

Financial Forecasting

M.Sc. in Finance – 2018/19 – 1st Semester

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Classes: 1. Tuesdays: 18:00-21:00 2. Thursdays: 19:30-22:30

Textbook: Gloria Gonzalez-Rivera, *Forecasting for Economics and Business*, Pearson, 2013

Complement: A. A. Costa (1998). Notes on pragmatic forecasting procedures and exponential smoothing, CEMAPRE working paper

Software: EViews, ISTM2000, or any other software with basic time series analysis and forecasting capability

Goals: To introduce the main topics in time series analysis and forecasting with an emphasis in financial applications. To develop essential time series forecasting practical ability.

Evaluation: Group work, and final exam

These slides are based on:

González-Rivera: *Forecasting for Economics and Business*, Copyright © 2013 Pearson Education, Inc.
Slides adapted for this course. We thank Gloria González-Rivera and assume full responsibility for all errors due to our changes which are mainly in red

Week	Topic	Text Chapters
Sep 18 / 20	Introduction to time series: trends, cycles, seasonality Forecasting: error and horizon, stationarity, transformations	1 3.1-2
Sep 25 / 27	Autocorrelation and partial autocorrelation. Univariate and multivariate data. Forecast horizon. Forecast weighting the past	3.3-3.4 4.1-2
Oct 02 / 04	Exponential smoothing	Costa 1-3, 5-6
Oct 09 / 11	WN and MA processes	6.1, 6.3
Oct 16 / 18	AR processes	7.1-2
Oct 23 / 25	Seasonality and Seasonal ARMA models	7.3
Oct 30 / tba	Recap and examples	8.1
Nov 06 / 08	ARMA model selection	8.2
Nov 13 / 15	ARMA forecasting, brief reference to error criteria and measures	8.3, 9.1-2
Nov 20 / 22	Deterministic and stochastic trends – unit roots	10.1-2
Nov 27 / 29	Unit roots, forecasting with ARIMA models	10.2
Dec 04 / 06	Volatility	13.1-3
Dec 11 / 13	ARCH and GARCH models	13.5, 14.1

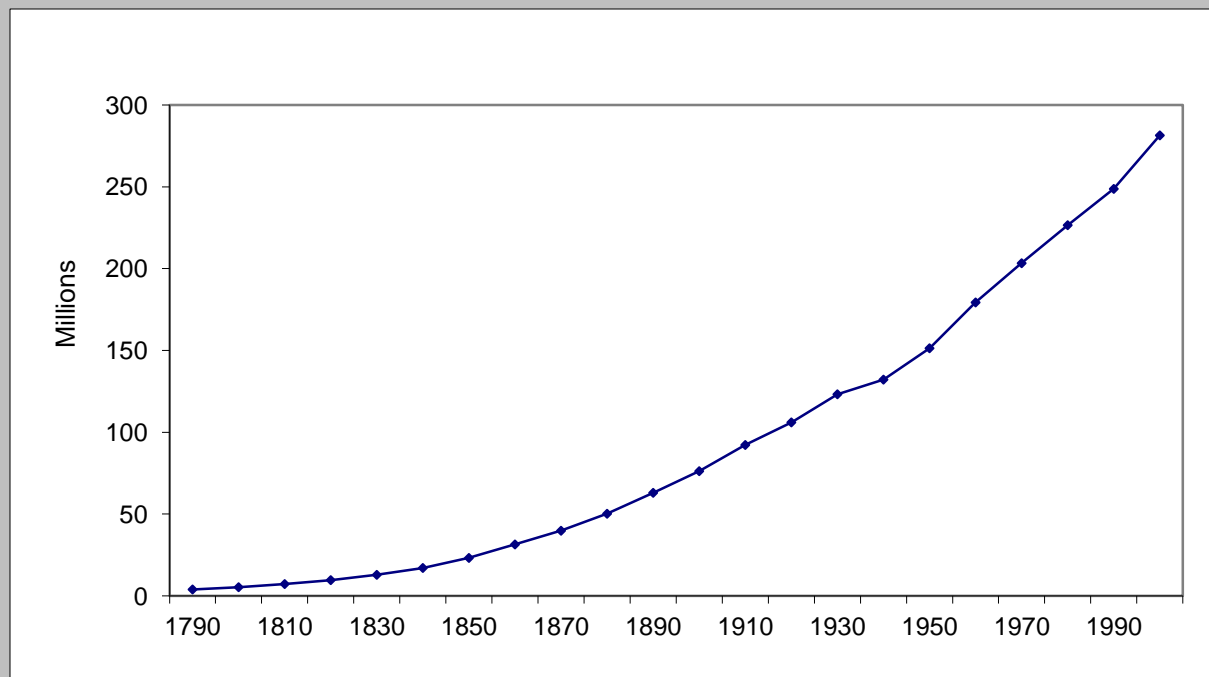
- Forecasting: both science and art
- Forecasting:
 - Events: stochastic processes
 - Values: time series
- ***Time series: collection of values indexed by time***
 - can be qualitative, ordinal, integer values, real value
 - can be univariate or multivariate
 - can be observed or random variables in a model

