Issuers' commitments would add more value than any rating scheme could ever do

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Abstract

This paper analyzes the evolution of the structured products market focusing on the tools available for private investors, on which they rely for the selection process. The selection process is extremely difficult because there is a myriad of products, because of the dynamic nature of the market and market participants' actions, and because of the complexity of many of the products.

We consider the existing types of tools, in particular the rating schemes that have been proposed by industry participants to provide guidance to the investor. We propose a set of properties that a rating scheme should show and check whether the existing schemes carry these properties.

Our findings suggest that the existing rating schemes do not carry the desired properties. Furthermore, for the purpose of solving a highly indefinite selection process, an effective rating scheme may not exist.

In light of this, we propose the introduction of a new quantity, the *floor*, that has a legal and financial meaning, on which issuers can also compete in addition to price and spread. Its acceptance and use would also yield standardization towards investors' interests by excluding some pricing practices and severely limiting others.

Even though very little research has been produced in this area, we believe this to be a topic of high importance in establishing guidelines for healthy industry development and regulation that upholds investors' interests.

Key words: Structured products, ratings, floor, retail financial products, certificates.

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[†]The author wishes to thank Millennium bcp investimento, S.A. for the financial support being provided during the course of his Ph.D. studies.

1 Introduction

Around the world there is a growing number of securities and contracts issued and written by financial institutions. Their purpose is to offer a customized risk/return profile that suits investors' preferences. These so called structured products[1] are linked to diverse underlying assets and are used by private and institutional investors alike. They cover short, medium and long term products from low risk to high risk and leverage.

In Germany and elsewhere this market shows significant activity with the number of issuers surpassing ten in the most liquid underlyings. For example, in June 2008, the most active German exchange for structured products, Börse Stuttgart's Euwax, reported 33 active issuers and more than 300,000 structured products listed. Other countries, specially in Europe and Australia, have also developed structured product markets with several issuers, thousands of products, and whose liquidity is close to 5% of the country's stock market. In the year 2008 the structured products' exchange traded volume, on the European exchanges members of FESE[2], amounted to €213 billion while equities volume amounted to €3,885 billion. In addition to the exchange traded volume, one should also consider the over the counter transactions of listed and unlisted structured products. These are surely a significant percentage of the total structured products trading, but for which, unfortunately, there are no aggregated statistics.

The key difference between structured products and the standardized derivative contracts, i.e. exchange traded options and futures, is the fact that they are issued as securities. This means that a structured product issue has a definite number of "shares" and is bound to the dynamics of securities trading. These dynamics differ strongly from those of standardized derivative contracts specially when selling is concerned. Simply stated, a security can only be sold if it is held (either by previous purchase or borrow), while taking up a selling position in standardized derivative contracts is not hindered by that constraint.

The importance of this difference is clear in light of arbitrage theory. It states that for a claim's price (security or contract) to be coherent with the price(s) of its underlying asset(s) (that again may be securities or contracts), it is necessary that an agent be able to sell the claim short, if it is overpriced with respect to its underlying, and to buy it, if it is underpriced. However, in the case of structured products, borrowing is impossible[3] and, consequently, so is short selling. Thus, there is no market force driving the price of an overpriced security towards its arbitrage theory fair price. That is, the price it would have if short selling were possible.

Hence, the consequence of the impossibility of short selling is that the claim may be overpriced but may never be underpriced. However, arbitrage theory only states the overpricing *can* occur, not that it *does* occur. Though, it should come as no surprise that banks require a reward for going through the costs of issuing and maintaining these products and that profit is their true *raison d'être*. There is some research corroborating this fact by Stoimenov and Wilkens [4] and [5], and Wilkens et al. [6] that detail the dynamics of the overpricing over the life cycle of a product. This dynamics exhibit overpricing at issuance, overpricing decaying over the life of the product, significant overpricing drops after issuance, and order flow driven price behavior.

