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PIOTR WYBIERALSKI

piotr.wybieralski@ue.poznan.pl
Poznań University of Economics and Business. Institute of International Business and Economics
10 Niepodległości Av., 61-875 Poznań
ORCID ID: https://orcid.org/0000-0001-8280-8465

Cross-Currency Interest Rate Swap Application in the Long-Term Currency Risk Management

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Abstract

Effective currency risk management using various derivatives is particularly important under increased market volatility. The risk is relatively higher for longer than shorter time frames. This study highlights the implementation of selected instruments for long-term hedging. It presents the application of cross-currency interest rate swap as a currency risk hedging tool used by Polish exporters, mainly manufacturers generating their revenues mostly abroad (in euro area), exposed to negative exchange rate fluctuations. The paper covers issues related to the pricing, market risk estimation and collateral required in the OTC market, as well as undertakes a sensitivity analysis in search for exchange rates at which margin call occurs. There is a comparative analysis and back test simulation conducted using market data from exchange and money markets. The study emphasized that the analyzed instrument meets the expectations in terms of hedging the company cash flows, as well as may generate additional benefits due to the still existing interest rate differential.

Introduction

There are various instruments available for non-financial companies to manage their currency risk exposure in over-the-counter market in Poland. One of them worth considering especially in long-term hedging is cross-currency interest rate swap (CIRS). In general sense the CIRS is an agreement between two parties to exchange stream of payments in one currency for a stream of cash flows in another. It is mainly associated with changing both the interest and exchange rates mostly for investment loans. However, it can be quite easily adopted as an alternative to forward and option contracts especially in dealing with long-term exposures.

The main aim of the article is to present the application of CIRS transaction as a currency risk hedging tool used by Polish exporters, mainly manufacturers generating their revenues mostly abroad (in euro area), exposed to negative exchange rate fluctuations. The additional goal is to recognize whether the current pricing of long lasting CIRS transaction (including the still observed interest differential) exceeds the average exchange rates in the recent market history. The paper covers issues related to the pricing, market risk estimation and collateral required in the OTC market, as well as undertakes a sensitivity analysis in search for exchange rates at which margin call occurs. There is a comparative analysis and back test simulation conducted using market data from exchange and money markets.

Literature review and theoretical background

This section concentrates mainly on three topics. In the first place the CIRS application for hedging purposes is presented, the second part contains review of selected studies on interest rate parity recently published and finally some data on turnover of the CIRSs in Poland.

As a hedging tool, the CIRS agreement is usually used for loan or bond issue in order to change the currency and interest rate of financing (on this topic, see Leszczyńska, 2007; Malinowski, 2011; Brzychczy, 2012; Klimontowicz & Pyka, 2018). It can be implemented in two ways. The company may apply for financing in the international capital markets and receive loan in foreign currency, then convert proceeds into home currency and using the CIRS agreement the company hedges the cash flows, both principal and interest. This path may be worth considering when the company applies for the amount that is not possible to reach locally or is cheaper abroad, even after deducting the cost of hedging. The second application assumes the situation when an ordinary foreign currency denominated loan is not likely to obtain (due to many reasons, for instance, in case of company willing to apply for any external financial support, such as state subsidy, while the granting agency requires funding in local currency). In such a situation, a loan in local currency is disbursed and swap transaction is applied to convert the local currency into foreign

one. Without any modification to loan agreement in local currency the company converts both principal and interest into the foreign currency. In that case the company repays the debt using proceeds in foreign currency. There are different types of CIRS contracts used in terms of interest rates. Whether the company wishes to pay fixed or floating rate, namely whether the company wants to hedge the interest rate or rely on market developments.

