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DYNAMIC SCHEMES OF HEDGING – DELTA HEDGING AND DELTA-GAMMA HEDGING ON CURRENCY MARKET

Abstract

Dynamic schemes of hedging against currency risk are carefully structured procedures, which should be carried out immediately during continuous transaction monitoring in case of changes in currency value. Hence, it can be described as selective, continuous preventing of open positions in currency options. The hedging techniques which reduce the loss without excluding the profits from currency movements are given preference. Their application requires access to reliable forecasts of future currency movements, as well as certain readiness to bear that kind of risk.

This article presents two dynamic schemes of hedging: delta hedging and delta-gamma hedging with examples from the Polish currency market.

Key words: hedging, delta hedging, delta-gamma hedging.

I. INTRODUCTION

Dynamic schemes of hedging against currency risk are carefully structured procedures, which should be carried out immediately during continuous transaction monitoring in case of changes in currency value. Hence, it can be described as selective, continuous preventing of open positions in currency options. The hedging techniques which reduce the loss without excluding the profits from currency movements are given preference. Their application requires access to reliable forecasts of future currency movements, as well as certain readiness to bear that kind of risk.

Nowadays, in the financial world, a dynamic scheme called delta hedging enjoys the highest recognition as one of the most sophisticated methods to spread the risk. It is most frequently applied by institutional investors to hedge short positions in derivative instruments. Delta hedging is also used

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by banks, which as currency derivatives grantor, have to lower the risk of current transactions on currency market. Only recently delta-gamma hedging wins its popularity as a modification of its well-known predecessor.

Delta hedging enables active hedging of short positions in quoted derivative instruments, particularly in options. Knowing the function of exercising option contracts, one can calculate the risk level which is inherent in having short positions in these instruments.

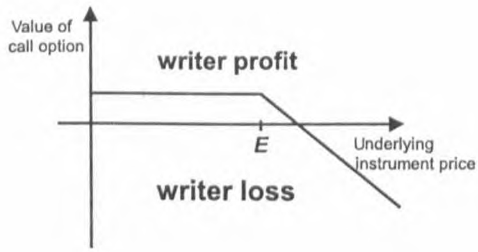

Figure 1. Exercise function for call option

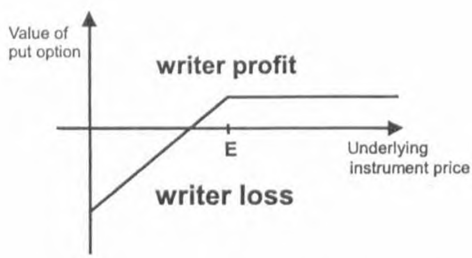

Figure 2. Exercise function for put option

The functions are as follows:

$$F_{CALL} = \min(E - K;\ 0) \qquad F_{PUT} = \min(K - E;\ 0) \tag{1}$$

where K is the price of underlying instrument and E is the exercise price.

It can be therefore noticed that, in case of a large difference between the current prices of underlying instruments and the exercise prices, huge losses can occur. It refers particularly to call option, where the loss is theoretically infinite. In case of owning such positions the bank has a natural need to hedge them.

II. DELTA HEDGING SCHEME

Methods based solely on the idea of pricing derivative instruments are used to manage open currency positions in options. Application of pricing of these instruments to the risk management melts down to observing the value changes of underlying instruments and adjusting the respective number of underlying instruments, which shall be included in portfolio. Hence, the short position of derivative instruments must be hedged by the long position of the assets they refer to.

The flexibility of change in the option value with respect to change in the underlying instrument price is used as the exact measure of the number of underlying asset. The rate is defined as delta:

$$\Delta = \frac{df}{dK} \tag{2}$$

where f stands for the option price (derivative instrument) and K is the price of underlying instrument.

A hedged portfolio based on the delta rate should be structured as follows:

for one underlying instrument there is $^{1}/_{\Delta}$ of derivative instruments

With such a portfolio structure the losses incurred by some instruments shall be covered by means of the profits generated by the others, which means the bank shall achieve full hedging. One should however realise that such a situation is only possible for a very short period of time. In order to hedge for an unlimited period of time, one should consider the necessary adjustment of portfolio. Periodical (e.g. weekly) adjusting of the hedge is called rebalancing and the whole scheme conducted in this way is defined as dynamic delta hedging.