CHAPTER 1

INTRODUCTION AND CONTEXT

1.3 Becoming Familiar with Economic Time Series: Features of a Time Series

Figure 1.1 Population of the United State at 10-year Intervals (1790-2000)



Source: <http://www.census.gov/compendia/statab/cats/population.html>

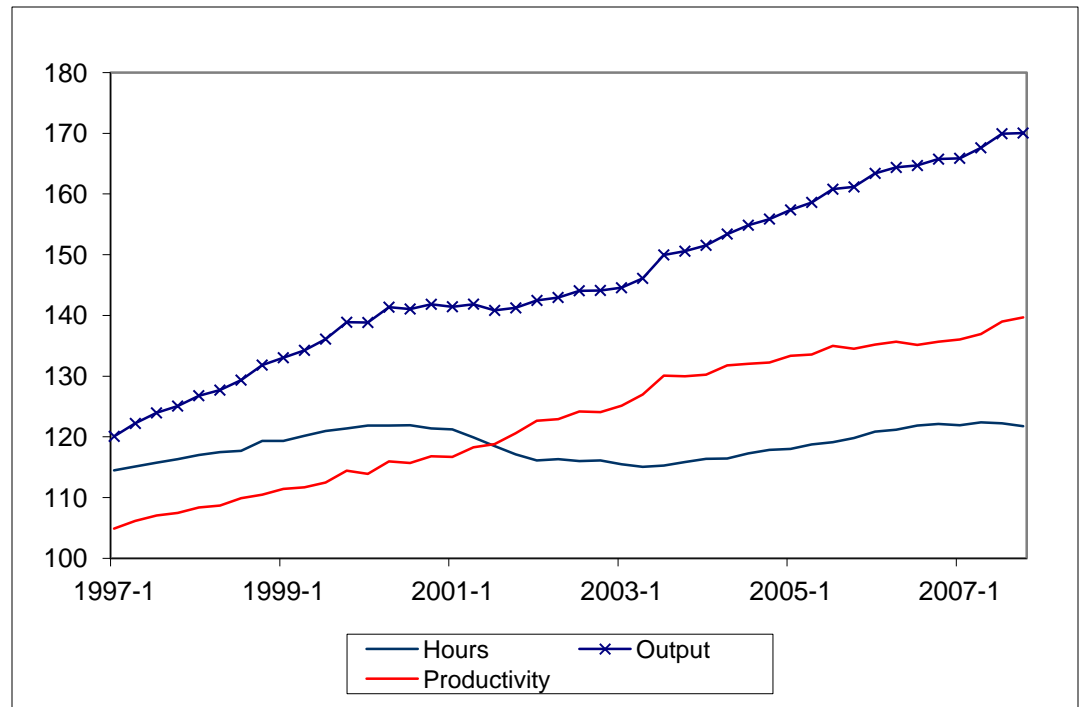
1.3.1 Trends

Figure 1.2 Quarterly Productivity, Output, and Hours (Non-Farm Business Sector)

Where can you see a trend?

