Capital & Market Risk
Insights

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SHORT PUT OPTIONS IN RETAIL CDs

A Hidden Source of Interest Rate Risk

Today's relatively low interest rate environment, coupled with the banks' dependence on retail CDs, and the growing proportion of retail CDs with longer term maturities may mean that Banks' risk of understanding the exposure to the early withdrawl option has significantly increased.

Most financial institutions offer retail[1] certificates of deposit (CDs) as a higher-yielding investment alternative to savings, NOW, and money market deposit accounts. Retail CDs are offered for various maturities, typically from 7 days out through 5 years, usually with fixed rate coupons that reflect current yield curve, competitive, and liquidity preference considerations. Moreover, many financial institutions impose early withdrawal penalties that require depositors to forfeit some amount of interest should they withdraw the CD prior to its maturity. This early withdrawal penalty typically amounts to a flat 91 or 182 days of interest, regardless of the coupon or the remaining maturity of the CD. When modeling retail CDs within an Economic Value of Equity (EVE) framework, banks often ignore the fact that the depositor has the option to withdraw the CD prior to maturity, and will discount the contractual cash flows of the CD to arrive at the economic value of the deposit. Ignoring the depositor's option of early withdrawal reflects bankers' attempts to simplify interest rate risk modeling as well as a belief that the early withdrawal penalty deters the depositor from withdrawing the CD early. However, calculating the economic value of the CD using contractual cash flows, which ignores the possibility of early withdrawal, is neither accurate nor appropriate, and doing so may result in an unknown but potentially large source of market risk for certain financial institutions. The recent spate of mortgage refinancing suggests that retail bank customers are becoming increasingly financially astute and will likely recognize the value of their option to withdraw CDs early if interest rates rise by a sufficient amount. Given the relatively low interest rate environment and the chance that interest rates may increase in the future[2], this risk is no longer theoretical and should not be ignored.

The problem with assuming that depositors will not withdraw their CDs early can be shown with a simple example. Suppose a depositor has a 2% coupon $10,000 par value CD having three years left until maturity. The bank that granted this CD imposes a 182-day penalty for early withdrawal regardless of the CD's coupon or the remaining maturity. Suppose further that interest rates on comparable three-year CDs rise 100 basis points and are now 3%. What would an economically rational depositor do? A wise depositor would determine how long it would take to "re-coup" the penalty at the new CD coupon rate, and if this time were shorter than the maturity of the new CD, the depositor would withdraw the old CD and invest in a new, higher coupon CD.

In this example, the depositor would incur a penalty equaling $99.73 for withdrawing the CD early. But, by reinvesting the $10,000 in a new 3% coupon, three-year CD, it would take only 4.04 months to recover the penalty.

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Table 1 compares the CD interest income recovery for interest rate increases relative to early withdrawal penalties. Given that the longest recovery time is less than five months for 4% coupon CDs when rates increase 100 basis points, there is a real financial incentive for depositors to exercise this option.

The fact that the depositor "owns" an option to withdraw the CD early puts the bank in a potentially disadvantageous position if interest rates were to rise. Moreover, the larger the increase in rates, the greater the economic risk to the bank. This can be illustrated using the same 2% coupon three-year CD used earlier. Table 2 shows the gain in economic value for various CDs over various rate increases as well as a 91 day and 182 day penalty, both stated a percent of par. We find that, when rates increase by 100, 200, and 300 basis points, the economic value of the CD (from the perspective of the bank) increases 2.86%, 5.63%, and 8.31% of its par value, respectively. The economic value of the CD increases when interest rates **increase** because, in an environment of higher market rates, lower coupon fixed rate funding becomes more valuable to the bank. Stated differently, the bank now has funding at below market rates. This of course assumes that the depositor does not withdraw the CD early. But if the depositor does realize the financial incentive to withdraw the CD early, the bank receives a penalty in lieu of the gain in the economic value of the CD. In our example above, if interest rates were to increase 200 basis points, the bank will receive the penalty from the depositor equaling 1% of the par value of the CD, but will lose 5.63% in the appreciated economic value of the CD, for a "net loss" of 4.63%. This loss, net of the penalty received, represents the foregone value of having below-market funding. If the gain in the value of the CD exceeds the penalty imposed, these CDs generate a source of market risk to the bank.

