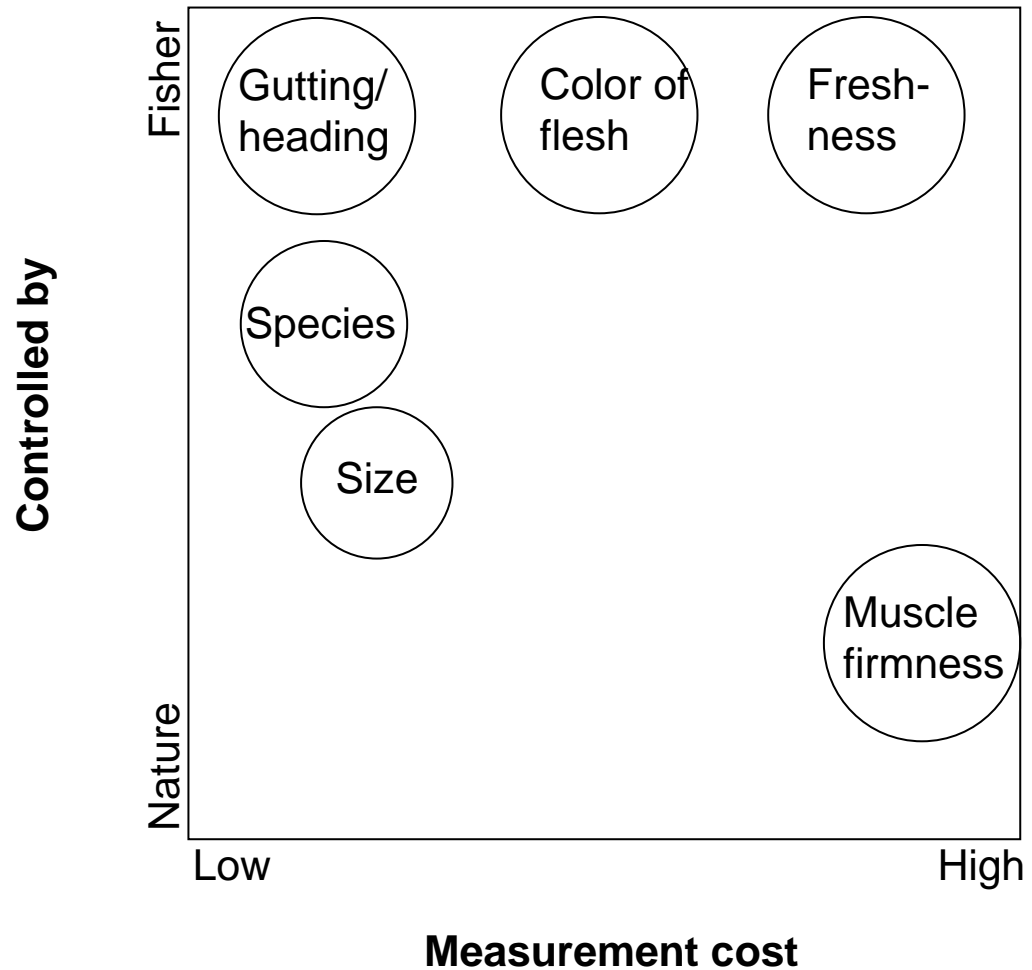
- The fisher knows more about the attributes of the fish than the buyer

Information asymmetry increases the quantity of low-quality goods sold at the expense of high quality goods.

