International Journal of Innovative Research in Engineering and Management (IJIREM)
ISSN: 2350-0557, Volume-9, Special Issue-2, February-2022
Young Researchers' Conference on Indian Literatures, 2022
Organized by Presidency University, Bangalore, India

Otc Interest Rate Derivatives: Management and Financial Instruments

Dr. Muralidhar Sunil,
Assistant Professor, Master In Business Administration (General Management), Presidency University, Bangalore, India,
Email Id: sunilrashinkar@presidencyuniversity.in

Instruments including forward rate agreements (FRAs), interest rate swaps, caps, floors, and collars are examples of OTC interest rate derivatives. OTC interest rate derivatives create conditions for the exchange of cash payments depending on changes in market interest rates, much as exchange-traded interest rate derivatives like interest rate futures and futures options. Interest rate caps, floors, and collars are option-like agreements that call for one party to pay the other when a specified interest rate, most frequently a specified maturity of LIBOR, moves outside of stipulations. An FRA is a forward contract that establishes terms for the exchange of cash payments based on changes in the London Interbank Offered Rate (LIBOR). interest rate swaps provide for the exchange of payments based on differences between two different interest rates. and interest rate swaps are forward contracts

In a number of crucial ways, the over-the-counter market is distinct from futures markets. While futures and futures options are standardized contracts that trade on established exchanges, the OTC market is an unregulated market made up of dealers, or market makers, who communicate across computer networks to exchange price information and conduct transactions. Although the over-the-counter market has a high degree of contract uniformity, dealers that participate in this market tailor agreements to match the unique demands of their clients. Furthermore, counterparties to OTC derivative agreements must assume some default or credit risk, in contrast to futures markets, where futures exchange clearinghouses ensure contract fulfillment via a system of margin requirements along with the daily payment of winnings or losses. Since 1981, the year of the first publicly recognized swap deal, the market for interest rate derivatives has grown quickly and innovated at a brisk pace. FRAs, caps, floors, collars, and other hybrid instruments including forward swaps, options on swaps (swaptions), and even options on options (captions), all quickly followed the introduction of trading in interest rate swaps.

Forward Rate Contracts

A Forward Rate Agreement (FRA) is a contract between two parties that provides protection for the borrower or lender against unfavorable changes in interest rates. Since FRAs are not traded on an exchange like futures, they are referred to as OTC products. These are the primary characteristics of FRA. Banks often utilize it to set the interest rates on projected future deposits or the interest income on variable-rate loans that are LIBOR-indexed. There is no transfer of principle involved. Although it dictates the amount of the payment, the main amount of the agreement is referred to as notional since there is never a real exchange of the principal. At maturity, it is paid in cash, with the profit or loss represented. If some defined LIBOR maturity is higher than a predetermined forward rate on the contract maturity or settlement date, the bank selling the FRA promises to pay the buyer the additional interest expense on some notional principal amount. In contrast, if market interest rates drop below the forward rate, the buyer agrees to reimburse the seller any reduction in interest costs.

Swaps of Interest Rates

An agreement between two parties to exchange, or swap, future payment streams based on variations in the returns to various assets or changes in the price of an underlying object is known as a swap. The most prevalent kind of swap arrangement is an interest rate swap. The parties to the arrangement, known as the swap counterparties, agree to exchange payments that are linked to two distinct interest rates when they enter into an interest rate swap. The swap's set notional principal amount which is never really exchanged determines the total payments. Interest rate swaps are a practical way for financial intermediaries, such as banks, insurance companies, and pension funds, to alter the maturity of existing debt or an interest-bearing asset [1], [2].

Parallel loan arrangements, in which businesses traded loans with various currency denominations, gave rise to swaps. Despite the fact that some swaps were organized in the late 1970s, the first publicly reported swap occurred

in 1981 when IBM and the World Bank decided to exchange interest payments on debt with various currency denominations, an agreement known as a currency swap. The Student Loan Marketing Association (Sallie Mae) of the US entered into the first interest rate swap in history in 1982, exchanging fixed-rate interest payments on an issuance of intermediate-term debt for floating-rate payments linked to the yield on three-month Treasury bills. Since then, the interest rate swap industry has expanded quickly.

Swap Dealers: In the early days of interest rate swaps, transactions were brokered by financial intermediaries who had customers interested in doing so. These intermediaries then looked among their other clients for counterparties to the transaction. The middleman received a brokerage fee as payment, but when the deal was done, he or she stopped playing a part. The agreement was made between the two ultimate swap users, who dealt directly in money.

