

The Economics of Norwegian Salmon
Farming:
A review of 30 years of Production Growth

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OUTLINE

- Motivation for the review
- Productivity growth
- Stages of development in Norwegian salmon aquaculture
- Concluding remarks





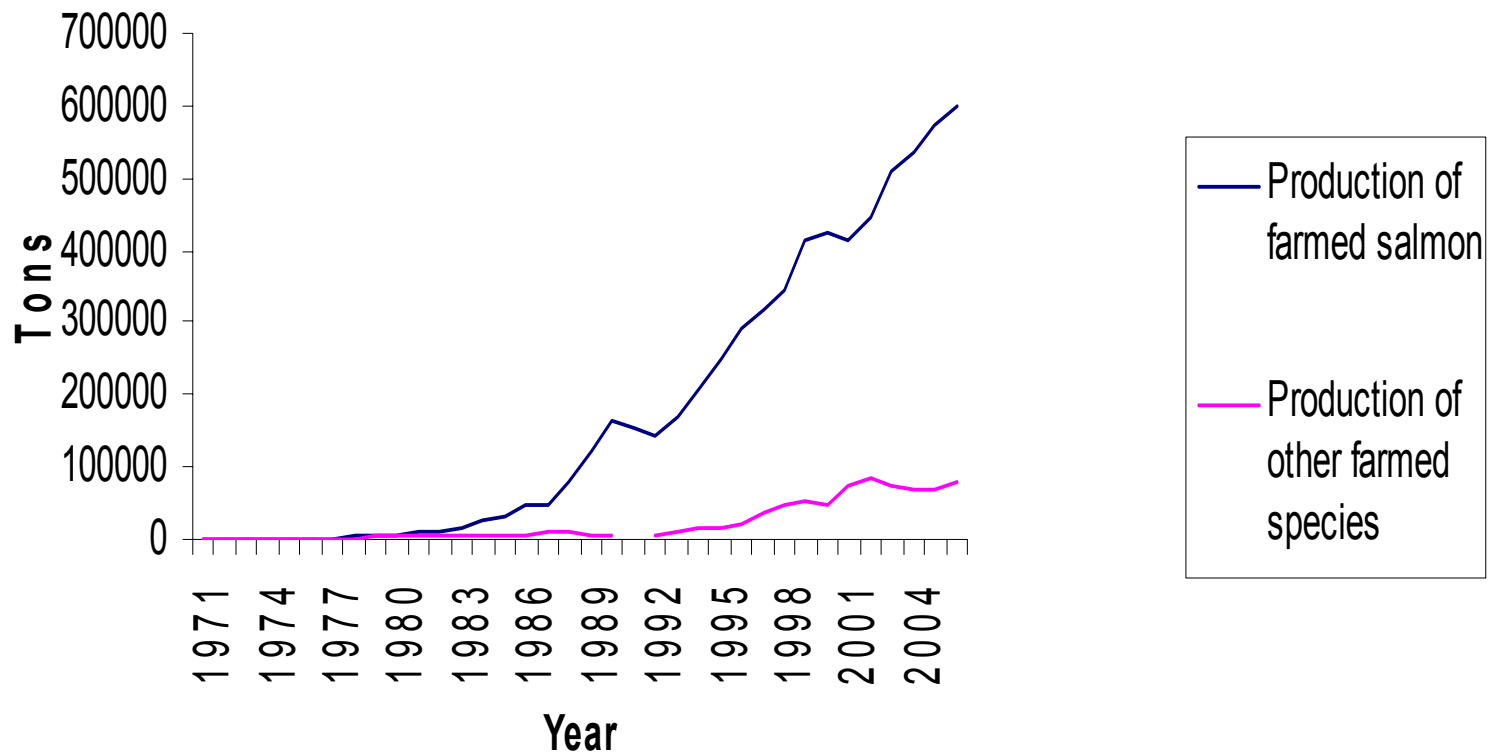
MOTIVATION FOR THE REVIEW

- Salmon aquaculture in Norway has been rather successful
- It exist an overwhelming dataset with farm data (panel) from 1982-2007
- The industry is carefully studied by economists for more than 25 years, reviewing these studies might provide new insight
- Experiences from Norwegian Salmon aquaculture might benefit other emerging aquaculture industries