Apart from loan or bond, namely interest exposure hedging, CIRS contracts may be also used for currency hedging purposes as an alternative to other instruments, such as forward or option contracts. In such cases, the zero-coupon CIRS is usually prepared.[1] From this point of view, it is very important to meet the currency risk hedging objectives developed by a given company (on currency risk hedging goals, see Wybieralski, 2014). The transaction may be applied in the long term, for future cash flows with reference to budget rates, usually indicated by manufacturers (trading companies typically prefer shorter time frames). Hence the rate of exchange set in the CIRS agreement should match at least this budget rate. Another issue is the amount of foreign currency involved in the CIRS contract. Producers usually rely in this regard on either volume of trading contracts signed in physical market (projected cash flows) or recent history of relationship with their counterparties. There may be also some hedging policy implemented with guidelines stating, for instance, that no more than 20% of annual proceeds in foreign currency may be hedged in upcoming years (i.e. yearly foreign currency turnover hedged in equal parts over the next 5 years to come). While talking about hedging activity, it is very important, not to exceed the real demand for hedging activity, otherwise it is rather speculation than hedge. It is worth mentioning that CIRS contracts are also applied in investments, namely in carry trade strategies that rely on so-called uncovered interest rate parity (arbitrage). There are many studies on this topic investigated in different time frames, currencies, assets classes, etc. (see Śliwiński, 2017; Engel & Lee, 2017; Chernov & Creal, 2018; Hassan & Mano, 2018; Lustig, Stathopoulos, & Verdelhan, 2018, and others). The theory suggests that higher interest rates in one country should be compensated by currency depreciation, thus preventing from carrying out the uncovered interest arbitrage. As a result, there should not be any investment strategy that allows to benefit from exchange and interest rates movements, achieving long-term profits. However, empirical tests on uncovered interest parity are very often contradictory with this thesis. Thus, taking into account that the movement of future spot rates is not always determined by an interest differential, it can be an additional incentive to consider long-term hedging with the CIRS agreement. However, it seems that the contract is hardly used in this context, based on the volumes concluded. According to the survey

[1] Under this zero-coupon CIRS agreement, no interest payments will be made. No exchange of notional amounts will occur on the start date. On each settlement date, the company will receive an amount in a specified currency from the bank and will pay to the bank the relevant amount in another currency in exchange (just like in an ordinary forward contract).

on developments in the foreign exchange and OTC derivatives markets conducted by the Bank for International Settlements together with the Polish National Bank in April 2016, the average daily turnover in the CIRS market amounted to USD 160 million. This number was higher by approximately 28% than in April 2013, when the previous survey took place. However, considering the foreign exchange derivatives market, comprising outright forwards, fx swaps, CIRSs and currency options, in total accounted for USD 7,033 million, the CIRS average daily turnover makes only 2.3% of the whole derivatives market. It is 5 times less than the amount of forward contracts, but at least 2 times outweighs option contracts market share (see Table 1).

Table 1. Average daily net turnover in the domestic foreign exchange market in April 2013 and April 2016 (in USD million)

	2013	2016	Percentage change (at current exchange rates)	Percentage change (at constant exchange rate)
Foreign exchange market	**7 564**	**9 116**	**21**	**33**
Spot transactions	2 324	2 083	-10	1
Outright forwards	464	845	82	108
of which non-deliverable forwards	21	323	-	-
Fx swaps	4 581	5 958	30	41
CIRSs	125	160	28	45
Currency options	70	70	0	14

Source: (Polish National Bank, 2016, p. 4).

Cross-currency interest rate swaps were mainly applied for hedging purposes, against market risk arising from the mismatch of assets and liabilities of the bank's balance sheet. Hence almost 80% of all CIRS contracts were concluded within financial institutions. The rest part, amounted to USD 33 million, were executed by non-financial entities (see Table 2). Almost 51% of all CIRS contracts were concluded in the EUR/USD market, 28% in CHF/PLN, and 18% in EUR/PLN (see Figure 1).