Large multinational commercial and investment banks now control a larger portion of the industry, which has grown into a dealer market. Before a consumer for the opposite side of the transaction is found, dealers function as market makers who are prepared to become counterparties to various swap transactions. An intermediary known as a swap dealer facilitates financial flows between several clients, or end users, acting as a middleman in each transaction. End users are relieved from having to keep track of the financial health of several distinct swap counterparties thanks to the dealer market structure. Due to the fact that dealers serve as intermediaries, end users only need to be worried about the dealer's financial standing and not the other ultimate end user of the instrument [3], [4].

Dealer Interest Rate Swaps Market

Swap market conventions: Interest rate swaps come in a wide variety of forms. The most typical is the fixed/floating swap, where a fixed-rate payer pays a floating-rate payer using a long-term interest rate, while the latter pays the fixed-rate payer using an index based on a short-term money market rate. Fixed/floating swap characteristics include:

1. A set rate of interest.
2. A variable or floating interest rate that is recalculated on a regular basis.
3. A hypothetical principal amount that serves as the foundation for all interest payments. And
4. The duration of the agreement, including a list of payment dates as well as a calendar of interest rate reset dates (i.e., days when the interest rate value used to calculate floating-rate payments is established).

The market interest rate for Treasury securities with a maturity that corresponds to the length of the swap agreement serves as the foundation for the fixed interest rate most often. The swap is known as generic or plain vanilla when the floating rate is most often linked to three- or six-month LIBOR. However, the floating rate may be indexed to nearly any money market rate, including the Treasury bill, commercial paper, federal funds, or prime interest rate. A fixed/floating interest rate swap's maturity, or tenor, might range from 1 to 15 years. According to custom, a fixed-rate payer is named the buyer and is referred to as being long the swap, whilst a floating-rate payer is named the seller and is referred to as being short the swap.

Timing of Payments: If the agreement calls for the exchange of cash from the beginning, as in the case of a no-par swap, the transaction takes place on the first settlement date. A swap is arranged on its trade date and goes into effect two days later on its initial settlement date. The effective date of the swap, which normally corresponds with the first settlement date, is the day interest starts to build up. Floating-rate payments are adjusted on periodic reset dates based on the current market-determined value of the floating-rate index, with subsequent payments made on a sequence of payment dates also known as settlement dates specified by the agreement forward swaps, where the effective date of the swap is deferred, are an exception to this rule. The term of the interest rate index itself often determines the reset frequency for the floating-rate index. For instance, the payment dates would typically follow six months after the reset of the variable rate on a generic swap linked to the six-month LIBOR. However, swaps linked to Treasury bill rates, which are reset weekly, allow for more frequent resets of the floating rate. Intervals between fixed interest payments might be three, six, or one year. The most frequent payment periods are semiannual because they match the gaps between Treasury bond interest payments. Although they often do, floating-rate payment intervals need not match fixed-rate payment intervals. It is customary to only swap the net difference between the fixed and floating payments when payment periods line up [5], [6].

Price Quotation: A fixed/floating swap's price is given in two parts: a fixed interest rate and an index that serves as the foundation for the floating interest rate. The floating rate may be determined by using an index of short-term market rates (such a LIBOR maturity) plus or minus a specified margin, or it can be set to the index flat that is, the floating interest rate index itself without any margin applied. As is customary in the swap market, the fixed interest rate is offered as an All-In-Cost (AIC), which implies that it is stated in relation to a uniform floating-rate index. Typically, the AIC is offered as a spread over Treasury securities with a period matching the swap's maturity. A

swap dealer might, for instance, quote a price on a three-year generic swap at an All-In-Cost of 72-76 flat, which means the dealer is prepared to buy the swap that is, enter into the swap as a fixed-rate payer) at 72 basis points over the current three-year interest rate on Treasuries while receiving floating-rate payments indexed to a specific maturity of LIBOR with no margin and sell the swap receive fixed and Depending on the kind of arrangement, bid-asked spreads on the swap market might be quite different. For a two- or three-year generic swap, the spread may be as little as 3 to 4 basis points, but spreads for nonstandard, custom-tailored swaps are often substantially greater [7]. Consider the basic swap sometimes known as a plain vanilla swap as an illustration of how an easy interest rate swap works. A generic swap's fixed interest payments are often computed using a 30/360 day-count standard, which assumes that each month has 30 days and that the interest rate is based on a year with 360 days. The semi-annual fixed-rate payment, assuming an All-In-Cost of the swap, would be:

According to a 360-day year, the actual number of days that have passed since the last payment date is used to compute interest payments for floating-rate loans. Let dt stand for the duration since the most recent settlement date. The following formula is used to calculate the floating-rate payment:

(N)(LIBOR)(dt/360).