MOTIVATION FOR THE REVIEW

Norwegian aquaculture production



SALMON FARM DATASET

- Unbalanced panel data based on annual data collected by the Norwegian directorate of fisheries since 1982
- Covers more than 50% of total salmon industry in most years
- About 80 variables is reported
- Used in a number of Ph.D-theses: Salvanes (1988), Tveterås (1998), Guttormsen (2002), Roll (2008) and more than thirty per reviewed articles

Source: Roll K.H. (2008)





MOTIVATION FOR THE REVIEW

- A rich source of literature discussing several aspects of the norwegian salmon industry
- Asche, F. (1997). "Trade Disputes and Productivity Gains: The Curse of Farmed Salmon Production?" Marine Resource Economics **12**(1): 67-73. Asche, F. (2006). Primary industries facing global markets: the supply chains and markets for Norwegian food and forest products. Oslo, Universitetsforl. Asche, F., T. Bjørndal, et al. (2003). "Relative Productivity Development in Salmon Aquaculture." Marine Resource Economics **18**(2): 205-10. Asche, F. and A. G. Guttormsen (2001). "Patterns in the Relative Price for Different Sizes of Farmed Fish." Marine Resource Economics **16**(3): 235-47. Asche, F., A. G. Guttormsen, et al. (1999). "Environmental Problems, Productivity and Innovations in Norwegian Salmon Aquaculture." Aquaculture Economics and Management **3**(1): 19-29. Asche, F. and R. Tveteras (1999). "Modeling Production Risk with a Two-Step Procedure." Journal of Agricultural and Resource Economics **24**(2): 424-39. Bjørndal, T. (2002). "The Competitiveness of the Chilean Salmon Aquaculture Industry." Aquaculture Economics and Management **6**(1-2): 97-116. Bjørndal, T. and K. G. Salvanes (1995). "Gains from Deregulation? An Empirical Test for Efficiency Gains in the Norwegian Fish Farming Industry." Journal of Agricultural Economics **46**(1): 113-26. Bjørndal, T. and K. G. Salvanes (1991). Production technology and regional productivity differences in the Norwegian fish farming industry. Bergen. Guttormsen, A. G. (2002). "Input Factor Substitutability in Salmon Aquaculture." Marine Resource Economics **17**(2): 91-102. Kumbhakar, S. C. (2001). "Estimation of Profit Functions When Profit Is Not Maximum." American Journal of Agricultural Economics **83**(1): 1-19. Kumbhakar, S. C. (2002). "Risk Preferences and Technology: A Joint Analysis." Marine Resource Economics **17**(2): 77-89. Kumbhakar, S. C. and R. Tveteras (2003). "Risk Preferences, Production Risk and Firm Heterogeneity." Scandinavian Journal of Economics **105**(2): 275-93. Ostbye, S. (1999). "A Technical Note on Input Price Proxies Used in Salmon Farming Industry Studies." Marine Resource Economics **14**(3): 215-23. Salvanes, K. G. (1985). Fiskeoppdrett og offentlig regulering: ein empirisk analyse av kostnadstilhøve i norsk matfiskoppdrett. Bergen, K. G. Salvanes: vi, 149 bl. Salvanes, K. G. (1988). Salmon aquaculture in Norway: an empirical analysis of cost and production properties. Bergen, Institute of Fisheries Economics, Norwegian School of Economics and Business Administration: vii, 142 bl. Salvanes, K. G. (1989). "The Structure of the Norwegian Fish Farming Industry: An Empirical Analysis of Economies of Scale and Substitution Possibilities." Marine Resource Economics **6**(4): 349-373. Salvanes, K. G. (1993). "Public regulation and Production Factor Misallocation: A Restricted Cost Function for the Norwegian Aquaculture Industry." Marine Resource Economics **8**: S. 50-64. Toft, A., T. Bjørndal, et al. (1994). Kostnadsstruktur og kostnadsutvikling i matfiskoppdrett - ei drøfting av empiriske resultat. SNF-rapport. S. f. s.-o. næringslivsforskning. Tveteras, R. (1999). "...

