Antonio Caggia, Giovanni Paolo Crespi, Aldo Nassigh

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SCRYING EUROPE INTERBANK RATES

Antonio Caggia[*], Giovanni Paolo Crespi[**], Aldo Nassigh[***]

1. Introduction

In the late nineties the EURo InterBank Offered Rate (Euribor[1]) has been introduced in the European financial market. Euribor is a judgmental rate, based upon the estimations of a representative panel of banks about the best price that one prime bank is quoting to another prime bank for interbank term deposits within the euro zone[2]. Therefore, Euribor, cannot be regarded as a market rate, since there is no assurance that any contract will be eventually signed with that rate.

Nevertheless Euribor, as others reference interbank rates like the Libor rates, is widely used to measure market expectations on future interest rates and is the prevailing underlying of Interest Rates Swap (IRS) rates in the Euro zone. The growth of the euro-denominated IRS market after the monetary union was so quick that, already in 2003, Remolona and Wooldridge[3] could state *"The euro interest rate swap market is one of the largest and most liquid financial markets in the world. Indeed, the swap curve is emerging as the preeminent benchmark yield curve in euro financial markets"*. Since then the growth of the euro-IRS market followed step by step the growth of the overall global IRS market, that represents by far the largest share of the interest rate derivatives market, with $461 trillion notional outstanding in 2013[4]. For the most liquid euro-IRS contracts, the so-called plain-vanilla that pay fixed coupons at annual frequency and receive Euribor at semiannual or quarterly frequency, brokers distribute quotes to

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[1] Euribor rates are quoted spot with base actual/360, also quoted in base actual/365 is made available by data providers.

[2] Technical features of Euribor published by Euribor-EBF.

[3] Eli M Remolona, Philip D Wooldridge, *The euro interest rate swap market*, BIS Quarterly Review, March 2003

[4] BIS Quarterly Review, *International banking and financial market developments*. June 2014.

the market players on a ladder of standard maturities. The growth in liquidity of the euro-IRS market has been accompanied by the extension of maturities available, so that currently major brokers quote contracts with maturity up to 50 years, with material liquidity for maturities up to 30 years. Current statistics published for the Euro-IRS market by the Depository Trust & Clearing Corporation[5], based on the scheduled term year show that, out of $93 trillion notional outstanding[6], $17 trillion were IRS with outstanding maturity of 10 years or more (18.4% of the total) and $1.6 trillion were IRS with outstanding maturity of 30 years or more (1.7% of the total).

Chart 1: Total (aggregated across all currencies, maturities and regions) of Forward Rate Agreements and Interest Rate Swaps - *All Counterparties* (net) (in $US Trillions)
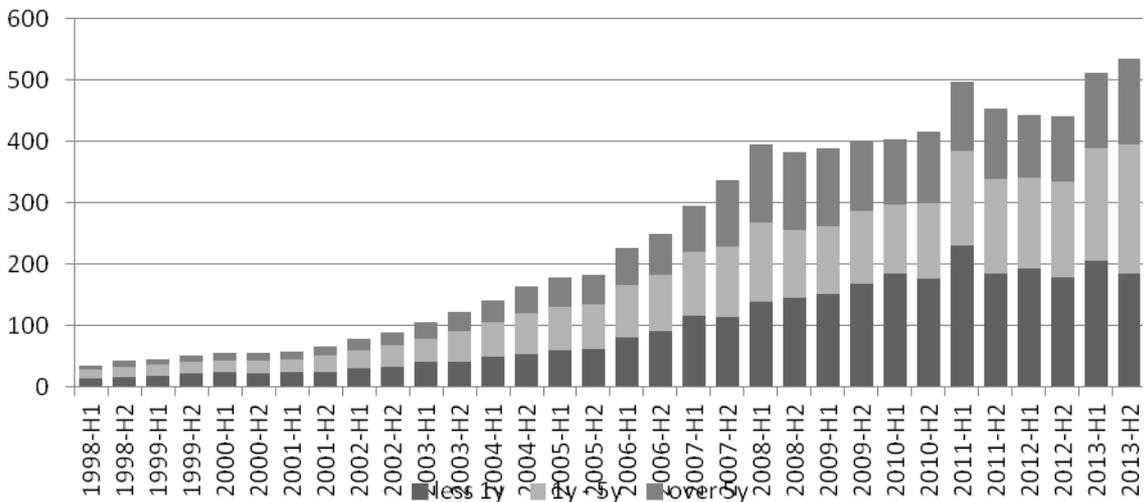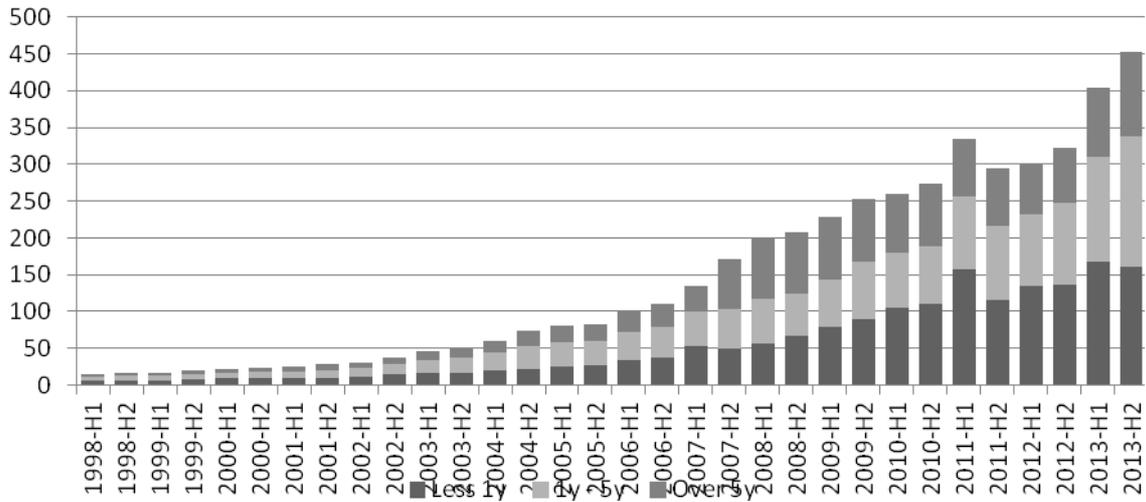