One may rightfully ask also why does an investor even consider buying securities that are possibly overpriced. There are certainly several reasons for doing so but here we just state

[1] We shall use the terms *products* and *structured products* interchangeably.

[2] Federation of European Securities Exchanges

[3] Borrowing is impossible for several reasons, the most important of which are the unwillingness of the issuers to lend the securities, the dispersion of holders of such products, and the nonexistence of a securities lending market for these securities. Exchange traded funds (ETFs), though being securities, are different from structured products for they have built in, in the fund's by-laws, the borrowing possibility for their market makers.

one: many investors do not have the size or will to invest in non-biased securities in a way that would replicate the structured product's payoff. Thus, the trade-offs are ones of price versus size or price versus convenience, which are also present in any other market, financial or not. What is not similar to other markets is the inability of an investor, due to lack of information, to choose the best trade-off available. This is the core subject of this paper.

So far, the efforts to produce the lacking information have been devoted to the development of rating schemes that classify and order products according to a scale. We devote section 2 to assess whether such ratings do produce relevant information, to enable the choice of the best trade-off, and conclude that they do not. In section 3 we develop a formal analysis of the lack of information problem, propose a solution, and show that it produces relevant information. We conclude, in section 4, giving our view of the development of the structured products market in connection with the lack of information problem.

2 Rating Schemes

Before analyzing existing rating schemes, we shall first state what we believe are the properties a rating should have in order to be effective in providing relevant information for the selection problem. Hence a rating should be:

- focused - the rating should measure only one well defined target feature;
- easily perceived - should allow for immediate perception of level and order between products;
- informative - produce additional information to set already available;
- impartial - consider only attributes specific to the product itself;
- current - the rating should be updated to reflect changes of the input data;
- robust - the rating should not be hindered by unusual or complex payoff profiles. It should be applicable to whatever product or contract.

These principles are probably easier to agree upon than to fulfill. Even the well-known and established ratings that classify the credit worthiness of issuers like the Moody's, Standard & Poor's or Fitch's credit ratings do not fulfill all the principles above. Common critics are that (i) ratings react slowly to changes in the environment, (ii) rating agencies choose the timing of rating reviews to be cautious about the political impact on the subject country or company, (iii) the fact that rated subjects pay for the rating service and that sole fact may bias the judgment (similar to an auditor's problem), (iv) rating agencies make significant subjective evaluations, and (v) that rating procedures are not robust enough to be standard across all industries and are not easily applicable to complex structures. This last issue has even been severely highlighted in the course of the current financial crisis. These critics put into question all principles above except the first three; credit ratings are focused solely on measuring the ability to meet future payments, are easily perceived, and do allow for decisions. Nevertheless, they are regarded by industry participants and regulators extremely useful classifications.

Given the success of credit rating schemes, several institutions started to apply the same concept to distill the large quantity of information present in the structured products market. Examples of these schemes are the ones from Institut für ZertifikateAnalyse[4] (IZA), Scope

[4]www.iza.de

Group[5] and European Derivatives Group[6] (EDG), as are issuers' classification schemes. We shall analyze these rating schemes in general as our analysis is focused on the foundations and concepts that underlie these schemes. By keeping the analysis general, we believe that it remains valid not only for existing schemes but also for future ones that address the same problem. For illustration purposes we do take the mentioned schemes as examples to highlight the problems and implications that arise in connection with principles above.

We shall proceed by taking each principle above individually and examine what sort of procedures it rules out.

Focused excludes:

- a target feature created and defined within the rating process itself.

Examples of such target features are the *quality* of a product or its *appropriateness* to a given investor profile. These concepts are defined within the rating process, they do not mean anything outside of it. Examples of proper target features are the ability to meet future payments or the overall cost of a structured product. These concepts exist *a priori.* When costs, credit rating, investor risk preferences, etc. are aggregated or composed into a single measure, the result is an arbitrary and meaningless concept that cannot be attached to anything outside the scope of the rating process. Furthermore, if such a concept were to be taken as reference, it would, at best, reflect the preferences of a theoretical investor that, for being so individually specific, no other investor could relate to. Any investor, other than the theoretical, with different preferences with respect to any of the attributes, would not rate the products in the same order or scale as the rating would.