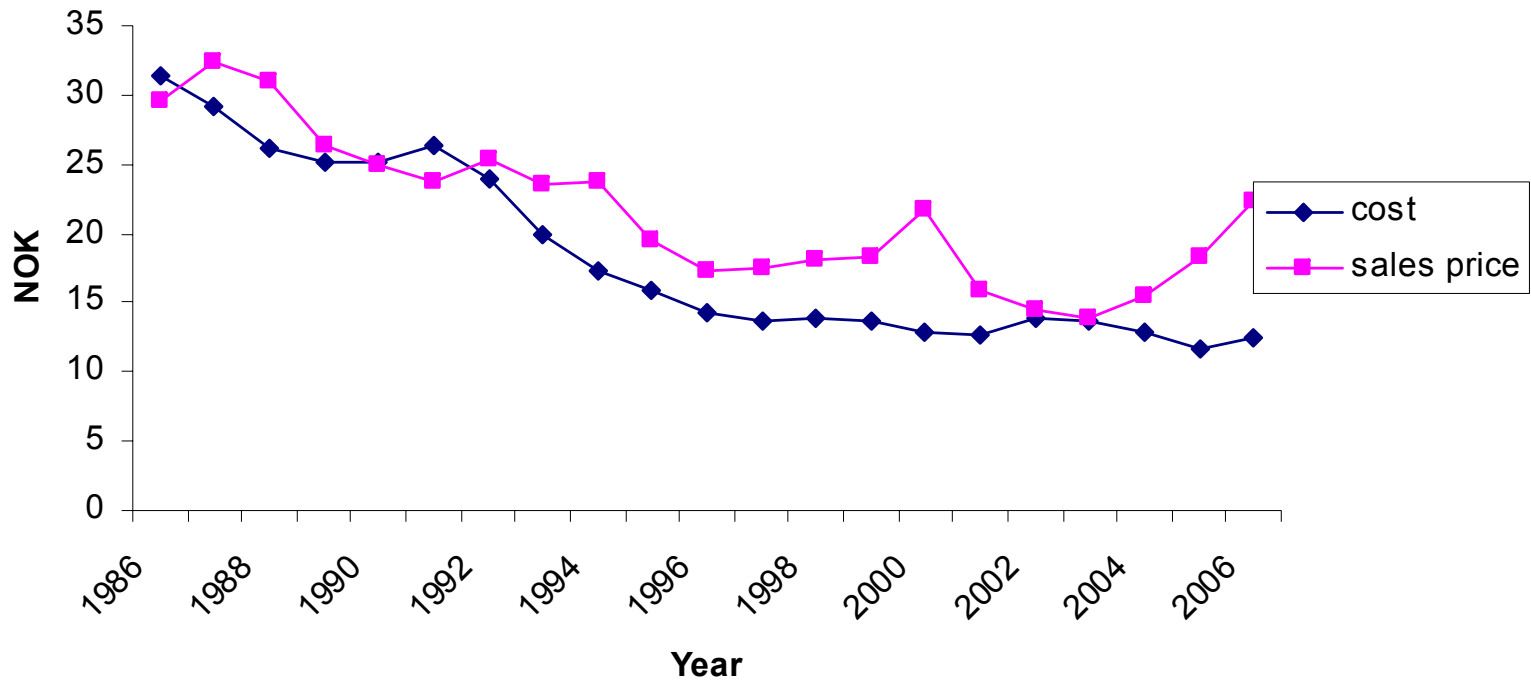


SOME STUDIES

- Estimation of cost functions , examining economics of scale, input factor substitution, cluster effects etc.
 - Salvanes (1989, 1993)
 - Bjørndal and Salvanes (1991, 1995)
 - Østbye (2000)
 - Guttormsen (2002)
 - Roll (2008)
- Estimation of production functions, risk evaluation
 - Asche and Tveterås (1999)
 - Tveterås (2000)
 - Kumbhakar (2002)
 - Kumbhakar and tveterås (2003)
- Other
 - Vassdal and Roland (1998)
 - Tveterås (2002)
 - Vassdal, in Asche (2006)