Taken together, the results from Tables 1 and 2, suggest that banks may not be rationally pricing their CDs with respect to the penalty imposed. As noted, early withdrawal penalties typically require depositors to forfeit some amount of interest, typically a flat 91 or 182 days of interest, regardless of the coupon or the remaining maturity of the CD. Yet, as illustrated in Table 2, this penalty income does not appear to adequately compensate a bank for the loss of low-coupon funding that occurs when a depositor withdraws a low-coupon CD prior to its maturity to take advantage of higher CD rates. Therefore, an "uneconomic penalty scheme" may be a source of interest rate risk for financial institutions. Exacerbating this risk is the fact that, if a bank uses contractual cash flows to model CDs within the EVE framework, the quantification of this interest rate risk, and therefore risk reports, will likely be inaccurate.

When contractual cash flows are used to determine the economic value of the CD (from the perspective of the financial institution), a relatively linear[3], upward-sloping price-yield function is generated over various rate environments. However, when the option to withdraw early is taken into consideration, this price-yield function is not linear, but rises at a decreasing rate as rates increase. Graph A illustrates these relationships. Specifically, Graph A depicts the percent change in price from par for a five-year 2% coupon CD. The triangle markers denote that the CD is being modeled using contractual cash flows, while the square markers denote that the CD is being modeled as if it were using option-adjusted cash flows[4]. For rate reductions, the change in value of the CD is approximately the same under both modeling methodologies[5]. However, for rate increases, the two methodologies generate very different changes in value. The difference between the linear price-yield function and the lower curvilinear price-yield function in Graph A represents the economic value of the depositor's option to

Table 1:
Comparison of CD Interest Income Recovery for Interest Rate Increases Relative to Early Withdrawal Penalty (per $10,000)

		+100		+200		+300		3 months Interest Penalty	6 months Interest Penalty
		3 mo	6 mo	3 mo	6 mo	3 mo	6 mo	$ Amount	
Term	**Coup**	**Time to Recover Penalty (in months)**							
1Y	2.00%	2.02	4.04	1.52	3.03	1.21	2.43	$49.86	$99.73
1Y	3.00%	2.28	4.55	1.82	3.64	1.52	3.03	$74.79	$149.59
1Y	4.00%	2.43	4.85	2.02	4.04	1.73	3.47	$99.73	$199.45
3Y	2.00%	2.02	4.04	1.52	3.03	1.21	2.43	$49.86	$99.73
3Y	3.00%	2.28	4.55	1.82	3.64	1.52	3.03	$74.79	$149.59
3Y	4.00%	2.43	4.85	2.02	4.04	1.73	3.47	$99.73	$199.45
5Y	2.00%	2.02	4.04	1.52	3.03	1.21	2.43	$49.86	$99.73
5Y	3.00%	2.28	4.55	1.82	3.64	1.52	3.03	$74.79	$149.59
5Y	4.00%	2.43	4.85	2.02	4.04	1.73	3.47	$99.73	$199.45

withdraw the CD prior to maturity. Notice how the value of this option increases the larger the difference between the CD's coupon rate and current market rates.

The bank has effectively sold to the CD depositor an American-style "put" option that is imbedded in the CD, whereby the early withdrawal penalty is analogous to the strike rate. From the depositor's perspective, if interest rates rise such that the depreciated value of the CD is larger than the penalty paid (the option's strike rate), the rational depositor will exercise his option to put the CD back to the bank (i.e. withdraw early) and invest in a new higher rate CD. The larger the rate differential between the CD coupon and current market rates, the larger the value of this option. But because the bank is short this option, the rising value of the put option offsets the rising economic value of the CD, hence a price-yield curve that rises at a decreasing rate.

From the bank's perspective, modeling contractual cash flows rather than option-adjusted cash flows will overstate the positive change in economic value of the CD for an increase in market interest rates. This has potentially serious implications for financial institutions because using contractual cash flows to model the change economic value of the CD portfolio will likely result in an understatement of net EVE at risk. Moreover, the mis-measurement of market risk stemming from the use of contractual cashflows to model CDs could result in the generation of incorrect market risk reports as well as the implementation of incorrect or insufficient hedging strategies. Clearly, to measure this risk accurately, the cash flows estimated for various rate scenarios need to be adjusted to incorporate probabilistic assumptions regarding early withdrawal.

But just how material is this risk to financial institutions? Clearly, the risk will be higher when: 1) a bank has a large proportion of retail CDs relative to its deposit base, 2) the CD portfolio has a relatively long remaining contractual maturity, 3) the CD portfolio has a relatively low weighted-average coupon, and 4) early withdrawal penalties are not that punitive. Given today's relatively low interest rate environment, it is generally thought that retail depositors have a preference for short-maturity investments in anticipation of higher interest rates in the future, rather than locking in today's low rates. If this were true, then the dollar volume of retail CDs would comprise a very low proportion of the entire deposit structure and/or the distribution of retail CD balances would be centered in very short maturity CDs. As the following analysis will show, this risk is not that material on a systemic level, but is material for specific types of banks, particularly community banks.