- Low quality producers are able to take advantage of lower production cost



Types of attributes



Second problem – supply of attributes

Especially concerns size

Targeting by gear or location choice

Non-targeted individuals have increased probability of reaching sexual maturity

=> breeding for a smaller fish

– rents from the whole fishery reduce

Highgrading by discarding less valuable catch

– mortality of discarded fish high so no effects on mortality rate

– rents lost in non landed catch + data fouling



Case study – Icelandic fish auctions

Auctions started in 1987

Sell about 100.000 tons each year

Value about 14 billion ISK

Locations around Iceland but one central auction on the internet



Registered attributes

Size class

Gutting

Storage class

Gutting and/or storage method

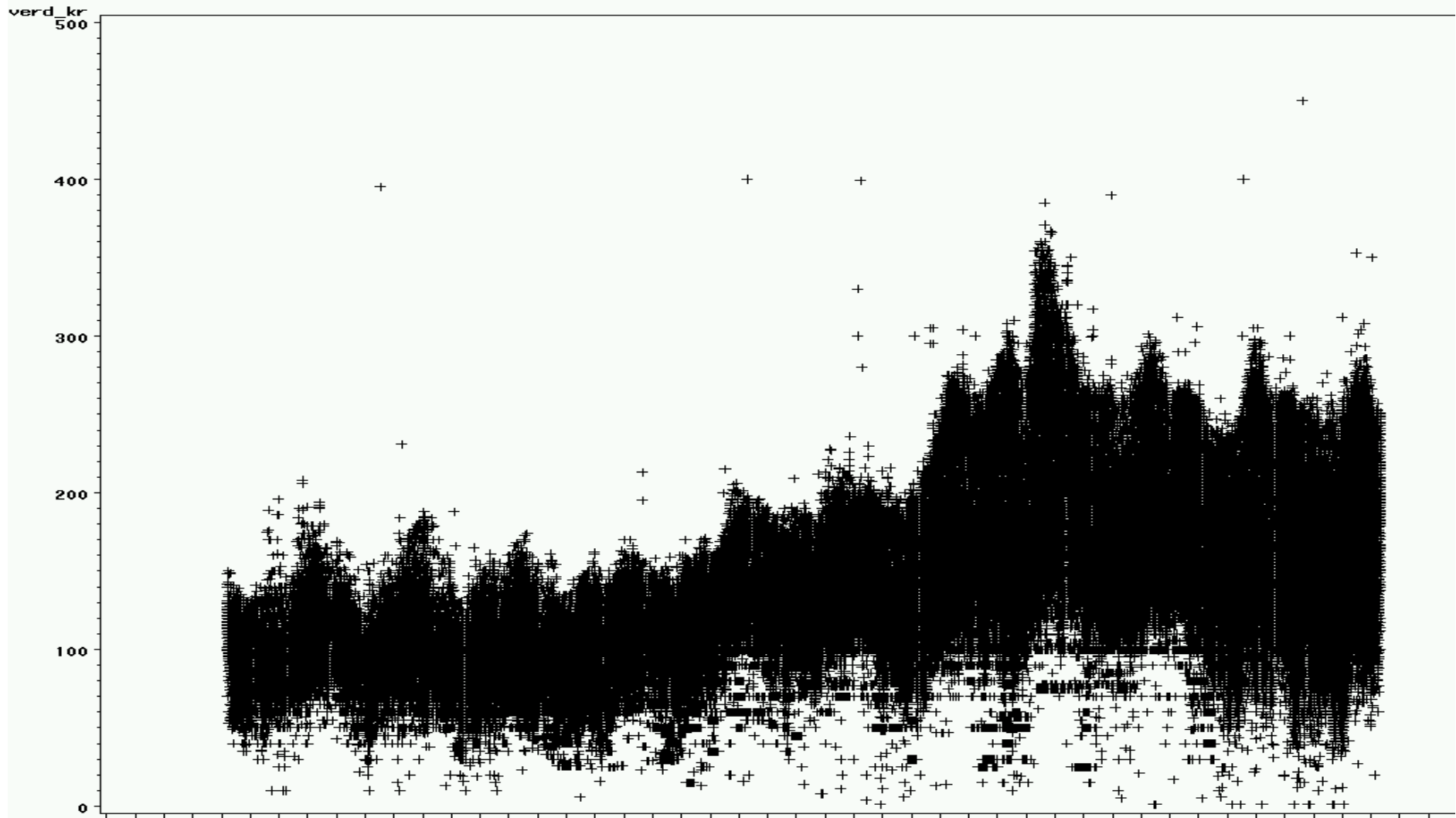