Source: Authors elaboration based on BIS Quarterly Review, International Banking and Financial

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[5] Depository Trust & Clearing Corporation, Trade Information Warehouse for September 5th, 2014, data available on: http://www.dtcc.com/market-data/gtr-interest-rate-swap-data/table-6.aspx
[6] Data refer to plain-vanilla Euro-IRS recorded in the DTCC warehouse.

Chart 2: Total (aggregated across all currencies maturities and regions) of Forward Rate Agreements and Interest Rate Swaps - *Other Financial Institutions* (in $US Trillions)

Source: Authors elaboration based on BIS Quarterly Review, International Banking and Financial

On the other hand, two recent market events boosted the Euro-IRS market: first, the Euro-sovereign crisis put under question the creditworthiness of government bonds as long-term risk-free securities, second, the practice of collateralization and the widespread recourse to Central Counterparts greatly reduced the credit risk for plain-vanilla interest rate derivatives. Therefore, IRS are nowadays offering to the investors who want to play on medium/long term interest rates an attractive alternative to fixed-income securities.

In the literature, we find abundant analyses (e.g. Cochrane and Piazzesi, 2005) of the risk premium paid by fixed-income securities in reward of their market risk, commonly measured thanks to the duration. In this letter, we aim to investigate whether the same feature arises also from the IRS market.

Our investigation is particularly topical since Euribor rates have been exceptionally and persistently low in the past and the market consensus is that this ultra-low rates regime will persist in the coming quarters (Borio 2015). As a matter of fact, risk-averse investors like fund managers and, particularly, pension fund managers, are increasingly attracted by the IRS market as a way of securing a reliable flow of fixed coupons in the long run in reward of minimal payments at ultra-low Euribor rates, i.e. the floating rate coupons of a IRS *fixed-rate receiver*, thus boosting the yield of their funds. The attractiveness of the IRS market is even greater, as, thanks to collateralization and the usage of central counterparts, the credit risk embedded in such products is nowadays perceived lower than most of the Euro-sovereign government bonds (with the noticeable exception of Germany) in the long-term, so that playing on the IRS market may look to investors as an unconditionally *safe play*.

We investigate this topic by simulating long- and medium-term fixed income investment strategies realized by means of interest rate derivatives put into effect across the time span ranging from 1998 to 2014. The availability of time series across this time interval allows to compare the expectations embedded in the simulated investment strategy with the realization.

Since the first publication of Euribor on December 30, 1998, a large dataset composed of time series of daily Euribor fixings with different terms is now available. Likewise we can collect daily time series of IRS rates.

Based upon available data, it is therefore possible to derive empirical evidence on the risk-neutral expectation of future interest rates. Consequently, empirical data allow to build the historical record of the excess return earned by fixed income investors in reward of rates' fluctuation. Eventually, we are able to gauge if whether the current risk premium earned by risk-adverse fixed income investors playing on the long end of the curve do effectively correspond to the real-world excess returns.

To achieve our goals, we compare implicit future rates with their realization across the time period ranging from December 30, 1998 to March 30, 2014.

