

มหาวิทยาลัยเชียงใหม่
Chiang Mai University

ภาคผนวก

ตารางภาคผนวกที่ 1 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 60 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปีเป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
Index Value S 21.11
Volatility σ 23.00%
Time to expiration t, in calendar days 28
Risk-free rate Rf, annual percentage rate 3.76%
Dividend Yield Y, in percent 0

<= INPUT New Strike Prices

Check figures:
d(1) 4.42795
d(2) 4.36424
N(d1) 1.00000
N(d2) 0.99999

NOTE: B-S function uses t=calendar days, not trading days
based on B-S assumption of continuous trading

| Time to Expiration (trading days) | Time to Expiration (calendar days) | .SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | LN(Index return) | Volatility 6 | D1 | D2 | N(D1) | N(D2) | -S Option Value |
|-----------------------------------|------------------------------------|--------------|---|------------------|--------------|---------|---------|---------|---------|-----------------|
| 20 | 28 | 21.11 | 3.760 | 0.0037969 | 0.24269 | 4.9433 | 4.8865 | 1.00000 | 0.99999 | 5.156 |
| 19 | 25 | 21.24 | 3.760 | 0.0061393 | 0.23269 | 4.7248 | 4.6639 | 0.99999 | 0.99999 | 5.281 |
| 18 | 24 | 20.99 | 3.760 | -0.0118401 | 0.22932 | 4.6877 | 4.6289 | 0.99999 | 0.99999 | 5.030 |
| 17 | 23 | 21.00 | 3.760 | 0.0004763 | 0.22925 | 4.7953 | 4.7377 | 0.99999 | 0.99999 | 5.038 |
| 16 | 22 | 20.85 | 3.760 | -0.0071685 | 0.22376 | 4.8884 | 4.8335 | 0.99999 | 0.99999 | 4.886 |
| 15 | 21 | 21.15 | 3.760 | 0.0142860 | 0.22443 | 5.2507 | 5.1969 | 1.00000 | 1.00000 | 5.185 |
| 14 | 21 | 21.31 | 3.760 | 0.0075365 | 0.22163 | 5.8851 | 5.8359 | 1.00000 | 1.00000 | 5.340 |
| 13 | 17 | 21.28 | 3.760 | -0.0014088 | 0.22108 | 6.0376 | 5.9899 | 1.00000 | 1.00000 | 5.308 |
| 12 | 16 | 22.02 | 3.760 | 0.0341835 | 0.23127 | 6.6537 | 6.6053 | 1.00000 | 1.00000 | 6.046 |
| 11 | 15 | 21.72 | 3.760 | -0.0137176 | 0.23213 | 6.5514 | 6.5043 | 1.00000 | 1.00000 | 5.745 |
| 10 | 14 | 21.91 | 3.760 | 0.0087097 | 0.23052 | 7.0173 | 6.9722 | 1.00000 | 1.00000 | 5.933 |
| 9 | 11 | 21.50 | 3.760 | -0.0188902 | 0.23149 | 7.4005 | 7.3603 | 1.00000 | 1.00000 | 5.518 |
| 8 | 10 | 21.56 | 3.760 | 0.0027868 | 0.23122 | 7.8391 | 7.8009 | 1.00000 | 1.00000 | 5.576 |
| 7 | 9 | 21.49 | 3.760 | -0.0032520 | 0.23105 | 8.1748 | 8.1385 | 1.00000 | 1.00000 | 5.505 |
| 6 | 8 | 21.36 | 3.760 | 0.0060677 | 0.23087 | 8.4946 | 8.4604 | 1.00000 | 1.00000 | 5.373 |
| 5 | 7 | 21.46 | 3.760 | 0.0046707 | 0.23074 | 9.2268 | 9.1949 | 1.00000 | 1.00000 | 5.472 |
| 4 | 4 | 21.55 | 3.760 | 0.0041851 | 0.23083 | 12.3525 | 12.3283 | 1.00000 | 1.00000 | 5.557 |
| 3 | 3 | 21.60 | 3.760 | 0.0023175 | 0.22897 | 14.4821 | 14.4613 | 1.00000 | 1.00000 | 5.605 |
| 2 | 2 | 21.71 | 3.760 | 0.0050797 | 0.22776 | 18.1222 | 18.1053 | 1.00000 | 1.00000 | 5.713 |
| 1 | 1 | 21.61 | 3.760 | -0.0046168 | 0.22553 | 25.4765 | 25.4647 | 1.00000 | 1.00000 | 5.612 |
| 0 | 0 | 21.55 | 3.760 | -0.0027804 | 0.22567 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | 0.230 |

ที่มา : จากการศึกษา

ตารางภาคผนวกที่ 2 แสดงราคา Call Option เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 90 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปีเป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
 SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 26.20%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.89545
 d(2) 3.82288
 N(d1) 0.99995
 N(d2) 0.99993