To implement the practice one should assume the following: first, it must be decided at what time intervals the portfolio will be adjusted. Next, which pricing model will be adopted by the bank. It is important because delta rate is defined on the basis of pricing model. When currency is the underlying instrument the Garmann-Kohlhagen model is used. Finally, the correct volatility of underlying instruments should be accepted. It may be the value estimated on the basis of historical data, but more often it is implied risk calculated on the basis of the known option price.

The following examples based on empirical data from Polish market illustrate the delta hedging scheme for a bank quoting call option in USD.

The choice of examples from 1998 was determinated by one of the most interesting situations on the Polish currency market.

Example 1. On 1st August 1998 ING Barings Bank quotes a European call option for 100 000 USD with the exercise price 3.485 PLZ and one month expiration date. Because of the currency movements, the bank decides to hedge its position by means of dynamic delta hedging with daily adjustment. In order to apply the scheme the Garman-Kohlhagen model was accepted as the basis of calculation.

$$\Delta = e^{-r_f T} N(d_1).$$

For the needs of the example the currency values from August 1998 were adopted.

Estimated volatility as the implied risk from Garman-Kohlhagen model is 10.5 %. Current interest rates without the risk are as follows:

$r_f = 4.71\%$ in the USA (the average return of 3-month Treasury Bills),

$r_d = 17.74\%$ in Poland (the average return of 13-week treasury bonds). The bank opens the short position with the value of 3.439 PLZ, gaining 4020 PLZ from selling the option. In this situation the delta rate is 0.41 which means the necessity to buy about 41 000 dollars. With the price of 3.439 the bank has to bear the cost of 140 999 PLZ, should the operation be covered from the bank's assets. The transaction cost shall rise to 141 473 PLZ, should the hedging be covered with a loan. To hedge the portfolio efficiently the bank should buy the currency when delta rate goes up and sell part of the currency assets when it falls down. In this way the bank is entirely hedged by means of daily adjustments of the portfolio. Details are presented in Table 1.

After one month the option expires in-the-money (which means the exercise price is under the current underlying asset price). An option buyer shall want to exercise an option which makes the bank obliged to provide 100 000 USD at the value of 3.485 PLZ. At the expiration the bank sells the fixed amount of currency for 348 500 PLZ. However, for its purchase 350 679 PLZ from bank's assets were spent, which results in a favourable flow of financial means; or 369 863 PLZ from the loan, which results in the loss. Taking into account the money gained on selling the option the bottom line at the expiration is:

	Bank's assets	Loan
Selling the option	4 020	4 020
Profit from exercising the option	348 500	348 500
The cost of currency purchase	350 679	369 863
Total	1 841	–17 343

Despite adverse market condition, i.e. rise of exchange rate over the exercise price the bank profited on the whole operation due to hedging its position from the bank's assets. In case it was not hedged, the bank would have had to buy 100 000 USD on the market for 3.815 PLZ each, which should mean the loss amounting to 28 980 PLZ. It turned out that financing the hedging scheme by means of loan is disadvantageous, although it is still more advantageous than no hedging scheme at all.

Table 1. Example of dynamic delta hedging

Option days	USD/PLZ exchange rate	Delta	USD purchased	USD cumulated	Loan	Cumulated loan	Interests	Loan + interests
22	**3.4390**	**0.41**	**41 000.00**	**41 000**	**140 999.00**	**140 999**	**473.702**	**141 473**
21	3.4320	**0.37**	–4 000.00	37 000	–13 728.00	127 271	427.582	128 172
20	3.4245	**0.33**	–4 000.00	33 000	–13 698.00	113 573	381.562	114 856
19	3.4195	**0.30**	–3 000.00	30 000	–10 258.50	103 315	347.097	104 944
18	3.4450	**0.41**	11 000.00	41 000	37 895.00	141 210	474.410	143 314
17	3.4450	**0.40**	–1 000.00	40 000	–3 445.00	137 765	462.836	140 332
16	3.4460	**0.40**	0.00	40 000	0.00	137 765	462.836	140 795
15	3.4905	**0.63**	23 000.00	63 000	80 281.50	218 046	732.551	221 809
14	3.4540	**0.42**	–21 000.00	42 000	–72 534.00	145 512	488.864	149 763
13	3.5045	**0.71**	29 000.00	71 000	101 630.50	247 143	830.304	252 224
12	3.4995	**0.68**	–3 000.00	68 000	–10 498.50	236 644	795.033	242 521
11	3.4995	**0.68**	0.00	68 000	0.00	236 644	795.033	243 316
10	3.5210	**0.80**	12 000.00	80 000	42 252.00	278 896	936.983	286 505
9	3.5280	**0.84**	4 000.00	84 000	14 112.00	293 008	984.394	301 601
8	3.6000	**0.99**	15 000.00	99 000	54 000.00	347 008	1 165.813	356 767
7	3.6710	**1.00**	1 000.00	100 000	3 671.00	350 679	1 178.147	361 616
6	3.7950	**1.00**	0.00	100 000	0.00	350 679	1 178.147	362 794
5	3.6650	**1.00**	0.00	100 000	0.00	350 679	1 178.147	363 972
4	3.6950	**1.00**	0.00	100 000	0.00	350 679	1 178.147	365 151
3	3.7790	**1.00**	0.00	100 000	0.00	350 679	1 178.147	366 329
2	3.7950	**1.00**	0.00	100 000	0.00	350 679	1 178.147	367 507
1	3.8150	**1.00**	0.00	100 000	0.00	350 679	1 178.147	368 685
0	**3.8150**	**1.00**	**0.00**	**100 000**	**0.00**	**350 679**	**1 178.147**	**369 863**