Vessel

Location

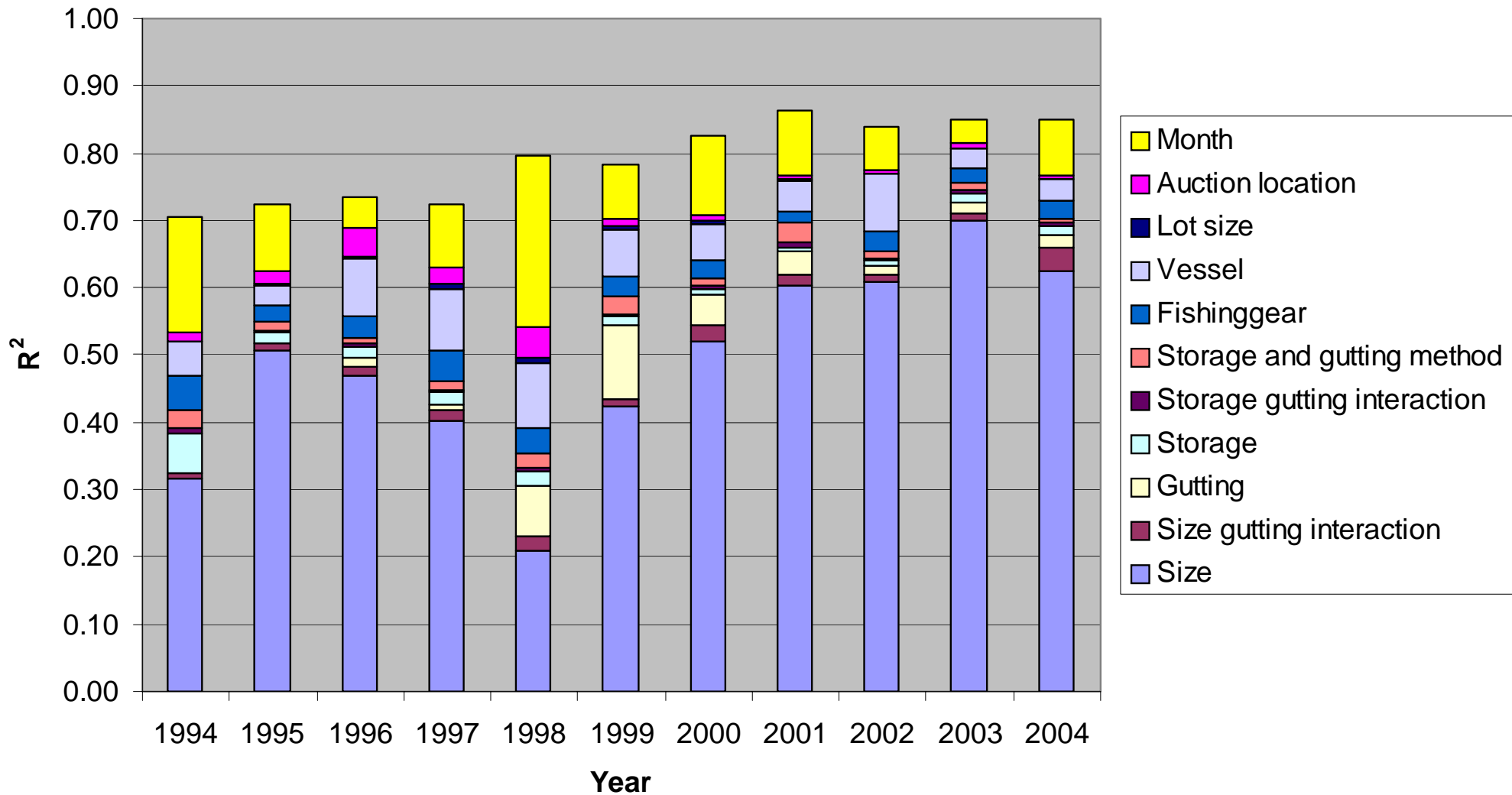
Lot size



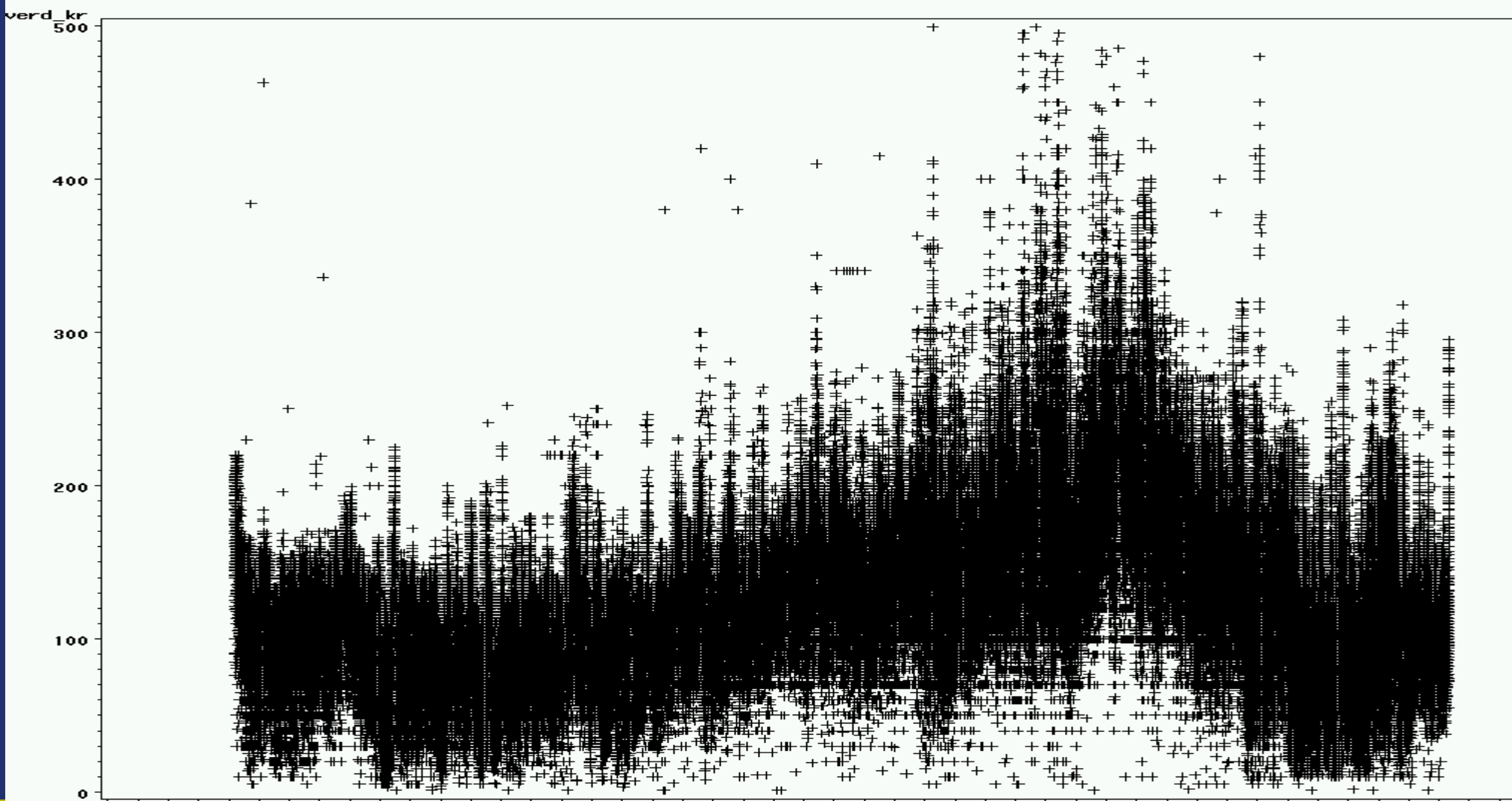
Cod price in the auctions 1994-2005



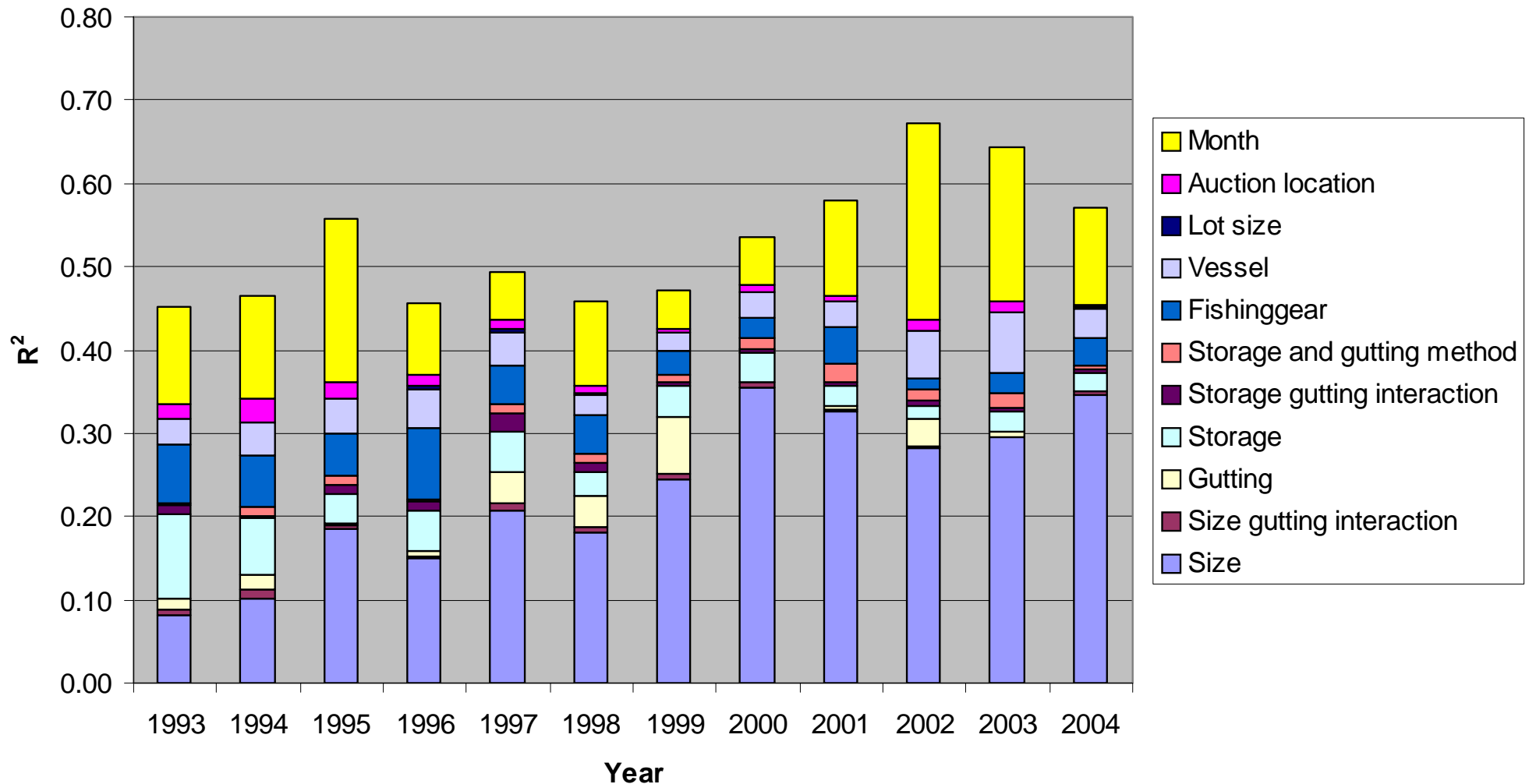
Factors explaining cod price



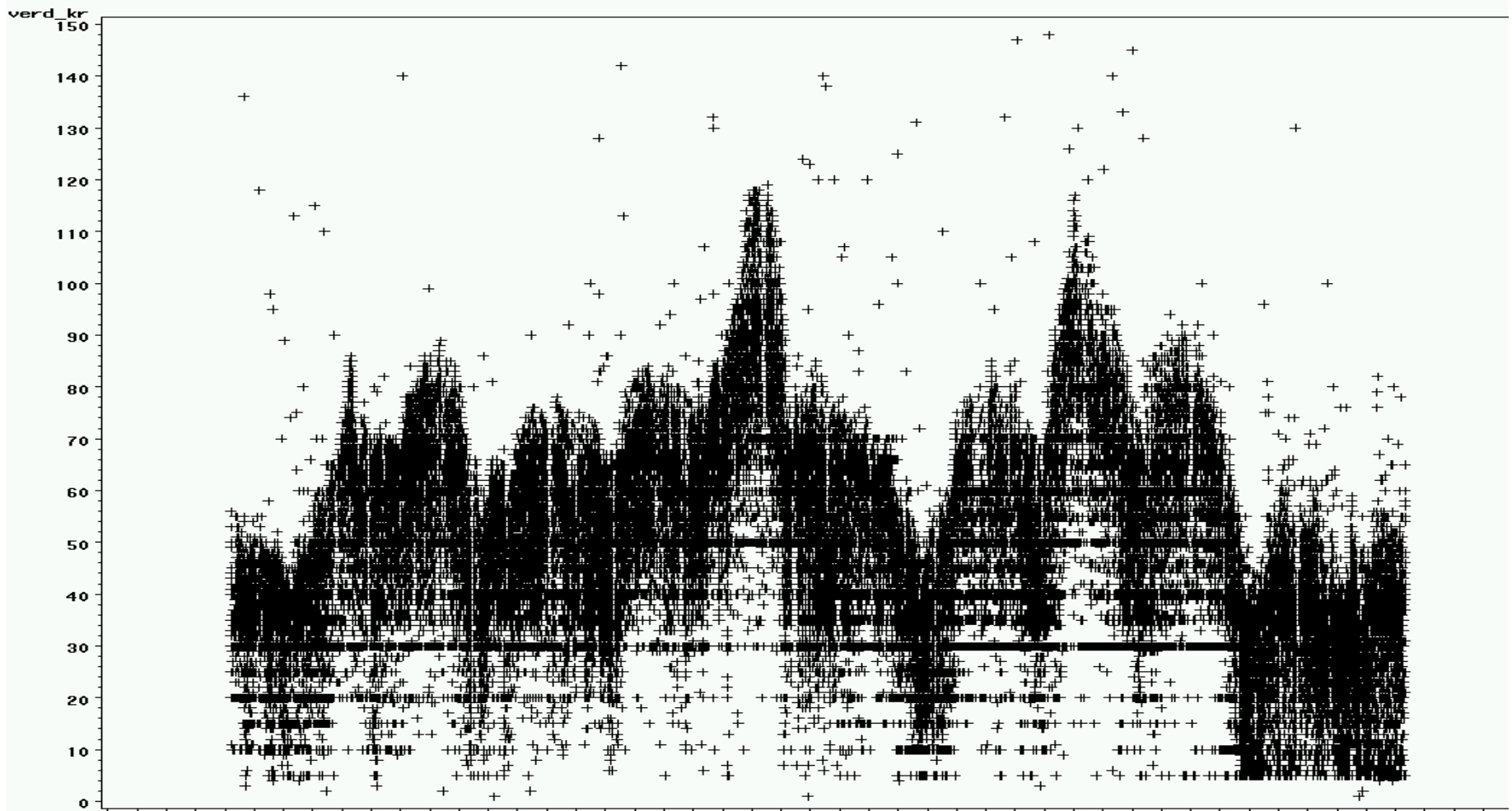
Haddock price 1994-2005



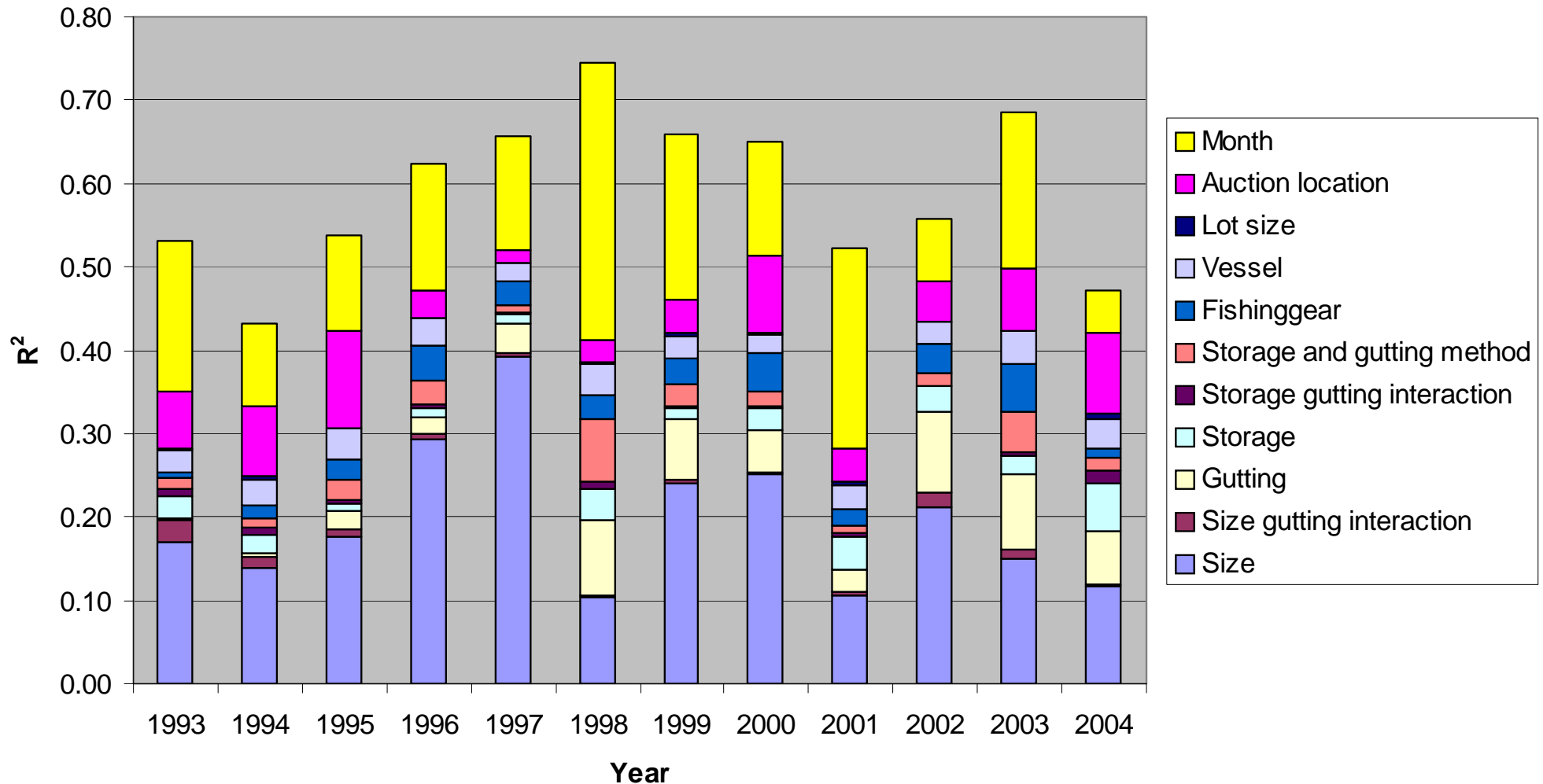
Factors explaining haddock price



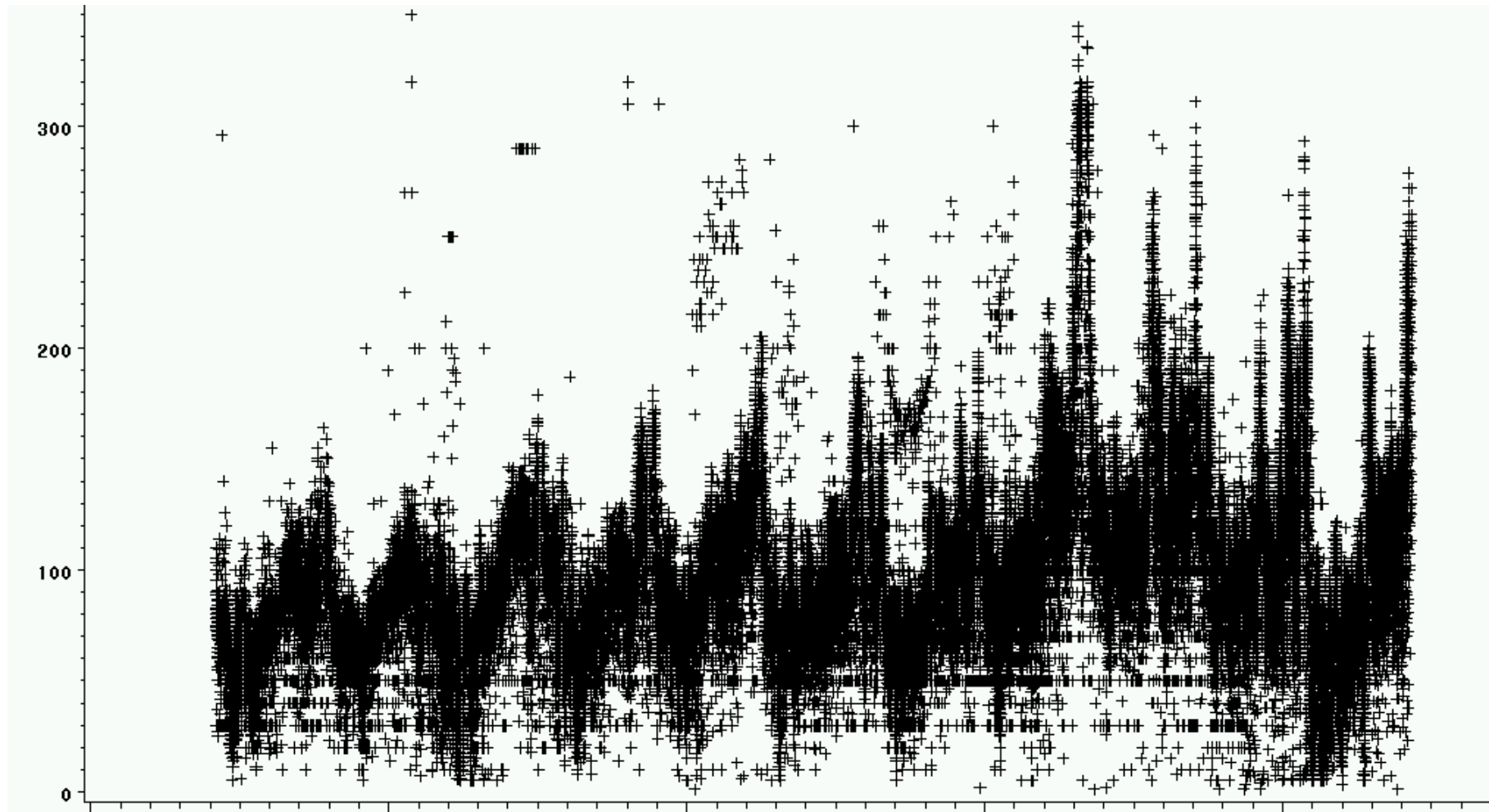
Saithe price 1994 - 2005



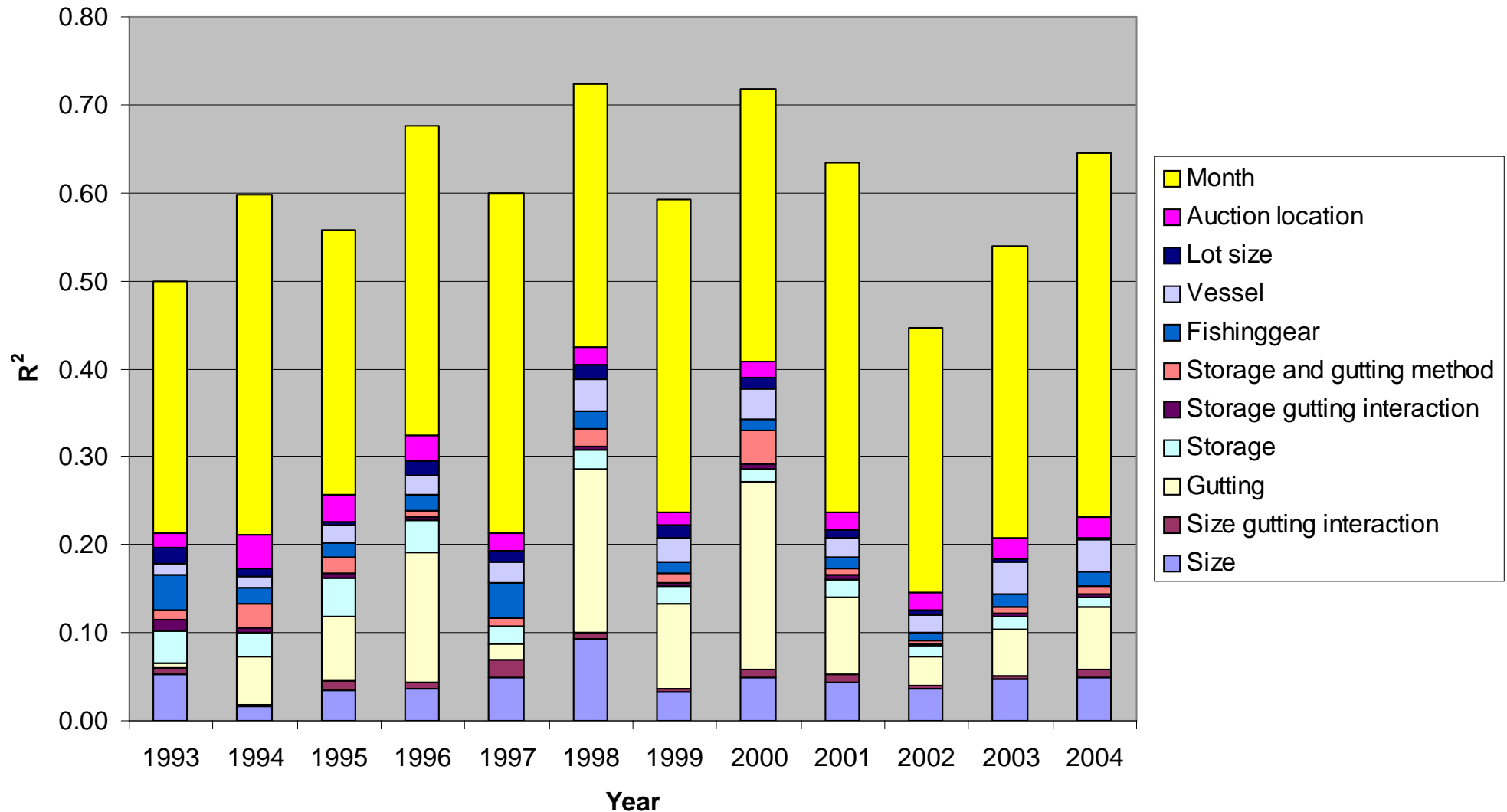
Factors explaining saithe price



Wolffish price 1994-2005



Factors explaining wolffish price



Valuable attributes

Very high degree of explained price variation

- attributes affect price

Size, gutting and month of the year most important

- varying degree of importance of attributes compared to seasonal patterns
cod>haddock>saithe>wolffish