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | Average Bank Rate mos., Annual rate | LN(Index return) | Volatility | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|-------------|-------------------------------------|------------------|------------|-----------|-----------|----------|----------|------------------|
| 20 | 1-Jun-01 | 21.11 | 3.760 | 0.0037969 | 0.27454 | 4.376913 | 4.312648 | 0.999994 | 0.999992 | 5.156 |
| 19 | 4-Jun-01 | 21.24 | 3.760 | 0.0061393 | 0.27477 | 4.011370 | 3.939460 | 0.999970 | 0.999959 | 5.281 |
| 18 | 5-Jun-01 | 20.99 | 3.760 | -0.0118401 | 0.27492 | 3.920938 | 3.850441 | 0.999956 | 0.999941 | 5.030 |
| 17 | 6-Jun-01 | 21.00 | 3.760 | 0.0004763 | 0.27461 | 4.013652 | 3.944717 | 0.999970 | 0.999960 | 5.038 |
| 16 | 7-Jun-01 | 20.85 | 3.760 | -0.0071685 | 0.27183 | 4.034602 | 3.967865 | 0.999973 | 0.999964 | 4.886 |
| 15 | 8-Jun-01 | 21.15 | 3.760 | 0.0142860 | 0.27306 | 4.326306 | 4.260809 | 0.999992 | 0.999990 | 5.185 |
| 14 | 11-Jun-01 | 21.31 | 3.760 | 0.0075365 | 0.26041 | 5.016765 | 4.958936 | 1.000000 | 1.000000 | 5.340 |
| 13 | 12-Jun-01 | 21.28 | 3.760 | -0.0014088 | 0.25745 | 5.192035 | 5.136474 | 1.000000 | 1.000000 | 5.308 |
| 12 | 13-Jun-01 | 22.02 | 3.760 | 0.0341835 | 0.26414 | 5.832172 | 5.776869 | 1.000000 | 1.000000 | 6.046 |
| 11 | 14-Jun-01 | 21.72 | 3.760 | -0.0137176 | 0.26169 | 5.816999 | 5.763948 | 1.000000 | 1.000000 | 5.745 |
| 10 | 15-Jun-01 | 21.91 | 3.760 | 0.0087097 | 0.25869 | 6.258441 | 6.207777 | 1.000000 | 1.000000 | 5.933 |
| 9 | 18-Jun-01 | 21.50 | 3.760 | -0.0188902 | 0.26009 | 6.591429 | 6.546277 | 1.000000 | 1.000000 | 5.518 |
| 8 | 19-Jun-01 | 21.56 | 3.760 | 0.0027868 | 0.25916 | 6.998339 | 6.955443 | 1.000000 | 1.000000 | 5.576 |
| 7 | 20-Jun-01 | 21.49 | 3.760 | -0.0032520 | 0.25791 | 7.327192 | 7.286692 | 1.000000 | 1.000000 | 5.505 |
| 6 | 21-Jun-01 | 21.36 | 3.760 | -0.0060677 | 0.25614 | 7.660119 | 7.622198 | 1.000000 | 1.000000 | 5.373 |
| 5 | 22-Jun-01 | 21.46 | 3.760 | 0.0046707 | 0.25513 | 8.348046 | 8.312715 | 1.000000 | 1.000000 | 5.472 |
| 4 | 25-Jun-01 | 21.55 | 3.760 | 0.0041851 | 0.25487 | 11.189761 | 11.163080 | 1.000000 | 1.000000 | 5.557 |
| 3 | 26-Jun-01 | 21.60 | 3.760 | 0.0023175 | 0.25225 | 13.147569 | 13.124700 | 1.000000 | 1.000000 | 5.605 |
| 2 | 27-Jun-01 | 21.71 | 3.760 | 0.0050797 | 0.25132 | 16.425315 | 16.406712 | 1.000000 | 1.000000 | 5.713 |
| 1 | 28-Jun-01 | 21.61 | 3.760 | -0.0046168 | 0.24802 | 23.166895 | 23.153913 | 1.000000 | 1.000000 | 5.612 |
| 0 | 29-Jun-01 | 21.55 | 3.760 | -0.0027804 | 0.24805 | 23.166895 | 23.153913 | 1.000000 | 1.000000 | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | 0.262 |

ที่มา: จากกรคำนวณ

ตารางภาคผนวกที่ 3 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 120 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้ตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) **K** 16 <= INPUT New Strike Prices
 Index Value **S** 21.11
 Volatility σ 28.87% = 0.2887; historical volatility
 Time to expiration **t**, in calendar days 28
 Risk-free rate **Rf**, annual percentage rate 3.76% = 0.0376
 Dividend Yield **Y**, in percent 0

Call Value t days before expiration 5.16

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.54224
 d(2) 3.46228
 N(d1) 0.99980
 N(d2) 0.99973

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | SET50 STAMP | Average Bank Rate 3 mos., Annual rate (%) | LN(Index return) | Volatility 120 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|--|------------------------------------|-------------|-------------|---|------------------|----------------|-----------|-----------|----------|----------|------------------|
| 20 | 28 | 21.11 | 1-Jun-01 | 3.760 | 0.0037969 | 0.28515 | 4.216503 | 4.149755 | 0.999988 | 0.999983 | 5.156 |
| 19 | 25 | 21.24 | 4-Jun-01 | 3.760 | 0.0061393 | 0.28390 | 3.884725 | 3.810426 | 0.999949 | 0.999931 | 5.281 |
| 18 | 24 | 20.99 | 5-Jun-01 | 3.760 | -0.0118401 | 0.28405 | 3.797226 | 3.724388 | 0.999927 | 0.999902 | 5.030 |
| 17 | 23 | 21.00 | 6-Jun-01 | 3.760 | 0.0004763 | 0.28403 | 3.882826 | 3.811526 | 0.999948 | 0.999931 | 5.038 |
| 16 | 22 | 20.85 | 7-Jun-01 | 3.760 | -0.0071685 | 0.28426 | 3.861191 | 3.791403 | 0.999944 | 0.999925 | 4.886 |
| 15 | 21 | 21.15 | 8-Jun-01 | 3.760 | 0.0142860 | 0.28491 | 4.149200 | 4.080862 | 0.999963 | 0.999978 | 5.185 |
| 14 | 18 | 21.31 | 11-Jun-01 | 3.760 | 0.0075365 | 0.28385 | 4.607395 | 4.544359 | 0.999998 | 0.999997 | 5.340 |
| 13 | 17 | 21.28 | 12-Jun-01 | 3.760 | -0.0014088 | 0.28357 | 4.719119 | 4.657920 | 0.999999 | 0.999998 | 5.308 |
| 12 | 16 | 22.02 | 13-Jun-01 | 3.760 | 0.0341835 | 0.28755 | 5.362165 | 5.301962 | 1.000000 | 1.000000 | 6.046 |
| 11 | 15 | 21.72 | 14-Jun-01 | 3.760 | -0.0137176 | 0.28817 | 5.287620 | 5.229202 | 1.000000 | 1.000000 | 5.745 |
| 10 | 14 | 21.91 | 15-Jun-01 | 3.760 | 0.0087097 | 0.28807 | 5.625673 | 5.569255 | 1.000000 | 1.000000 | 5.933 |
| 9 | 11 | 21.50 | 18-Jun-01 | 3.760 | -0.0188902 | 0.28954 | 5.925937 | 5.875673 | 1.000000 | 1.000000 | 5.518 |
| 8 | 10 | 21.56 | 19-Jun-01 | 3.760 | 0.0027868 | 0.28940 | 6.271852 | 6.223951 | 1.000000 | 1.000000 | 5.576 |
| 7 | 9 | 21.49 | 20-Jun-01 | 3.760 | -0.0032520 | 0.28946 | 6.533249 | 6.487795 | 1.000000 | 1.000000 | 5.505 |
| 6 | 8 | 21.36 | 21-Jun-01 | 3.760 | -0.0060677 | 0.28904 | 6.792709 | 6.749917 | 1.000000 | 1.000000 | 5.373 |
| 5 | 7 | 21.46 | 22-Jun-01 | 3.760 | 0.0046707 | 0.28904 | 7.372919 | 7.332891 | 1.000000 | 1.000000 | 5.472 |
| 4 | 4 | 21.55 | 25-Jun-01 | 3.760 | 0.0041851 | 0.28879 | 9.878983 | 9.848751 | 1.000000 | 1.000000 | 5.557 |
| 3 | 3 | 21.60 | 26-Jun-01 | 3.760 | 0.0023175 | 0.28871 | 11.490469 | 11.464294 | 1.000000 | 1.000000 | 5.605 |
| 2 | 2 | 21.71 | 27-Jun-01 | 3.760 | 0.0050797 | 0.28872 | 14.300135 | 14.278763 | 1.000000 | 1.000000 | 5.713 |
| 1 | 1 | 21.61 | 28-Jun-01 | 3.760 | -0.0046168 | 0.28880 | 19.896056 | 19.882939 | 1.000000 | 1.000000 | 5.612 |
| 0 | 0 | 21.55 | 29-Jun-01 | 3.760 | -0.0027804 | 0.28811 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) 3.760 0.287 | | | | | | | | | | | |