Easily Perceived excludes:

- multidimensional rating assessments;
- use of the same symbols to order distinct groups of products.

A multidimensional rating assessment fails to fulfill its very purpose since it does not map the set of products to an ordered scale. For example, a two dimensional rating, e.g. a measure of cost and another of expected return, can be sorted in an infinite number of ways by linearly combining the two measures. Thus, the ordering is left unresolved and hence the investor still lacks a clear basis for a decision. The ease of perceptiveness also excludes the use of the same symbols on several subsets of products that are not comparable with each other. Although the definition of subsets would simplify the rating process, the reuse of the same symbols would yield and implicit comparison that is not intended by the rating itself.

Informative excludes:

- redundant measurements of target features.

A rating that orders by issue date or maturity date also does not add any information to the existing set. A uniform classification of all products also would not carry any information, as it would not order the products.

Impartial excludes:

- the inclusion of investor preferences;
- the use of valuation models;
- estimated parameters;

[5] www.scope.de

[6] www.derivatives-group.com

- arbitrary or subjective assessments.

The key to understand the impartiality concept can be found in measurement theory. The problem is that the inclusion of measurements of attributes that are not specific to the rated products will change the ordering and evaluation of the products. This inclusion shall never be consensual as it biases the rating towards some of the products. On the other hand, the inclusion of attributes that are specific to the product cannot be argued against for it is the product itself that is being rated. Investor preferences are evidently product non-specific. A valuation model implicitly biases the evaluations towards some products, just consider a barrier and a vanilla option in light of a model that assumes the existence of jumps and one that does not. One can very easily construct an example with two products where the two models yield different orders. The same is true for the inclusion of estimates. Estimates are sample and estimation method dependent and, furthermore, for the calibration of models to market prices, there may be several parameter sets that would calibrate the model. The same is true for arbitrary and subjective assessments that, if changed, would also change the ordering of the products. These assessments include the choice inherent to any aggregation or composition of measurements of different target features.

Current excludes:

- rating revision not linked to input data variability.

An immediate and dramatic consequence of this principle is that the rating should be reassessed every time the input data is refreshed. Thus, if the rating depends on live information, e.g. product price, stock prices or option prices, the rating must also be updated live. Given the nature of the structured products market, where prices are typically overpriced, the price of the structured product is a necessary input to assess the costs embedded in it. The other necessary inputs are the prices of the underlying asset and of related derivatives needed to calculate the theoretical price. Thus, including costs in the rating assessment implies that the rating should be updated as frequently as the product price updates and as often the underlying asset prices updates. For most exchange traded structured products this makes it infeasible to include the cost estimates as an input for the rating process. The same may be said with respect to estimated data, i.e., the rating should be updated as often as the sample that underlies the estimation develops.

Robust excludes:

- rating processes valid only for a specific product type or class;
- any specific model.

The robustness requires that the rating process is a general approach valid for any product that exists or may exist. Different rating processes for different product types raise the problem of comparison across types. Furthermore, the inclusion of future products in the requirement comes from the fact that if they are not included by construction, new products may be created specifically targeted to take advantage of the limitations of the rating process. By the same token, no model may be able to properly evaluate and describe the risk of all types of products. It is, in fact, quite well known that typical models of a given asset class do not preform well when applied to other asset classes.

Still on the robustness principle, one may argue that it is too demanding and should not be considered. Even the well accepted and established credit ratings do not fulfill this principle, so why should the structured products ratings do. We believe it should be upheld for the sole reason that the structured products market has seen a remarkable dynamic in its short history in terms of creation of new types of products. There is also no evidence that this trend is abating.

