Journal of Business & Financial Affairs
ISSN: 2167-0234

Martínez et al., J Bus Fin Aff 2019, 8:1
DOI: 10.4172/2167-0234.1000367

Review Article Open Access

Contracts "FRA" - Forward Rate Agreement: Interest Rate Forwards

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Abstract

In this paper we aim to offer a primary and general view of the FRA derivative financial instrument, analyzing some of its main characteristics, presenting the development of formulas for calculating the Price of an FRA, as well as the evolution and current situation within the markets unorganized derivatives or OTC (market "Over The Counter"), ending with a brief reference on the advantages and disadvantages of the use of the instrument under study by companies to manage the risk of fluctuations in future interest rates.

Keywords: Over the counter; OTC markets; Derivatives; Future interest rates; Interest rate risk; Risk management; Interest rate forwards; FRA; Forward rate; Hedges

Introduction

The FRAs are agreements on future interest rates and are included in derivative financial instruments on interest rates, fulfilling the function of guaranteeing the interest rate both in investment operations and in financing operations, for example, of a determined project for a company [1,2]. An FRA is basically a forward contract on interest rates through which, through an agreement of the parties, the interest rate of a theoretical deposit is established or determined at a fixed term and for a specific amount, which will be carried out in a future date established in the agreement. This operation will allow canceling the risk of volatility in interest rates during the period established in the aforementioned agreement between the parties. Consequently, it could be said that a FRA contract is not a financing instrument, but rather it can be said that it is a risk hedging instrument, offering the parties the elimination of the risk derived from possible fluctuations in the interest rates future interest [3].

Operational Mechanics of Operations with FRAs

As we have already mentioned, the FRAs are contracts between two parties ("Lender" and "Taker"), which are negotiated in non-organized OTC markets, where each of the parties to the agreement ensures a certain interest rate on a deposit. With a future start date, being a medium and short term interest rate hedging instrument. FRAs are contracts that are very similar to financial futures contracts (for example, the Forwards on exchange rate), non-standardized products adjusted to the needs of the two contracting parties. The FRAs allow covering future interest flows, both to the "Takers" and to the "Providers" of funds, and this is very important for example for companies with a profile in foreign trade operations (either exporting the goods produced, or importing intermediate inputs for production, or final) [4,5]. In this context, since companies may have to finance either an Export or an Import within a certain future period, they could then cover the risk associated with the volatility of future interest rates using a tool such as the FRA [6].

So, as a first reference it can be said that in this type of FRA contracts three important dates can be established:

t0: the date of signature of the contract where the interest rate is agreed, the start date, the term of the contract, and the amount of the transaction.

t1: the start date of the contract, which corresponds to the start of the transaction to be guaranteed, resulting in settlement through the payment of the difference in the flow of interest between the current reference rate in the interbank market to date, and the interest rate agreed upon at the signing of the contract.

t2: the expiration date of the contract, with the expiration of the financial transaction.

The mechanism of the operation with FRAs can be observed in a time scheme indicated in Figure 1.

In a temporary scheme:

The period of time from the signing of the contract to its beginning is called "Deferral Period" or "Deferred Term", while the period that goes from t1 and t2 is called "Guaranteed Period of Financial Operation" [7].

As an example, it can be said that an FRA Contract that has its start date within 2 months, and its completion within 6 months, would be FRA (2/8). In this specific operation, the duration of the contract or the period to be guaranteed would have a duration of 6 months.

We can exemplify notations of FRA Contracts, such as:

- ✓ FRA (1/4): Starts within 1 month, for a period of 3 months.
- ✓ FRA (3/6): Starts within 3 months, for a period of 3 months.

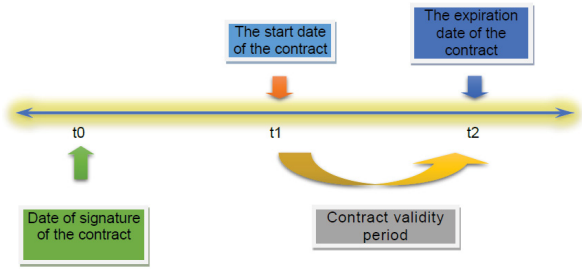

Figure 1: Temporary scheme of the operation with FRAs.

Figure 1: Theoretical Framework model.

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Received February 06, 2019; **Accepted** February 28, 2019; **Published** March 06, 2019

Citation: Martínez CE, Ledesma J, Asaro A, Tavernise W (2019) Contracts "FRA" - Forward Rate Agreement: Interest Rate Forwards. J Bus Fin Aff 8: 367. doi: 10.4172/2167-0234.1000367

✓ FRA (3/9): Starts within 3 months, for a period of 6 months.

The importance of the FRA Contracts is directed to the management of interest rates in medium/short term operations, being that at longer terms than those referenced, the FRA Contracts no longer have a good liquidity in the market [8,9].