In a "plain vanilla" interest rates swap contract one party, B (the so-called *fixed rate payer*) agrees to pay to another party, A, cash flows equal to interest at a predetermined fixed rate on a notional principal for a number of years. At the same time, party A (the so-called *floating rate payer*) agrees to pay party B cash flows equal to interest at a floating rate on the same notional principal for the same period of time. One of the possible reason party B should enter the agreement is risk aversion. Indeed party B would be able to transform a floating rate loan into a fixed one, not being exposed to market fluctuations. It is reasonable to assume that IRS should, therefore, contain some risk premium.

In Section 2 we introduce the basic pricing equation on IRS contract that is used on our time series analysis. The properties of the time series used as database are presented in Section 3. The process to *scry* future interest rates from the quotes available in our database is described in Section 4, where we finally compare them with the market realizations, measuring the excess return. In Section 5 we discuss the accuracy of market forecasts on future interest rates for 1 year term, implicit in IRS, compared to the actual realization on the market. Since hedging procedures are also based on Forward Rate Agreements (FRA), we extend the mathematical procedure of the previous sections to estimate implicit FRA starting from IRS curves and to compare them with quoted Euribor. Finally Section 7 is devoted to draw some conclusions.

2. IRS and FRA

Interest Rates Swaps provide a useful tool to exchange fixed interests payment with floating ones. Traders buying fixed cash flows are willing to pay a price to get rid of the uncertainty due to floating interest rates in the market. Since the introduction of EURO financial markets, an increasing database of market values of Euribors and IRSs rates are now available.

Under non arbitrage condition, market equilibrium requires that the present value of a fixed flow of interests (based on IRS) equals the present value of a floating flow of interests (based on forward rates) with the same expiration date. The equilibrium condition of the Plain Vanilla Fixed to Floating Interest Rate Swap is as follows:

$$\sum_{t=1}^{n} IRSny^{(\theta)} \times v^{(\theta)}\left(\theta, \theta+t\right) = \sum_{t=1}^{2n} h^{(\theta)}\left(\theta+\tfrac{t-1}{2}; \theta+\tfrac{t}{2}\right) \times v^{(\theta)}\left(\theta, \theta+\tfrac{t}{2}\right) \tag{1.1}$$

Where θ is an open market day in our database, $v^{(\theta)}\left(\alpha, \beta\right)$ is the market discount factor between date α and date $\beta > \alpha$ at day θ; t represent an annual time step, so that the interval $\left[\theta, \theta+\tfrac{t}{2}\right]$ is a semiannual period, while $\left[\theta, \theta+t\right]$ is annual. Therefore the fixed cash flow in the LHS of (1.1) is made of n annual constant payments of interests based on $IRSny^{(\theta)}$ (the Interest Rate Swap maturing in n years quoted on day θ). The RHS of (1.1) contains $2n$ semiannual floating payments estimated through forward interest rates $h^{(\theta)}\left(\theta+\tfrac{t-1}{2}; \theta+\tfrac{t}{2}\right)$. According to (1.1) and taking advantage of the relationship between spot and forward rates, it is possible to express $IRSny^{(\theta)}$ as a function of discount factors

$$IRSny^{(\theta)} = \frac{1 - v^{(\theta)}\left(\theta, \theta+n\right)}{\sum_{t=1}^{n} v^{(\theta)}\left(\theta, \theta+t\right)} \tag{1.2}$$

Also FRA allows to hedge against fluctuation in interest rates. The basic idea is very similar to that of an IRS contract, although FRA offers the opportunity of hedging only one cash flow at a time. The contract is signed at date θ for a period of time $\left[t_1, t_2\right]$, where $\theta \leq t_1 \leq t_2$. Parts A agree to pay a fixed interest rate (the agreed FRA strike) accrued across the period of time $\left[t_1, t_2\right]$ to part B that agrees to pay to A floating interest rate that is quoted on the market at date t_1 accrued for the same period of time. Therefore at time t_1 the amount of the cash flow

$$\left|\left(\text{agreed FRA}\right) - h^{(t_1)}\left(t_1, t_2\right)\right| \times N \times \left(t_2 - t_1\right) = \Delta i \times N \times \left(t_2 - t_1\right)$$ to be paid at the final date t_2 is

known and the contract can be closed at time t_1 by paying its actual value of

$$\frac{\Delta i \times N \times \left(t_2 - t_1\right)}{1 + h^{(t_1)}\left(t_1, t_2\right) \times \left(t_2 - t_1\right)} \qquad (1.2)$$

In the formulas above, we denote the spot rate thanks to the same notation introduced for the forward rate, i.e. we indicate the spot rate quoted at time θ with maturity T with $h^{(\theta)}(\theta; \theta + T)$.

For the purpose of this paper, we are not interested in quoted FRA, but we derive the implicit quotes of FRA from the IRS curve, as described in Section 6.

