## Contents

1 Hyperbolic Secant Distributions ........................................ 1  
  1.1 Preliminary Functions ............................................. 1  
  1.2 Definition ....................................................... 3  
  1.3 Properties ....................................................... 4  
  1.4 Parameter Estimation ............................................. 10  
References ............................................................. 12  

2 The GSH Distribution Family and Skew Versions ..................... 15  
  2.1 Perk’s Distribution Family ........................................ 15  
  2.2 Properties of the GSH Family ..................................... 17  
  2.3 Introducing Skewness by Splitting the Scale Parameter .......... 18  
  2.4 Introducing Skewness by Means of the Esscher Transformation ............................................. 20  
  2.5 Vaughan’s Skew Extension ......................................... 23  
References ............................................................. 24  

3 The NEF-GHS or Meixner Distribution Family ......................... 27  
  3.1 GHS Distribution: Definition and History ....................... 27  
  3.2 GHS Distribution: Properties ..................................... 29  
  3.3 Introducing Skewness by Means of the Esscher Transformation ............................................. 31  
References ............................................................. 35  

4 The BHS Distribution Family ........................................... 37  
  4.1 Introducing Skewness and Kurtosis via Order Statistics .......... 37  
  4.2 BHS Distribution: Definition ..................................... 39  
  4.3 BHS Distribution: Properties ..................................... 40  
  4.4 EGB2 Distribution .................................................. 42  
References ............................................................. 43
## 5 The SHS and SASHS Distribution Family

- 5.1 Variable Transformations Based on the Sinus Hyperbolic Function
- 5.2 Definition of the SHS and SASHS Distribution Family
- 5.3 Basic Properties of the SHS and SASHS Distribution Families

### References

## 6 Application to Finance

- 6.1 Excursion: Moment-Ratio Plots
- 6.2 Return Series Under Consideration
- 6.3 Fitting Generalized Hyperbolic Secant Distribution: Unconditional Case
- 6.4 Fitting Generalized Hyperbolic Secant Distribution: Conditional Case

### References

### Appendix A: R-Code: Fitting a BHS Distribution

### Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>The SHS and SASHS Distribution Family</td>
<td>45</td>
</tr>
<tr>
<td>5.1</td>
<td>Variable Transformations Based on the Sinus Hyperbolic Function</td>
<td>45</td>
</tr>
<tr>
<td>5.2</td>
<td>Definition of the SHS and SASHS Distribution Family</td>
<td>47</td>
</tr>
<tr>
<td>5.3</td>
<td>Basic Properties of the SHS and SASHS Distribution Families</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>53</td>
</tr>
<tr>
<td>6</td>
<td>Application to Finance</td>
<td>55</td>
</tr>
<tr>
<td>6.1</td>
<td>Excursion: Moment-Ratio Plots</td>
<td>55</td>
</tr>
<tr>
<td>6.2</td>
<td>Return Series Under Consideration</td>
<td>57</td>
</tr>
<tr>
<td>6.3</td>
<td>Fitting Generalized Hyperbolic Secant Distribution: Unconditional Case</td>
<td>59</td>
</tr>
<tr>
<td>6.4</td>
<td>Fitting Generalized Hyperbolic Secant Distribution: Conditional Case</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>References</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Appendix A: R-Code: Fitting a BHS Distribution</td>
<td>71</td>
</tr>
</tbody>
</table>
Generalized Hyperbolic Secant Distributions
With Applications to Finance
Fischer, M.
2014, VIII, 72 p. 17 illus., 4 illus. in color., Softcover
ISBN: 978-3-642-45137-9