Source: Personal calculation.

Example 2. On 1st September 1998 ING Barings Bank quotes a European call option for 100 000 USD with the exercise price 3.87 PLZ and one month expiration date. Because of the currency movements, the bank decides to hedge its position by means of dynamic delta hedging with daily adjustment. In order to apply the scheme the Garman-Kohlhagen model and the currency values from September 1998 were accepted as the basis of calculation. Estimated volatility as the implied risk is 17.8 %. Current interest rates without the risk are as follows:

$r_f = 4.69\%$ in the USA (the average return of 3-month Treasury Bills),

$r_d = 17.13\%$ in Poland (the average return of 13-week treasury bonds). The bank opens the short position with the value of 3.815 PLZ, gaining 7270 PLZ from selling the option. In this situation the delta rate is 0.39 which means the necessity to buy about 39 000 dollars. With the price of 3.815 the bank has to bear the cost of 148 785 PLZ. With the portfolio adjustments similar to the first case the situation is presented in Table 2.

After one month the option expires out-of-the-money (which means the exercise price is higher than the current underlying asset price), so it is not exercised. Hence, on the last day the bank sells all the dollars in question, which results in 5250 PLZ of cumulated cost of hedging from the bank's assets. Adding to it the money gained on selling the option, the bottom line at the expiration is:

	Bank's assets	Loan
Selling the option	7 270	7 270
The cost of currency purchase	–5 250	–6 252
Total	2 020	1 018

By hedging its short position at the time of quite considerable currency movements the bank managed to profit on the operation. It must be mentioned however that in this particular case the bank would have achieved a better result without any hedging at all. The profit would be equal to money gained from selling the option, i.e. 7270 PLZ. Yet, with the volatility estimated at 17.8% it is difficult to predict what shall happen with the currency value within a one month time and what will be the character of the changes. The deep crisis in Russia at that time evoked a lot of pessimistic forecasts for global economy and at the beginning of September 1998 it was difficult to predict such a quick stabilisation of USD/PLZ exchange rate and the return to the pre-crisis value. Therefore, the decision to hedge the transaction or not is very complicated and depends on individual approach to the possible development of the future situation.