3. Time series

We collected Euribor on maturities 1, 2 and 3 weeks and from 1 to 12 months published on the official website https:\\www.euribor.org, creating a database of all available daily values from end of December 1998 to April 2014.
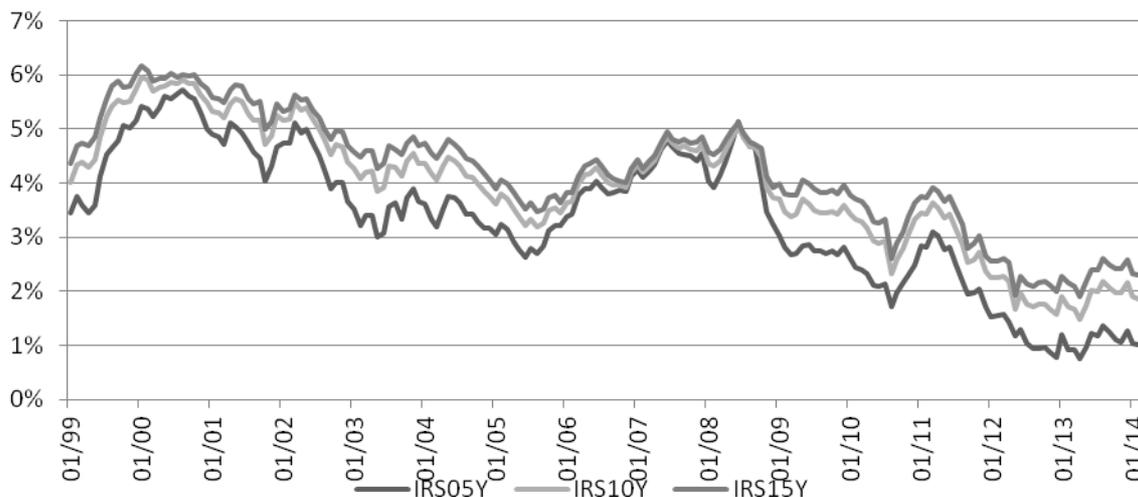
Chart 3: Euribor

Source: https:\\www.euribor.org
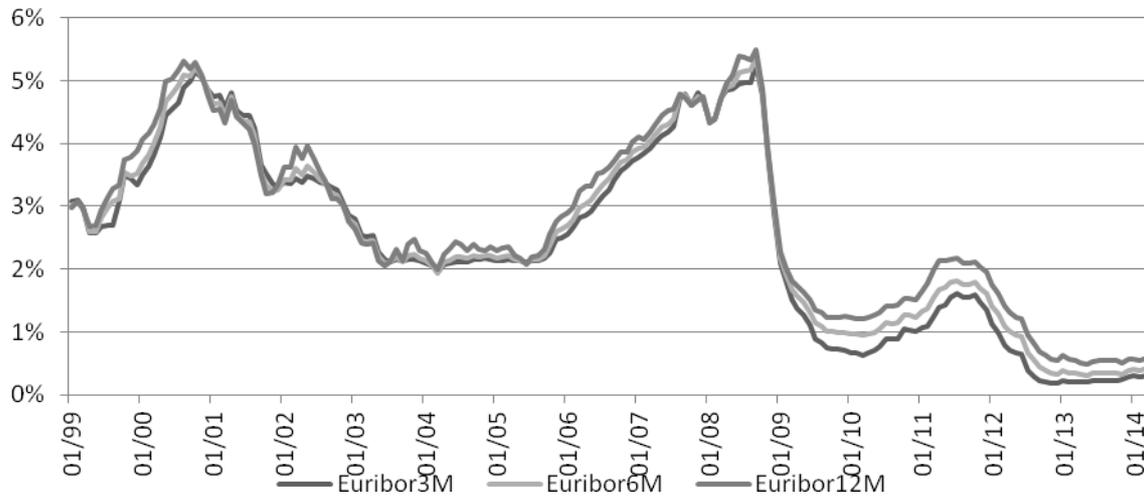
Quoted 1 to 30 years IRS can be found on Bloomberg website, where are published ask, bid and mid values. To create the database, we used all available end of day mid values from 1999 to 2014.

Chart 4: EurIRS

Source: Bloomberg

4. Scrying IRS

Unlike the bond market, the IRS market, in which derivatives are entered into at zero cost, offers no elementary way to assess the excess return gained by investors w.r.t. the short-term risk-free rate. For example, let us assume that an investor (e.g. a pension fund) with investment horizon of 10 years buys a 10-years fixed-rate risk-free bond (e.g. a German bund). She would measure *ex post* the excess return corresponding to the duration risk premium of the bond by comparing the yield to maturity of the investment with the geometric average of the short-term risk free rate (say, Euribor 1 six months) realized until across the investment horizon. Indeed, let us assume the same investor adds to her portfolio a 10 year IRS fixed-rate receiver to increase the return of her investment. This is equivalent (Hull, 2011) to adding a leveraged investment in a 10 year fixed-rate risk-free bond funded at the Euribor rate.