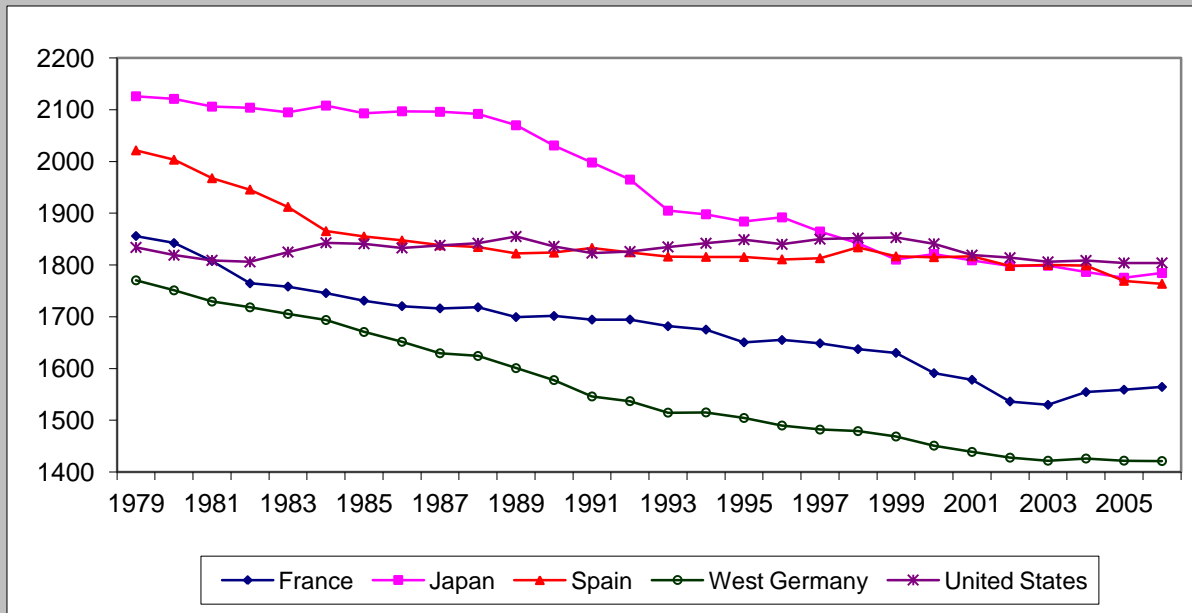
What's a trend?

- long run
- monotonic change



Source: Bureau of Labor Statistics

Figure 1.3 Annual Hours Worked in the OECD Countries 1979-2006



Source: <http://www.oecd.org>

1.3.2 Cycles

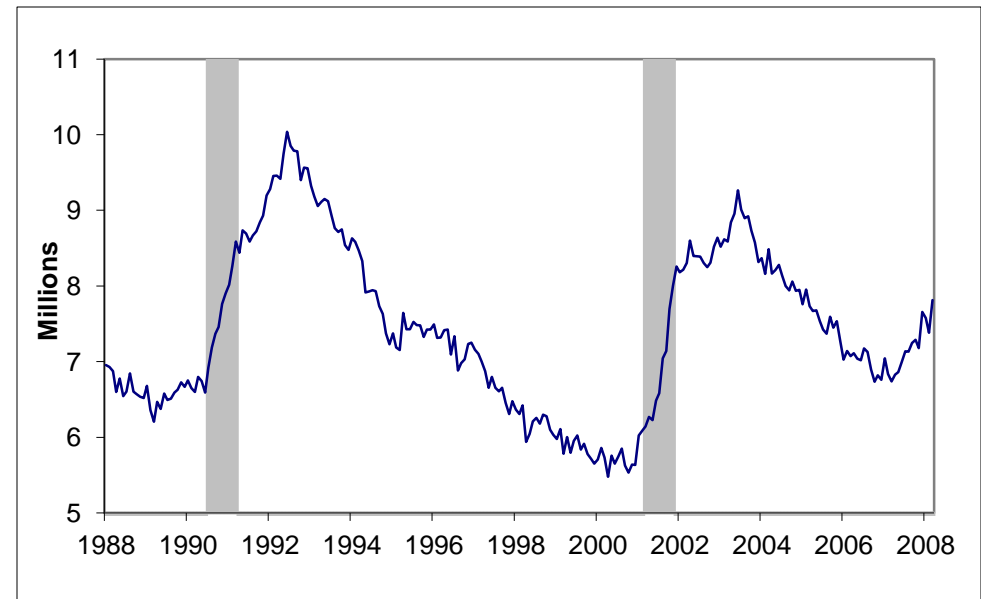
Cycle: “When a time series exhibits periodic fluctuations, we say that it has a *cycle*. The *cycle* may be seasonal or nonseasonal.”