ที่มา : จากการศึกษา

ตารางภาคผนวกที่ 4 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 150 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
Index Value S 21.11
Volatility σ 27.50%
Time to expiration t, in calendar days 28
Risk-free rate Rf, annual percentage rate 3.76%
Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
d(1) 3.71482
d(2) 3.63865
N(d1) 0.99990
N(d2) 0.99986

Call Value t days before expiratio 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | L,N(index return) | Volatility 150 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|-------------|---|-------------------|----------------|-----------|-----------|----------|----------|------------------|
| 20 | 28 | 21.11 | 3.760 | 0.0037969 | 0.28145 | 4.271144 | 4.705262 | 0.999990 | 0.999987 | 5.156 |
| 19 | 25 | 21.24 | 3.760 | 0.0061393 | 0.27852 | 3.958333 | 3.885441 | 0.999962 | 0.999949 | 5.281 |
| 18 | 24 | 20.99 | 3.760 | -0.0118401 | 0.27893 | 3.865690 | 3.794167 | 0.999945 | 0.999926 | 5.030 |
| 17 | 23 | 21.00 | 3.760 | 0.0004763 | 0.27884 | 3.953830 | 3.883834 | 0.999962 | 0.999949 | 5.038 |
| 16 | 22 | 20.85 | 3.760 | -0.0071685 | 0.27772 | 3.950487 | 3.882304 | 0.999961 | 0.999948 | 4.866 |
| 15 | 21 | 21.15 | 3.760 | 0.0142860 | 0.27743 | 4.259216 | 4.192671 | 0.999990 | 0.999986 | 5.185 |
| 14 | 18 | 21.31 | 3.760 | 0.0075365 | 0.27752 | 4.711087 | 4.649458 | 0.999999 | 0.999998 | 5.340 |
| 13 | 17 | 21.28 | 3.760 | -0.0014088 | 0.27657 | 4.836995 | 4.777306 | 0.999959 | 0.999959 | 5.308 |
| 16 | 16 | 22.02 | 3.760 | 0.0341835 | 0.27983 | 5.508489 | 5.449902 | 1.000000 | 1.000000 | 6.046 |
| 11 | 15 | 21.72 | 3.760 | -0.0137176 | 0.27716 | 5.495444 | 5.439258 | 1.000000 | 1.000000 | 5.745 |
| 10 | 14 | 21.91 | 3.760 | 0.0087097 | 0.27734 | 5.841167 | 5.786850 | 1.000000 | 1.000000 | 5.933 |
| 9 | 11 | 21.50 | 3.760 | -0.0188902 | 0.27524 | 6.231182 | 6.183398 | 1.000000 | 1.000000 | 5.518 |
| 8 | 10 | 21.56 | 3.760 | 0.0027868 | 0.27439 | 6.612215 | 6.566798 | 1.000000 | 1.000000 | 5.576 |
| 7 | 9 | 21.49 | 3.760 | -0.0032520 | 0.27443 | 6.888654 | 6.845961 | 1.000000 | 1.000000 | 5.505 |
| 6 | 8 | 21.36 | 3.760 | -0.0060677 | 0.27211 | 7.212771 | 7.172486 | 1.000000 | 1.000000 | 5.373 |
| 5 | 7 | 21.46 | 3.760 | 0.0046707 | 0.27043 | 7.877684 | 7.840234 | 1.000000 | 1.000000 | 5.472 |
| 4 | 4 | 21.55 | 3.760 | 0.0041851 | 0.27045 | 10.546582 | 10.518270 | 1.000000 | 1.000000 | 5.557 |
| 3 | 3 | 21.60 | 3.760 | 0.0023175 | 0.26851 | 12.353158 | 12.328815 | 1.000000 | 1.000000 | 5.605 |
| 2 | 2 | 21.71 | 3.760 | 0.0050797 | 0.26856 | 15.371864 | 15.351984 | 1.000000 | 1.000000 | 5.713 |
| 1 | 1 | 21.61 | 3.760 | -0.0046168 | 0.26864 | 21.390034 | 21.375973 | 1.000000 | 1.000000 | 5.612 |
| 0 | 0 | 21.55 | 3.760 | -0.0027804 | 0.26861 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |

Average (from 1 June to 30 June) 0.275

ที่มา : จากการศึกษา

ตารางภาคผนวกที่ 5 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 180 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 28.50%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