Like the investor playing in the bond market, the investor in the IRS requires a risk premium commensurate to the duration mismatch between of the 10 year fixed-rate risk-free bond and the funding (say: six months). In order to measure ex-post the excess return corresponding to this risk premium, we introduce the *scryied* IRS rate, that is the coupon rate that a hypothetical investor entering in an IRS fixed-rate receiver would earn if she would be able to forecast without uncertainty (that is, if she would foretell the future using a crystal ball) the realized Euribor rates along the life of the contract.

According to the available time series, we evaluate the *scryied* IRS rate at time θ $IRS^*ny^{(\theta)}$ using in (1.2) the discount factors computed via Euribor eventually listed on the market:

$$\hat{v}^{(\theta)}\left(\theta,\theta+n\right)=\prod_{t=0}^{n-1}\left(1+h^{(\theta+t)}\left(\theta+t,\theta+t+1\right)\right)^{-1}$$

$$\hat{v}^{(\theta)}\left(\theta,\theta+t\right)=\prod_{s=1}^{2t}\left(1+h^{\left(\theta+\frac{s-1}{2}\right)}\left(\theta+\frac{s-1}{2},\theta+\frac{s}{2}\right)\right)^{-\frac{1}{2}} \tag{1.4}$$

$$IRS^{*}ny^{(\theta)}=\frac{1-\hat{v}^{(\theta)}\left(\theta,\theta+n\right)}{\sum_{t=1}^{n}\hat{v}^{(\theta)}\left(\theta,\theta+t\right)}$$

For example, the *scryied* 5y IRS quoted in January 1999 is computed out of Euribor fixings collected in the next five years.

It can be shown with some algebra that $IRS^{*}ny^{(\theta)}$ converges to the geometric mean of the realized 1 year spot rate $h^{(\theta+t)}(\theta+t, \theta+t+1)$, *t=0,1,...,n-1*, across the life of the IRS as the standard deviation of the realized 1 year spot rate goes to zero. In other words, we introduce the *scryed* IRS rate for an investor playing with derivatives as the equivalent of the geometric average of the Euribor rates for the investor in fixed-rate bonds.

Chart 5: Realized (*scryed*) IRS using the discount factors computed via Euribor
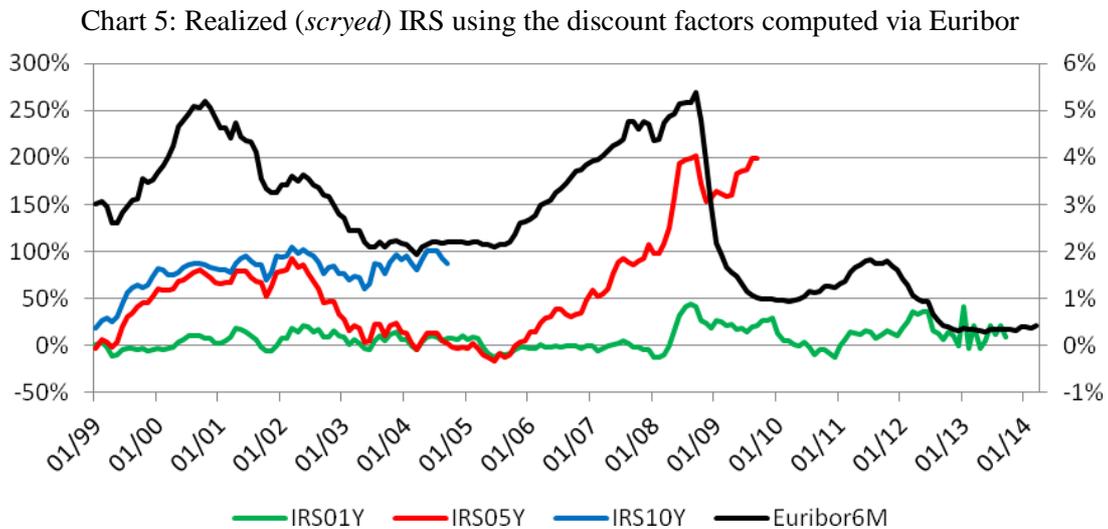
LHS axis: relative difference between quoted and *scryied* IRS (see text below);

RHS axis: Euribor 6 months

Source: Authors elaboration based on www.euribor.org and Bloomberg data

Chart 5 shows the difference between the quoted IRS at time t and the *scryied IRS*. The difference is expressed as a percentage of the *scryied* IRS itself. For reference, on the RHS vertical axis is plotted the time series of the Euribor 6m fixings. Depending on the original

maturity of the IRS contract, time series contains a different number of realizations (e.g. the time series for the 5y IRS ends on September 2009).