Table 2. Example of dynamic delta hedging

Option days	USD/PLZ exchange rate	Delta	USD purchased	USD cumulated	Loan	Cumulated loan	Interests	Loan + interests
22	**3.8150**	**0.39**	**39 000.00**	**39 000**	**148 785.00**	**148 785**	**490.132**	**149 275**
21	3.6850	**0.04**	–35 000.00	4 000	–128 975.00	19 810	65.259	20 365
20	3.6880	**0.04**	0.00	4 000	0.00	19 810	65.259	20 431
19	3.6880	**0.03**	–1 000.00	3 000	–3 688.00	16 122	53.110	16 796
18	3.6240	**0.00**	–3 000.00	0	–10 872.00	5 250	17.295	5 941
17	3.6010	**0.00**	0.00	0	0.00	5 250	17.295	5 958
16	3.6180	**0.00**	0.00	0	0.00	5 250	17.295	5 976
15	3.5650	**0.00**	0.00	0	0.00	5 250	17.295	5 993
14	3.6540	**0.00**	0.00	0	0.00	5 250	17.295	6 010
13	3.6540	**0.00**	0.00	0	0.00	5 250	17.295	6 028
12	3.5860	**0.00**	0.00	0	0.00	5 250	17.295	6 045
11	3.5860	**0.00**	0.00	0	0.00	5 250	17.295	6 062
10	3.5865	**0.00**	0.00	0	0.00	5 250	17.295	6 079
9	3.5730	**0.00**	0.00	0	0.00	5 250	17.295	6 097
8	3.6030	**0.00**	0.00	0	0.00	5 250	17.295	6 114
7	3.6030	**0.00**	0.00	0	0.00	5 250	17.295	6 131
6	3.5950	**0.00**	0.00	0	0.00	5 250	17.295	6 149
5	3.5830	**0.00**	0.00	0	0.00	5 250	17.295	6 166
4	3.5820	**0.00**	0.00	0	0.00	5 250	17.295	6 183
3	3.5490	**0.00**	0.00	0	0.00	5 250	17.295	6 200
2	3.5470	**0.00**	0.00	0	0.00	5 250	17.295	6 218
1	3.5470	**0.00**	0.00	0	0.00	5 250	17.295	6 235
0	**3.5620**	**0.00**	**0.00**	**0**	**0.00**	**5 250**	**17.295**	**6 252**

Source: Personal calculation.

III. DELTA-GAMMA HEDGING SCHEME

Delta-gamma hedging scheme is a modification of delta hedging scheme, in which an additional sensitivity rate is calculated to adjust the selling or purchase value of underlying instruments to hedge the position in derivative instruments. The gamma rate presents to what extent shall delta change when the underlying instrument price changes. Hence, it is second derivative of the option price with respect to underlying instrument price.

$$\Gamma = \frac{d^2 f}{d^2 K} \tag{3}$$

Gamma for a single option is always positive and depends on the price of underlying instrument K.

In delta-gamma hedging scheme the flexibility of change in the option value with respect to change in the underlying instrument price reduced by the flexibility of change in delta with respect to change in the primary instrument price is used as the exact measure of the number of underlying asset. A hedged portfolio based on the delta and gamma rate should be structured as follows:

for one underlying instrument there is $^1/_\Delta - {^1/_\Gamma}$ of derivative instruments

With such a portfolio structure the losses incurred by some instruments shall be covered by means of the profits generated by the others, which means the bank shall achieve full hedging.

Example 3. The bank quotes a European call option for 100 000 USD with the exercise price 3.5 PLZ and one month expiration date. Because of the currency movements, the bank decides to hedge its position by means of dynamic delta-gamma hedging with daily adjustment. In order to apply the scheme the Garman-Kohlhagen model was accepted as the basis of calculation. Hence:

$$\Delta = e^{-r_f T} N(d) \quad \text{and} \quad \Gamma = \frac{N'(d_1) e^{-r_f T}}{K\sigma\sqrt{T}}.$$

The remaining rates are as above: estimated volatility for one month is 10.8%. Current interest rates without the risk are as follows:

$r_f = 4.71\%$ in the USA (the average return of 3-month Treasury Bills),
$r_d = 17.74\%$ in Poland (the average return of 13-week treasury bonds).

The bank opens the short position with the value of 3.439 PLZ, gaining 4020 PLZ from selling the option. In this situation the delta rate is 0.41 reduced by gamma – 0,36, which means the necessity to buy about 36 400 dollars. With the price of 3.439 the bank has to bear the cost of 125 179.60 PLZ, should the operation be covered from the bank's assets. The transaction cost shall rise to 125 240 PLZ, should the hedging be covered with a loan. To hedge the portfolio efficiently the bank should buy the currency when delta-gamma rate goes up and sell part of the currency assets when it falls down. In this way the bank is entirely hedged by means of daily adjustments of the portfolio. Details are presented in Table 3.