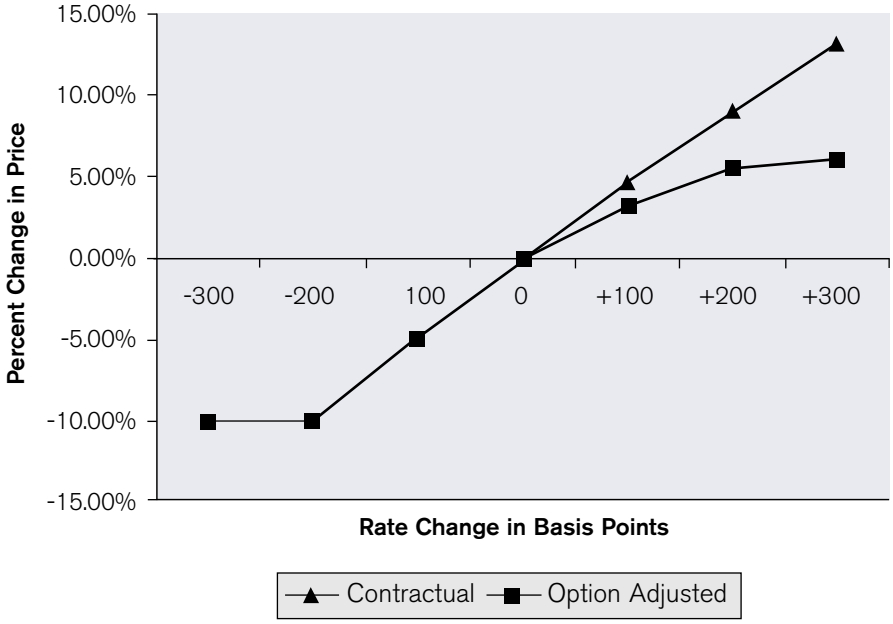
Table 2:
Comparison of CD "Appreciation" for Interest Rate Increases Relative to Early Withdrawal Penalty Income
(From Bank's Perspective)

CD Terms[6]	+100	+200	+300	91 Day (3 months) Penalty Income	182 Day (6 months) Penalty Income
1Y 2%	0.98%	1.95%	2.91%	0.50%	1.00%
1Y 3%	0.98%	1.94%	2.89%	0.75%	1.50%
1Y 4%	0.97%	1.93%	2.87%	1.00%	2.00%
3Y 2%	2.86%	5.63%	8.31%	0.50%	1.00%
3Y 3%	2.81%	5.54%	8.18%	0.75%	1.50%
3Y 4%	2.77%	5.45%	8.05%	1.00%	2.00%
5Y 2%	4.63%	9.02%	13.20%	0.50%	1.00%
5Y 3%	4.51%	8.80%	12.88%	0.75%	1.50%
5Y 4%	4.40%	8.58%	12.56%	1.00%	2.00%

To understand the extent to which the domestic banking industry has depended on retail CDs, we can look at retail CDs as a percent of total deposits using Call Report data as of March 31, 2003 for the 7,858 banks domiciled in the United States. The means, standard deviations, and other descriptive statistics were generated for the aggregate banking industry as well as for the constituent money center, super-regional, regional, and community banking groups. From this data it is interesting to note that, despite the record-low interest rate environment experienced over the last several years, retail CDs continue to comprise a sizeable funding source for the majority of financial institutions, particularly community banks. Table 3 shows that for the domestic banking industry overall, retail CDs averaged a sizeable 30.5% of total deposits, with this proportion ranging from 17.8% to 43.2% of total deposits for approximately two-thirds of the banks. Alternatively, for nearly 70% of the banks, retail CDs equaled 25% or more of total deposits, while only 4.7% of the banks had retail CDs equaling more than 50% of total deposits (see Table 4). Similar materiality is observed when retail CDs are measured as percent of average assets. For the domestic banking industry overall, retail CDs averaged a sizeable 26% of total average assets, with community banks dominating this statistic (see Table 5). Although the mean level of retail CDs as a percentage of total deposits has slipped slightly from 34% noted for March 31, 2000 (see Table 6), overall the percentage remains material.