Results shown in the chart above allow investors to draw some noticeable conclusions: the blue solid line corresponding to the 10 years IRS lies in the positive region and reaches twice (in 2002 and 2004) the level of 100%. This means that those who decided to enter into a fixed-rate receiver IRS with 10 years maturity in the period 1999-2004 earned fixed-rate coupons as large as twice the coupons that would have been earned by the (hypothetical) investor playing in the (hypothetical) market of the *scryied* IRS. During the same period, the blue solid line is never in the negative region, this means that investors in the 10 years IRS were never disappointed by receiving coupons lower than those received by the (hypothetical) *scryied* 10 years IRS.

Results are less well defined for investors who decided to enter into a fixed-rate receiver IRS with 5 years maturity in the period 1999-2009 (corresponding to the solid red line in the chart). Fixed-rate coupons earned by investors that started the 5 years IRS in 2005 were lower (solid red line in the negative region) that those of the (hypothetical) *scryed* IRS. This means that the sequence of upward shocks of the Euribor rate during the interest rate hike in the period from June 2005 to September 2008 (black solid line plotted against the LHS axis) consisted, at least partially, of positive surprises w.r.t. market expectation.

The disappointment of investors playing on the fixed-rate leg of the 5 years IRS was short-lived since the sudden decrease of Euribor rates after September 2008 and the onset of the current ultra-low rates regime in Autumn 2012 represented a series of negative surprises w.r.t. market expectation. As a matter of fact, the investor who decided to enter into a fixed-rate receiver IRS with 5 years maturity in the years 2006 to 2009 earned coupons as large as three times (in July 2008) than the (hypothetical) *scryied* IRS.

Only if we look at the IRS with the shortest maturity, i.e. the one-year IRS (solid green line in the chart above), at least at first sight, the comparison shows no clear evidence of the fixed-rate coupons of the IRS being larger than those of the *scryied* IRS, with the solid green line on the chart that fluctuates around zero, showing balance between positive and negative surprises w.r.t. market expectation in the period under observation (1999-2013).

Since investors enter into IRS contracts at the market rate at zero cost and the credit counterparty risk arising from these contracts can be effectively mitigated[7], by looking at the results shown in the Chart 5 an investor could draw the conclusion that a fixed-rate receiver Euro-denominated IRS is very close to a *free lunch* and that it comes as close to a *free lunch* as the maturity of the IRS increases. Of course, such conclusion has to be challenged arguing that

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[7] Thanks to bilateral netting, collateralization and the recourse to Central Counterparts

the time period under analysis includes exceptional events, i.e. the Lehman crisis in September 2008, followed by the powerful intervention of the Central Bank and the current ultra-low rate season, so that no general conclusions can be drawn.

In the next section we continue the discussion thanks to a different method, that builds on the approach introduced by Fama 1987 to evaluate the duration risk premium of investments in U.S. Treasury bonds.

5. Implicit forward Vs achieved Euribor

Let us assume we are investors with one-year investment horizon, following the seminal idea of (Fama, 1987), we derive from the time series of IRS the implied one-year forward Euribor at each date θ.

Given the $IRSny^{(\theta)}$, we can write the pricing equation of the *par-yield bond* corresponding to the *fixed-rate* leg of the IRS,

$$1 = \sum_{t=1}^{n} IRSny^{(\theta)} v^{(\theta)} \left(\theta, \theta + t \right) + 1 \cdot v^{(\theta)} \left(\theta, \theta + n \right) \tag{1.5}$$

that is, an annuity paying n constant installments per year at the nominal IRS rate and a final refund of the notional has unit present value.

By (1.5) we can obtain that the discount factor $v^{(\theta)} \left(\theta, \theta + n \right)$ can be expressed as a function of $IRS_{ny}^{(\theta)}$ and of the discount factors for the *n-1* previous periods (that is, we *bootstrap* the term structure of the discount factors):

$$1 = \sum_{t=1}^{n-1} IRSny^{(\theta)} v^{(\theta)} \left(\theta, \theta + t \right) + \left(1 + IRSny^{(\theta)} \right) \cdot v^{(\theta)} \left(\theta, \theta + n \right)$$

$$v^{(\theta)} \left(\theta, \theta + n \right) = \frac{1 - \sum_{t=1}^{n-1} IRSny^{(\theta)} v^{(\theta)} \left(\theta, \theta + t \right)}{\left(1 + IRSny^{(\theta)} \right)} \tag{1.6}$$

Finally we can express $v^{(\theta)} \left(\theta, \theta + n \right) = v^{(\theta)} \left(\theta, \theta + n - 1 \right) \left(1 + h^{(\theta)} \left(\theta + n - 1, \theta + n \right) \right)^{-1}$, that provides a recursive formula to obtain implicit forward rates from quoted IRS. Indeed, assume $IRS1y^{(\theta)}$ and $IRS2y^{(\theta)}$ are quoted. By (1.5) we have

$$1 = IRS2y^{(\theta)} \cdot v^{(\theta)} \left(\theta, \theta + 1 \right) + IRS2y^{(\theta)} \cdot v^{(\theta)} \left(\theta, \theta + 2 \right) + 1 \cdot v^{(0)} \left(\theta, \theta + 2 \right) \tag{1.7}$$