Example: Be a company that must finance an export operation and want to protect itself within six months of a possible increase in the interest rate, for a period of three months, for an amount of USD 1,000,000. For this the company decides to buy a FRA (6/9), for a nominal value of USD 1,000,000, the agreed rate at the time of signing the FRA Contract of 3% per year. In any situation that occurs in the future, in this way the buyer of the FRA contract, in this case the exporting company, ensures that the interest rate that will be paid for a deposit of USD 1,000,000 within six months have a "floor" of 3%. The liquidation for differences will be made at the beginning of the bilateral contract, being able to fulfill:

1. That the market interest rate is greater than 3%, with which the selling party of the FRA should assume the difference, the cost of the deposit being greater than the guaranteed one.
2. That the market rate is lower than 3%, with which the buying party should assume the difference up to the rate of 3%, with the cost of the deposit lower than the guaranteed [10,11].

In order to determine the amount of the settlement of the transaction, the interest is calculated at the expiration of the contract, and then updated, since these types of contracts are settled on the start date thereof, and not at expiration.

Determination of the FRA Price

Then, as already mentioned in this paper, the FRA contract is settled as the difference between the negotiated FRA interest rate ("i fra"), and the market interest rate ("im") at the time of the date of recruitment of the FRA. The difference with the market is paid in advance. Consequently, it can be written that:

$$C = \frac{(im - ifra).N.\frac{tfra}{365}}{\left(1 + im.\frac{tfra}{365}\right)}$$

Where "t fra" are the days of the period of validity of the contract, and "N" the Nominal to cover. As a result, the buyer will receive from the seller this amount or this "C" amount, on the start date, that is, if the market rate at the time the Contract begins is higher than the FRA rate on the contract date.

Calculation of the Theoretical Interest Rate of the FRA

Suppose now that you want to know what would be the price of an FRA or "Theoretical term rate", with start date within 3 months and period of validity 3 months [12,13]. This can be seen in Figure 2.

For equivalences of interest rates, it must be fulfilled that:

(1+i0;6)=(1+i0;3).(1+i3;6)

Where i3; 6 = Forward Rate = FRA Rate =?

Therefore, we can write:

$$\left(1 + i0;6.\frac{180}{365}\right) = \left(1 + i0;3.\frac{90}{365}\right).\left(1 + ifra.\frac{90}{365}\right)$$

$$\left(1 + ifra.\frac{90}{365}\right) = \frac{\left(1 + i0;6.\frac{180}{365}\right)}{\left(1 + i0;3.\frac{90}{365}\right)}$$

$$\left(ifra.\frac{90}{365}\right) = \left(\frac{\left(1 + i0;6.\frac{180}{365}\right)}{\left(1 + i0;3.\frac{90}{365}\right)}\right) - 1$$

$$fra = \left[\left(\frac{\left(1 + i0;6.\frac{180}{365}\right)}{\left(1 + i0;3.\frac{90}{365}\right)}\right) - 1\right].\left(\frac{365}{90}\right)$$

Negotiation of Financial Derivatives and Contracts FRAs

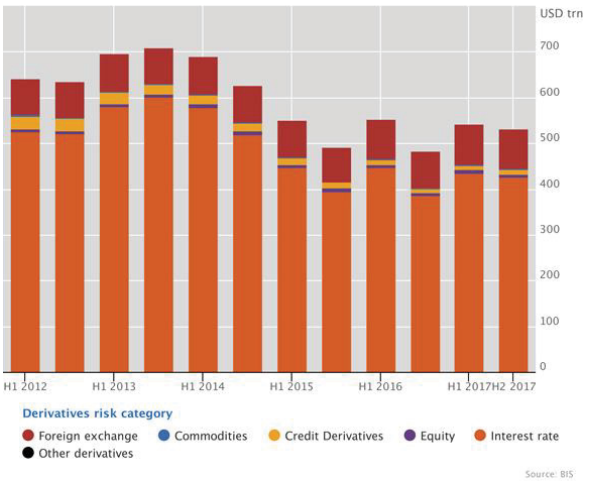
According to the data collected from the BIS, the trading of Interest Rate Derivatives has remained relatively stable from 2015 to 2017, which reflects the importance of managing the interest rate risk. Figure 1 shows this evolution in more detail (Graph 1) [14-16].

On the other hand, Graph 2 shows the negotiations of FRA Contracts during 2018, which confirms the use of this instrument as a risk management tool for interest rates (Tables 1-3 and Graph 3) [17].

Conclusions on the Advantages and Disadvantages of Operating with FRAs

Regarding the first conclusions, in this sense it can begin with the disadvantages of operations with FRA Contracts, and in this sense,

Figure 2: Temporary schedule of an operation with FRA of 3 months, starting in 3 months.



Source: BIS Statistics Explorer (http://stats.bis.org/statx/)

Graph 1: Interest Rate Derivatives - In USD (dollars), operations worldwide.