Findings from the survey on foreign exchange and OTC derivatives markets show that CIRSs are rarely used by Polish non-financial companies in currency risk management. There may be a few reasons for such a result. First of all, CIRS agreements in Poland are generally used by non-financial companies to convert their financial exposure, mainly investment loan's currency from one to another, particularly when an ordinary EURO denominated loan is not easily granted. Another reason of low interests in CIRS application in currency risk management may be simple the lack of demand for long-term covering tools. For hedging purposes, forward and options contracts are used more often especially in shorter time frames. And, finally, it seems that the access to such instruments is more and more limited nowadays both from legal perspective (MiFID and other requirements implemented) and end-user instrument availability in the market (CIRS agreements are usually treated as highly risky instruments, not suitable and adequate for everyone).

Table 2. Average daily net turnover in the domestic foreign exchange market by counterparty in April 2016 (in USD million)

	Resident	Non-resident	TOTAL
Foreign exchange market	**2 396**	**6 720**	**9 116**
with financial institutions	**1 361**	**6 656**	**8 017**
with non-financial entities	**1 035**	**64**	**1 099**
Spot transactions	1 026	1 057	2 083
with financial institutions	455	1 035	1 490
with non-financial entities	571	22	593
Outright forwards	457	388	845
with financial institutions	146	377	523
with non-financial entities	311	11	322
Fx swaps	821	5 137	5 958
with financial institutions	731	5 106	5 837
with non-financial entities	90	31	121
CIRSs	60	100	160
with financial institutions	27	100	127
with non-financial entities	33	0	33
Currency options	31	39	70
with financial institutions	1	39	40
with non-financial entities	31	0	30

Source: (Polish National Bank, 2016, p. 5).

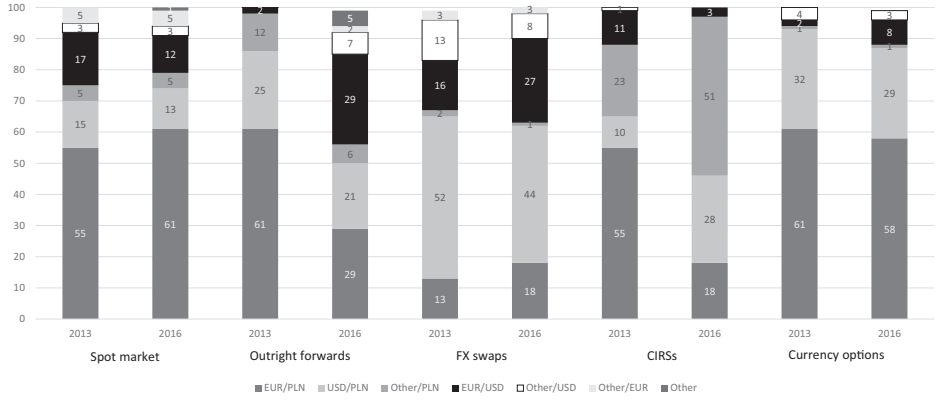

Figure 1. Currency breakdown of turnover in the domestic foreign exchange market in April 2013 and April 2016 (in %)

Source: (Polish National Bank, 2016, p. 5).

However, implementing longer lasting hedging strategies, especially for Polish manufacturers selling abroad in Eurozone may be worth considering because of (1) the possibility to protect budget rates in longer time frames and (2) additional benefits in form of higher exchange rates resulting from still observed interest differential in the market.

Research methods

Let us consider the CIRS application for Polish manufacturer receiving EUR 100,000 monthly for the next 5 coming years. There are 60 sequential cash flows to be hedged amounting to EUR 6.0 million in total. In this case a Zero-Coupon CIRS is constructed based on market data received from ICE Data Derivatives on 23 April 2019. Using Cash Rates, Forward Rate Agreements and Interest Rate Swaps, zero-rates curves are created for CIRS pricing.[2] Following standard valuation formula for CIRSs with zero-coupon payments, at the spot rate EUR/PLN 4.2878, the exchange rate in the CIRS agreement is about 4.5065 (there are 0.2187 positive swap points). The transaction is concluded on the following terms:[3]

a) Cash flows to be paid by the company:
– Currency: EUR
– Starting notional: 6.0 million
– Interest rate: 0% fixed
– Basis: 30/360
– Payment frequency: monthly
b) Cash flows to be paid by a bank:
– Currency: PLN
– Starting notional: 27.039 million
– Interest rate : 0% fixed
– Basis: ACT/ACT 365-ISDA
– Payment frequency: monthly
Rate of exchange: 4.5065;
Trade date: 23 April 2019
Start date: 25 April 2019
End date: 30 April 2024