The higher exposure implied by a sizeable proportion of retail CDs, relative to total deposits, may be mitigated if a large majority of the CD balances have very short remaining maturities. After all, even if interest rates were to substantially increase, a depositor would not likely withdraw prior to maturity a CD having a short remaining maturity to take advantage of higher rates. Therefore, to discern the materiality of this risk, we need to know the distribution of retail CDs by remaining maturity. The call report segregates the balances of retail CDs into four time

Graph A:
Comparison of Contractual Versus Option-Adjusted Price-Yield Functions



buckets, specifically those that reprice or mature in "less than three months", "three to twelve months", "one to three years", and "greater than three years". For each bank, the proportion of retail CDs dollars in each remaining maturity bucket, relative to total retail CDs, was generated, and then the mean and standard deviation for the aggregate banking industry and component groups were calculated. These calculations were generated as of March 31, 2003 and March 31, 2000, and are summarized in Table 7.

Several interesting observations can be made from the data. In terms of maturity distribution, the largest proportion of CD balances are concentrated in the three-to-twelve months time bucket, and this has not changed from 2000, although the average proportion has slipped from nearly 50% to nearly 46% of retail CDs. Although the majority of retail CD portfolios have a relatively short maturity, the longer-maturity categories have grown since 2000. For example, the average proportion of CDs having remaining maturities greater than three years nearly doubled from 3.1% of in 2000 to 6.1% in 2003. An increasing trend was also noted for CDs in the 1 to 3 year maturity bucket, which increased from 19.8% in 2000 to 21%. It is remarkable that the super-regional banks (those whose average assets range between $10 billion and $75 billion) have experienced the largest increase. Specifically, for super-regional banks, the average proportion of CD balances with maturities greater than three years nearly doubled from 6.5% to 12% as depositors lengthened their CDs from the three to twelve month maturity category. Although the largest proportion of CD balances is concentrated in short-maturity time buckets, there has been a trend toward longer-term maturities. Moreover, since these new CDs are likely to have relatively low coupons, these longer maturity CDs may have the highest risk exposure to early withdrawal.

Conclusions

This article has pointed out the importance of using option-adjusted cash flows, rather than contractual cash flows, when modeling the economic value of retail CDs, especially when the penalty for early withdrawal is not rationally priced. Otherwise, interest rate risk may be understated, which may give rise to inaccurate risk reports and improper hedging strategies. This risk is not trivial because many financial institutions have a substantial dependence on retail CDs, and the proportion of retail CDs having longer term maturities (i.e. greater than one year) has grown over the past three years

–Cheryl L. Sulima, CFA

Table 3:
Summary Statistics Retail CDs <$100M as a Percent of Total Deposits
(March 31, 2003)

Group[8]	# Banks	Mean	STDV	Median	Min	Max	Quartile 1	Quartile 3
Money Center	11	7.5%	4.5%	8.4%	1.1%	13.3%	2.2%	11.1%
Super-Regional	71	13.7%	9.6%	12.8%	0.0%	34.1%	4.8%	21.7%
Regional	687	22.5%	12.5%	22.8%	0.0%	84.3%	12.8%	31.1%
Community	7089	31.4%	12.3%	32.1%	0.0%	100.0%	23.9%	39.9%
Aggregate	7858	30.5%	12.7%	31.2%	0.0%	100.0%	22.5%	39.3%

Table 4: Percent of Banks Whose Retail CDs as a Percent of Total Deposits Exceed the Stated Proportion
(March 31, 2003)

CDs/TD > 50.0%	4.7%
CDs/TD > 30.0%	53.9%
CDs/TD > 25.0%	69.0%

Table 5: Retail CDs <$100M as a Percent of Total Average Assets
(March 31, 2003)

Money Center	5.1%
Super-Regional	9.5%
Regional	17.7%
Community	26.9%
Aggregate	25.9%

Footnotes

[1] For the purpose of this article, retail CDs are those accounts having balances less than $100,000. Jumbo CDs, consisting of accounts having balances greater than $100,000, generally represent wholesale funding sources from public or corporate entities. As such, jumbo CDs may not exhibit the same early withdrawal behavior as do retail CDs (specifically because they frequently contain "make whole" clauses), and therefore should be modeled according to their own behavioral characteristics.

[2] The views and opinions stated in this article are those of the author only, and do not represent those of the Federal Reserve Bank of Chicago or Federal Reserve System.

[3] Actually, a coupon-bearing CD without the ability to withdraw early would be slightly positively convex.

[4] The option-adjusted values generated for Graph A were estimated.

[5] That the price change is floored at 10% for rate reductions of –300 basis points reflects the fact that the CD has a coupon of 2%.

[6] The "CD Terms" column represents the remaining maturity (i.e. 3Y represents three years) and coupon of the CD. Columns denoted as +100, +200, and +300 represent the percent change in value of the CD from par for the stated rate movement in basis points, from the perspective of the bank. Price calculations assume that CD "coupons" are paid quarterly but are not reinvested.