<= INPUT New Strike Prices

Check figures:
 d(1) 3.58719
 d(2) 3.50826
 N(d1) 0.99983
 N(d2) 0.99977

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Call Value t days before expiratio 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | .SET50 TIME STAMP | .SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | LN(index return) | Volatility 180 | D1 | D2 | N(D1) | N(D2) | B-S Option Value | |
|-----------------------------------|------------------------------------|-------------------|--------------|---|------------------|----------------|-----------|-----------|----------|----------|------------------|--|
| 20 | 28 | 1-Jun-01 | 21.11 | 3.760 | 0.0037969 | 0.28920 | 4.158403 | 4.050706 | 0.99984 | 0.99978 | 5.156 | |
| 19 | 25 | 4-Jun-01 | 21.24 | 3.760 | 0.0061393 | 0.28869 | 3.821486 | 3.745932 | 0.999934 | 0.999910 | 5.281 | |
| 18 | 24 | 5-Jun-01 | 20.99 | 3.760 | -0.0118401 | 0.28895 | 3.734103 | 3.660009 | 0.999906 | 0.999874 | 5.030 | |
| 17 | 23 | 6-Jun-01 | 21.00 | 3.760 | 0.0004763 | 0.28724 | 3.840270 | 3.768165 | 0.999939 | 0.999918 | 5.038 | |
| 16 | 22 | 7-Jun-01 | 20.85 | 3.760 | -0.0071685 | 0.28717 | 3.822807 | 3.752304 | 0.999934 | 0.999912 | 4.886 | |
| 15 | 21 | 8-Jun-01 | 21.15 | 3.760 | 0.0142860 | 0.28744 | 4.113186 | 4.044239 | 0.999980 | 0.999974 | 5.185 | |
| 14 | 21 | 11-Jun-01 | 21.31 | 3.760 | 0.0075365 | 0.28711 | 4.555889 | 4.492131 | 0.99997 | 0.99996 | 5.340 | |
| 17 | 17 | 12-Jun-01 | 21.28 | 3.760 | -0.0014088 | 0.28593 | 4.680663 | 4.618955 | 0.999999 | 0.999998 | 5.308 | |
| 16 | 16 | 13-Jun-01 | 22.02 | 3.760 | 0.0341835 | 0.28709 | 5.370537 | 5.310428 | 1.000000 | 1.000000 | 6.046 | |
| 15 | 15 | 14-Jun-01 | 21.72 | 3.760 | -0.0137176 | 0.28789 | 5.298250 | 5.239950 | 1.000000 | 1.000000 | 5.745 | |
| 14 | 14 | 15-Jun-01 | 21.91 | 3.760 | 0.0087097 | 0.28741 | 5.969506 | 5.919612 | 1.000000 | 1.000000 | 5.833 | |
| 11 | 11 | 18-Jun-01 | 21.50 | 3.760 | -0.0188902 | 0.28652 | 5.655765 | 5.599650 | 1.000000 | 1.000000 | 5.518 | |
| 10 | 10 | 19-Jun-01 | 21.56 | 3.760 | 0.0027868 | 0.28385 | 6.398027 | 6.351077 | 1.000000 | 1.000000 | 5.576 | |
| 9 | 9 | 20-Jun-01 | 21.49 | 3.760 | -0.0032520 | 0.28165 | 6.713244 | 6.669017 | 1.000000 | 1.000000 | 5.505 | |
| 7 | 8 | 21-Jun-01 | 21.36 | 3.760 | -0.0060677 | 0.28166 | 6.969513 | 6.927813 | 1.000000 | 1.000000 | 5.373 | |
| 6 | 6 | 22-Jun-01 | 21.46 | 3.760 | 0.0046707 | 0.28133 | 7.573857 | 7.534896 | 1.000000 | 1.000000 | 5.472 | |
| 5 | 5 | 25-Jun-01 | 21.55 | 3.760 | 0.0041851 | 0.27992 | 10.190998 | 10.161695 | 1.000000 | 1.000000 | 5.557 | |
| 4 | 4 | 26-Jun-01 | 21.60 | 3.760 | 0.0023175 | 0.27959 | 11.864538 | 11.839191 | 1.000000 | 1.000000 | 5.605 | |
| 3 | 3 | 27-Jun-01 | 21.71 | 3.760 | 0.0050797 | 0.27962 | 14.764502 | 14.743803 | 1.000000 | 1.000000 | 5.713 | |
| 2 | 2 | 28-Jun-01 | 21.61 | 3.760 | -0.0046168 | 0.27823 | 20.652985 | 20.638421 | 1.000000 | 1.000000 | 5.612 | |
| 1 | 1 | 29-Jun-01 | 21.55 | 3.760 | -0.0027804 | 0.27825 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | |
| 0 | 0 | | | | | | | | | | | |
| | | | | Average (from 1 June to 30 June) | 3.760 | | | | | | 0.285 | |

Average (from 1 June to 30 June)

ที่มา : จากการค้าตาม

ตารางภาคผนวกที่ 6 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 210 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 28.40%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

<= INPUT New Strike Prices
 = 0.284; historical volatility
 = 0.0376

Check figures:
 d(1) 3.59955
 d(2) 3.52089
 N(d1) 0.99984
 N(d2) 0.99978

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | LN(index return) | Volatility 210 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|-------------|-------------|---|------------------|----------------|----------|----------|----------|----------|------------------|
| 20 | 28 | 21.11 | 21.11 | 3.760 | 0.0037969 | 0.29186 | 4.12116 | 4.05284 | 0.99981 | 0.99975 | 5.156 |
| 19 | 25 | 21.24 | 21.24 | 3.760 | 0.0061393 | 0.29139 | 3.78675 | 3.71049 | 0.999524 | 0.999897 | 5.281 |
| 18 | 24 | 20.99 | 20.99 | 3.760 | -0.0118401 | 0.29146 | 3.70264 | 3.62790 | 0.999593 | 0.999857 | 5.030 |
| 17 | 23 | 21.00 | 21.00 | 3.760 | 0.0004763 | 0.29122 | 3.78886 | 3.71576 | 0.99924 | 0.999899 | 5.038 |
| 16 | 22 | 20.85 | 20.85 | 3.760 | -0.0071685 | 0.28971 | 3.78996 | 3.71893 | 0.99925 | 0.999900 | 4.886 |
| 15 | 21 | 21.15 | 21.15 | 3.760 | 0.0142860 | 0.28596 | 4.13409 | 4.06550 | 0.99982 | 0.999976 | 5.185 |
| 14 | 18 | 21.31 | 21.31 | 3.760 | 0.0075365 | 0.28516 | 4.98653 | 4.52320 | 0.99998 | 0.999997 | 5.340 |
| 13 | 17 | 21.28 | 21.28 | 3.760 | -0.0014088 | 0.28393 | 4.71330 | 4.65202 | 0.99999 | 0.999998 | 5.308 |
| 12 | 16 | 22.02 | 22.02 | 3.760 | 0.0341835 | 0.28613 | 5.38849 | 5.32858 | 1.00000 | 1.00000 | 6.046 |
| 11 | 15 | 21.72 | 21.72 | 3.760 | -0.0137176 | 0.28595 | 5.32831 | 5.27034 | 1.00000 | 1.00000 | 5.745 |
| 10 | 14 | 21.91 | 21.91 | 3.760 | 0.0087097 | 0.28274 | 5.73070 | 5.67533 | 1.00000 | 1.00000 | 5.933 |
| 9 | 11 | 21.50 | 21.50 | 3.760 | -0.0188902 | 0.28224 | 6.05652 | 6.00735 | 1.00000 | 1.00000 | 5.518 |
| 8 | 10 | 21.56 | 21.56 | 3.760 | 0.0027868 | 0.28234 | 6.42731 | 6.38057 | 1.00000 | 1.00000 | 5.576 |
| 7 | 9 | 21.49 | 21.49 | 3.760 | -0.0032520 | 0.27970 | 6.75966 | 6.71574 | 1.00000 | 1.00000 | 5.505 |
| 6 | 8 | 21.36 | 21.36 | 3.760 | -0.0060677 | 0.27961 | 7.02030 | 6.97890 | 1.00000 | 1.00000 | 5.373 |
| 5 | 7 | 21.46 | 21.46 | 3.760 | 0.0046707 | 0.27878 | 7.64294 | 7.60433 | 1.00000 | 1.00000 | 5.472 |
| 4 | 4 | 21.55 | 21.55 | 3.760 | 0.0041851 | 0.27819 | 10.25394 | 10.22482 | 1.00000 | 1.00000 | 5.557 |
| 3 | 3 | 21.60 | 21.60 | 3.760 | 0.0023175 | 0.27789 | 11.93680 | 11.91161 | 1.00000 | 1.00000 | 5.605 |
| 2 | 2 | 21.71 | 21.71 | 3.760 | 0.0050797 | 0.27683 | 14.91327 | 14.89277 | 1.00000 | 1.00000 | 5.713 |
| 1 | 1 | 21.61 | 21.61 | 3.760 | -0.0046168 | 0.27644 | 20.77207 | 20.77207 | 1.00000 | 1.00000 | 5.612 |
| 0 | 0 | 21.55 | 21.55 | 3.760 | -0.0027804 | 0.27486 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | | |
| 3.760 | | | | | | | | | | | |