Let's say a dealer offers an All-In-Cost for a generic swap at 10% when measured against flat LIBOR for six months. The semi-annual fixed payment would be if the notional principle of the swap was $1 million.

$50,000 = ($1,000,000) (0.10) (180/360).

Assume that the matching LIBOR was 8 percent on the swap's effective date, and that there are 181 days in the six-month period between the swap's effective date and the first payment date (also known as a settlement date). The first payment at a variable rate would then be $40,222.22 ($1,000,000,000) (0.08) (181/360).

A swap agreement often stipulates that only the net sum of the pledged payments must be swapped. In this case, the fixed-rate payer would give the floating-rate payer a net sum of $9,777.78, which is equal to $50,000 minus $40,222.22.

When the planned frequency of the fixed-rate payment and the floating-rate payment are different, this is referred to as a mismatch in payment frequency. Swaps with floating-rate payments based on maturities less than the standard fixed-rate payment frequency of six months often experience mismatches.

Day-count Conventions: The swap market employs a broad range of day-count conventions. Both the actual/365 (bond equivalent) and actual/360 bases may be used to quote fixed payments. The actual/360 day-count method that is often employed in the money market is generally followed by floating-rate payments adjusted to private-sector interest rates. Treasury bill rates are used to determine floating-rate payments on an actual/365 basis.

Non-Generic Swaps: The term basis swap refers to an interest rate swap that stipulates an exchange of payments based on the difference between two separate variable rates, such as the difference between LIBOR and the prime rate. Other interest rate swaps include forward swaps, which postpone the swap's effective date. swaptions, which are options on interest rate swaps. and put and callable swaps, which give one side the ability to terminate the swap at certain intervals. This list is by no means complete. there are several other interest rate swap products traded at the moment, and the variety keeps expanding. Interest rate swaps may be thought of as implicit contracts for mutual lending. A participant in an interest rate swap implicitly maintains long and short positions in different interest-bearing securities. This fact is used by swap valuation approaches to simplify the task of pricing an interest rate swap into the simple task of pricing two underlying fictitious securities with redemption or face values equal to the notional principal amount of the swap.

Non-Par Swaps: In most circumstances, swaps are priced such that the notional main amount of the swap is simply equal to the value of both hypothetical component securities, which is why the initial value of the agreement is zero to both counterparties. However, sometimes a swap's pricing may be set up such that one side owes the other money at first settlement, creating a non-par exchange. When interest rates have changed after the first swap was arranged or when a precise match of a certain cash flow is required, non-par swaps are used to balance positions in swaps taken into in the past. In comparison to the straightforward scenario outlined above, non-par swap valuation approaches are a little more complex. The Impact of Market Interest Rate Changes on Swap Values: A change in market interest rates has a similar impact on the value of a fixed/floating swap as it does on a corporate bond with a similar term. To see why, consider the fact that, on interest rate reset days, a change in market interest rates will not affect the value of the hypothetical variable-rate note implicit in a fixed/floating swap. The value of the swap will thus only be impacted by changes in market interest rates on reset dates if such changes have an impact on the price of the fictitious fixed-rate bond. For a fixed-rate payer, a rise in interest rates raises the value of the swap

position to the same extent as it would enhance the value of a short position in a fixed-rate bond since it decreases the bond's value [8], [9].

The amount of the subsequent payment due on the variable-rate note is decided in the period between interest rate reset dates. Therefore, the values of both the hypothetical variable-rate note and the hypothetical fixed-rate bond are impacted by changes in market interest rates. In this scenario, the variation in the value of the variable-rate note somewhat cancels out the variation in the value of the fixed-rate note. A fixed/floating interest rate swap's price behavior will often resemble that of a fixed-rate note with a maturity equal to the swap's term minus the variable interest rate's maturity. For instance, depending on how long it has been since the previous interest rate reset date, a two-year generic swap indexed to six-month LIBOR would roughly mimic the behavior of a fixed-rate bond with a term to maturity of between 18 and 24 months. When the term structure of interest rates is upward-sloping, the value of a fixed/floating swap often varies over time. The value of an interest rate swap will only be constant during the course of the agreement if both the term structure and market interest rates are flat. By using the proper examples, describe the idea of an interest rate swap.