To complete our analysis of rating schemes for structured products, we check what is left after the exclusions implied by the principles. Although no existing rating scheme belongs to the class of ratings schemes satisfying the principles above, that class may be non-empty. We are unable to produce a formal proof of the existence or the non-existence of rating schemes that fulfill the principles. We can report though that we have not been able to find one. Given the market characteristics, we believe that a rating scheme should consider the overall costs of the products, but that implies the existence of a model to calculate the theoretical price, and that, in turn, is not allowed by the principles. It would also use live data that would imply a live rating. We also fail to see how two products with the same overall costs, but with different payoff profiles, can be ordered in a non-subjective way.

With respect to the rating schemes mentioned above, no single one satisfies the principles above. All three, IZA, Scope and EDG produce scores which do not measure any objective feature of the product. They all rely extensively on aggregation of measurements of both objective and subjective features, e.g., cost, risk, concept of the product, and information produced to describe the product. They consider cost and risk, which in turn require the choice of a model with parameters that need to be estimated and calibrated, and whose assessments are highly ephemeral and not consensual among market participants. Risk is measured by the value at risk only, even though risk may be assessed in multiple ways, yielding each of these its own order. Moreover, computing the value at risk requires a model assumption and possibly parameter assumptions on the distribution of the underlying, which is highly subjective. Though they all exhibit rating reassessement periods that are longer than two weeks. EDG and IZA even consider investor preferences as part of the rating process, as if an investor would know how to describe his or her risk profile in these terms, or check if it would match any of the predefined ones.

Another perspective of the problem is to ask what is the harm in choosing a rating scheme that does not fulfill the principles. Such a choice would foster standardization and all products would still be rated on an equal basis. Even though all principles stand relevant in such a case, the impartiality principle assumes increased importance. If a rating that does not fulfill it is taken as a standard, or even enforced by regulation, that would yield only a standardization towards the (subjective and arbitrary) rating definition and not towards investors' interests. Furthermore, even though investors still need to solve the selection problem on their own, as existing ratings are not effective in ordering products in a meaningful way, they bear their costs. Either payed directly to an agency or embeded in the price of the product (in which the issuer reflects all its costs including the rating related ones), investors end up paying for rating schemes.

Therefore, we believe that a rating scheme is not the answer to bring standardization and informed investor choice to the structured products market. We believe instead that it can be achieved by introducing more tangible information, of the sort of bid-ask spreads and prices.

3 Floor

The proposal we describe in this section builds on the work of Stoimenov and Wilkens [4] and [5], and Wilkens et al. [6] that describe the dynamics of the price of a structured product over its life cycle. This dynamics exhibit overpricing at issuance, overpricing decaying over the life of the product, significant overpricing drops after issuance, and order flow driven price behavior. The authors rely on the concept of theoretical value and super-hedging boundaries to establish a price reference. This price is then compared with market prices to determine the overpricing and its dynamics.

To formalize these observations, without loss of generality, we assume that the issuer determines its bid and ask prices in according to the functions

$$Ask(t) = f^A(t) + Markup^A(t), \tag{1}$$

$$Bid(t) = f^B(t) + Markup^B(t), \tag{2}$$

where $f^{A,B}(t)$ is the issuer's estimate of the product's theoretical values, using the relevant spread sides for each variable, and $Markup^{A,B}(t)$ are arbitrary functions. The markup functions may depend on any factor, including the total quantity sold of the product up to time t.

The price policies described above generate profit for the issuers that can be decomposed in two parcels: interest and capital gains, denoted by P_i and P_{cg} respectively.

The interest is earned on the sale price markup $Markup^A(t_0)$ only, for we assume $f^A(t_0)$ was spent to purchase the issuer's hedge. If we assume a bank account yielding an overnight rate $r(i)$, the profit accumulated up to time t is just

$$P_i(t) = \left(\prod_{i=[t_0]}^{[t]-1} (1 + r(i)) - 1 \right) \times Markup^A(t_0), \tag{3}$$

where t_0 is the trade time and i running from the day of t_0, $[t_0]$ to the day before t, $[t] - 1$.