Average (from 1 June to 30 June)

ที่มา : จากการศึกษา

ตารางภาพผนวกที่ 7 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 240 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
 SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 28.70%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.56275
 d(2) 3.48326
 N(d1) 0.99982
 N(d2) 0.99975

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | .SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | LN(Index return) | Volatility 240 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|--------------|---|------------------|----------------|----------|----------|----------|----------|------------------|
| 20 | 28 | 1-Jun-01 | 3.760 | 0.0037969 | 0.28932 | 4.15664 | 4.08691 | 0.999984 | 0.999978 | 5.156 |
| 19 | 25 | 4-Jun-01 | 3.760 | 0.0061393 | 0.28885 | 3.81935 | 3.74376 | 0.999933 | 0.999909 | 5.281 |
| 18 | 24 | 5-Jun-01 | 3.760 | -0.0118401 | 0.28682 | 3.76135 | 3.68781 | 0.999915 | 0.999887 | 5.030 |
| 17 | 23 | 6-Jun-01 | 3.760 | 0.0004763 | 0.28681 | 3.84589 | 3.77389 | 0.999940 | 0.999920 | 5.038 |
| 16 | 22 | 7-Jun-01 | 3.760 | -0.0071685 | 0.28689 | 3.82647 | 3.75603 | 0.999935 | 0.999914 | 4.886 |
| 15 | 21 | 8-Jun-01 | 3.760 | 0.0142860 | 0.28713 | 4.11766 | 4.04879 | 0.999981 | 0.999974 | 5.185 |
| 14 | 18 | 11-Jun-01 | 3.760 | 0.0075365 | 0.28724 | 4.55379 | 4.49001 | 0.999997 | 0.999996 | 5.340 |
| 13 | 17 | 12-Jun-01 | 3.760 | -0.0014088 | 0.28718 | 4.66053 | 4.59855 | 0.999998 | 0.999998 | 5.308 |
| 12 | 16 | 13-Jun-01 | 3.760 | 0.0341835 | 0.28903 | 5.33499 | 5.27448 | 1.000000 | 1.000000 | 6.046 |
| 11 | 15 | 14-Jun-01 | 3.760 | -0.0137176 | 0.28935 | 5.26634 | 5.20769 | 1.000000 | 1.000000 | 5.745 |
| 10 | 14 | 15-Jun-01 | 3.760 | 0.0087097 | 0.28941 | 5.59985 | 5.54317 | 1.000000 | 1.000000 | 5.933 |
| 9 | 11 | 18-Jun-01 | 3.760 | -0.0188902 | 0.28971 | 5.92256 | 5.87226 | 1.000000 | 1.000000 | 5.518 |
| 8 | 10 | 19-Jun-01 | 3.760 | 0.0027868 | 0.28972 | 6.26480 | 6.21685 | 1.000000 | 1.000000 | 5.576 |
| 7 | 9 | 20-Jun-01 | 3.760 | -0.0032520 | 0.28971 | 6.58410 | 6.53900 | 1.000000 | 1.000000 | 5.505 |
| 6 | 8 | 21-Jun-01 | 3.760 | -0.0060677 | 0.28719 | 6.83628 | 6.79376 | 1.000000 | 1.000000 | 5.373 |
| 5 | 7 | 22-Jun-01 | 3.760 | 0.0046707 | 0.28666 | 7.43378 | 7.39408 | 1.000000 | 1.000000 | 5.472 |
| 4 | 4 | 25-Jun-01 | 3.760 | 0.0041851 | 0.28663 | 9.92644 | 9.92644 | 1.000000 | 1.000000 | 5.557 |
| 3 | 3 | 26-Jun-01 | 3.760 | 0.0023175 | 0.28564 | 11.61374 | 11.58785 | 1.000000 | 1.000000 | 5.605 |
| 2 | 2 | 27-Jun-01 | 3.760 | 0.0050797 | 0.28579 | 14.47661 | 14.45550 | 1.000000 | 1.000000 | 5.713 |
| 1 | 1 | 28-Jun-01 | 3.760 | -0.0046168 | 0.28473 | 20.18205 | 20.16715 | 1.000000 | 1.000000 | 5.612 |
| 0 | 0 | 29-Jun-01 | 3.760 | -0.0027804 | 0.28442 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | 0.287 |

ที่มา : จากการศึกษา

ตารางภาพผนวกที่ 8 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 270 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 30.10%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.40083
 d(2) 3.31746
 N(d1) 0.99966
 N(d2) 0.99955