Swaptions

Swaps originally gained popularity in the US in the middle of the 1980s as a result of structured bonds that were attached to callable options offered by borrowers. A callable bond is one that the borrower issues with the option to call it at par from the investor at a future date or dates. Investors are given a higher yield in exchange for the issuer's right to call the bond issuance at par. In order to go from a fixed to a variable interest profile, bond issuers often issue an IRS concurrently with the bond issuance. The issuer then needs swaps as insurance to cancel all or part of the initial IRS in the event that the bonds are placed or called. It has been discovered that swaptions may be helpful to obtain a certain overall interest rate or yield on a loan in addition to protecting against a callable bond problem. Simple options on interest rate swaps are known as interest rate swaptions. The holder is granted the option, but not the duty, to engage in an interest rate swap at a given future date, at a particular fixed rate, and for a defined duration. The client chooses the striking rate (the point at which it joins the interest rate swap agreement), the duration of the option period, the floating rate index (Prime, LIBOR, C.P.), and the tenor in exchange for a one-time payment (premium).

The striking rate, option period duration, term of the swap, notional amount, amortization, and frequency of settlement are all agreed upon by the buyer and seller of the swaption. The option period typically expires on the swap's start date if the swaption is executed. By purchasing a swaption, the buyer has the option to pay (get) a fixed rate on a certain date and receive (pay) a variable rate index. It is intended to provide the holder the option to engage into the current market swap rate if the market rates are lower while also providing the benefits of the agreed-upon strike rate in the event that the market rates are higher. If the swaption holder obtains the fixed rate as per the swap agreement, the opposite is true. The swaption will be executed and counterparties will engage into an interest rate swap in accordance with the terms of the swaption agreement if the strike rate of the swap is more advantageous than the current market swap rate. In contrast to standard swaps, a swaption allows the buyer to profit from any potential upside as well as protect them from any negative risk. The swaption expires worthless if it is not exercised by maturity, just like any other option [10], [11]. According to the buyer's exercise rights, swaps may be divided into three categories:

1. European Swaptions only provide the buyer the opportunity to exercise on the option's maturity date.
2. Contrarily, American Swaptions provide the buyer the freedom to exercise at any point throughout the option term.
3. Buyers of Bermudan Swaptions have the option to execute on certain dates throughout the option term.

Example

Let's say X Ltd. anticipates having $1,000,000 USD available to invest over the course of three years. X aims to provide a minimum return of 5% while safeguarding itself against declining interest rates. It also wants to be able to benefit from any potential increase in interest rates. A company purchases a 3-month swaption from a bank at a rate of 5%. Let's see how the Swaption would function in the following two scenarios:

1. The Interest-Rate Swap rate for three years is 4.5% in three months. Utilizing the Swaption system, X requests that the bank arrange an interest-rate swap for this duration at the agreed-upon rate of 5%. Therefore, the remaining time's 5% return is guaranteed. Alternatively, X might ask Bank to provide compensation for the same time equivalent to a margin of 0.5%.

2. The Interest-Rate Swap rate for three years is 5.4% in three months. X decides against using your Swaption and deposits its money at the 5.4% market rate. In these conditions, the Swaption gave X protection against declining interest rates while simultaneously enabling it to benefit from an increase in rates.

The following are the main characteristics of swaptions: A swaption is essentially an option on a forward-start IRS, with precise terms like the fixed interest rate, the floating reference interest rate, and the tenor of the IRS determined at the completion of the swaption contract. Therefore, a 3-month into 5-year swaption would be seen as a possibility to engage into a 5-year IRS in 3 months. It matters a lot for the premium computation whether the swaption is a fixed payer or receiver kind. With a fixed-rate payer swaption, the option buyer has the chance to lock in a fixed rate via an IRS at a predetermined later date. So, one may think of such a swaption as a call option on a forward swap rate.