[7] To consider all banks equally, absolute dollar size of deposit is ignored.

[8] Money Center banks are deemed to be those with average assets greater than $75 billion; super-regional banks are those whose average assets range between $10 billion and $75 billion; regional banks are deemed to be those whose average assets range between $500 million and $10 billion; and community banks are those whose average assets are less than $500 million.

Table 6: Summary Statistics Retail CDs <$100M as a Percent of Total Deposits
(March 31, 2000)

Group	# Banks	Mean	STDV
Money Center	10	10.0%	6.8%
Super-Regional	66	19.0%	10.2%
Regional	600	26.7%	14.0%
Community	7798	35.1%	12.7%
Aggregate	8474	34.3%	13.1%

Table 7: Distribution by Remaining Maturity As a % of Retail CDs <$100M

	March 31, 2003				March 31, 2000			
Group	< 3 mos	3 to 12 mos	1 to 3 yrs	> 3 yrs	< 3 mos	3 to 12 mos	1 to 3 yrs	> 3 yrs
Money Center3	27.5%	40.6%	22.6%	9.4%	38.1%	41.3%	17.2%	3.5%
Super-Regional	22.9%	34.2%	26.7%	12.0%	26.3%	41.6%	24.2%	6.5%
Regional	25.8%	40.6%	22.5%	7.9%	27.6%	44.5%	20.9%	3.6%
Community	25.6%	46.5%	20.8%	5.8%	26.6%	49.9%	19.6%	3.0%
Aggregate	25.6%	45.9%	21.0%	6.1%	26.7%	49.5%	19.8%	3.1%
(STDV)	(11.5%)	(12.8%)	(11.9%)	(7.4%)	(11.5%)	(12.4%)	(11.4%)	(4.5%)

RECENT DEVELOPMENTS IN AN ELECTRIFYING ENVIRONMENT

An Analysis of the German Market for Energy Trading

In the previous issue of Capital and Market Risk Insights, the authors presented an analysis of the German market for energy trading and energy derivatives. This article continues the analysis by presenting a possible regulatory treatment of these new products for capital adequacy purposes. This regulatory proposal has been put forward for discussion by the supervisory authorities in Germany. As outlined in the analysis, the markets for energy trading possess specific patterns which differ from those of classical financial markets. Hence, in part, the regulatory arrangement is designed to take account of these particular features.

Principal results of the first paper

Electricity trading displays distribution characteristics and volatilities that are not comparable to those of classical financial products. This is obvious from the nature of the underlying (not storable, only deliverable in a small range, high fluctuations in the demand, etc). This makes effective risk management more difficult.

Furthermore, listed markets exhibit a relatively high volatility, always bearing in mind that the largest part of the market is traded over the counter. As shown in Part I, the markets differ greatly, especially in terms of the volatility of the spot and futures markets.

If the results of the analyses in Part I are to be included in a potential prudential regulatory provision, a differentiation in line with the market is unavoidable. Overall, the present weighting methodology of German capital adequacy rules, which represent the national implementation of the European Capital Adequacy Directive and was developed for classical trading products, does not take due account of this. Under the existing provisions–which are quite generalized and were originally not intended for such instruments–electricity, like commodities, attracts a risk weight of 15% on net positions and 3% on gross positions. The potential application of these risk weights has been a cause of concern for (and has led to some misunderstanding among) market participants. A risk weight of 3% on gross positions, in particular, would not be feasible for the majority of financial institutions[1]. These circumstances will take on more importance due to the growing activities of commercial banks and other financial institutions in this market[2]. During the past few months, supervisors have been in discussions with financial institutions. The aim of these discussions is to reflect supervisors' ideas and what is considered best practice in the energy markets into a new treatment of energy derivatives.

Proposal for a regulatory treatment of energy derivatives

Derivation of the capital charge for energy derivatives

The idea behind the new arrangement, which currently has consultation status[3], is to facilitate a capital treatment of the instruments appropriate to their risk, within a framework that is as simple as possible. German supervisors intend to issue a circular on this shortly.

Existing provisions are to be replaced by a method based on a "historical simulation", in which the risk variable is represented, on the basis of the current portfolio, by the standard deviation of the changes in the value of that portfolio[4].

An innovation (which has therefore not yet been considered in the simplified provisions) is the idea of making it possible, for the first time, to establish a portfolio concept. In other words, positions relating to underlyings of the same kind can be combined in a market risk portfolio for the purpose of determining the prudential capital requirements. In the case of different underlyings, supervisory authorities may likewise give their consent to this aggregation approach, provided an institution has made a uniform and permanent decision and if there is a demonstrable collateral relationship between the instruments. For some financial services institutions that operate, say, their own power station, this is important because they can then offset obligations to take delivery in the primary energy sector (which are intended for operating the power station) against each other in the market risk portfolios.