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | SET50 CLOSE 3 mos. | Average Bank Rate (%) | LN(Index return) | Volatility | Volatility 270 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|-------------|--------------------|-----------------------|------------------|------------|----------------|----------|----------|----------|----------|------------------|
| 20 | 28 | 21.11 | 21.11 | 3.760 | 0.0037969 | 0.30702 | 0.30702 | 3.92110 | 3.84824 | 0.999956 | 0.999941 | 5.156 |
| 19 | 25 | 21.24 | 21.24 | 3.760 | 0.0061393 | 0.30708 | 0.30708 | 3.59728 | 3.51691 | 0.999839 | 0.999782 | 5.281 |
| 18 | 24 | 20.99 | 20.99 | 3.760 | -0.0118401 | 0.30718 | 0.30718 | 3.51705 | 3.43828 | 0.999782 | 0.999707 | 5.030 |
| 17 | 23 | 21.00 | 21.00 | 3.760 | 0.0004763 | 0.30694 | 0.30694 | 3.59865 | 3.52160 | 0.999840 | 0.999785 | 5.038 |
| 16 | 22 | 20.85 | 20.85 | 3.760 | -0.0071685 | 0.30675 | 0.30675 | 3.58341 | 3.50810 | 0.999830 | 0.999774 | 4.886 |
| 15 | 21 | 21.15 | 21.15 | 3.760 | 0.0142860 | 0.30710 | 0.30710 | 3.85444 | 3.78077 | 0.999942 | 0.999922 | 5.185 |
| 14 | 18 | 21.31 | 21.31 | 3.760 | 0.0075365 | 0.30469 | 0.30469 | 4.29680 | 4.22914 | 0.999891 | 0.999888 | 5.340 |
| 13 | 17 | 21.28 | 21.28 | 3.760 | -0.0014088 | 0.30393 | 0.30393 | 4.40729 | 4.34169 | 0.999995 | 0.999993 | 5.308 |
| 12 | 16 | 22.02 | 22.02 | 3.760 | 0.0341835 | 0.30262 | 0.30262 | 5.09463 | 5.03143 | 1.000000 | 1.000000 | 6.046 |
| 11 | 15 | 21.72 | 21.72 | 3.760 | -0.0137176 | 0.30202 | 0.30202 | 5.04787 | 4.98664 | 1.000000 | 1.000000 | 5.745 |
| 10 | 14 | 21.91 | 21.91 | 3.760 | 0.0087097 | 0.30080 | 0.30080 | 5.39000 | 5.33109 | 1.000000 | 1.000000 | 5.333 |
| 9 | 11 | 21.50 | 21.50 | 3.760 | -0.0188902 | 0.30066 | 0.30066 | 5.70861 | 5.65642 | 1.000000 | 1.000000 | 5.518 |
| 8 | 10 | 21.56 | 21.56 | 3.760 | 0.0027868 | 0.29853 | 0.29853 | 6.08134 | 6.03193 | 1.000000 | 1.000000 | 5.576 |
| 7 | 9 | 21.49 | 21.49 | 3.760 | -0.0032520 | 0.29770 | 0.29770 | 6.35377 | 6.30702 | 1.000000 | 1.000000 | 5.505 |
| 6 | 8 | 21.36 | 21.36 | 3.760 | -0.0060677 | 0.29714 | 0.29714 | 6.55148 | 6.51148 | 1.000000 | 1.000000 | 5.373 |
| 5 | 7 | 21.46 | 21.46 | 3.760 | 0.0046707 | 0.29613 | 0.29613 | 7.19742 | 7.15641 | 1.000000 | 1.000000 | 5.472 |
| 4 | 4 | 21.55 | 21.55 | 3.760 | 0.0041851 | 0.29516 | 0.29516 | 9.66644 | 9.63554 | 1.000000 | 1.000000 | 5.557 |
| 3 | 3 | 21.60 | 21.60 | 3.760 | 0.0023775 | 0.29449 | 0.29449 | 11.23876 | 11.23876 | 1.000000 | 1.000000 | 5.605 |
| 2 | 2 | 21.71 | 21.71 | 3.760 | 0.0050797 | 0.29153 | 0.29153 | 14.16216 | 14.14058 | 1.000000 | 1.000000 | 5.713 |
| 1 | 1 | 21.61 | 21.61 | 3.760 | -0.0046168 | 0.29068 | 0.29068 | 19.76925 | 19.75404 | 1.000000 | 1.000000 | 5.612 |
| 0 | 0 | 21.55 | 21.55 | 3.760 | -0.0027804 | 0.29020 | 0.29020 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | | | 3.760 |

ที่มา : จากกรคำนวณ

ตารางพัฒนาครั้งที่ 9 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 300 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 30.60%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.34663
 d(2) 3.26188
 N(d1) 0.99959
 N(d2) 0.99945

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 CLOSE | SET50 STAMP | Average Bank Rate 3 mos., Annual rate (%) | LN(Index return) | Volatility 300 | D1 | D2 | N(D1) | N(D2) | -\$ Option Value |
|-----------------------------------|------------------------------------|-------------|-------------|---|------------------|----------------|----------|----------|---------|---------|------------------|
| 20 | 28 | 21.11 | 1-Jun-01 | 3.760 | 0.0037969 | 0.30958 | 3.86927 | 3.81680 | 0.99950 | 0.99932 | 5.156 |
| 19 | 25 | 21.24 | 4-Jun-01 | 3.760 | 0.0061393 | 0.30807 | 3.58595 | 3.50532 | 0.99832 | 0.99772 | 5.281 |
| 18 | 24 | 20.99 | 5-Jun-01 | 3.760 | -0.0118401 | 0.30702 | 3.51880 | 3.44008 | 0.99783 | 0.99709 | 5.030 |
| 17 | 23 | 21.00 | 6-Jun-01 | 3.760 | 0.0004763 | 0.30510 | 3.61886 | 3.54327 | 0.99853 | 0.99802 | 5.038 |
| 16 | 22 | 20.85 | 7-Jun-01 | 3.760 | -0.0071685 | 0.30402 | 3.61497 | 3.54033 | 0.99850 | 0.99800 | 4.886 |
| 15 | 21 | 21.15 | 8-Jun-01 | 3.760 | 0.0142860 | 0.30418 | 3.89076 | 3.81780 | 0.99950 | 0.99933 | 5.185 |
| 14 | 18 | 21.31 | 11-Jun-01 | 3.760 | 0.0075365 | 0.30426 | 4.30274 | 4.23517 | 0.99992 | 0.99989 | 5.340 |
| 13 | 17 | 21.28 | 12-Jun-01 | 3.760 | -0.0014088 | 0.30421 | 4.40322 | 4.33757 | 0.99995 | 0.99993 | 5.308 |
| 12 | 16 | 22.02 | 13-Jun-01 | 3.760 | 0.0341835 | 0.30579 | 5.04593 | 4.98191 | 1.00000 | 1.00000 | 6.046 |
| 11 | 15 | 21.72 | 14-Jun-01 | 3.760 | -0.0137176 | 0.30585 | 4.98547 | 4.92347 | 1.00000 | 1.00000 | 5.745 |
| 10 | 14 | 21.91 | 15-Jun-01 | 3.760 | 0.0087097 | 0.30567 | 5.30518 | 5.24532 | 1.00000 | 1.00000 | 5.933 |
| 9 | 11 | 21.50 | 18-Jun-01 | 3.760 | -0.0188902 | 0.30584 | 5.61100 | 5.55789 | 1.00000 | 1.00000 | 5.518 |
| 8 | 10 | 21.56 | 19-Jun-01 | 3.760 | 0.0027868 | 0.30575 | 5.93909 | 5.88848 | 1.00000 | 1.00000 | 5.576 |
| 7 | 9 | 21.49 | 20-Jun-01 | 3.760 | -0.0032520 | 0.30573 | 6.18811 | 6.14010 | 1.00000 | 1.00000 | 5.505 |
| 6 | 8 | 21.36 | 21-Jun-01 | 3.760 | -0.0060677 | 0.30473 | 6.44519 | 6.40007 | 1.00000 | 1.00000 | 5.373 |
| 5 | 7 | 21.46 | 22-Jun-01 | 3.760 | 0.0046707 | 0.30476 | 6.99471 | 6.95251 | 1.00000 | 1.00000 | 5.472 |
| 4 | 4 | 21.55 | 25-Jun-01 | 3.760 | 0.0041851 | 0.30480 | 9.36166 | 9.32975 | 1.00000 | 1.00000 | 5.557 |
| 3 | 3 | 21.60 | 26-Jun-01 | 3.760 | 0.0023175 | 0.30433 | 10.90204 | 10.87444 | 1.00000 | 1.00000 | 5.605 |
| 2 | 2 | 21.71 | 27-Jun-01 | 3.760 | 0.0050797 | 0.30426 | 13.57066 | 13.54814 | 1.00000 | 1.00000 | 5.713 |
| 1 | 1 | 21.61 | 28-Jun-01 | 3.760 | -0.0046168 | 0.30340 | 18.94077 | 18.92489 | 1.00000 | 1.00000 | 5.812 |
| 0 | 0 | 21.55 | 29-Jun-01 | 3.760 | -0.0027804 | 0.30341 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | Average (from 1 June to 30 June) | 3.760 | 0.306 | | | | | |