In order to open any position in the OTC derivatives, a collateral is required to cover pre-settlement risk. Bankers very often subtract the amount of default risk from client's total approved credit and grant the so-called treasury limits to deal with this exposure.[4] The treasury limit utilization takes into account both the potential loss expressed by margin rates (VaR approach) and the present value of all outstanding contracts. In case the present value of remaining contracts exceeds the value of treasury limit, a margin call rule appears.

[2] Computation was made using the SuperDerivatives calculator (https://www.superderivatives.com/).

[3] The bank's margin was omitted in valuation, because after the introduction of MiFID I and II, the bank is obliged to inform about the pricing policy before the transaction (about its impact on the return on investment). At the moment of conclusion it can be also asked about the price mark-up. Moreover, after the transaction conclusion this information is attached to the confirmation of the contract. Bank's margin depends on the negotiating possibilities of both parties.

[4] The risk that one party of a contract will fail to meet the terms of the contract and default before the contract's settlement date, prematurely ending the contract.

In our example of 5-year CIRS agreement in the amount of EUR 6.0 million margin rates are given in Table 3. The market risk estimation, based on the VaR approach takes usually into account the margin rates both for the interest and exchange rates. In this case the total margin rate at 26.5% is considered for the average notional amount (in the investigated example of EUR 3.050 million or PLN 13.75 million). The market risk estimation equals about PLN 3.6 million.

Table 3. Margin rates for exchange and interest derivatives in various markets across different time frames

Tenor (in years)	Margin rates for EUR/PLN	Margin rates for EUR swaps	Margin rates for PLN swaps
1	12.05%	1.00%	1.00%
2	16.50%	1.25%	2.00%
3	19.50%	1.50%	2.50%
4	20.50%	1.75%	3.00%
5	21.00%	2.00%	3.50%

Source: Data derived from one of the Polish publicly-traded commercial banks.

Results and discussion

The risk profile of the analyzed CIRS agreement is the same as for the short position in the forward contract and assumes the positive value for Polish entrepreneur when the market falls on settlement days – the current spot rate is below the rate of exchange set in CIRS contract, there will be a positive payout in case of net settlement mode. On the other hand, when the market rises there is a negative contract's value (see detailed outcome in scenarios analysis at the end of this section in Table 5). For the company receiving EUROs it is very important to set an unchanged rate to be able to predict the cash flows obtained in local currency, namely in PLN, in which most of expenses are incurred. This is usually one of the most important currency risk hedging objectives indicated by manufactures, referred as the budget rate. Hence, the rate of exchange set in currency hedging strategies should match at least this reference rate. The higher this exchange rate set in such transaction, the better the company's situation. Hence, long-term strategies due to still positive swap points in EUR/PLN market may further encourage to undertake hedging activities. Figure 2 shows the historical exchange rate fluctuation since February 2000, based on monthly movements (open, high, low and close price). Figure 3 shows the same spot rate based on monthly intervals for closing prices and the 60-month simple moving average (60M SMA, starts from January 2005).[5]

[5] The standard CIRS valuation is made on DCF method using appropriate interest rates. After conclusion the contract is settled to the real market on the value dates (settlement days). There are 60 sub-periods and 60 different exchange rates to be considered in order to asses overall profit and loss outcome. A simplifying assumption is made by adopting the average exchange rates over all 60 periods, such reference rates are presented as a 60M simple moving average rate. It indicates the average exchange rate to which such contract

