

Fluctuation in North-Atlantic cod stocks with special emphasis on the Faroe Plateau cod

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Summary of a discussion paper by
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Methods.

Data from commercial catch of cod have been prepared in order to reveal short term fluctuations in the stocks. A running 3 years average is used to smooth the data. A 9 years running average is subtracted in order to remove long time average (band pass filter). The results are presented in fig. 1. Regular fluctuations with a period of 7-10 years can be seen.

The Faroe cod is fluctuating regularly, with increasing deviation from the mean in recent time making it very interesting for closer inspection.

The Faroe Cod

Landings of cod from the Faroe area 1904-1997 are shown in fig. 2. It can be seen that catches are low during World War 2. The light fishing pressure during the war did not lead to increased catches after the war. The fish not caught during the war was lost.

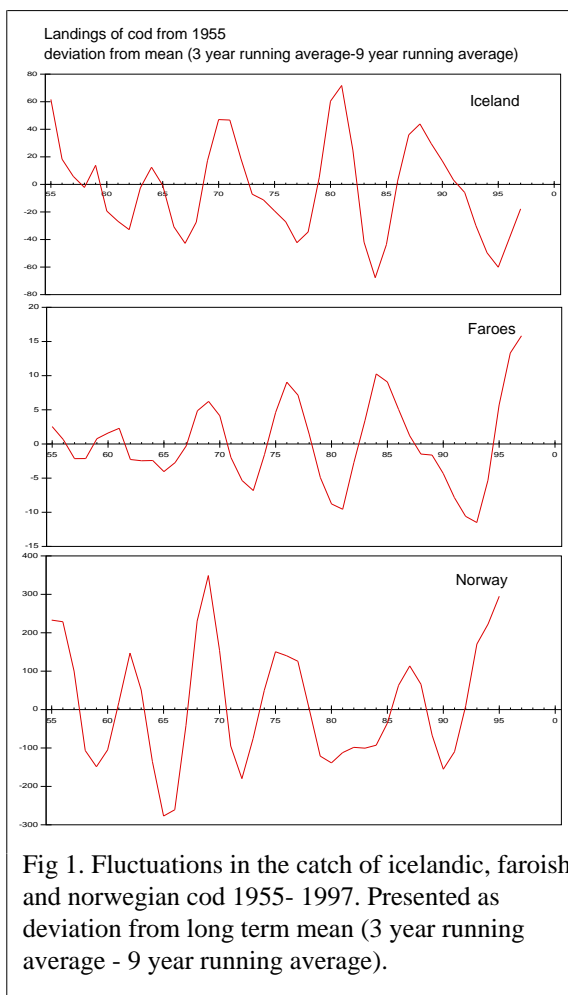


Fig 1. Fluctuations in the catch of icelandic, faroish and norwegian cod 1955- 1997. Presented as deviation from long term mean (3 year running average - 9 year running average).

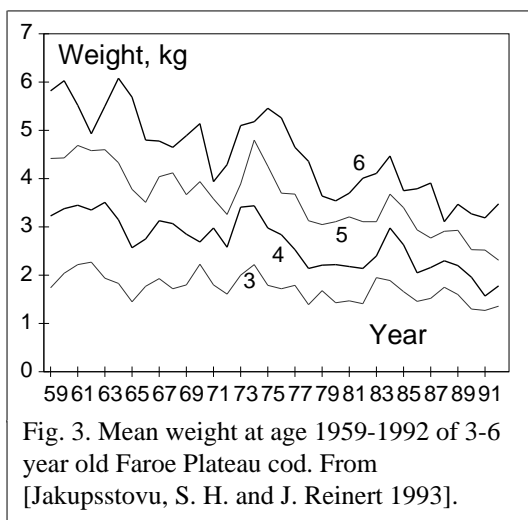


Fig. 3. Mean weight at age 1959-1992 of 3-6 year old Faroe Plateau cod. From [Jakupsstovu, S. H. and J. Reinert 1993].

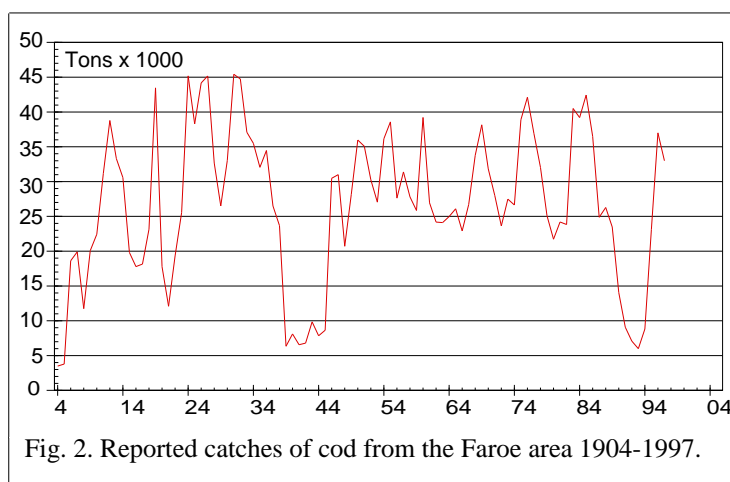


Fig. 2. Reported catches of cod from the Faroe area 1904-1997.

The period after 1961

Data on weight at age are available since 1961 Fig 3. The average weight has been falling through the period. It is possible to calculate the annual growth rate G ($G = \ln(\text{weight year } n+1 / \text{weight year } n)$), and the result for 4 year old fish is shown in fig 4. A 3 -year running average is

used to smooth the data. It can be seen that growth is fluctuating regularly.