PRODUCTIVITY GROWTH

Development in cost and price

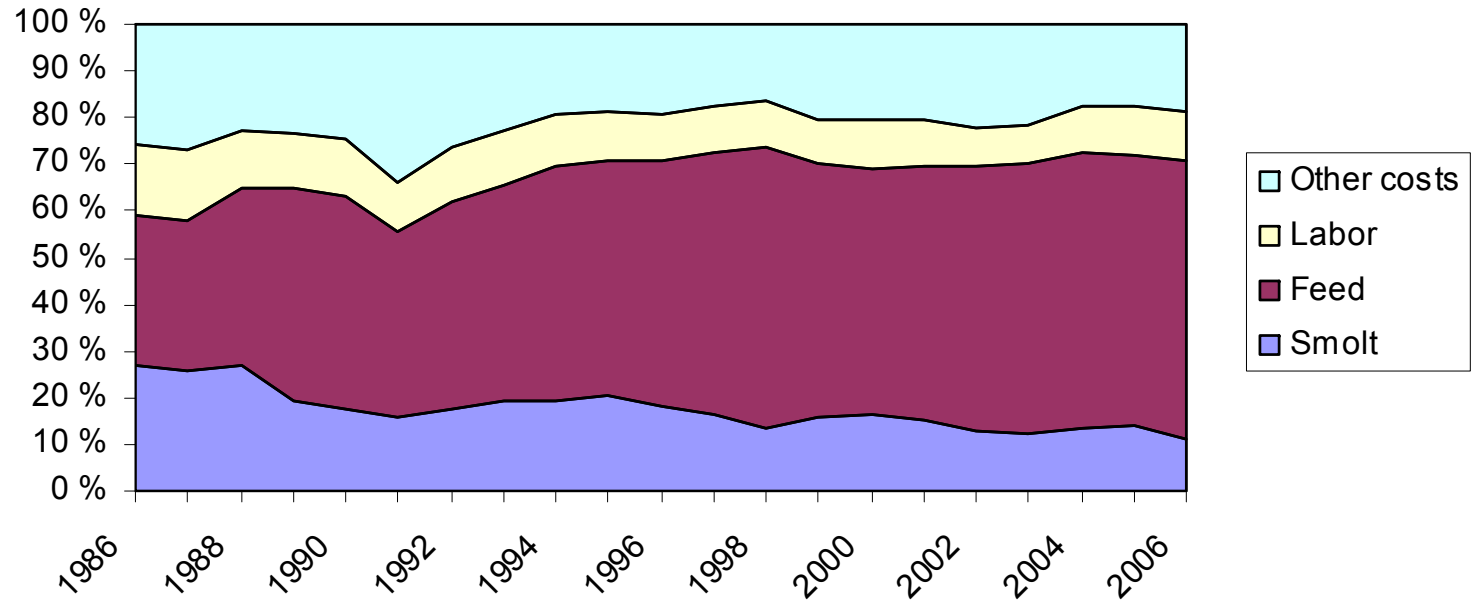


Source: The Norwegian Directorate of Fisheries