The calculation itself is then made on the simulated changes in the value of the current portfolio, where the effective observation period should be at least 50 days. Where mark-to-market prices or price histories are unavailable for individual instruments prices can be determined theoretically, i.e. via a mark-to-model approach.

As a second step, the standard deviation of the daily relative portfolio returns is estimated by means of either the classical moment estimators or by more sophisticated methods (e.g. the maximum likelihood estimator or as parametrically adjusted distributions and their particular shape parameters). In this connection, the institution is required to provide supervisors with precise documentation on the methodology used. Furthermore, the institution must choose an enduring approach

to calculate the capital charge. This is necessary because supervisors do not intend to limit the class of potential distributions. For the estimation of the respective standard deviation, the institution has to take into account an effective observation horizon of 50 trading days[5].

The capital charge is then given by the average of the standard deviations thus calculated over the past 50 days, multiplied by a fixed factor (comparable to the factor 3 with respect to market risk models[6,7]), and by the current value of the portfolio. This is comparable to smoothing the weighting when using a value at risk model:

$$\text{Capital charge} = \left(7.5 \cdot \frac{1}{50}\sum_{i=0}^{49} \sigma_{t_0 - i}\right) \cdot PV_{t_0}(Pf_{t_0})$$

where σ_{t_0} denotes the standard deviation of the changes in the value of the portfolio estimated for the day t_0, t_0 is the current day and $PV_{t_0}(Pf_{t_0})$ is the present value of the current portfolio Pf_{t_0} evaluated at the current day.

Example for the calculation of the capital charge

For example, consider a portfolio consisting only of a single position held in a stock index. Because the main focus of the proposed regulatory treatment relies on a very focussed "mapping" of the whole portfolio as one risk factor, this is not really a restriction. For this example, we use the moment estimator to calculate the standard deviations.

With regard to the current portfolio Pf_{t_0} –as in the historical simulation–the historical portfolio values $PV_{t_0}(Pf_{t_0}), PV_{t_0-1}(Pf_{t_0}),$ ..., $PV_{t_0-50}(Pf_{t_0})$ are observed. This implies a revaluation of the portfolio as of the current date t_0 with respect to the historical market prices of the last 50 trading days.

In the next step, the relative changes of the portfolio values are calculated:

$$R_{t_0}^{t_0} = \frac{PV_{t_0}(Pf_{t_0})}{PV_{t_0-1}(Pf_{t_0})} - 1, R_{t_0-1}^{t_0} = \frac{PV_{t_0-1}(Pf_{t_0})}{PV_{t_0-2}(Pf_{t_0})} - 1,$$

$$..., R_{t_0-49}^{t_0} = \frac{PV_{t_0-49}(Pf_{t_0})}{PV_{t_0-50}(Pf_{t_0})} - 1$$

Thus, the standard deviation may easily be derived by the classical moment estimator:

$$\sigma_{t_0} = \sqrt{\frac{1}{51}\sum_{i=0}^{49}\left(R_{t_0-i}^{t_0} - \overline{R^{t_0}}\right)^2}$$

where $\overline{R^{t_0}}$ denotes the mean of the relative portfolio changes:

$$\overline{R^{t_0}} = \frac{1}{50}\sum_{i=0}^{49} R_{t_0-i}^{t_0}$$

In the same manner, yesterday's σ_{t_0-1} was already calculated on the basis of the relative changes in the present value of yesterday's portfolio:

$$R_{t_0-1}^{t_0-1} = \frac{PV_{t_0-1}(Pf_{t_0-1})}{PV_{t_0-2}(Pf_{t_0-1})} - 1, R_{t_0-2}^{t_0-1} = \frac{PV_{t_0-2}(Pf_{t_0-1})}{PV_{t_0-3}(Pf_{t_0-1})} - 1, ...,$$

$$R_{t_0-50}^{t_0-1} = \frac{PV_{t_0-50}(Pf_{t_0-1})}{PV_{t_0-51}(Pf_{t_0-1})} - 1$$

By this, the portfolio as of yesterday has been reevaluated by market prices as of the 50 preceding trading days.