Figure 2. EUR/PLN spot rate, 1-month candlestick (February 2000 – March 2019)

Source: Author's own study based on data from www.stooq.pl

The 60M SMA mean price in the investigated period was about PLN 4.0901 for EUR and standard deviation was nearly PLN 0.1164. The maximum 60M SMA was 4.2550 in the analyzed time frame. It means that rate of exchange in the 5-year CIRS contract with 60 sequential payments, set at 4.5065 is above not only the 60M SMA mean but also exceeds its highest peak. Hence, the company concluding such transaction at the specified exchange rate in a time range from February 2000 until April 2014 would be converting currency at the rate much higher than average one.[6]

As mentioned above, such transaction to be concluded in the OTC market requires treasury limit to cover pre-settlement risk in the amount of PLN 3.6 million. Assuming the company received such limit amount we can now search for the exchange rates at which margin call rule applies. Once the transaction is concluded, the market exchange rate should increase from 4.2878 up to 4.8628 (+13.41% spot rate change, see Table 4) the day after conclusion when the contract's present value exceeds the amount of treasury limit granted (PLN 3.6 million). As time goes by,

would be settled. Of course, this is not an explicit confirmation that the future market developments will look similar, but certainly when entering into a CIRS transaction, the moment of conclusion will be taken into account in the context of historical rates. As mentioned, the basic reference exchange rate is the price level set in the company's budget, but certainly market practitioners will be interested in the level of historical exchange rates in the form of a moving average rate for 60-monthly periods.

[6] The contracts concluded from May 2014 are still waiting for final settlement day to come – at the time of preparation of this paper, for instance, transaction concluded in January 2015 would be possible to asses in reference to the 60M SMA at the end of 2019.

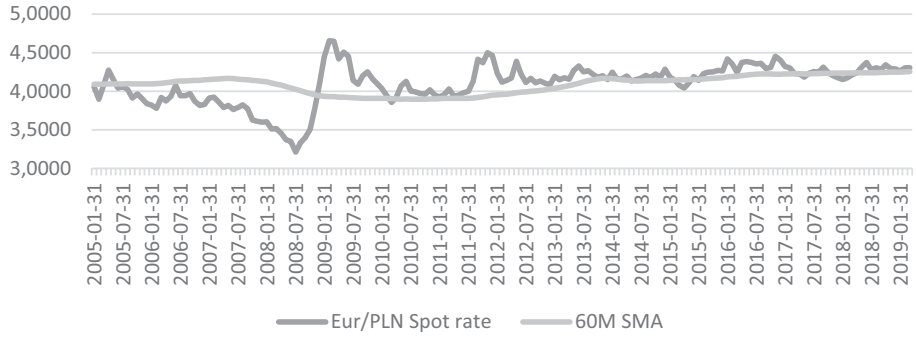

Figure 3. EUR/PLN spot rate based on monthly closing rates and 60M SMA

Source: Author's own study based on data from www.stooq.pl

this exchange rate increases, since the sequential payments expires (the outstanding amount decreases linear) and treasury limit remains unchanged (under assumption that 5-year treasury limit was granted). On each settlement dates the cash flows and risk profile is presented in the scenarios in Table 5 assuming 21% market change (margin rate for EUR/PLN in 5-year time frame).

Table 4. Margin call scenarios

Valuation date	Outstanding amount (in million EUR)	Spot rate	Spot rate change	Market value (results in PLN)
1 day after conclusion	6.0	4.8628	+13.41%	-3,599,717
1 year after conclusion	4.8	5.0630	+18.08%	-3,600,302
2 years after conclusion	3.6	5.3606	+25.02%	-3,593,073
3 years after conclusion	2.4	5.9104	+37.84%	-3,598,067
4 years after conclusion	1.2	7.4555	+73.87%	-3,597,559

Source: Author's own study.