PRODUCTIVITY GROWTH

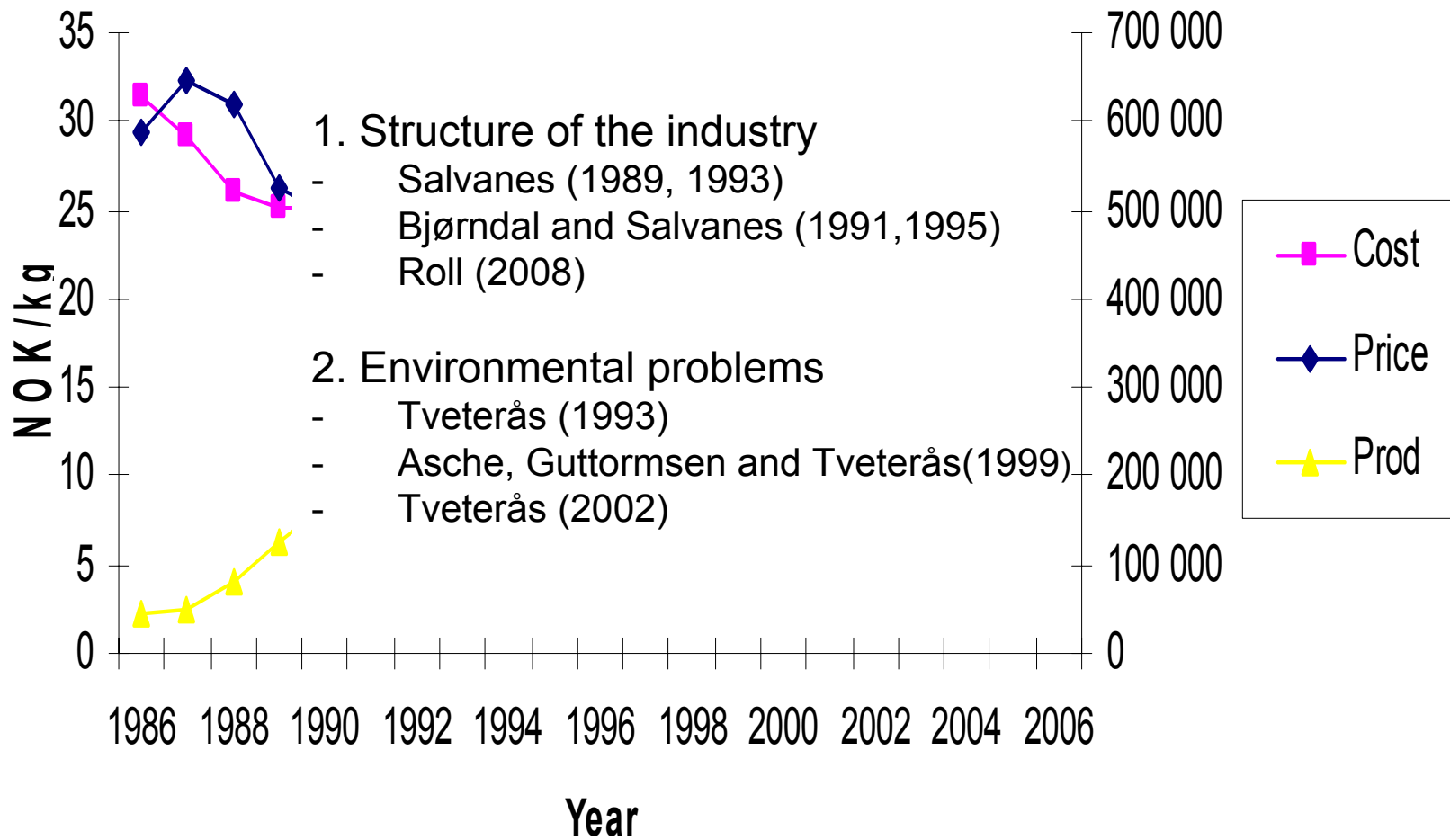
- COST SHARES IN NORWEGIAN AQUACULTURE INDUSTRY