- Usually cycles have no fixed periods
- Many people distinguish cycles and seasonality

“A cycle is *seasonal* when specific fluctuations occur within the calendar year, for instance activities that peak in summer months (or in specific quarters, days, hours, etc.)

- Seasonality usually refers to fixed periods, or almost fixed

Figure 1.4 Unemployed Persons (Seasonally Adjusted), Monthly Data 1988-2008



Source: St. Louis Federal Reserve Bank. FRED

1.3.3 Seasonality

Figure 1.5 Number of People in Poverty and Poverty Rate, Yearly Data 1959-2006

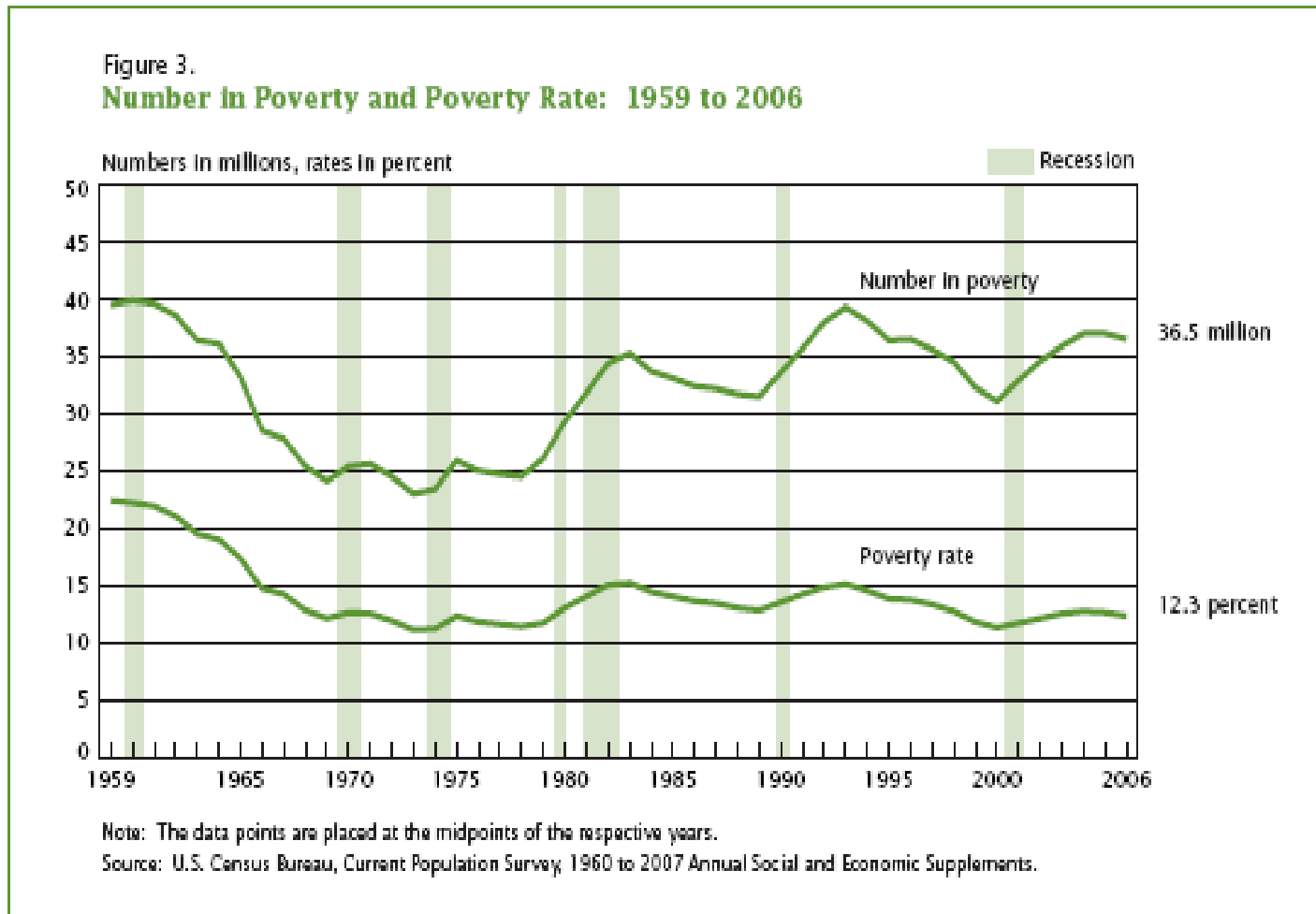
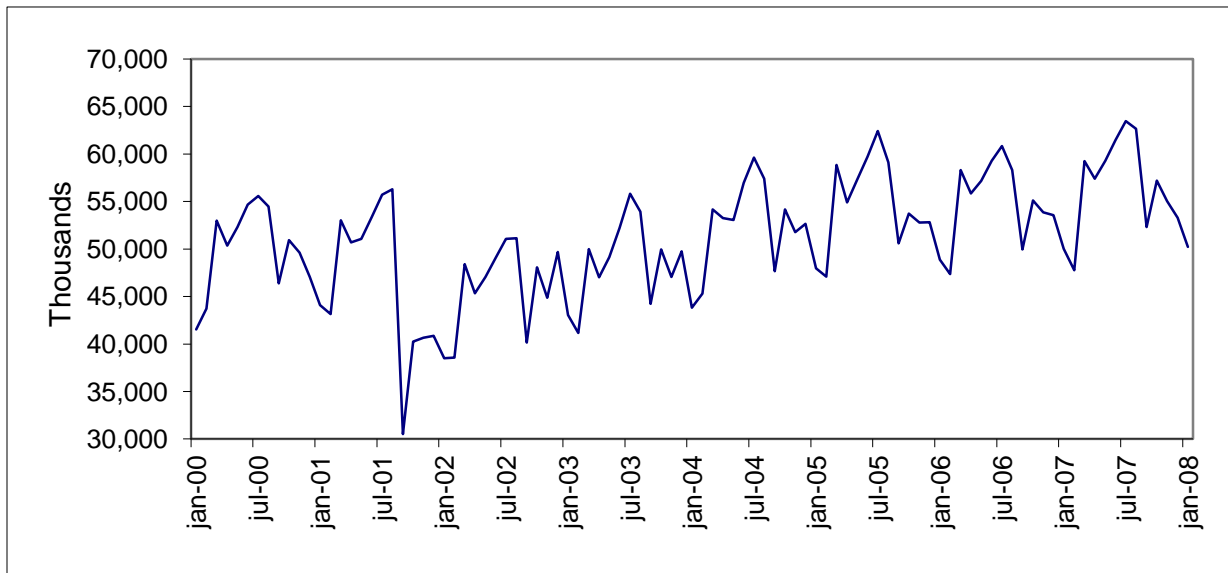
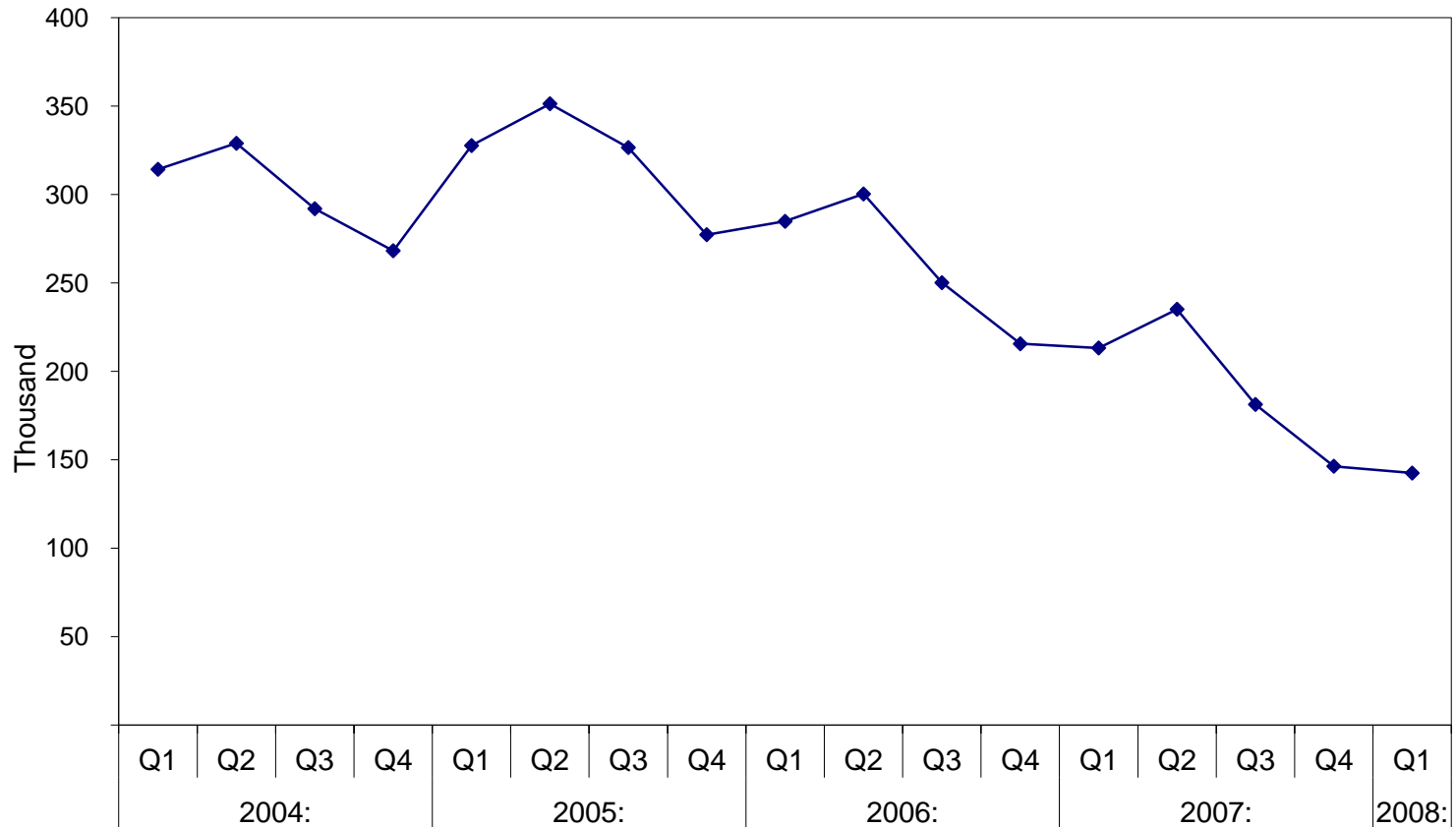