Although the main part of the transaction risk is associated with the volatility in the foreign exchange market, the shifts in interest rate also may influence the value of the contract. This risk is usually measured in swap transactions by basis point value (BPV). The shifts in interest rates, represented by 1 BPV equals for cash flows in euro (the first leg) about EUR 1.55 thousand and almost PLN 6.25 thousand for payments in PLN (the second leg).[7] That means the interest rate in PLN should increase by 576 bp or interest rate in EUR should drop by 541 bp the day after conclusion to fully utilize treasury limit.

[7] Computation is made using the SuperDerivatives calculator.

Table 5. Risk scenarios on settlement days assuming market change +/-21% vs rate of exchange set in the CIRS contract

No	The Start of interest sub-period	The End of interest sub-period	Non-Base CIRS amount [PLN]	Base CIRS amount (EUR)	Bank pays:			Company pays:			Scenario I	Scenario II	Scenario III
					Fixed interest rate in PLN	Amortization amount (PLN)	Fixed interest payments (PLN)	Fixed Interest rate in EUR	Amortization amount (EUR)	Fixed interest payments in EUR	Currency gains at spot rate 4.5065 (in PLN)	Currency loss at spot rate 5.4529 (in PLN)	Currency gains at spot rate 3.5601 (in PLN)
1	2019-04-25	2019-05-31	27 039 000	6 000 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
2	2019-05-31	2019-06-28	26 588 350	5 900 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
3	2019-06-28	2019-07-31	26 137 700	5 800 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
4	2019-07-31	2019-08-30	25 687 050	5 700 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
5	2019-08-30	2019-09-30	25 236 400	5 600 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
6	2019-09-30	2019-10-31	24 785 750	5 500 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
7	2019-10-31	2019-11-29	24 335 100	5 400 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
8	2019-11-29	2019-12-31	23 884 450	5 300 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
9	2019-12-31	2020-01-31	23 433 800	5 200 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
10	2020-01-31	2020-02-28	22 983 150	5 100 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
11	2020-02-28	2020-03-31	22 532 500	5 000 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
12	2020-03-31	2020-04-30	22 081 850	4 900 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
13	2020-04-30	2020-05-29	21 631 200	4 800 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
14	2020-05-29	2020-06-30	21 180 550	4 700 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
15	2020-06-30	2020-07-31	20 729 900	4 600 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
16	2020-07-31	2020-08-31	20 279 250	4 500 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
17	2020-08-31	2020-09-30	19 828 600	4 400 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
18	2020-09-30	2020-10-30	19 377 950	4 300 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
19	2020-10-30	2020-11-30	18 927 300	4 200 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
20	2020-11-30	2020-12-31	18 476 650	4 100 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
21	2020-12-31	2021-01-29	18 026 000	4 000 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
22	2021-01-29	2021-02-26	17 575 350	3 900 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
23	2021-02-26	2021-03-31	17 124 700	3 800 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
24	2021-03-31	2021-04-30	16 674 050	3 700 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
25	2021-04-30	2021-05-31	16 223 400	3 600 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
...	...	...	...	...	...	...	...	...	...	...	...	...	...

No	The Start of interest sub-period	The End of interest sub-period	Non-Base CIRS amount [PLN]	Base CIRS amount (EUR)	Bank pays:			Company pays:			Scenario I	Scenario II	Scenario III
					Fixed interest rate in PLN	Amortization amount (PLN)	Fixed interest payments (PLN)	Fixed Interest rate in EUR	Amortization amount (EUR)	Fixed interest payments in EUR	Currency gains at spot rate 4.5065 (in PLN)	Currency loss at spot rate 5.4529 (in PLN)	Currency gains at spot rate 3.5601 (in PLN)
46	2023-01-31	2023-02-28	6 759 750	1 500 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
47	2023-02-28	2023-03-31	6 309 100	1 400 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
48	2023-03-31	2023-04-28	5 858 450	1 300 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
49	2023-04-28	2023-05-31	5 407 800	1 200 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
50	2023-05-31	2023-06-30	4 957 150	1 100 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
51	2023-06-30	2023-07-31	4 506 500	1 000 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
52	2023-07-31	2023-08-31	4 055 850	900 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
53	2023-08-31	2023-09-29	3 605 200	800 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
54	2023-09-29	2023-10-31	3 154 550	700 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
55	2023-10-31	2023-11-30	2 703 900	600 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
56	2023-11-30	2023-12-29	2 253 250	500 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
57	2023-12-29	2024-01-31	1 802 600	400 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
58	2024-01-31	2024-02-29	1 351 950	300 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
59	2024-02-29	2024-03-29	901 300	200 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
60	2024-03-29	2024-04-30	450 650	100 000	0%	450 650	0	0%	100 000	0	0	-94 640	94 640
						27 039 000	0		6 000 000	0	0	-5 678 400	5 678 400