Average (from 1 June to 30 June)

ที่มา : จาการคำนวณ

ตารางภาพผนวกที่ 10 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 360 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 32.60%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 3.14669
 d(2) 3.05639
 N(d1) 0.99917
 N(d2) 0.99888

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | .SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | LN(Index return) | Volatility 360 | D1 | D2 | N(D1) | N(D2) | B-S Option Value |
|-----------------------------------|------------------------------------|--------------|---|------------------|----------------|----------|----------|----------|----------|------------------|
| 20 | 28 | 21.11 | 3.760 | 0.0037969 | 0.33114 | 3.64087 | 3.56336 | 0.999864 | 0.999817 | 5.156 |
| 19 | 25 | 21.24 | 3.760 | 0.0061393 | 0.33120 | 3.34142 | 3.25474 | 0.999583 | 0.999432 | 5.281 |
| 18 | 24 | 20.99 | 3.760 | -0.0118401 | 0.33132 | 3.26676 | 3.18180 | 0.999456 | 0.999268 | 5.030 |
| 17 | 23 | 21.00 | 3.760 | 0.0004763 | 0.33129 | 3.34000 | 3.25684 | 0.999581 | 0.999437 | 5.038 |
| 16 | 22 | 20.85 | 3.760 | -0.0071685 | 0.33034 | 3.33318 | 3.25208 | 0.999571 | 0.999427 | 4.886 |
| 15 | 21 | 21.15 | 3.760 | 0.0142860 | 0.33026 | 3.58951 | 3.51030 | 0.998834 | 0.999776 | 5.185 |
| 14 | 18 | 21.31 | 3.760 | 0.0075365 | 0.32905 | 3.98390 | 3.91083 | 0.999666 | 0.999954 | 5.340 |
| 13 | 17 | 21.28 | 3.760 | -0.0014088 | 0.32905 | 4.07604 | 4.00502 | 0.999977 | 0.999969 | 5.308 |
| 12 | 16 | 22.02 | 3.760 | 0.0341835 | 0.33032 | 4.67626 | 4.60710 | 0.999999 | 0.999998 | 6.046 |
| 11 | 15 | 21.72 | 3.760 | -0.0137176 | 0.33026 | 4.62172 | 4.55477 | 0.999988 | 0.999997 | 5.745 |
| 10 | 14 | 21.91 | 3.760 | 0.0087097 | 0.33036 | 4.91331 | 4.84861 | 1.000000 | 0.999999 | 5.933 |
| 9 | 11 | 21.50 | 3.760 | -0.0186902 | 0.32960 | 5.21223 | 5.15502 | 1.000000 | 1.000000 | 5.518 |
| 8 | 10 | 21.56 | 3.760 | 0.0027868 | 0.32956 | 5.51376 | 5.45921 | 1.000000 | 1.000000 | 5.576 |
| 7 | 7 | 21.49 | 3.760 | -0.0032520 | 0.32784 | 5.77418 | 5.72270 | 1.000000 | 1.000000 | 5.595 |
| 6 | 8 | 21.36 | 3.760 | -0.0060677 | 0.32205 | 6.10116 | 6.05348 | 1.000000 | 1.000000 | 5.373 |
| 5 | 7 | 21.46 | 3.760 | 0.0046707 | 0.31857 | 6.69352 | 6.64941 | 1.000000 | 1.000000 | 5.472 |
| 4 | 4 | 21.55 | 3.760 | 0.0041851 | 0.31772 | 8.98209 | 8.94863 | 1.000000 | 1.000000 | 5.557 |
| 3 | 3 | 21.60 | 3.760 | 0.0023175 | 0.31742 | 10.45371 | 10.42494 | 1.000000 | 1.000000 | 5.605 |
| 2 | 2 | 21.71 | 3.760 | 0.0050797 | 0.31721 | 13.01748 | 12.99400 | 1.000000 | 1.000000 | 5.713 |
| 1 | 1 | 21.61 | 3.760 | -0.0046168 | 0.31686 | 18.13706 | 18.12047 | 1.000000 | 1.000000 | 5.612 |
| 0 | 0 | 21.55 | 3.760 | -0.0027804 | 0.31686 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| Average (from 1 June to 30 June) | | | | | | | | | | 0.326 |

ที่มา : จากการศึกษา

ตารางภาคผนวกที่ 11 แสดงราคา Call Options เมื่อใช้ Volatility ที่คำนวณจากราคาปิดย้อนหลัง 720 วัน ราคาใช้สิทธิเท่ากับ 16 และใช้อัตราดอกเบี้ยเงินฝากประจำ 1 ปี เป็นอัตราดอกเบี้ยที่ไม่มีความเสี่ยง