It is important to note that this parcel of the profit cannot be controlled by the issuer after the initial transaction. On the investor's perspective, the loss, corresponding to the issuer's profit P_i, is included in his or her overall carry cost of holding the product. That cost is, to a large extent, predictable and/or bounded.

For the capital gains we need to write first the capital gains or losses on the whole structured product transaction, that is

$$Ask(t_0) - Bid(t) = f^A(t_0) - f^B(t) + Markup^A(t_0) - Markup^B(t). \tag{4}$$

We now assume that $f^A(t_0) - f^B(t)$ is covered by the issuer's hedge. Therefore, the issuer's capital gain attributable to the pricing policy is just

$$P_{cg}(t) = Markup^A(t_0) - Markup^B(t). \tag{5}$$

Unlike P_i, P_{cg} does depend on the issuer's pricing policy. The issuer is free to change $Markup^B(t)$ at any point; even set it at negative values[7]. On the investor's perspective, an decrease of $Markup^B(t)$ constitutes a loss. Such a loss is unpredictable in its size and moment.

We now claim that investors are better off if the $Markup^B(t)$ is known in advance, that is, before the investor purchases the product. Better off for the sole reason that investors would have enough information to weigh the total costs of the product against the benefits it brings them. Without the knowledge of $Markup^B(t)$ there is a loose end in the costs side until the product's maturity is reached, time when, by definition, $Markup^B(t)$ is zero.

Accordingly, we proceed with our analysis assuming, from this point on, that the issuer has commited to use the function $Markup^B(t)$ and that it stated on the product's term sheet.

However, there is still one open problem. This analysis has assumed that the issuer's estimates of the product's theoretical value, $f^{A,B}(t)$, are not subject to arbitrary revisions. With $f^{A,B}(t)$ the commitment is hollow because $f^{A,B}(t)$ may include not only the issuer's estimate of theoretical value but also hide part of the $Markup^{A,B}(t)$. If that is allowed

[7]This is equivalent to setting a bid price at a discount to the reference price. Stoimenov and Wilkens [4] provide evidence of this.

to happen, we are back to the initial situation, where there is not enough information to determine in advance the issuer's total profit. However, it is not reasonable to ask the issuer to disclose $f^{A,B}(t)$ for it may include trade secrets, be extremely complex and unusable by other parties.

Therefore, we need to replace $f^{A,B}(t)$, chosen by the issuer, by new function $h^{A,B}(t)$, independent of the issuer's views, such that expression (5) remains valid. In turn, this means $h^A(t_0) - h^B(t)$ is covered by the issuer's hedge.

This is easily accomplished if there is a static hedge for the structured product. Then $h^{A,B}(t)$ are just the prices of that static hedge portfolio, and $h^A(t_0) - h^B(t)$ is just the result from setting up and unwinding the hedge portfolio.

If there is a static super hedge, and $h^{A,B}(t)$ is the price of the super hedge portfolio, expression (5) is still valid for all t before maturity. At maturity time T, $P_{cg}(T) \geq Markup^A(t_0) - Markup^B(T)$ because the payoff of the super hedge portfolio may be greater than the payoff of the product. However, if the investor sells the structured product before maturity, the additional loss is not incurred.

Thus, if there is a static hedge or a super hedge for the structured product, there are functions $h^{A,B}(t)$ to replace $f^{A,B}(t)$ that are independent from the issuer's assessments. Functions $h^{A,B}(t)$ may even track a dynamic hedge (or super hedge) self-financing portfolio that the issuer is able to trade.