Hence, an "average" and thus smoothed standard deviation may be derived available through the following calculation:

$$\frac{1}{50}\sum_{i=0}^{49}\sigma_{t_0-i}$$

As the standard deviation has been estimated with respect to relative changes, it is obvious that, in order to obtain an appropriate capital charge, a multiplication by the current present value of the current portfolio is needed. For supervisory purposes the charge includes an additional multiplication, similar to the factor for market risk.

$$\text{Capital charge} = \left(7.5 \cdot \frac{1}{50}\sum_{i=0}^{49} \sigma_{t_0 - i}\right) \cdot PV_{t_0}(Pf_{t_0})$$

Additional Requirements

Additional requirements for this applied methodology are the performance of back-testing and stress tests. Furthermore, additional qualitative requirements for the conduct of such trade settlements have to be fulfilled.

Current endeavours are aimed at establishing a methodology, which, unlike the present generalized standard procedures, provides a more risk-sensitive computational methodology for the capital adequacy requirements, but nevertheless does not set enormously high additional qualitative requirements or call for an approval process as with market risk models. The provisions of the Capital Adequacy Directive can be observed, even though a regulatory arrangement at the EU level was not envisaged for the energy markets sector when the Directive was adopted. For institutions, the application of an internal risk management model for regulatory capital purposes remains, of course, unaffected.

Conclusion

The final section presented a proposed new regulatory treatment for energy derivatives. This approach contains a large number of innovations. In Germany there is the possibility for the first time, of capital cover based on an institution's in-house modeling without prior on-site inspection. The portfolio concept, in particular, is an innovation that corresponds to real conditions at the institutions. German banks, financial services institutions and financial market supervisors believe that this procedure will be in line with market players' interests and will probably provide the basis for an arrangement that is more appropriate for the risk.

–Thomas Morck, Carsten S. Wehn[9]

Footnotes

[1] See Scheele, K.: Wer sich jetzt richtig aufstellt, ist später kaum noch einzuholen [Anyone setting up in the right way now will be near-impossible to catch up with later...], Marktplatz Energie, (6) 2002.

[2] Financial institutions are defined as enterprises that provide financial services to others commercially or on a scale which requires a commercially organized business.

[3] A German version of the proposal may be found at: http://www.bafin.de/schreiben/schreiben03/030117.htm

[4] See Eberlein, E; Stahl, G: Electricity Risk – The nature of electricity risk, Working Paper (to be published), 2003.

[5] As it is the purpose of the regulatory treatment to be applied also to other instruments such as weather derivatives or derivatives on macroeconomic variables, this observation horizon may be changed for the instrument in question.

[6] See Basel Committee on Banking Supervision: Amendment to the Capital Accord to incorporate market risks, Basel, 1996.

[7] See Stahl, G.: Three Cheers, RISK (5) 1997, p 67-69.

[8] See: Basel Committee on Banking Supervision: Amendment to the Capital Accord to incorporate market risks, Basel, 1996.

[9] Thomas Morck and Carsten S. Wehn work in the Banking and Financial Supervision Department of the Deutsche Bundesbank and are both involved in the approval of banks' internal risk management models. Nevertheless, all statements made in the present article represent the authors' personal opinions and do not necessarily reflect the views of Deutsche Bundesbank.
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INTEREST ONLY MORTGAGES

By Jessica Egan

An interest-only mortgage consists of monthly interest-only payments for a fixed period of time, usually five to fifteen years in duration, during which the loan balance remains the same. The rate on the loan may be fixed or variable. At the end of the interest-only contractual period, either the entire balance is due or monthly payments increase by an amount sufficient to achieve full amortization over the remaining term of the loan.

There has been a recent surge in the demand for such mortgages even though the concept is not new. During the Roaring Twenties interest-only mortgages were quite common and homeowners expected to refinance at the end of the loan term. In some cases, the borrower was expected to be in a position to repay the capital debt by the end of the term via required, concurrent monthly payments into an investment fund, the idea being that this fund would grow enough so that the borrower could pay back the loan and possibly benefit from a surplus as well. The system worked well as long as the economy was growing, borrowers remained employed and real estate values increased. However, rising unemployment and falling prices during the Great Depression made this type of loan a bad deal for banks and most mortgages made since WWII have been regular amortizing loans.

Today interest-only loans are geared toward borrowers with strong cash flow, impeccable credit, and the intention to refinance or move at the end of the interest-only period. Interest-only mortgages in vogue today are touted as offering borrowers numerous advantages. For example, interest-only mortgage rates can be up to one percent lower than fixed-rate mortgages and the full monthly payment is tax-deductible. In addition, according to Mortgagesorter.com, most mortgage providers no longer ask for proof of an investment side/by product when approving interest-only mortgages.