Black-Scholes Option Valuation Example
SET50 Index Option -- June 30 Call, Strike price = 16

Strike price (Exercise price) K 16
 Index Value S 21.11
 Volatility σ 39.30%
 Time to expiration t, in calendar days 28
 Risk-free rate Rf, annual percentage rate 3.76%
 Dividend Yield Y, in percent 0

NOTE: B-S function uses t=calendar days, not trading days based on B-S assumption of continuous trading

Check figures:
 d(1) 2.62720
 d(2) 2.51835
 N(d1) 0.99570
 N(d2) 0.99410

Call Value t days before expiration 5.16

| Time to Expiration (trading days) | Time to Expiration (calendar days) | SET50 TIME STAMP | SET50 CLOSE | Average Bank Rate 3 mos., Annual rate (%) | Volatility (%) | LN(Index return) | D1 | D2 | N(D1) | N(D2) | -S | Option Value |
|-----------------------------------|------------------------------------|------------------|-------------|---|----------------|------------------|-----------|-----------|----------|----------|---------|--------------|
| 20 | 28 | 1-Jun-01 | 21.11 | 3.760 | 0.0037969 | 0.40005 | 3.028520 | 2.934876 | 0.998771 | 0.998332 | 5.157 | |
| 19 | 25 | 4-Jun-01 | 21.24 | 3.760 | 0.0061393 | 0.39959 | 2.785916 | 2.881339 | 0.997331 | 0.996334 | 5.283 | |
| 18 | 24 | 5-Jun-01 | 20.99 | 3.760 | -0.0118401 | 0.39937 | 2.726058 | 2.823649 | 0.996795 | 0.995650 | 5.032 | |
| 17 | 23 | 6-Jun-01 | 21.00 | 3.760 | 0.0004763 | 0.39788 | 2.796342 | 2.696464 | 0.997416 | 0.996496 | 5.040 | |
| 16 | 22 | 7-Jun-01 | 20.85 | 3.760 | -0.0071685 | 0.39779 | 2.783138 | 2.686478 | 0.997308 | 0.996379 | 4.888 | |
| 15 | 21 | 8-Jun-01 | 21.15 | 3.760 | 0.0142860 | 0.39783 | 2.994683 | 2.899258 | 0.998626 | 0.998130 | 5.185 | |
| 14 | 18 | 11-Jun-01 | 21.31 | 3.760 | 0.0075365 | 0.39784 | 3.308980 | 3.220631 | 0.999532 | 0.999360 | 5.340 | |
| 13 | 17 | 12-Jun-01 | 21.28 | 3.760 | -0.0014088 | 0.39783 | 3.384889 | 3.290032 | 0.999644 | 0.999515 | 5.308 | |
| 12 | 16 | 13-Jun-01 | 22.02 | 3.760 | 0.0341835 | 0.39832 | 3.890885 | 3.807488 | 0.999950 | 0.999930 | 6.046 | |
| 11 | 15 | 14-Jun-01 | 21.72 | 3.760 | -0.0137176 | 0.39792 | 3.848425 | 3.767757 | 0.999941 | 0.999918 | 5.745 | |
| 10 | 14 | 15-Jun-01 | 21.91 | 3.760 | 0.0087097 | 0.39794 | 4.090958 | 4.013022 | 0.999979 | 0.999970 | 5.933 | |
| 9 | 11 | 18-Jun-01 | 21.50 | 3.760 | -0.0188902 | 0.39739 | 4.333862 | 4.264875 | 0.999993 | 0.999990 | 5.518 | |
| 8 | 10 | 19-Jun-01 | 21.56 | 3.760 | 0.0027868 | 0.39674 | 4.590247 | 4.524578 | 0.999998 | 0.999997 | 5.576 | |
| 7 | 9 | 20-Jun-01 | 21.49 | 3.760 | -0.0032520 | 0.39526 | 4.798857 | 4.736790 | 0.999999 | 0.999999 | 5.505 | |
| 6 | 8 | 21-Jun-01 | 21.36 | 3.760 | -0.0060677 | 0.39526 | 4.980966 | 4.922449 | 1.000000 | 1.000000 | 5.373 | |
| 5 | 7 | 22-Jun-01 | 21.46 | 3.760 | 0.0046707 | 0.39435 | 5.416751 | 5.362140 | 1.000000 | 1.000000 | 5.472 | |
| 4 | 4 | 25-Jun-01 | 21.55 | 3.760 | 0.0041851 | 0.39435 | 7.244020 | 7.202738 | 1.000000 | 1.000000 | 5.557 | |
| 3 | 3 | 26-Jun-01 | 21.60 | 3.760 | 0.0023175 | 0.39338 | 8.441397 | 8.405733 | 1.000000 | 1.000000 | 5.605 | |
| 2 | 2 | 27-Jun-01 | 21.71 | 3.760 | 0.0050797 | 0.39337 | 10.502490 | 10.473372 | 1.000000 | 1.000000 | 5.713 | |
| 1 | 1 | 28-Jun-01 | 21.61 | 3.760 | -0.0046168 | 0.39308 | 14.623967 | 14.603392 | 1.000000 | 1.000000 | 5.612 | |
| 0 | 0 | 29-Jun-01 | 21.55 | 3.760 | -0.0027804 | 0.39299 | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | |
| Average (from 1 June to 30 June) | | | | | | | | | | | | |
| 0.393 | | | | | | | | | | | | |

ที่มา : จากภาคคำนวณ

ประวัติผู้เขียน

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| ชื่อ-สกุล | นางสาวกิ่งกาญจน์ วาฤทธิ |
| วัน เดือน ปีเกิด | 11 พฤศจิกายน 2514 |
| ประวัติการศึกษา | สำเร็จการศึกษามัธยมศึกษาตอนปลาย โรงเรียนสตรีศรีน่าน จังหวัดน่าน ปีการศึกษา 2532 สำเร็จการศึกษาปริญญาตรี เศรษฐศาสตรบัณฑิต คณะสังคมศาสตร์ มหาวิทยาลัยเชียงใหม่ ปีการศึกษา 2535 |
| ประวัติการทำงาน | บริษัทหลักทรัพย์ แอ็ดกินสัน จำกัด (มหาชน) สาขาเชียงใหม่ ตั้งแต่ปี พ.ศ 2535 จนถึงปัจจุบัน ตำแหน่งเจ้าหน้าที่การตลาดหลักทรัพย์ |