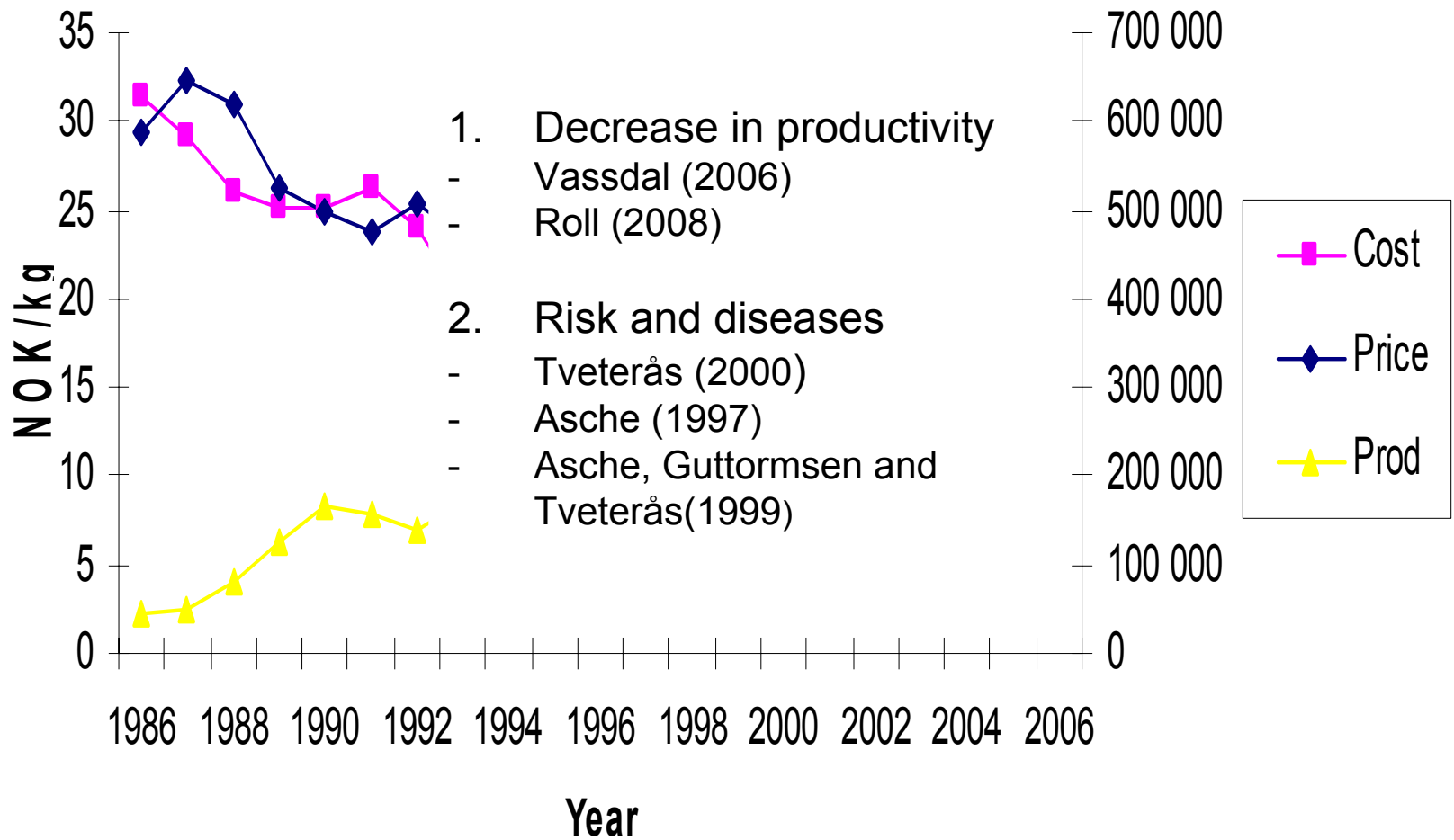
Source: The Norwegian Directorate of Fisheries



