Contents

1	Intr	oducti	ion	1		
2	Point Processes					
	2.1	Basic	Concepts of Point Processes	9		
		2.1.1	Fundamental Definitions	9		
		2.1.2	The Homogeneous Poisson Process	11		
		2.1.3	The Intensity Function and its Properties	12		
		2.1.4	Intensity-Based Inference	15		
	2.2	Types	of Point Processes	16		
		2.2.1	Poisson Processes	16		
		2.2.2	Renewal Processes	17		
		2.2.3	Dynamic Point Processes	17		
	2.3	Non-D	Oynamic Point Process Models	18		
		2.3.1	Intensity-Based Models	18		
		2.3.2	Duration Models	23		
		2.3.3	Count Data Models	24		
	2.4	Censo	ring and Time-Varying Covariates	24		
		2.4.1	Censoring			
		2.4.2	Time-Varying Covariates			
	2.5	Outlo	ok on Dynamic Extensions	28		
3	Ecc	nomic	Implications of Financial Durations	31		
	3.1	Types	s of Financial Durations			
		3.1.1	Selection by Single Marks			
		3.1.2	Selection by Sequences of Marks	33		
	3.2	The F	Role of Trade Durations in Market Microstructure Theory	34		
		3.2.1	Traditional Market Microstructure Approaches	34		
		3.2.2	Determinants of Trade Durations	36		
	3.3	Risk l	Estimation based on Price Durations			
		3.3.1	Duration-Based Volatility Measurement			
		3.3.2	Economic Implications of Directional Change Durations	42		

X	Contents
Λ	Contents

	3.4	Liquid	ity Measurement	42
		3.4.1	The Liquidity Concept	
		3.4.2	Volume Durations and Liquidity	
		3.4.3	The VNET Measure	43
		3.4.4	Measuring (II)liquidity Risks using Excess Volume	
			Durations	44
4	Stat	tistical	Properties of Financial Durations	47
	4.1		Preparation Issues	
		4.1.1	Matching Trades and Quotes	47
		4.1.2	Treatment of Split-Transactions	48
		4.1.3	Identification of Buyer- and Seller-Initiated Trades	48
	4.2	Transa	action Databases and Data Preparation	49
		4.2.1	NYSE Trading	
		4.2.2	XETRA Trading	
		4.2.3	Frankfurt Floor Trading	
		4.2.4	Bund Future Trading at EUREX and LIFFE	
		4.2.5	ASX Trading	52
	4.3		cical Properties of Trade, Limit Order and Quote	
			ions	
	4.4		tical Properties of Price Durations	
	4.5		tical Properties of (Excess) Volume Durations	
	4.6	Summ	arizing the Statistical Findings	. 75
5	Aut		essive Conditional Duration Models	
	5.1		A Models for (Log-)Durations	
	5.2		CD Model	
		5.2.1	The Basic ACD Framework	
		5.2.2	QML Estimation of the ACD Model	. 82
		5.2.3	Distributional Issues and ML Estimation of the ACD	
			Model	
		5.2.4	Seasonalities and Explanatory Variables	
	5.3		sions of the ACD Framework	
		5.3.1	Augmented ACD Models	
		5.3.2	Theoretical Properties of Augmented ACD Models	
		5.3.3	Regime-Switching ACD Models	
		5.3.4	Long Memory ACD Models	. 102
	. .	5.3.5	Further Extensions	
	5.4		ng the ACD Model	
		5.4.1	Simple Residual Checks	
		5.4.2	Density Forecast Evaluations	
		5.4.3	Lagrange Multiplier Tests	. 107
		5.4.4	Conditional Moment Tests	
		5.4.5	Integrated Conditional Moment Tests	
		5.4.6	Monte Carlo Evidence	. 115

			Contents	XI
	5.5	Applie	cations of ACD Models	123
		5.5.1	Evaluating ACD Models based on Trade and Price	
			Durations	123
		5.5.2	Modelling Trade Durations	143
		5.5.3	Quantifying (II)liquidity Risks	147
6	Sen		metric Dynamic Proportional Intensity Models	
	6.1	•	mic Integrated Intensity Processes	
	6.2		Semiparametric ACPI Model	
	6.3	Prope	erties of the Semiparametric ACPI Model	
		6.3.1	Autocorrelation Structure	
		6.3.2	Evaluating the Estimation Quality	
	6.4		sions of the ACPI Model	
		6.4.1	Regime-Switching Dynamics	
		6.4.2	Regime-Switching Baseline Intensities	
		6.4.3	Censoring	
		6.4.4	Unobserved Heterogeneity	
	6.5		ng the ACPI Model	
	6.6		nating Volatility Using the ACPI Model	
		6.6.1	The Data and the Generation of Price Events	
		6.6.2	Empirical Findings	180
7	Uni		e and Multivariate Dynamic Intensity Models.	
	7.1	Univa	ariate Dynamic Intensity Models	$\dots 194$
		7.1.1	The ACI Model	
		7.1.2	The Hawkes Model	
	7.2		variate Dynamic Intensity Models	
		7.2.1	Definitions	
		7.2.2	The Multivariate ACI Model	
		7.2.3	The Multivariate Hawkes Model	
	7.3	•	mic Latent Factor Models for Intensity Processes	
		7.3.1	The LFI Model	
		7.3.2	The Univariate LFI Model	
		7.3.3	The Multivariate LFI Model	
		7.3.4	Dynamic Properties of the LFI Model	
		7.3.5	SML Estimation of the LFI Model	
		7.3.6	Testing the LFI Model	
	7.4	Appli	ications of Dynamic Intensity Models	
		7.4.1	Estimating Multivariate Price Intensities	
		7.4.2	Estimating Simultaneous Buy/Sell Intensities	
		7.4.3	Estimating Trading Intensities Using LFI Models	246
8	Su	mmary	y and Conclusions	255
A	Im	portar	nt Distributions for Duration Data	259

XII Contents

В	List of Symbols (in Alphabetical Order)
Rei	erences
Ind	ex