After one month the option expires in-the-money (which means the exercise price is under the current underlying asset price). An option buyer shall want to exercise an option which makes the bank obliged to provide 100 000 USD at the value of 3.485 PLZ. At the expiration the bank sells the fixed amount of currency for 348 500 PLZ. However, for its purchase 351 525 PLZ from bank's assets were spent, which results in a favourable flow of financial means; or 354 145 PLZ from the loan, which results in the loss. Taking into account the money gained on selling the option the bottom line at the expiration is:

	Bank's assets	Loan
Selling the option	4 020	4 020
Profit from exercising the option	348 500	348 500
The cost of currency purchase	351 525	354 145
Total	995	–1 625

Despite adverse market condition, i.e. rise of exchange rate over the exercise price the bank managed to profit on the whole operation. In case it was not hedged, the bank would have had to buy 100 000 USD on the market for 3.815 PLZ each, which should mean the loss amounting to 28 980 PLZ.

As it turns out adjusting the delta rate with the gamma rate slightly reduces the operation profit when it is financed from bank's assets. However, in comparison to delta scheme, it considerably reduces the loss by financing the hedging scheme with a loan. In case of a bigger favourable currency movement the profit from delta-gamma hedging scheme could entirely cover the interests and lead to a positive final financial result.

Example 4. On 1st September 1998 ING Barings Bank quotes a European call option for 100 000 USD with the exercise price 3.87 PLZ and one month expiration date. In order to apply dynamic delta-gamma hedging scheme with daily adjustment the Garman-Kohlhagen model was accepted as the basis of calculation. The remaining rates are as follows: estimated volatility as the implied risk is 17.8%. Current interest rates without the risk are as follows:

$r_f = 4.69\%$ in the USA (the average return of 3-month Treasury Bills),

$r_d = 17.13\%$ in Poland (the average return of 13-week treasury bonds).

Table 3. Example of dynamic delta-gamma hedging

Option days	USD/PLZ exchange rate	Delta	Gamma	USD purchased	USD cumulated	Loan	Cumulated loan	Interests	Loan + interests
22	**3.4390**	**0.41**	**0.05**	**36 400.00**	**36 400**	**125 179.60**	**125 180**	**59.915**	**125 240**
21	3.4320	**0.37**	**0.05**	–3 990.00	32 410	–13 693.68	111 486	53.361	111 599
20	3.4245	**0.33**	**0.05**	–3 920.00	28 490	–13 424.04	98 062	46.935	98 222
19	3.4195	**0.30**	**0.04**	–2 920.00	25 570	–9 984.94	88 077	42.156	88 279
18	3.4450	**0.41**	**0.05**	10 360.00	35 930	35 690.20	123 767	59.239	124 029
17	3.4450	**0.40**	**0.05**	–1 120.00	34 810	–3 858.40	119 909	57.392	120 228
16	3.4460	**0.40**	**0.05**	–140.00	34 670	–482.44	119 426	57.161	119 802
15	3.4905	**0.63**	**0.05**	23 030.00	57 700	80 386.22	199 813	95.636	200 284
14	3.4540	**0.42**	**0.06**	–21 470.00	36 230	–74 157.38	125 655	60.142	126 187
13	3.5045	**0.71**	**0.05**	29 580.00	65 810	103 663.11	229 318	109.759	229 960
12	3.4995	**0.68**	**0.06**	–3 430.00	62 380	–12 003.29	217 315	104.013	218 061
11	3.4995	**0.68**	**0.06**	–250.00	62 130	–874.87	216 440	103.595	217 289
10	3.5210	**0.80**	**0.05**	13 070.00	75 200	46 019.47	262 460	125.621	263 434
9	3.5280	**0.84**	**0.04**	4 390.00	79 590	15 487.92	277 947	133.034	279 055
8	3.6000	**0.99**	**0.00**	18 980.00	98 570	68 328.00	346 275	165.738	347 549
7	3.6710	**1.00**	**0.00**	1 430.00	100 000	5 249.53	351 525	168.250	352 967
6	3.7950	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 135
5	3.6650	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 303
4	3.6950	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 472
3	3.7790	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 640
2	3.7950	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 808
1	3.8150	**1.00**	**0.00**	0.00	100 000	0.00	351 525	168.250	353 976
0	**3.8150**	1.00	0.00	**0.00**	**100 000**	**0.00**	**351 525**	**168.250**	**354 145**

Source: Personal calculation.