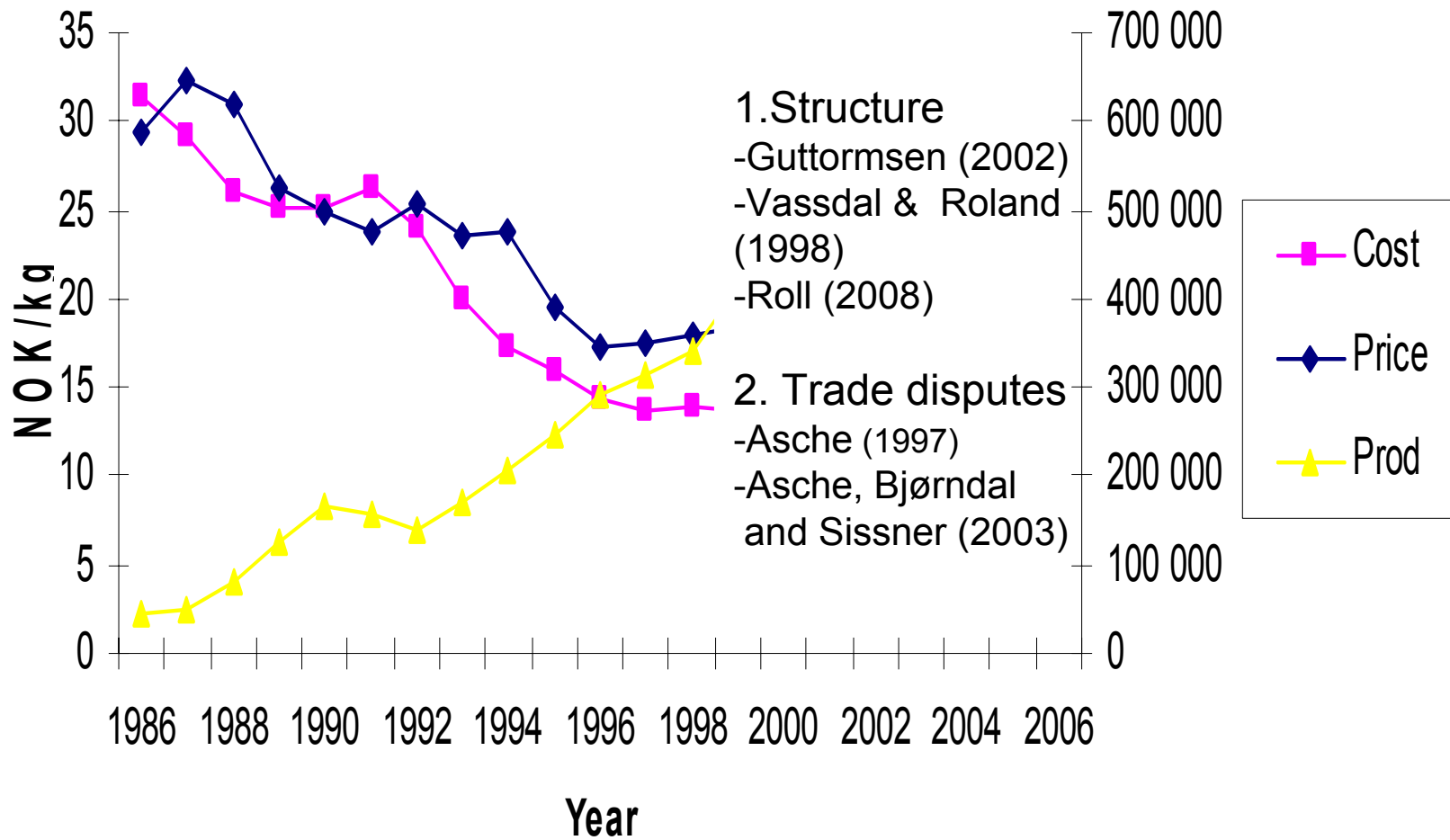
1. OWNER OPERATOR INDUSTRY



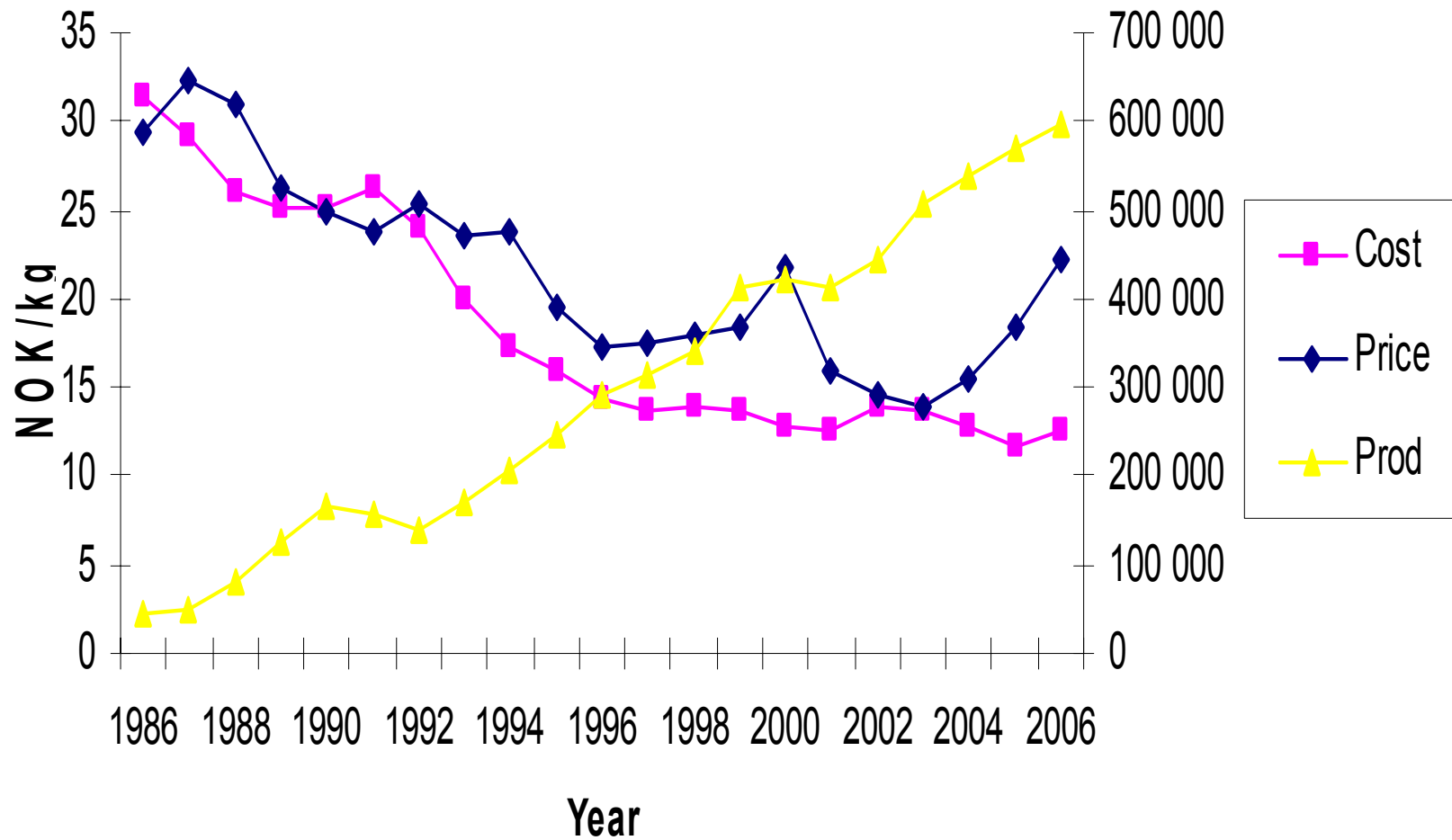
2. SALMON CRISIS



3. PROFESSIONALIZING THE INDUSTRY



4. HIGH PRICES, LOW PRICES, NEW CRISIS AND RESTRUCTURING



4. CONCLUSIONS

- Comparative advantages is important for successful production.
- Obstacles for growth has to great extent been handled by the industry and its partners.
- Knowledge and R&D has laid the foundation for the industry growth.
 - Technological growth has been impressive.
- The findings in the studies we have reviewed gives insight that might benefit other emerging farmed species.