Figure 1.6 Revenue Passenger Enplanements. Monthly Data 200-2008



Source: Bureau of Transportation Statistics

Figure 1.7 New Home Sales in the United States. Quarterly Data 2004-2008



Source: National Association of Realtors

Basic idea: decomposition of economic and financial time series:

$$Y_t = T_t + C_t + S_t + e_t$$

or

$$Y_t = T_t \cdot C_t \cdot S_t \cdot e_t$$

1.4 Basic Notation and the Objective of the Forecaster

1.4.1 Basic Notation

Description	Technical name	Notation
Object to analyze:	Time series	$\{y_t\}$
Value at present time t :	Known value of the series	y_t
Future at time $t+h$:	Random variable	Y_{t+h}
Value at future time $t+h$:	Unknown value of the random variable	y_{t+h}
Collection of information :	Univariate information set Multivariate information set	$I_t = \{y_1, y_2, \dots, y_t\}$ $I_t = \{y_1, y_2, \dots, y_t, x_1, x_2, \dots, x_t\}$
Final objective:	Forecast 1-step ahead h -step ahead	$f_{t,1}$ $f_{t,h}$
Uncertainty:	Forecast error	$e_{t,h} = y_{t+h} - f_{t,h}$

There are alternative notations

1.4.2 The Forecaster's Objective

Figure 1.8 The Forecasting Problem