The period of time between the transaction date and the expiration date is referred to as the option period. The strike rate refers to the swaption's set interest rate. An option to receive or pay fixed-rate money in exchange for getting or paying floating-rate money is the most basic sort of swaption accessible. Typically, these are choices in European fashion. As a result, at the swaption's maturity, one may choose to either execute the swap or let it expire unexercised, in which case all rights acquired by the holder would be lost. A forward-start IRS serves as the underlying instrument for a swaption. Basis points are used to indicate the swaption premium. These basis points are applied to the forward-start IRS's notional principal. If a borrower enters into a swaption to hedge an underlying borrowing, they would amortize the premium over the course of the option.

Swaptions have the option of being settled in cash, in which case they are marked to market off the relevant forward curve upon expiration and the difference is paid in cash. A swaption's ability to be marked to market relies on the swap's strike rate and how closely the strike price resembles the underlying, in this case, the forward start IRS. As a result, the intrinsic value would be connected to a swap whose start date is the same as the option's expiration date. A fixed-rate receiver swaption will grow in value when marking such a swaption to market if forward swap rates decline, but a fixed-rate payer swaption would drop in value. The benefit here is an efficient management of credit limitations in the case that the swaption is cash-settled and the counterparties do not actually transact an IRS with one another. Therefore, it is possible to somewhat reduce the inherent credit component of swaption price.

Swaption pricing hinges on creating a model of the probability distribution of the forward zero-coupon curve, which triggers a market process.

Simulating the modified Black model's path is the market standard technique for pricing swaptions. This is as a result of its popularity in the market and convenience of usage. But throughout the years, several sources have voiced harsh criticism of the modified Black formula. Modern models, referred to as arbitrage-free models, including the Ho-Lee, Heath-Jarrow-Merton, and Hull-White models, are created to prevent arbitrage opportunities brought on by changes in the yield curve. The volatility itself becomes a stochastic element in some of the more recent models. Swaptions are used for: For both active traders and corporate treasurers, there are several methods to use swaptions. Swap traders may use them to hedge a part of their swap books or for speculative reasons. For corporate treasurers, the appeal of swaptions is that they all include a forward component that offers the benefits of a forward-start swap as well as the freedom for the owner of the put or call to exercise or not as they see fit. Therefore, it is a useful tool for borrowers who have chosen to execute a swap but are unsure about the time.

Swaptions have developed into practical instruments for hedging embedded optionality, which occurs naturally in many business processes. Every time a product is sold on a sale-and-leaseback basis, where the counterparty to the lease contract has the option to either renew the lease for a further five years or cancel it after the original five years, embedded optionality is present. When the lease revenue is less than the expense of financing the item that is being leased, the leasing business may be vulnerable. The leasing business may safeguard itself against the lessee exercising their option to extend the lease by engaging into a 5-year swaption. The exchange will not be used if the lessee chooses not to renew. The possibility that the leasing business might still profit from engaging into a swaption in the event that forward swap rates have shifted in his favor during the option period is a major benefit of the swaption. In any case, by simply paying the first charge, the leasing business has protected itself from loss and acquired some degree of flexibility.

For borrowers aiming for an accept borrowing rate, swaptions are helpful. A payer's swaption holder may promise to pay a maximum fixed rate on a swap by paying an upfront premium, hedging his floating-rate borrowings. As a result, the borrower is free to stay in low floating-rate funds while also knowing that they will be protected if rates rise either predictably when the yield curve is positive or unexpectedly when it is flat or negative.

Swaptions are also beneficial to companies who are submitting contract proposals. Businesses must decide whether to commit to future borrowings in their own currency as part of a bid on a future project. A company would undoubtedly find it advantageous to submit a bid on a project knowing exactly what the borrowing rate would be if the contract were to be awarded. Additionally, swaps provide protection for callable and PU bond concerns. Additionally, investors and professional option traders often have different perspectives on the value of the embedded call that is a component of a callable bond issuance, providing for arbitrage. The borrower is basically given an embedded receiver's swaption by a callable bond issuance, which he can sell to a bank and utilize the premium from to lower his cost of funding. The more creative borrowers may take advantage of this arbitrage opportunity to lower their financing costs.

Caps on Interest Rates

When purchasing an interest rate cap, the buyer gives the seller a premium in exchange for the right to collect the difference in interest costs on a fictitious principal amount once a designated index of market interest rates climbs over a predetermined cap rate. However, if interest rates drop below the cap rate, the buyer is under no duty or responsibility. As a result, a cap is similar to an option in that it reflects a buyer right rather than an obligation.