< H2 2017 >>|	TOT	USD	EUR	JPY	GBP	CHF	CAD	SEK	Other currencies
	Notional amounts outstanding								
Total interest rate contracts	426.649	156.51	121.89	38.77	37.6	4.11	10.94	5.99	50.874
FRAs	68.334	36.846	18.763	26	6.25	947	7	2.11	3.386
Reporting dealers	1.252	401	72	0	19	0	0	66	693
Other financial institutions	65.63	35.198	18.677	24	6.22	946	1	1.99	2.57
Central counterparties	61.343	32.355	18.563	20	6.2	943	0	1.89	1.367
Non-financial customers	1.452	1.248	14	2	6	0	5	54	123

Table 1: Interest rate derivatives - In billions of US dollars - 2017.

« ‹ H1 2018 › »	TOT	USD	EUR	JPY	GBP	CHF	CAD	SEK	Other currencies
Notional amounts outstanding									
Total interest rate contracts	481.085	192.51	129.417	37.215	44.522	4.398	12.494	6.052	54.478
FRAs	84.131	46.836	23.351	27	7.455	1.107	44	2.136	3.175
Swaps	349.761	122.603	88.832	35.475	33.293	3.259	12.404	3.751	50.145
Total options	46.833	23.058	17.234	1.712	3.774	32	46	165	811
Gross market values									
Total interest rate contracts	6.644	1.326	3.14	443	1.067	52	104	60	452
FRAs	107	44	27	0	19	0	0	4	12
Currency Swaps	5.914	1.081	2.787	417	993	50	103	55	429
Total options	623	201	327	26	54	3	1	1	11
Herfindahl indices									
FRAs	671	747	833	1.222	1.198	1.411	6.363	1.237	
Between reporters	1.023	2.405	6.402	3.793	2.709	5.052	4.461	6.098	
With non-reporters	677	743	841	1.353	1.206	1.416	6.83	1.286	
Swaps	423	619	407	607	736	1.189	1.094	1.199	
Between reporters	487	611	479	496	777	847	877	2.391	
With non-reporters	435	629	413	627	741	1.578	1.109	1.191	
Total options	836	913	837	805	2.057	1.091	1.735	3.256	
Between reporters	709	894	653	809	903	973	2.003	2.657	
With non-reporters	1.129	1.003	1.503	925	3.679	1.509	2.205	4.78	

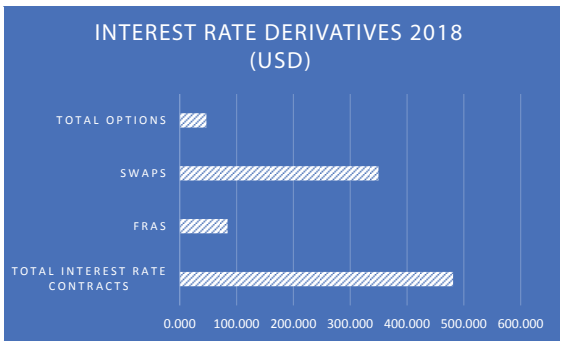
http://stats.bis.org/statx/srs/table/d7

Table 2: Interest rate derivatives - In billions of US dollars and Herfindahl points – 2018.

« ‹ H1 2018 › »	USD
Notional amounts outstanding	
Total interest rate contracts	481,085
FRAs	84,131
Swaps	349,761
Total options	46,833

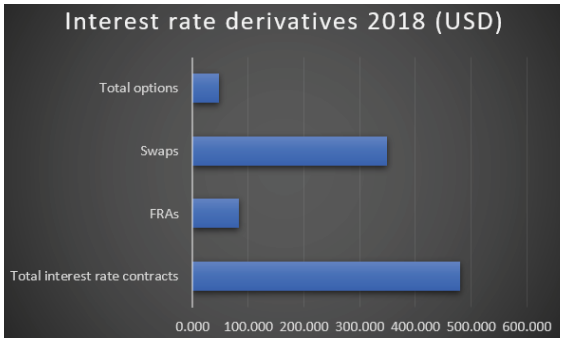
http://stats.bis.org/statx/srs/table/d7

Table 3: Interest rate derivatives - In billions of US dollars and Herfindahl points – 2018.



In billions of US dollars / Graph produced by the author / November 2018
Source: BIS - http://stats.bis.org/statx/srs/table/d7

Graph 2: Negotiations of FRA Contracts during 2018In USD (dollars), operations worldwide.



http://stats.bis.org/statx/srs/table/d7

Graph 3: Interest rate derivatives - In billions of US dollars and Herfindahl points – 2018.

it could be mentioned that there is a "risk of default" in the case that the counterparty that should make the payment, not make declaring yourself insolvent. On this point it is worth mentioning that this type of risk does not have the operations carried out in the Market with "Futures on interest rates", since there is a "Clearing House" or "Compensation Chamber" that assumes the risk (for another part, the Futures can be liquidated before the expiration).

But it is very important to highlight as an advantage, that for companies the FRA Contracts are very important as a tool in the protection against volatility risks or fluctuations in interest rates, both

upwards and downwards, since it gives certainty about future costs of operations in financial matters. As the liquidation of the operation is affected by differences, the risk with the counterparty is limited to the difference of interest, without there being any possibility of loss of the nominal value established in the operation.

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