Assuming no arbitrage, we have $v^{(\theta)}(\theta, \theta+1) = \left(1 + IRS1y^{(\theta)}\right)^{-1}$. Replacing this market value discount factor we obtain

$$v^{(\theta)}(\theta, \theta+2) = \frac{1 - IRS2y^{(\theta)}\left(1 + IRS1y^{(\theta)}\right)^{-1}}{1 + IRS2y^{(\theta)}} = \left(1 + IRS1y^{(\theta)}\right)^{-1}\left(1 + h^{(\theta)}(\theta+1, \theta+2)\right)^{-1}$$

(1.8)

By algebra we obtain

$$h^{(\theta)}(\theta+1, \theta+2) = \frac{2IRS2y^{(\theta)} - IRS1y^{(\theta)}}{1 + IRS1y^{(\theta)} - IRS2y^{(\theta)}}$$

(1.9)

The implicit one year Euribor is therefore $H^{(\theta)}(\theta+1, \theta+2) = h^{(\theta)}(\theta+1, \theta+2) \cdot \dfrac{360}{365}$ that we compare with the listed 1 year Euribor.

Recursively we can use our time series of IRS to compute $v^{(\theta)}(\theta, \theta+t)$ for $t = 1, \ldots n-1$ and to obtain all forward 1 year Euribor, that represents at θ the expectation on future interest rates. These data are compared with the time series of Euribor during the same time interval to gauge the information about future interest rates embedded in the IRS market.

Chart 6: Implied forward Euribor obtained by time series of IRS compared with the same Euribor quoted
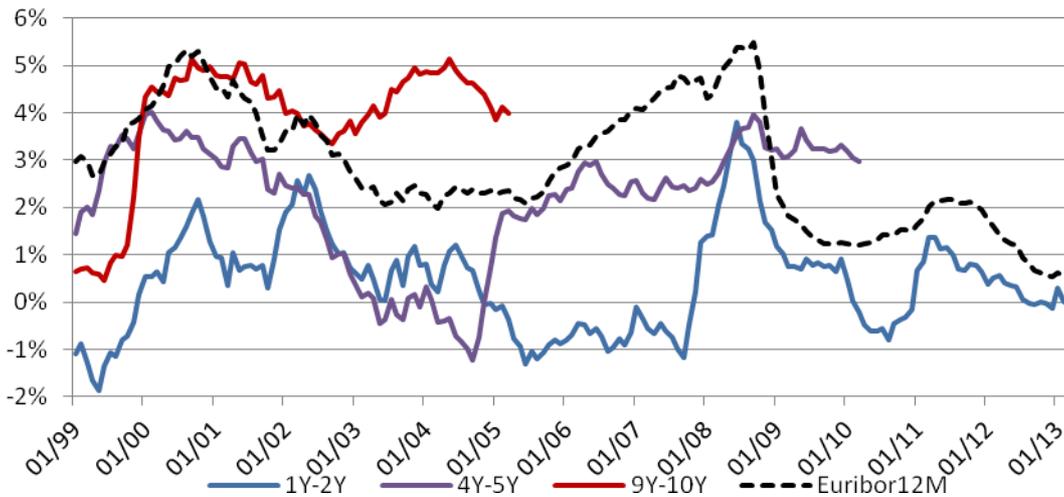
Forward-spot spread, 2-years, 5-years and 10-years rates (see text below);

Source: Authors elaboration based on www.euribor.org and Bloomberg data

Chart 6 shows the forward-realized spot spread based on the 2-year, 5-year and 10-year rates; i.e. the difference between three implied forwards: 1y-2y (light-blue line), 4y-5y (violet line), 9y-10y (red line), and the 1y Euribor rate. The time stamp on the horizontal axis corresponds to the original IRS quote (e.g. the 01/01/1999 value is the spread between the 1y Euribor fixing on January 1st, 2000 and the implied forward calculated on the basis of the 2y IRS quoted on January 1st 1999).

The general patterns of the forward-spot spread follows that of the relative difference between quoted and *scryied* IRS displayed in Figure 5. The 10-year forward-spot spread is positive across the full sample (1999-2005). Across the sample (1999-2010), the 5-years forward-spot spread is negative between May 2003 and October 2004, with a minimum value of 1.24% in September 2004, while the 2-year forward-spot spread is characterized by alternating runs of positive and negative values corresponding to positive and negative surprises w.r.t. market expectation.