Indications of information asymmetry

Easily measured attributes most important

- size, gutting, time of year

Storage less important than vessel number

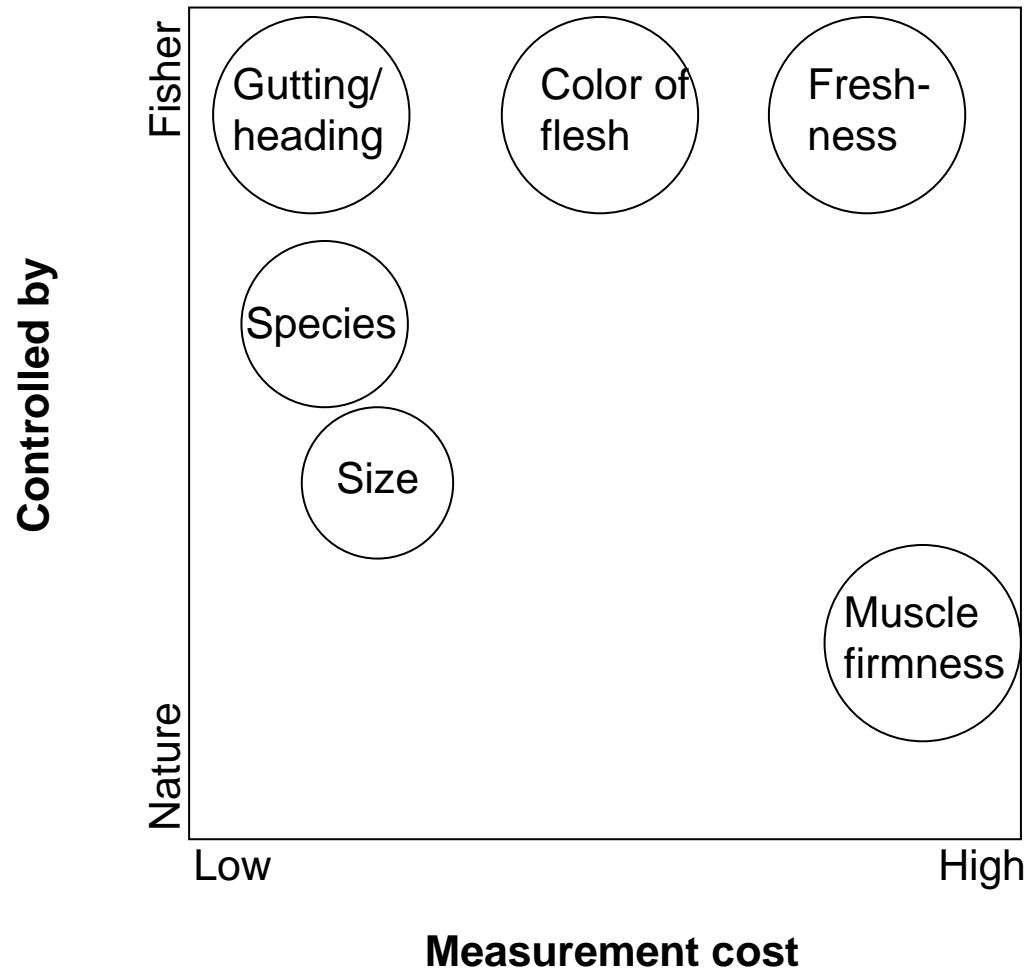
Vessel number maybe a personal guarantee of quality => some information asymmetry

- improvements in quality registration may reduce unexplained variance

Still a small proportion left of unexplained variation



Types of attributes



Indications of highgrading

The incentives is most definitely there

Development of the importance of size indicates an increased incentive for cod and haddock

We need to look more closely at data



Development of marginal attribute prices

Look at the development for cod

Estimate the model

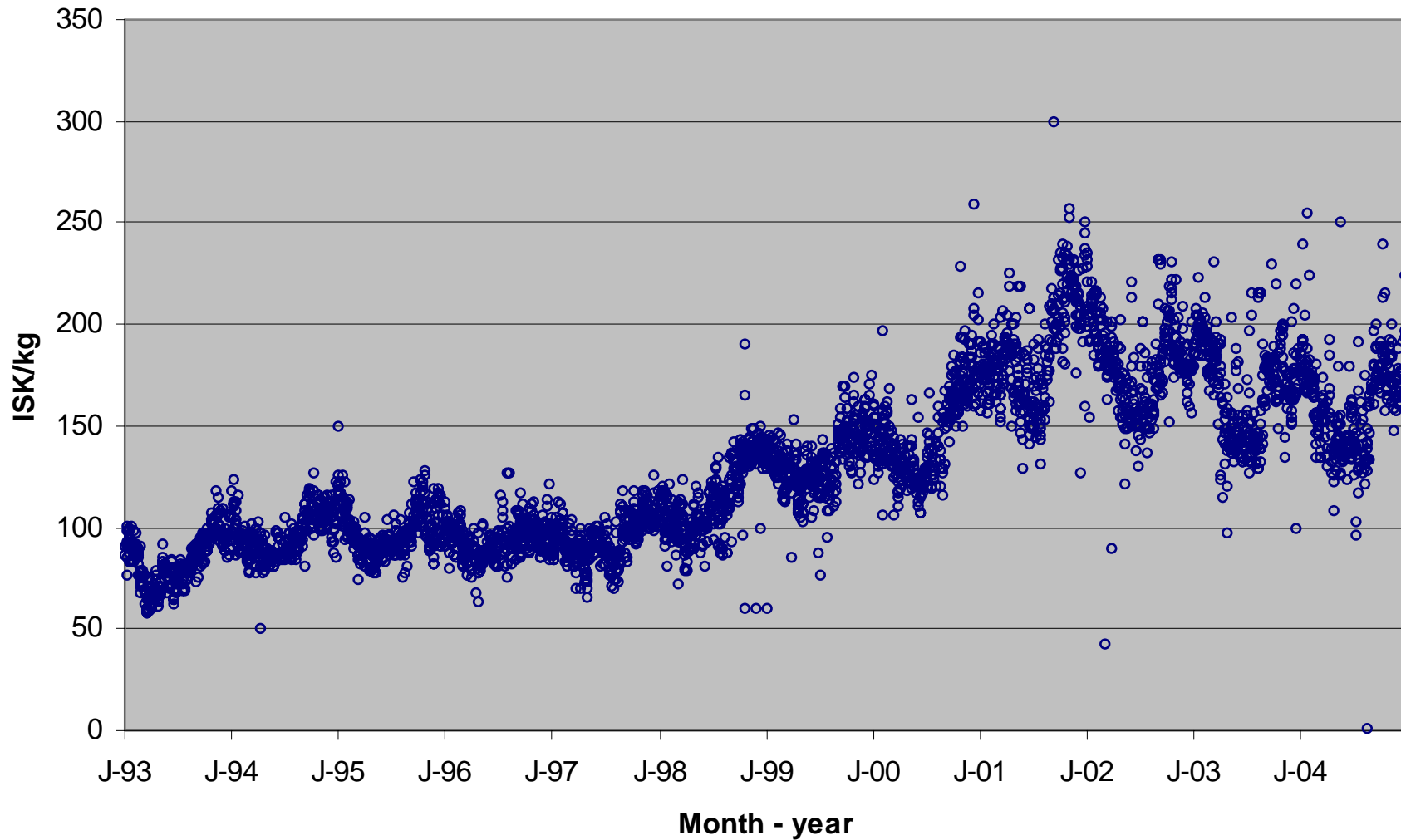
$$price_i = \beta_0 + \beta_1 size_i + \beta_2 storage_i + \beta_3 gutting_i + e_i$$

for each day of trading from 1993 through 2004 (3595 days)