Caps emerged from interest rate guarantees, which set a maximum amount of interest that could be charged on loans with fluctuating rates. Since banks started removing these assurances from floating-rate notes to offer to the market in 1985, over-the-counter interest rate cap trading has existed. The 1980s leveraged buyout boom fueled the growth of the interest rate cap market. Leveraged buyout companies often took on significant amounts of short-term debt, making them exposed to financial trouble in the event of an increase in interest rates. Lenders started asking these borrowers to purchase interest-rate caps as a consequence, lowering their risk of financial difficulty. Recently, as the quantity of new leveraged buyouts has decreased, so has trading activity in interest rate caps. A notional principal amount on which interest payments are based, an interest rate index, typically some specified LIBOR maturity, a cap rate, which is equivalent to the strike or exercise price of an option, and the duration of the agreement, including payment dates and interest rate reset dates, are the characteristics of an interest rate cap.

Interest rate swap market customs are followed by payment schedules for interest rate limits. The index rate's value is taken into account when calculating payment amounts on various interest rate reset dates. The period of the interest rate index often coincides with the intervals between interest rate reset dates and planned payment dates. As a result, payments for a cap linked to six-month LIBOR would be payable six months after interest rate reset dates, which would happen every six months. It is usual for cap purchasers to align interest payments on existing variable-rate debt with interest rate reset and payment interval dates. Interest rate resets and payment dates are typically spaced three to six months apart, and interest rate limits are applicable for periods of one to 10 years [12].

The difference in interest costs is paid by the seller to the buyer on the next payment date if the stated market index is higher than the cap rate. N is the notional principal amount of the agreement, rc is the cap rate (represented as a decimal), and dt is the number of days between the interest rate reset date and the payment date. This formula (N) max (0, r - rc)(dt /360) is used to calculate the payment amount. According to money market day-count norms, interest rates indicated in cap agreements are calculated using a 360-day year.

An FRA pays the present value of the change in interest due on the notional principle at settlement (which corresponds to the reset date of a cap), but payments on caps are postponed, which is one distinction between the payout to a FRA and the payoff to an in-the-money cap. The comparison between the payout to a cap and a call option on a FRA, however, is still correct since the amount of the payment has the identical present value in both scenarios. Only on the day of expiry is a European option eligible for exercise. The interest rate reset date coincides with the expiry date for a European-style option since a cap buyer may only exercise his option if the index rate is higher than the cap rate on that day.

REFERENCES

[1] J. Gyntelberg, The OTC interest rate derivatives market in 2013, *Bank Int. Settlements*, 2013.

[2] M. J. Fleming, J. P. Jackson, A. Li, A. Sarkar, and P. Zobel, An Analysis of OTC Interest Rate Derivatives Transactions: Implications for Public Reporting, *SSRN Electron. J.*, 2012, doi: 10.2139/ssrn.2030461.

[3] R. W. Włodarczyk and M. Sikorska, The importance of swap transactions in the evolution of the Polish currency market and the OTC interest rate derivatives market, *Int. Entrep. Rev.*, 2019, doi: 10.15678/ier.2019.0504.07.

[4] BIS, Triennial Central Bank Survey - Foreign Exchange Turnover in April 2013: Preliminary Global Result, *Bank Int. Settlements Rev.*, 2013.

[5] Bank for International Settlements, Foreign exchange turnover in April 2016, *Trienn. Cent. Bank Surv.*, 2016.

[6] C. Făt and F. Pop, The Evolution of OTC Interest Rate Derivative Market: The FRA Case, *Procedia Econ. Financ.*, 2015, doi: 10.1016/s2212-5671(15)01581-6.

[7] BIS, Foreign exchange turnover in April 2019, *Trienn. Cent. Bank Surv.*, 2019.
[8] Q. Bulletin, The foreign exchange and over-the-counter interest rate derivatives market in the United Kingdom, *Bank England. Q. Bull.*, 2013.
[9] BIS, Triennial Central Bank Survey: Foreign Exchange Turnover in April 2016, 2016.
[10] G. Cenedese, A. Ranaldo, and M. Vasios, OTC premia, *J. financ. econ.*, 2020, doi: 10.1016/j.jfineco.2019.09.010.
[11] D. Cole and D. Ji, The Australian OTC derivatives market: Insights from new trade repository data, *RBA Bull. June*, 2018.
[12] Bank of International Settlements, Triennial Central Bank Survey - Foreign Exchange Turnover in April 2013: Preliminary Global Result, *Bank Int. Settlements Rev.*, 2013.