Recruitment

Smoothed curve on recruitment is shown in fig. 5, revealing regular fluctuations of 7-9 years.

Results

It can be seen in fig. 6 that growth and recruitment fluctuate together in the same phase. If the catch, which reflects the stock size under a nearly constant effort management system, is put upon the former two, it can be seen to be in anti-phase.

Conclusions and hypothesis

1. Growth and recruitment depends on the size of the stock. Growth is low and recruitment is low when the stock is large and vice versa.

2. The cod affects its own food supply by own foraging, thereby affecting the possible size of the stock.

3. The fishing pattern affects the fluctuations. To low fishing pressure in a wrong period will increase the amplitude.

References:

Gaard, E., B. Hansen and J. Reinert 1993. Physical effects on recruitment of Faroe Plateau cod. ICES 1993/CCC Symposium/No.36.

Hofstede, A.E. 1974. The application of age determination in fishing management. In Bagenal, T.B. (Ed.), Ageing of Fish, Unwin Brothers, 206-220.

Jákupsstovu, H. í and J. Reinert 1993. Fluctuations in the Faroe Plateau Cod Stock. ICES 1993/CCC Symposium/No. 11.

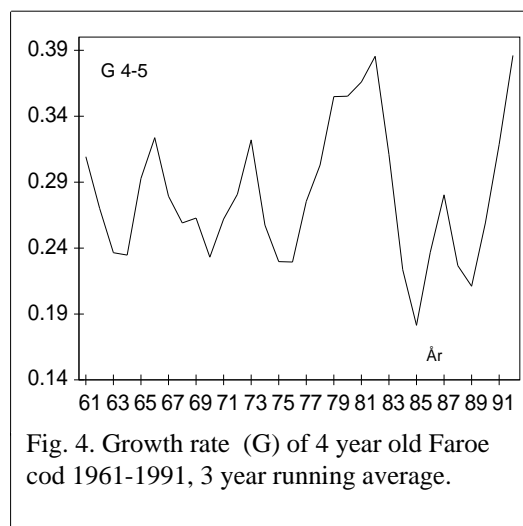


Fig. 4. Growth rate (G) of 4 year old Faroe cod 1961-1991, 3 year running average.

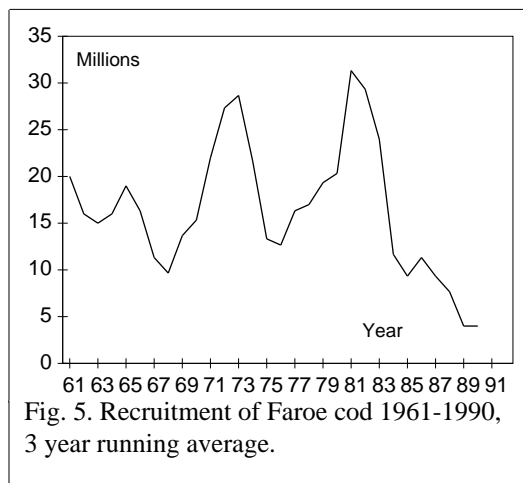


Fig. 5. Recruitment of Faroe cod 1961-1990, 3 year running average.

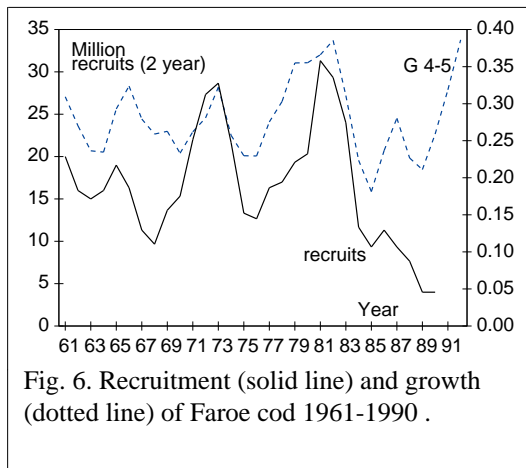


Fig. 6. Recruitment (solid line) and growth (dotted line) of Faroe cod 1961-1990 .

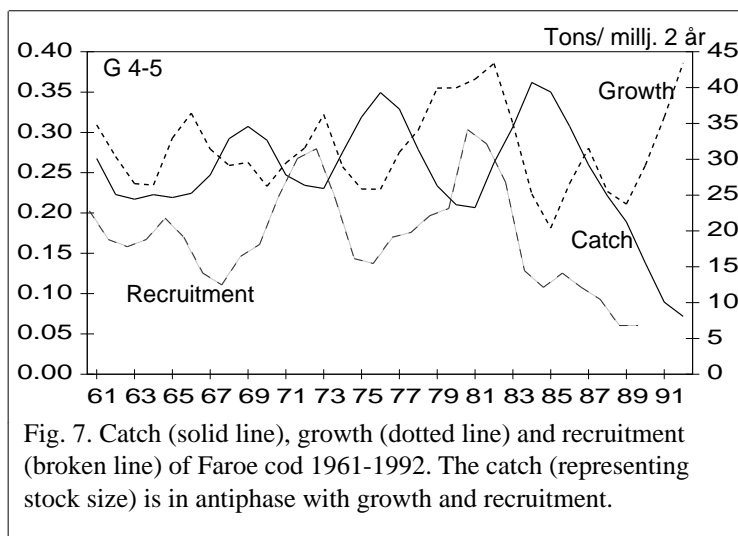


Fig. 7. Catch (solid line), growth (dotted line) and recruitment (broken line) of Faroe cod 1961-1992. The catch (representing stock size) is in antiphase with growth and recruitment.