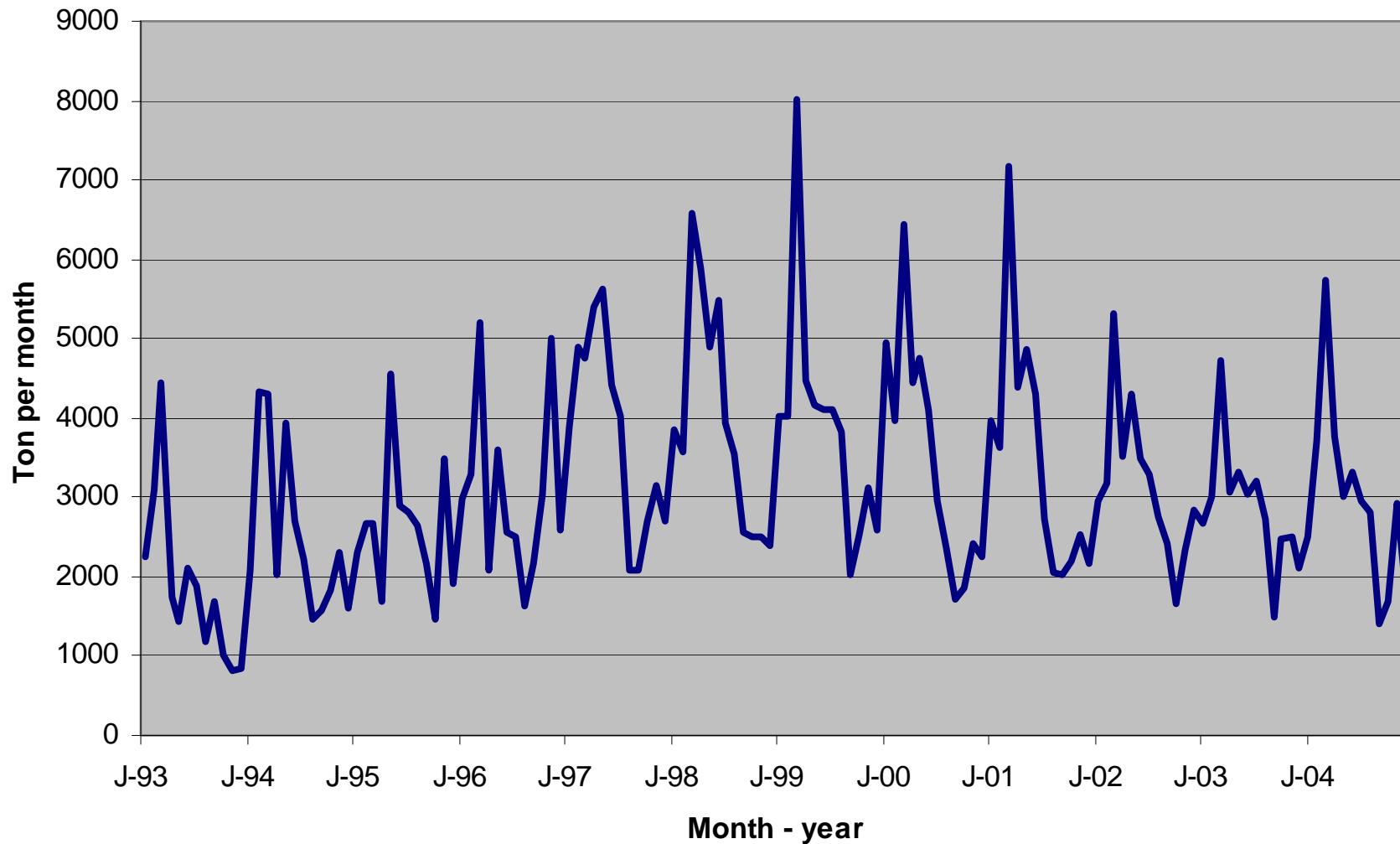
Add the supply of attributes



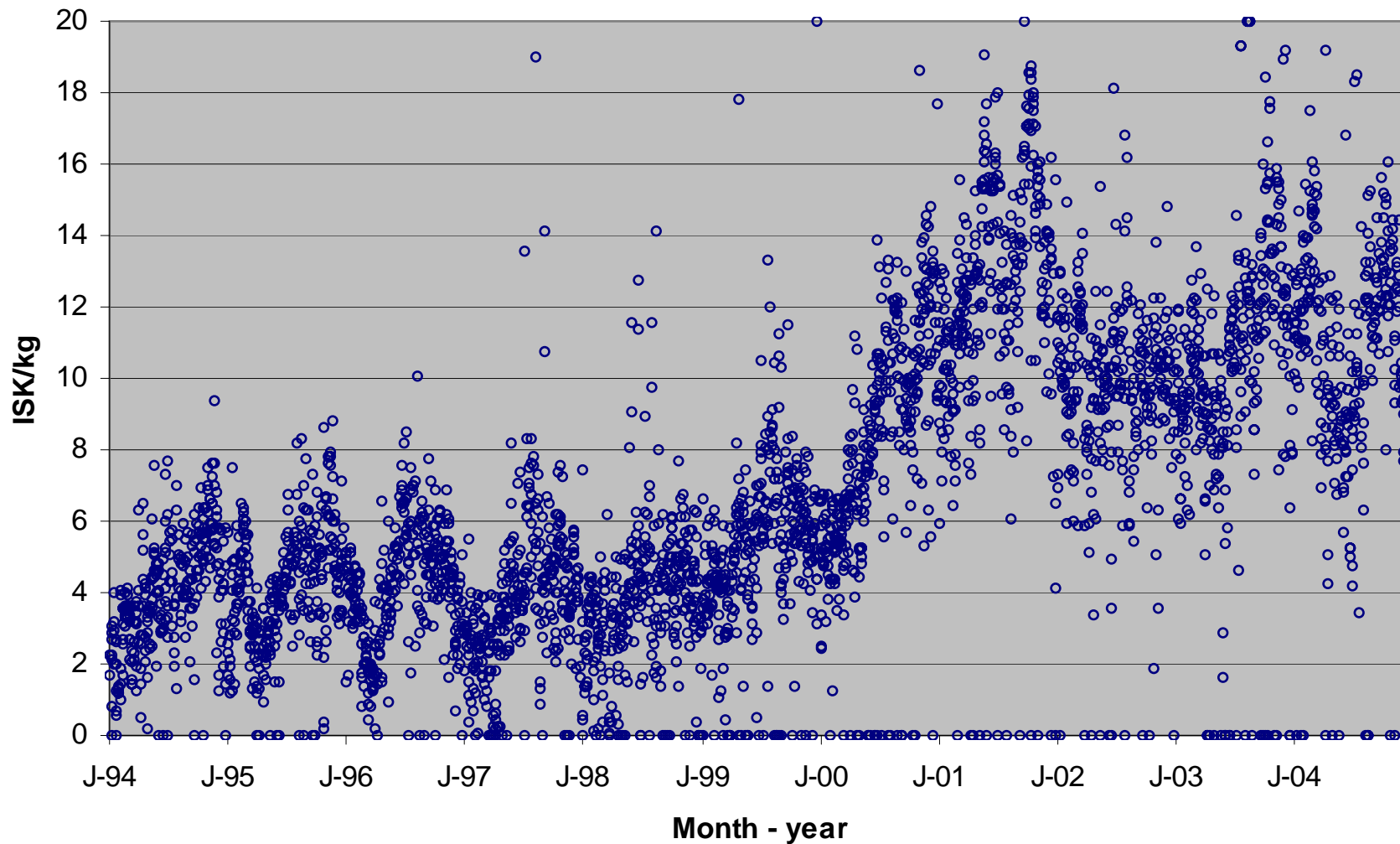
Average price



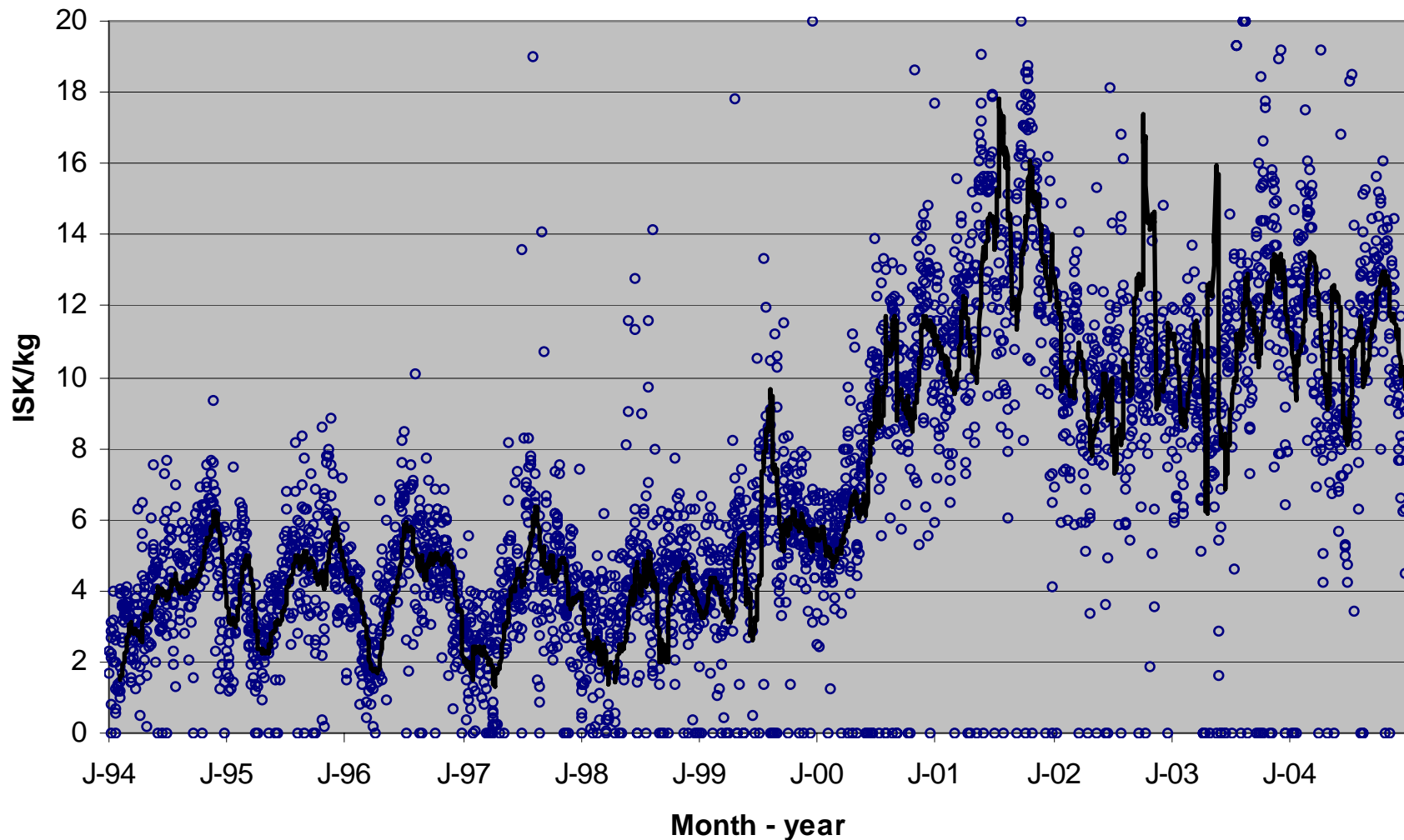
Supply



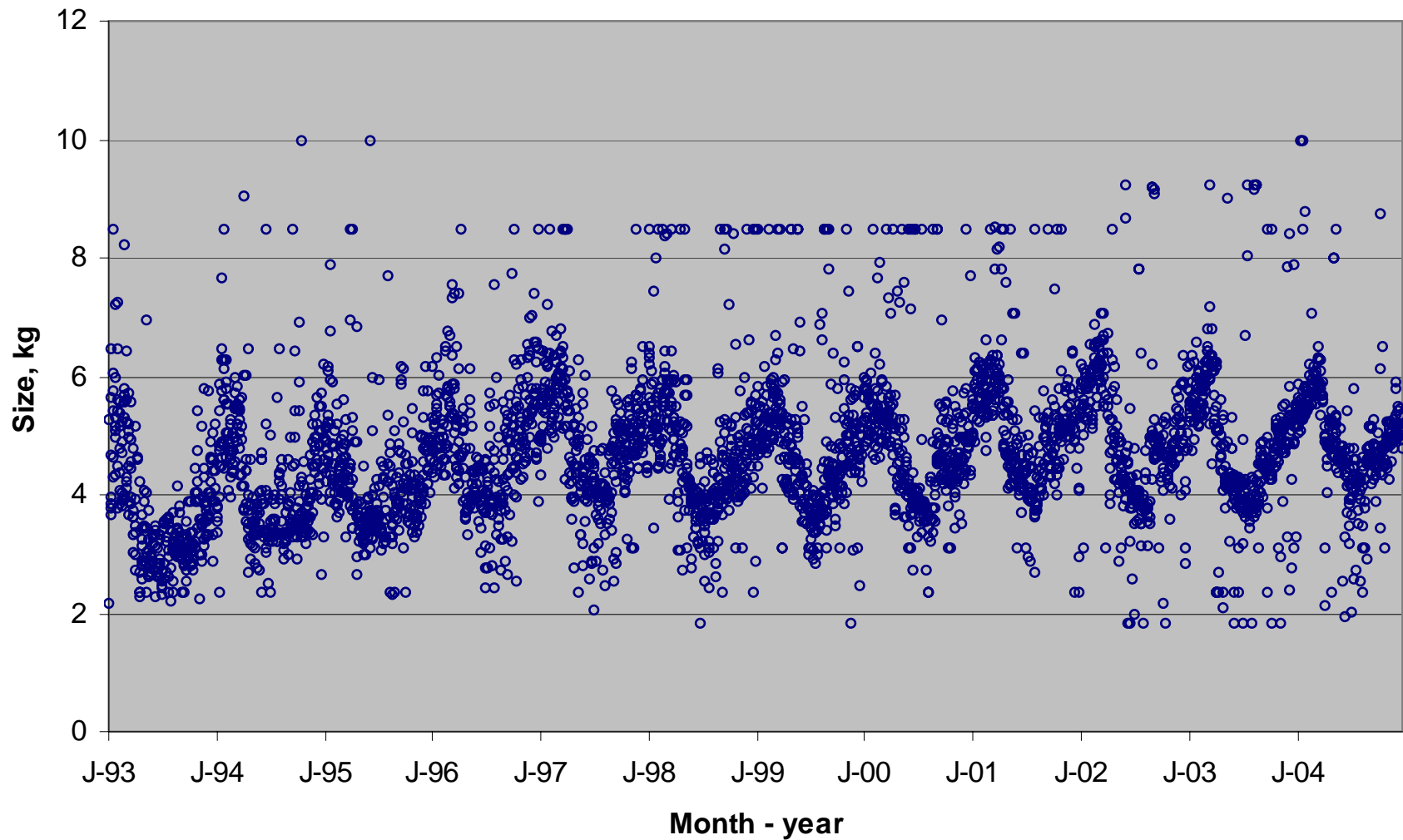
Marginal price for size



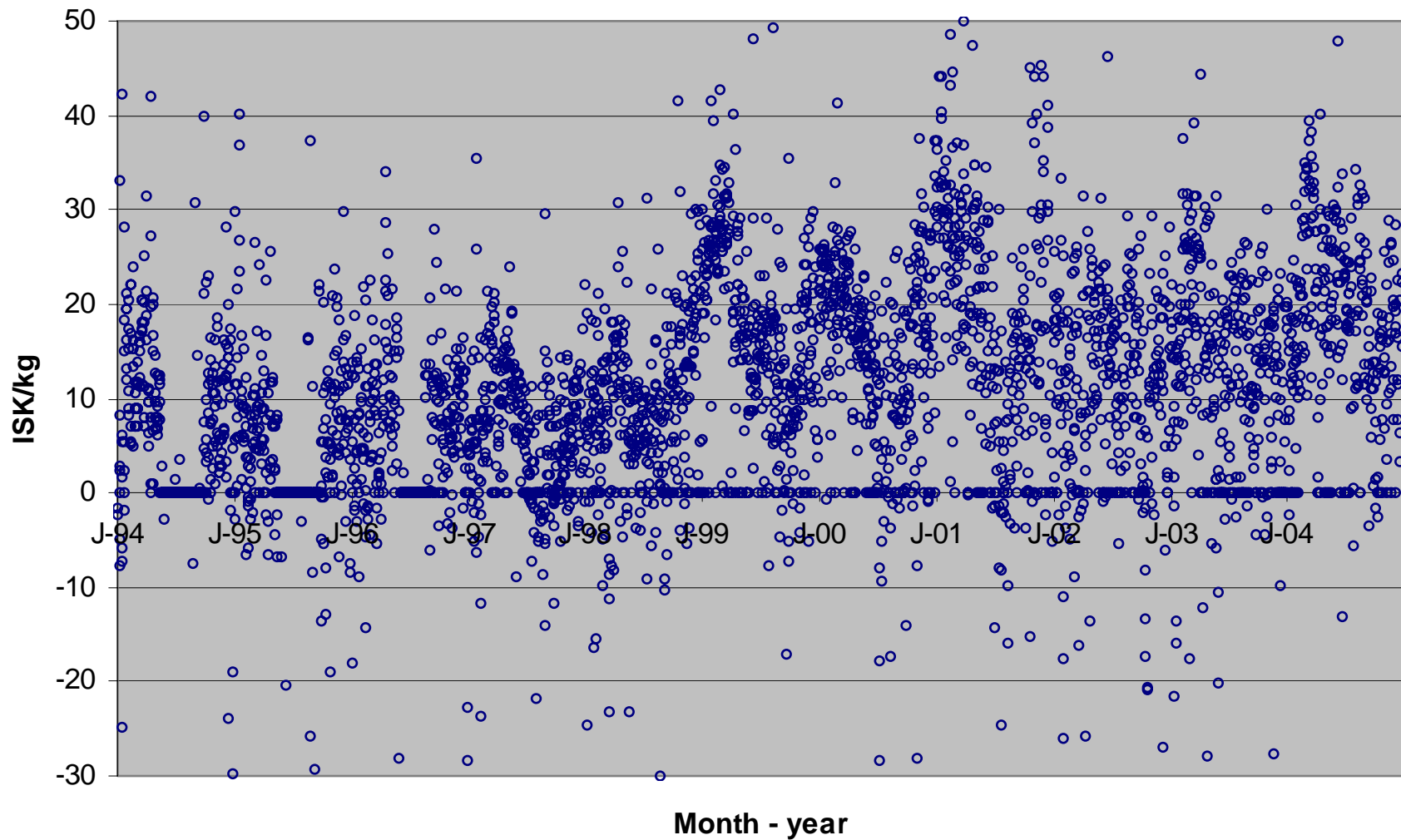
Marginal price for size



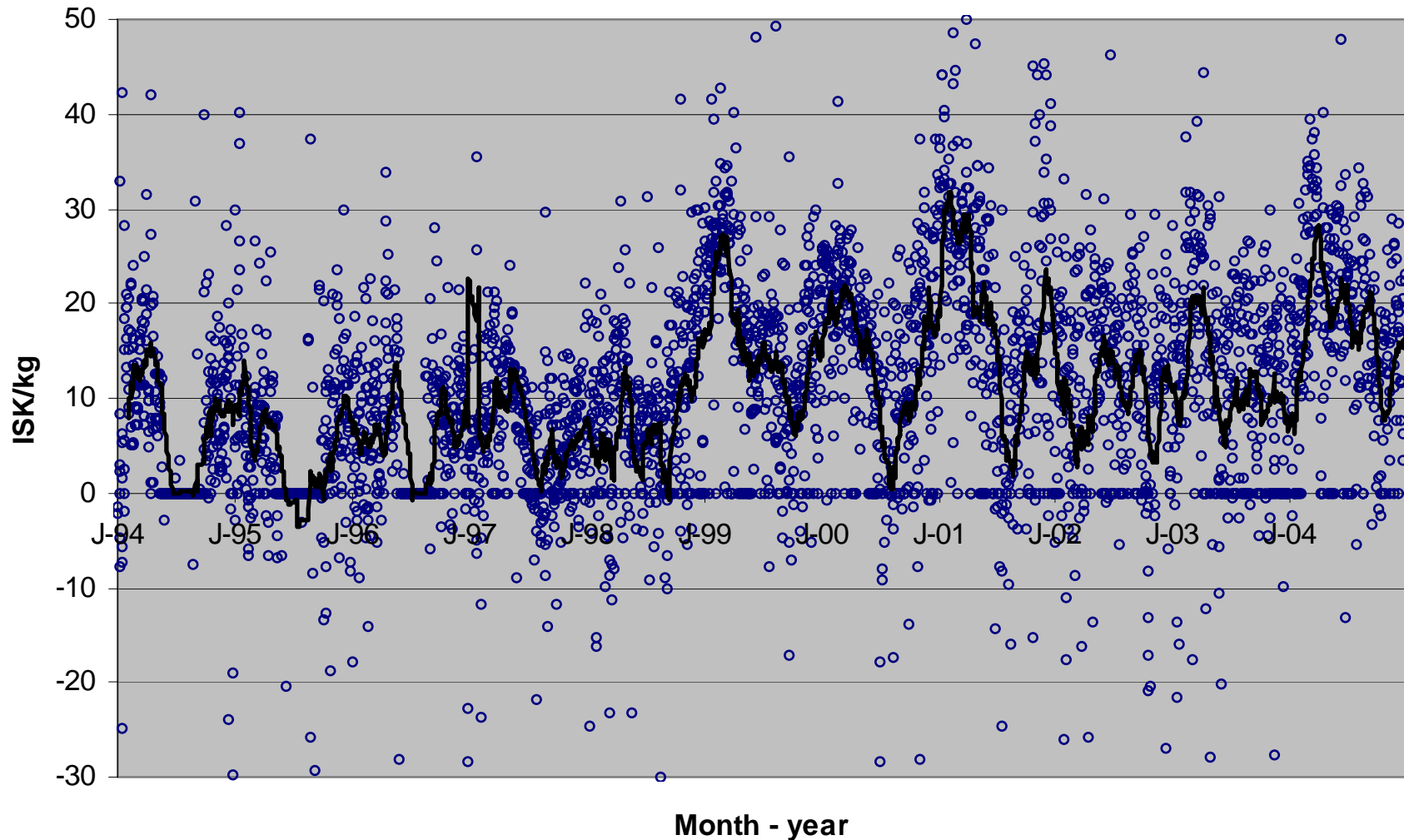
Average size



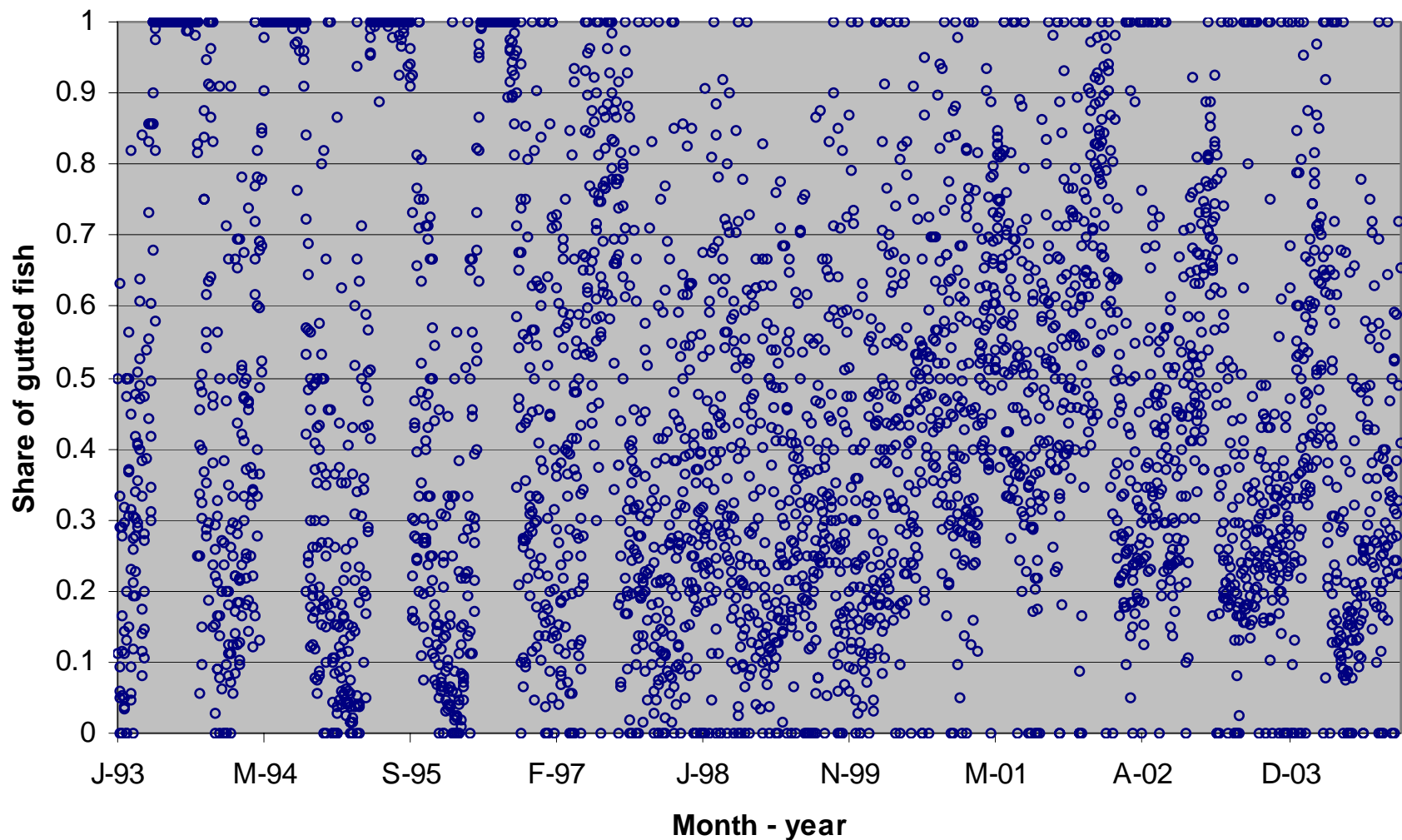
Marginal price for gutting



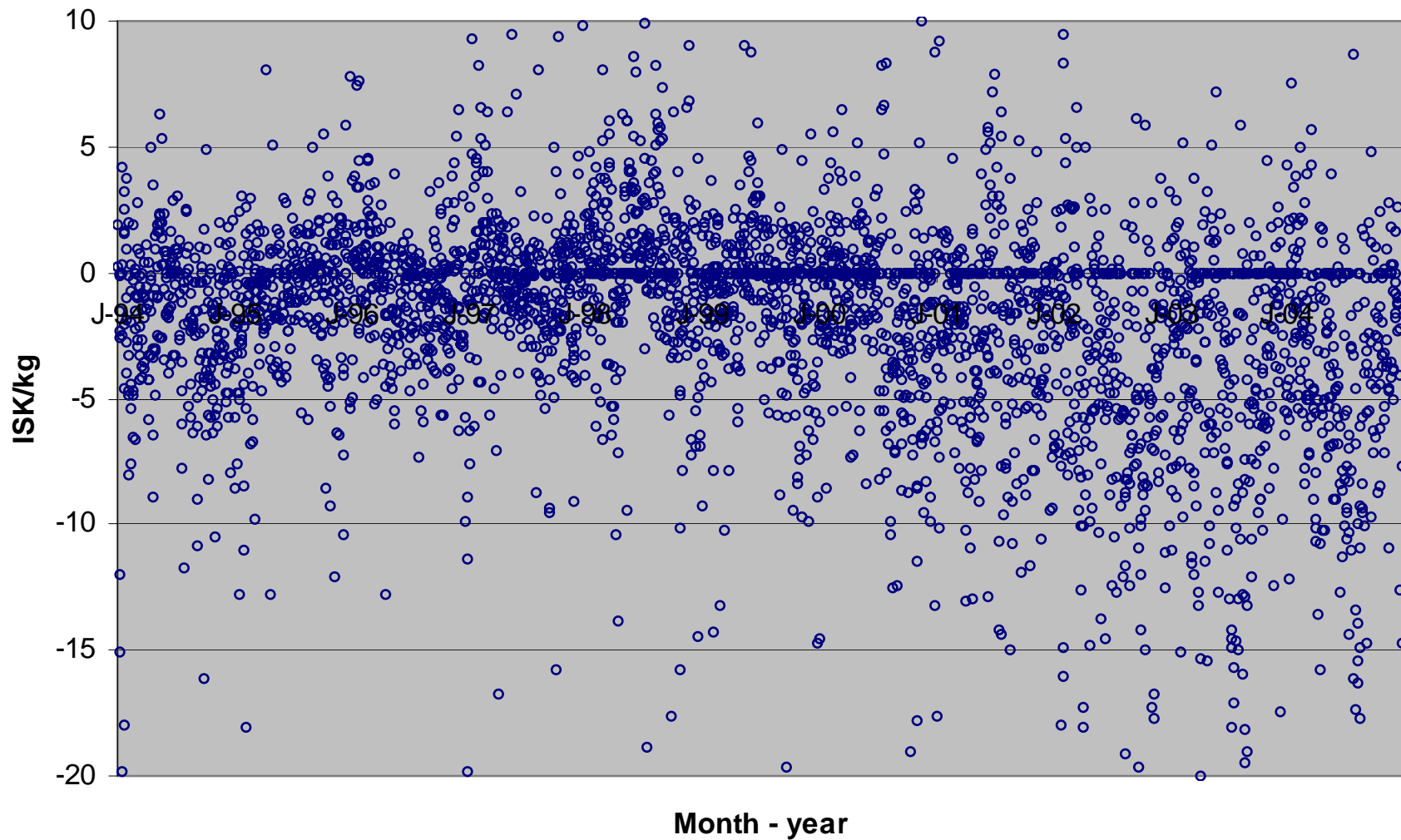
Marginal price for gutting



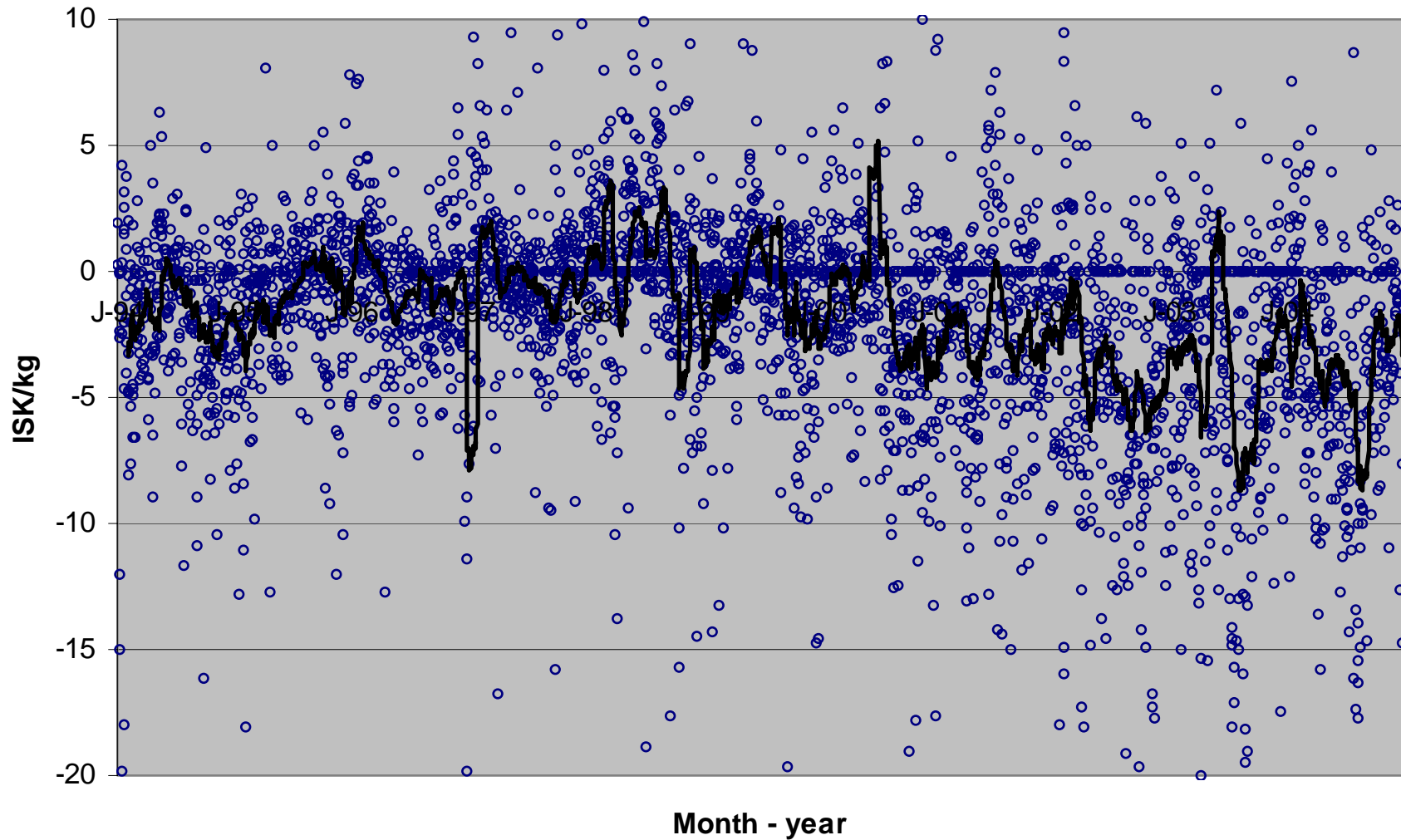
Average gutting



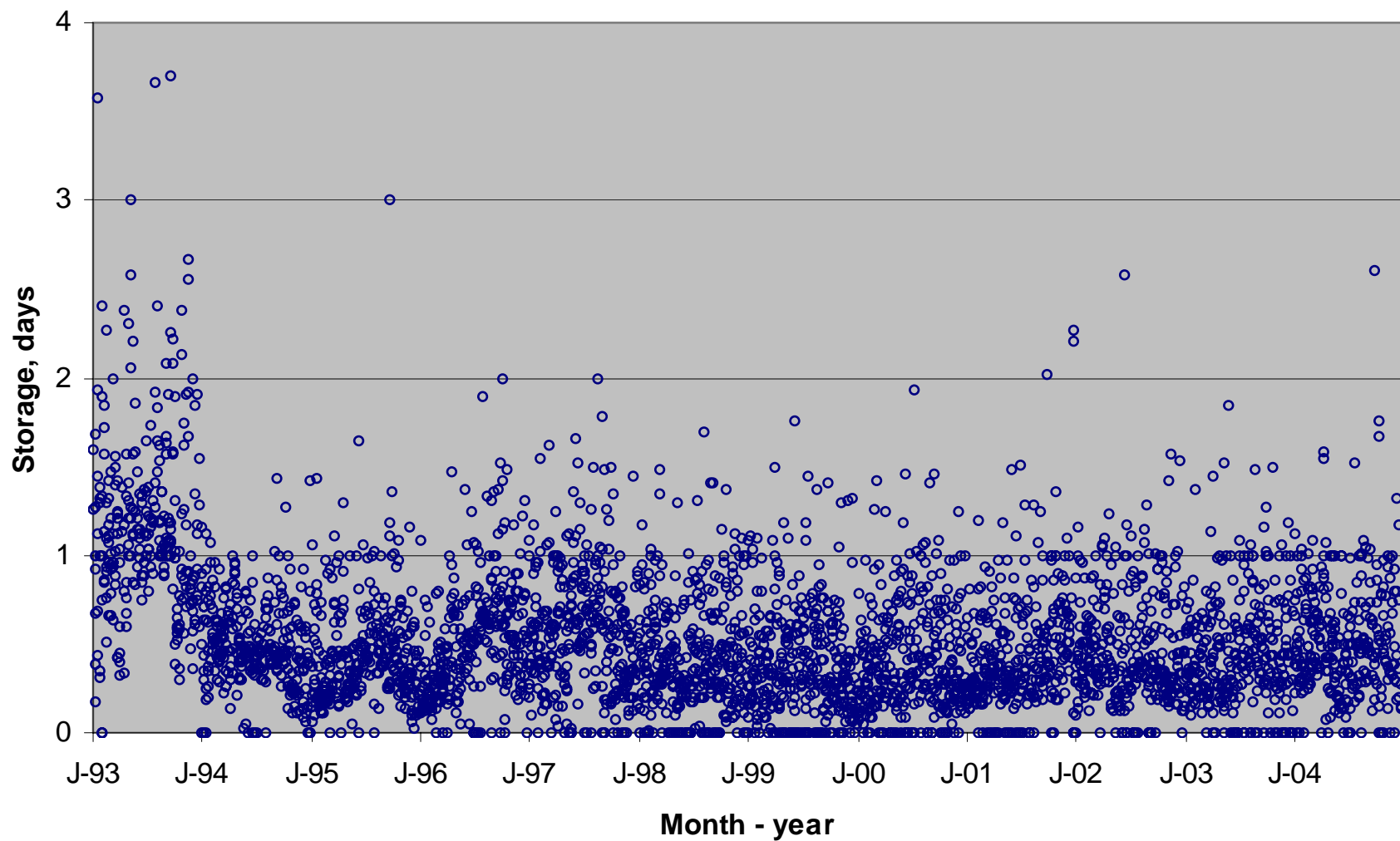
Marginal price for storage



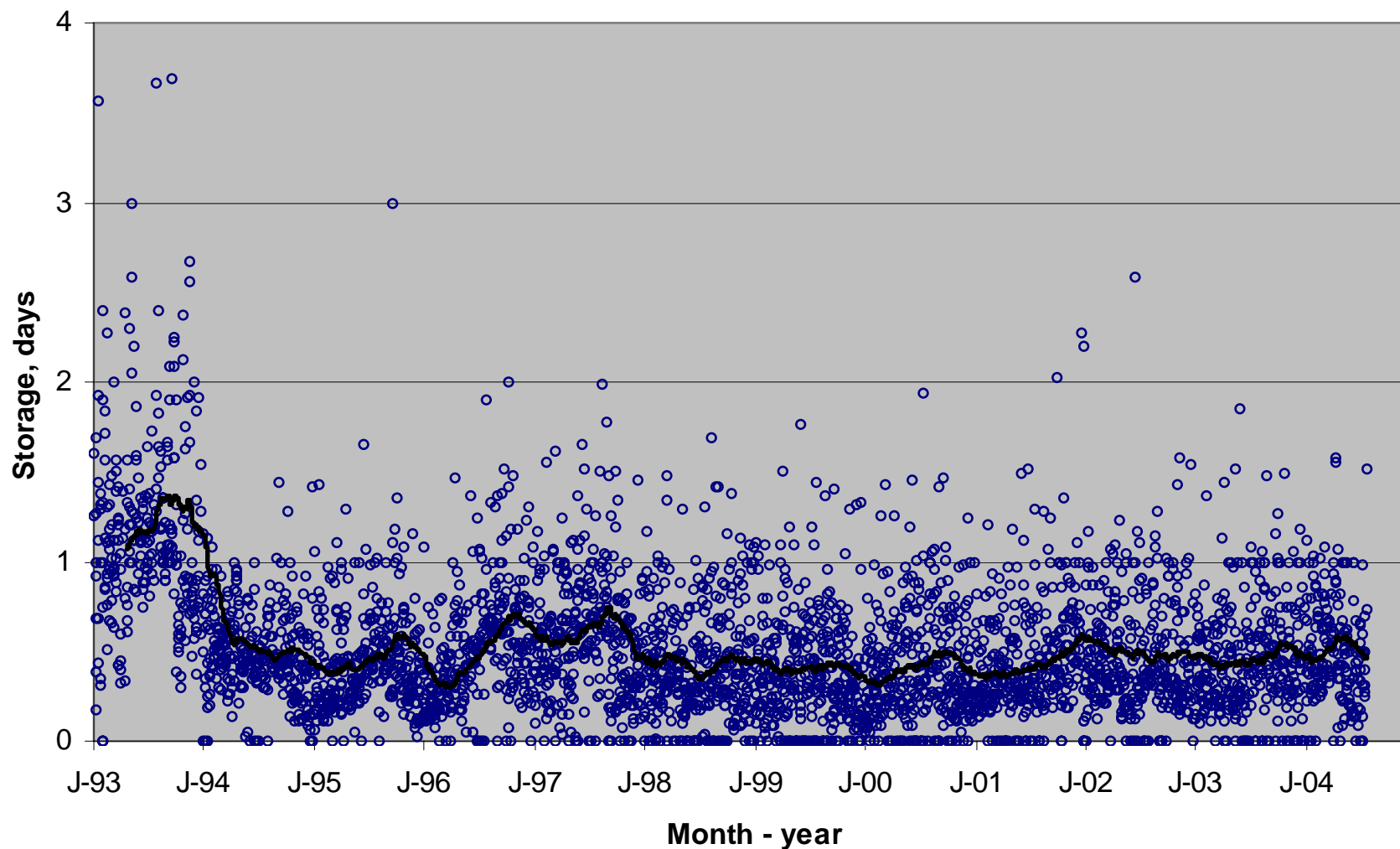
Marginal price for storage



Average storage



Average storage