6. Conclusions

We showed that investors playing in the Euro IRS market with maturities in the range from 5 to 10 years and receiving fixed rate coupons reach the same results as if making a leveraged investment in a long-term fixed-rate risk-free bond funded at the Euribor rate. With the two reciprocal analyses above, we showed that, on average, such investors benefit from excess returns and low volatility. On the contrary, the excess return on shorter maturities (up to 3 years) proves to be uncertain for investors with the same strategy. The former result is new to the best of our knowledge, while the latter is similar to findings on the, back then booming, US bond market observed and studied in (Fama and Bliss, 1987) and (Cochrane and Piazzesi, 2005). According to these results, lengthening maturities of fixed income investments using IRS has provided a risk premium that shows a positive trend, at least up to the longest maturity with reliable data (i.e. the implied FRA with fixing in nine years from the spot date and maturity in ten years).

Based on the available data set, it appears to be rewarding from the risk-return perspective lengthening maturities of fixed income investments thanks to IRS. Yet, Euro markets have now experienced a rather long period with extremely low interest rates. Such a climate becomes day by day liker to change but we lack enough empirical evidence to support proper conclusions.

Given the current data set, that is biased by the larger amount of data concerning contracts with less than five years maturity, we deem not appropriate to run a full portfolio optimization in order to investigate the mixture of IRS maturities that maximize the risk-reward of the investment. We leave this task as the next step of this research.

References

BIS Quarterly Review (2016), *International banking and financial market developments*

Borio C. E. V. *et al.* (2015), *The Costs of Deflations: A Historical Perspective*, «BIS Quarterly Review», March

Cochrane J. H., Piazzesi M. (2005), *Bond Risk Premia*, «American Economic Review», 95(1), March, 138-160

Cochrane J. H., Piazzesi M. (2009), *Decomposing the Yield Curve*, AFA 2010 Atlanta Meetings Paper.

Cox J., Ingersoll J., Ross S. (1985), *An Intertemporal General Equilibrium Model of Asset Pricing*, «Econometrica», 53, 363–384

Dahlquist M., Hasseltoft H (2013), *International bond risk premia*, «Journal of International Economics», 90(1), 17-32

Dai Q., Singleton K. J. (2000), *Specification Analysis of Affine Term Structure Models*, «Journal of Finance», 55, 1943–1978

Diebold F. X., Canlin Li (2006), *Forecasting The Term Structure Of Government Bond Yields*, «Journal of Econometrics», 30 (2), February, 337-364

Duffee G. R. (2002), *Term Premia and Interest Rate Forecasts in Affine Models*, «Journal of Finance», 57, 405–443

Duffie D., Kan R. (1996), *A Yield Factor Model of Interest Rates*, «Mathematical Finance», 6, 379–406

Fama E. F., MacBeth J. (1973), *Risk, Return and Equilibrium: Empirical Tests*, «Journal of Political Economy», 81, 607–636

Fama E. F., French K. R. (1988), *Dividend Yields and Expected Stock Returns*, «Journal of Financial Economics», 22, 3–27

Fama E. F., French K. R. (1992), *The Cross-Section of Expected Stock Returns*, «The Journal of Finance», 47, 427–65

Fama E. F., Bliss R. R. (1987), *The information in long-maturity forward rates*, «The American Economic Review», 680-692

Hull J. C. (2011), *Options, futures, and other derivatives*, Pearson Education

Kessler S., Scherer B. (2009), *Varying risk premia in international bond markets*, «Journal of Banking & Finance», 33(8), 1361-1375

Lettau M., Wachter J. (2007), *The Term Structures of Equity and Interest Rates*, Working Paper University of Pennsylvania Wharton School.

Mylnikov G. (2014), *Forecasting US Bond Returns: A Practitioner's Perspective*, «Journal of Portfolio Management», 40(3), 124

Piazzesi M., Schneider M. (2006), *Equilibrium Yield Curves*, National Bureau of Economic Analysis Macroeconomics Annual.

Remolona E. M., Wooldridge P. D. (2003), *The euro interest rate swap market*, «BIS Quarterly Review», 47

Sommario

In questo articolo, attraverso l'utilizzo delle serie storiche presenti sul mercato europeo degli IRS, verifichiamo la capacità di plasmare il futuro sostenendo che il mercato finanziario offre una strategia sicura per gli investitori che scelgono i tassi a lungo termine fissi anziché quelli variabili. Le serie storiche sono abbastanza lunghe per trarre qualche conclusione anche se gli shock esogeni che hanno afflitto gli ultimi decenni suggeriscono che sono necessari altri dati per un'analisi quantitativa più approfondita. Tuttavia il documento fornisce supporto ai traders per le strategie di copertura delle posizioni sui mercati a reddito fisso.

Abstract

In this article we test empirical data on European IRS market to check the ability to shape the future and arguing whether the financial market provides a safe strategy to investors choosing fixed long-term interest rates against floating ones. Time series are long enough to draw some conclusion, although some exogenous shocks that has afflicted the last decades suggest that more data are needed for a deeper quantitative analysis. Yet, the paper provide support to traders hedging their positions on fixed-income markets.

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