Source: Author's own study.

Conclusions

Effective currency risk management using various derivatives is particularly important under increased market volatility. This risk is relatively higher for longer than shorter time frames. This study highlights the application of selected instrument for long-term hedging, with linear monthly payments up to five years. An example of a Polish exporter is identified, that in large part sells abroad (in euro area). It has been operating this way for many years and does not intend to change the business profile in the near future. In this regard the risk management process has got a special meaning, it is defined mainly through the budget rate hedging objective. One of the instruments aimed to hedge the reference rates presented in the paper is the CIRS. Its exemplification based on current data from money and exchange markets was presented in this study. The paper covers issues such as transaction valuation, risk profile, market risk estimation, and sensitivity analysis for various market developments in terms of exchange rates at which margin call rule appears and additional collateral is required. The study emphasized that the analyzed instrument meets the expectations in the context of hedging the company cash flows, as well as may generate additional benefits due to the still existing interest rate differential.

References

Brzychczy, E. (2012). Proposal of using SWAPs by hard coal mining companies in Poland. *Mineral Resources Management*, *28*(2). **doi:10.2478/v10269-012-0016-0**

Chernov, M., & Creal, D. (2018). International yield curves and currency puzzles. *NBER Working Paper*, *25206*.

Engel, Ch., & Lee D. (2017). The uncovered interest parity puzzle, exchange rate forecasting and Taylor rules. *NBER Working Paper*, *24059*.

Hassan, T., & Mano, R. (2018). Forward and spot exchange rates in a multi-currency world. *NBER Working Paper*, *20294*.

Klimontowicz, M., & Pyka, A. (2018). Zabezpieczanie ryzyka stopy procentowej w kredytowaniu działalności przedsiębiorstw. *Studia i Materiały. Wydział Zarządzania UW*, 1(29). **doi:10.7172/1733-9758.2018.27.5**

Leszczyńska, E. (2007). *Rynek kontraktów swap w Polsce*. Warszawa: Narodowy Bank Polski.

Lustig, H., Stathopoulos, A., & Verdelhan, A. (2018). The term structure of currency carry trade risk premia. *NBER Working Paper*, *19623*.

Malinowski, A. (2011). Zastosowanie kontraktów *swap* w Polsce. *Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach. Seria: Administracja i Zarządzanie*, *88*(15).

Polish National Bank. (2016). *Turnover in the domestic Foreign Exchange and OTC Derivatives Markets in April 2016*. Retrieved from www.nbp.pl

Śliwiński, P. (2017). Testowanie hipotezy niezabezpieczonego parytetu stóp procentowych na przykładzie kursów USD/PLN oraz EUR/PLN w latach 2006–2010. *Acta Universitas Lodzensis*, *2*(328). **doi:10.18778/0208-6018.328.14**

Wybieralski, P. (2014). Transakcyjne ryzyko kursowe a cele działalności osłonowej przedsiębiorstw niefinansowych. *Zeszyty Naukowe Uniwersytetu Szczecińskiego*, *802*. *Finanse, Rynki Finansowe, Ubezpieczenia*.