Closer analysis – supply of attributes

Results from Kristofersson and Rickertsen (2007)

Estimate the daily bid functions for cod in the Icelandic fish auctions

The effects of relative changes in supply on MAP

	Quantity	Average size	Average storage	Gut ratio
Size	1.22	-19.25	-2.79	-21.96
	(1.41)	(-12.55)	(-5.50)	(-16.96)

Supply effects marginal attribute prices in the short run



Closer analysis - highgrading

Results from Kristofersson and Rickertsen (in review)

Estimate the upper limit of discards under the hypothesis that fishing technology is completely inflexible with respect to size

Test for price induces highgrading and simulate discard rates

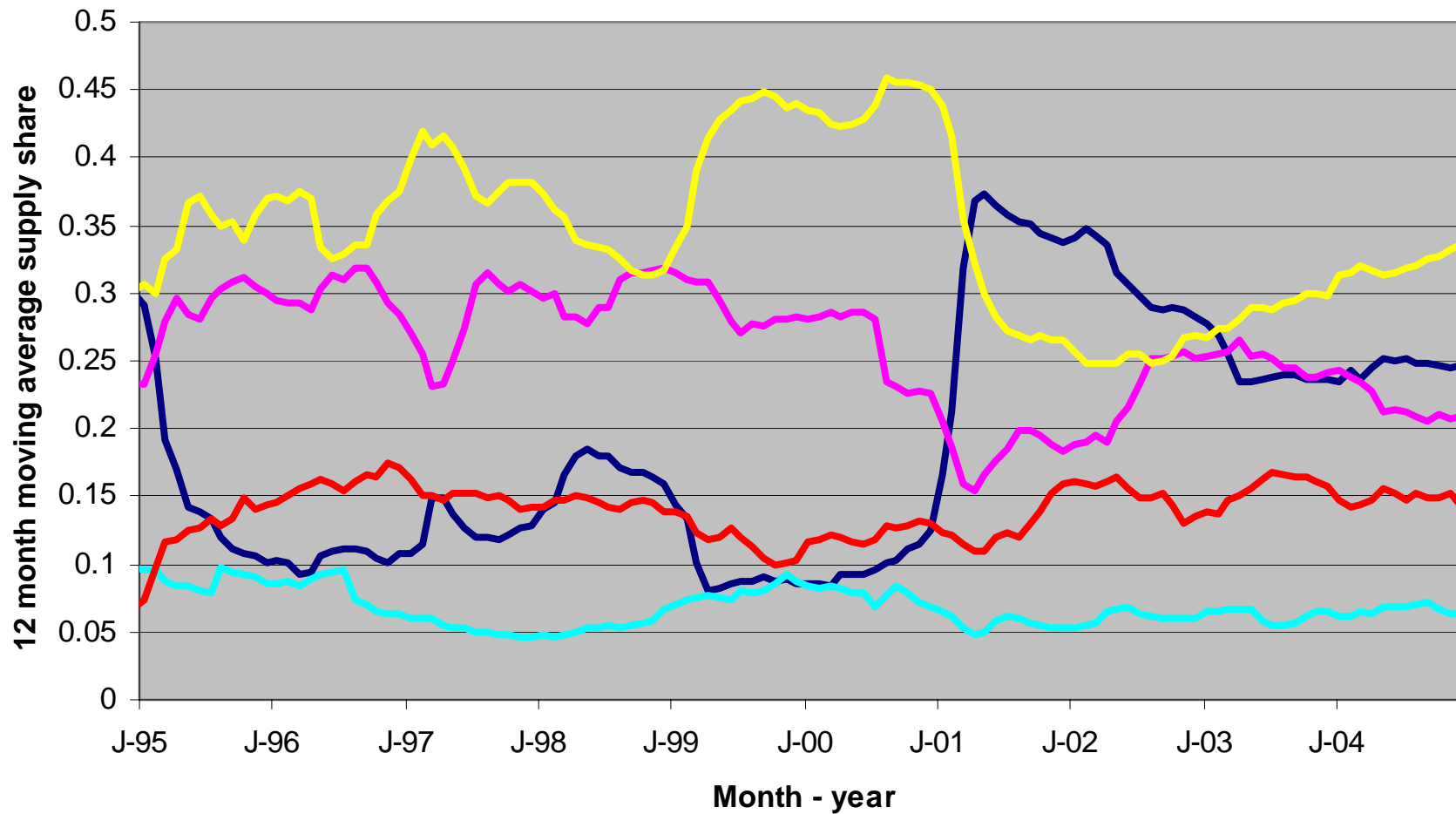


Closer analysis - highgrading

		Net	Long-line