Interest-only mortgages are now available to any qualified borrower and have surged Mortgage giant Fannie Mae, which did not deal in interest-only mortgages prior to the spring of 2001, purchased $1.2 billion of these loans over the remainder of that year. Washington Mutual generated more than $7 billion of these loans during a six month period beginning in September 2001. Interest-only loans tend to be larger than regular amortizing loans. For instance, Wells Fargo Mortgage's average interest-only loan at $560,000 is three times the size of its average home loan.

Lenders use interest-only mortgages to boost business in markets where regular lending is challenging. Interest-only mortgages are most popular in California, where high (and rising) real estate prices have made purchasing a home difficult for the average buyer. Investor sophistication, spiraling housing prices, and consumer craving for immediate gratification have also been cited as causes for the revived interest in interest-only loans in today's market.

Some of the more appealing aspects of interest-only borrowing for consumers include the ability to purchase a more expensive home, increased cash-management options, and larger tax deductions. Interest-only payments are less than regular mortgage payments, allowing the borrower to purchase a larger home or have more financial flexibility with the same home. The option to purchase a larger home is especially alluring to borrowers dependent on a trust fund or future inheritance and those with strong expectations of rising future income. Home buyers can use the portion of the payment that would have gone for principal for other investments, such as retirement plans, education, home remodeling, or simply to avoid other types of debt. An interest-only borrower is free to make principal payments at any time during the loan period. In the case where a "savings vehicle" is established for the homeowner and actually over performs, the borrower may be left with a cash surplus at the end of the term.

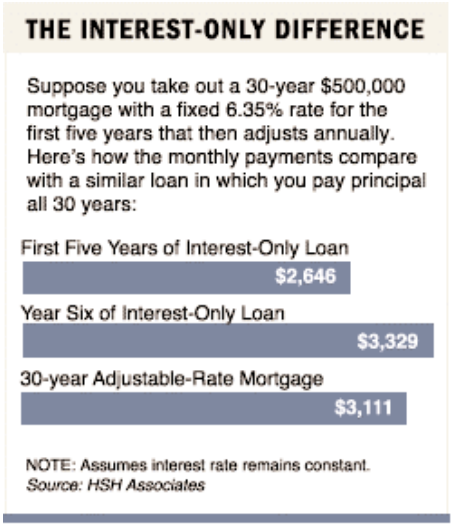
However, interest-only mortgages come with their own specific risks, which can be significant. Because no equity is accumulated during the interest-only period, borrowers could wind up owing more than their house is worth if housing prices drop substantially. Building wealth has always been considered one of the primary purposes of buying a home, but this doesn't happen with interest-only mortgages. These risks imply that interest-only borrowers must cultivate a certain amount of financial discipline.

Some interest-only loans have adjustable rates for a given period of their term and borrowers may face higher monthly payments if interest-rates rise. Some loans do not convert to a regular mortgage at the end of the interest-only period, but instead demand a balloon payment of the principal balance. Although interest-only mortgages appeal particularly to those looking to own their home for a short period of time, the real estate market can be volatile and borrowers may suffer losses if they are forced to sell during a period of decreased demand. Consumers who are unable to make the balloon payment or cannot

qualify for a loan refinance run the risk of financial loss and a bad credit rating.

Mortgage lending is a profitable business for financial institutions and it follows that they will continue to offer a wide range of mortgage products. Increasing numbers of lenders are aggressively advertising interest-only loans. Jay Brinkmann, economist at the Mortgage Bankers Association, is concerned about the level of information being provided to the average interest-only borrower. He worries that some borrowers "may be going after the lowest rate and not realizing the interest-rate risk." Financial educator and author Ruth Hayden believes that the true danger in interest-only mortgages can be found in the expectations of the home buyers. She warns that borrowers must not assume that they will get any money out when the interest-only portion of the loan ends. They must have no interest in building up equity in a house. Most of the issues with respect to interest-only mortgages lie in the ability of borrowers to be discerning about their financial position and exercise financial discipline, as well as to be fully informed about the exact terms and potential losses involved in such a loan.

–Jessica Egan



Footnotes

[1] MacDonald, Jay, Bankrate.com: Interest-Only Mortgages Target High-Priced Homes, June 20, 2002, http://www.bankrate.com/brm/news/mtg/20020620a.asp?print=on. (June 25, 2003).

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[3] Simon, Ruth, The Wall Street Journal, Real Estate Journal: This Mortgage Option Carries Plenty of Risk, June 25, 2002, http://homes.wsj.com/buysell/mortgages/200220425-simon.html. (June 25, 2003).

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[6] MacDonald, Jay, Bankrate.com: Interest-Only Mortgages Target High-Priced Homes, June 20, 2002, http://www.bankrate.com/brm/news/mtg/20020620a.asp?print=on. (June 25, 2003).

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