Table 4. Example of dynamic delta-gamma hedging

Option days	USD/PLZ exchange rate	Delta	Gamma	USD purchased	USD cumulated	Loan	Cumulated loan	Interests	Loan + interests
22	**3.8150**	**0.39**	**0.0410**	**34 900.00**	**34 900**	**133 143.50**	**133 144**	**62.486**	**133 206**
21	3.6850	**0.04**	**0.0100**	–31 900.00	3 000	–117 551.50	15 592	7.318	15 662
20	3.6880	**0.04**	**0.0099**	10.00	3 010	36.88	15 629	7.335	15 706
19	3.6880	**0.03**	**0.0091**	–920.00	2 090	–3 392.96	12 236	5.743	12 319
18	3.6240	**0.00**	**0.0014**	–2 230.00	–140	–8 081.52	4 154	1.950	4 239
17	3.6010	**0.00**	**0.0005**	90.00	–50	324.09	4 478	2.102	4 565
16	3.6180	**0.00**	**0.0007**	–20.00	–70	–72.36	4 406	2.068	4 495
15	3.5650	**0.00**	**0.0000**	70.00	0	249.55	4 656	2.185	4 747
14	3.6540	**0.00**	**0.0015**	–150.00	–150	–548.10	4 108	1.928	4 201
13	3.6540	**0.00**	**0.0011**	40.00	–110	146.16	4 254	1.996	4 349
12	3.5860	**0.00**	**0.0000**	110.00	0	394.46	4 648	2.181	4 745
11	3.5860	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 748
10	3.5865	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 750
9	3.5730	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 752
8	3.6030	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 754
7	3.6030	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 756
6	3.5950	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 759
5	3.5830	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 761
4	3.5820	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 763
3	3.5490	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 765
2	3.5470	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 767
1	3.5470	**0.00**	**0.0000**	0.00	0	0.00	4 648	2.181	4 769
0	**3.5620**	0.00	0.0000	**0.00**	**0**	**0.00**	**4 648**	**2.181**	**4 772**

Source: Personal calculation.

The bank opens the short position with the value of 3.815 PLZ, gaining 7270 PLZ from selling the option. In this situation the delta rate is 0.39, reduced by gamma – 0,041 which means the necessity to buy about 34 900 dollars. With the price of 3.815 the bank has to bear the cost of 133 143.50 PLZ, should the operation be covered from the bank's assets. The transaction cost shall rise to 133 206 PLZ, should the hedging be covered with a loan. With the daily portfolio adjustments the situation is presented in Table 4. After one month the option expires out-of-the-money (which means the exercise price is higher than the current underlying asset price), so it is not exercised. Hence, on the last day the bank sells all the dollars in question, which results in 4648 PLZ of cumulated cost of hedging from the bank's assets or 4772 PLZ from the loan. Adding to it the money gained on selling the option, the bottom line at the expiration is:

	Bank's assets	Loan
Selling the option	7 270	7 270
The cost of currency purchase	–4 648	–4 772
Total	2 622	2 498

By hedging its short position in currency option the bank has profited on the operation. Naturally in case the option is not exercised, the unhedged position is always more beneficial, but to predict the development of such a situation on quoting the option is extremely difficult. On the other hand, the efficiency of delta-gamma hedging with such currency movements is slightly higher than the one with delta hedging scheme.

Hedging schemes presented above appear to be only selected cases. Yet, already on their basis it can be noticed that apart from legal coverage or portfolio optimisation methods there are derivative currency instruments which can efficiently hedge legal entities, such as banks, against exchange risk. Their primary advantage is a relatively small capital necessary to provide the hedging. Moreover, the choice and application of dynamic schemes depends exclusively on the expectations of the legal entity which hedges its position.

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DYNAMICZNE STRATEGIE ZABEZPIECZAJĄCE - DELTA HEDGING I DELTA-GAMMA HEDGING NA RYNKU WALUTOWYM

Streszczenie

Dynamiczne strategie zabezpieczające przed ryzykiem walutowym to opracowane procedury czynności, które należy wykonywać na bieżąco, w sytuacjach zmian kursu waluty, w czasie ciągłego monitorowania transakcji. Jest to zatem stałe, selektywne przeciwdziałanie powstawaniu otwartych pozycji w opcjach walutowych. Preferowane są te techniki zabezpieczania, które ograniczając wysokość strat, nie wykluczają zysków kursowych. Ich stosowanie wymaga dostępu do rzetelnych prognoz przyszłych zmian cen walut, a także określonego stopnia gotowości do ponoszenia tego typu ryzyka.

Artykuł prezentuje dwa rodzaje dynamicznych strategii hedgingowych: delta hedging i delta-gamma hedging wraz z przykładami dla polskiego rynku walutowego.