P-values for the null hypothesis	No highgrading	0.000	0.008
	No Quota induced Discarding	0.041	0.336
Composition of landings	Small	1.00%	11.00%
	Medium	18.00%	67.00%
	Large	80.00%	22.00%
Predicted Discard Rates	Small	3.90%	2.44%
	Medium	0.79%	0.27%
	Large	0.00%	0.00%
	Total	4.70%	2.71%
Estimated Total Discards from IMRI		3.00%	1.00%



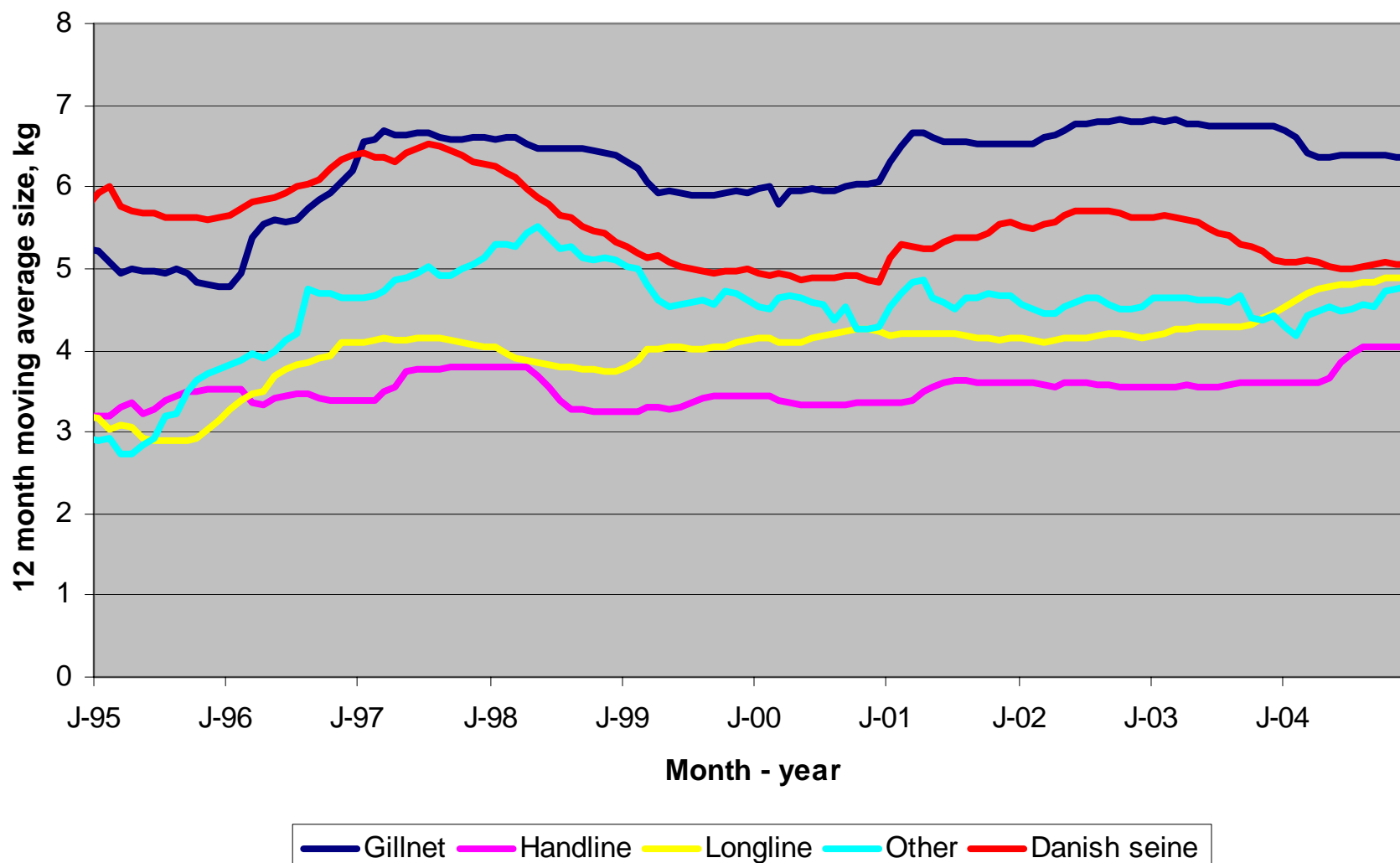
Supply gear type



— Gillnet — Handline — Longline — Other — Danish seine



Gear type supply



Indications

Development of average storage indicates increased focus on freshness

– not consistent with a market for lemons

Vessel and seasonal effect indicates that information system can be improved



Indications

Size effect clear

- seasonal supply
- affected by supply

A clear incentive and some evidence of it having an effect on average sizes

- some highgrading
- some change in catch composition



Conclusions

Large variability in the price of fish

Most of the variability can be explained by information on fish and fishing season

- Price mostly affected by easily measurable attributes
- Limited evidence for information asymmetry



Conclusions

Large incentives to highgrade or target large cod and haddock

- Some evidence that fishermen have responded to these incentives
 - some highgrading
 - some targeting

The fish auctions are a well functioning market system for a very heterogeneous product

...but there is room for improvement





The End

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