For products that cannot be statically super-hedged there may or may not be functions $h^{A,B}(t)$ to replace $f^{A,B}(t)$. However, if a product that can be decomposed as a portfolio, with its elements only taking positive values, the bid price may track only those elements that can be statically hedged (or super hedged). In such a case, the bid and ask functions (1) and (2) would be revised as

$$Ask(t) = h^A(t) + g^A(t) + Markup^A(t), \tag{6}$$

$$Bid(t) = h^B(t) + Markup^B(t), \tag{7}$$

with $h^{A,B}(t)$ the prices of the static hedge portfolio and $g^A(t) \geq 0$ the issuer's estimate of the price of the elements that are not statically hedgeable.

Hence, be $h^B(t)$ an hedge, super-hedge or sub-hedge, its determination is independent from the issuer's will. Furthermore, as $Markup^B(t)$ is defined before issuance, $Bid(t)$ does not depend on the issuer's will at any point it time during the life of the product.

For example, consider a capital guaranteed product composed by a zero coupon bond and an exotic option. Furthermore, assume the issuer considers the Reuters' or Bloomberg's zero coupon bond price estimate as a reference price for $h^{A,B}(t)$. Thus, the product would trade at least at the zero coupon bond price, which is still better than no lower boundary at all. We say at least at zero coupon bond price because, in some situations, the bid will significantly underprice the structured product. The issuer will then, most likely, bid the structured product above the bid commitment to prevent the bid-ask spread from getting too large and to show a more competitive price.

This example shows that issuers may have reasons to bid their structured products above their commitments. It is even likely that issuers do this on a consistent basis on all products, at least by a small amount. The reason being to avoid unintended breaches of the bid price commitments and diminish potential conflicts. This observation is what motivated us to name the issuer's commitment as *floor* and not bid price commitment. From now on we will refer to it only as floor.

The cases we considered so far are cases where it is simple to find a floor and where the floor does not charge the issuer with extra risks. However, the issuer is free to choose the floor, even floors that carry extra risks with them. For the cases we considered above, the term sheet of a structured product should include at least these additional clauses:

- Floor in the Secondary Market: applicable.
- Floor Guarantor: legal name of entity.
- Floor Type: sub-hedge, exact, super-hedge.
- Floor Reference Price: instrument identification and price location.
- Initial Floor Markup: X currency units.
- Floor Markup Daily Decay: Y currency units.

We remark that these rules, on the one hand, exclude some pricing policies reported in Stoimenov and Wilkens [4] and, on the other hand, make some others predictable. Arbitrary pricing policies are excluded as they cannot be described by any function. This is a major difference as the issuer is no longer free to charge investors that hold their structured products in an non-disclosed-in-advance way. Pricing policies that depend on transaction volume or total outstanding quantity would have to be described in advance in a function. Furthermore, its relevant quantities would have to be made public and refreshed at a rate set by the markup definition. This is probably enough to deter issuers from including such rules in the markup definition. Markup functions may still have a non-linear decay, as the reported large decays after issuance. However, as this information is known in advance, investors may postpone the purchase of the product until that period has passed. The floor still leaves room for regular and predictable pricing strategies that are essential for the issuer to be able to profit from its products.

We also make note that, the floor is a new value that should be disseminated through the information network. Just like it is done with the usual set of prices that include the bid and ask prices, the last traded price, the daily maximum and minimum, and the previous sessions' close price.

To conclude this section we cover the most common types of structured products and provide examples of static or dynamic (super) hedges.

We start with a simple example of a very common structured product. The product is called index-tracker and pays off the value of an equity price index on the maturity date. The choice of the index itself as the floor reference is problematic because an equity price index is not a valid static portfolio, for it suffers from cash withdrawals by the amount of the dividends its shares pay. Therefore, if the issuer would choose this index as the Floor Reference Price, the last two clauses should be reviewed to

- Floor Type: super-hedge.
- Initial Floor Markup: implicit in Floor Reference Price.
- Floor Markup Daily Decay: implicit in Floor Reference Price.

Figure 1 shows payoffs for vanilla warrants, discount certificates, bonus certificates and turbo warrants. The dashed lines represent the several possible values the product may pay off, depending on a barrier monitoring.

The proposals of hedge portfolios that follow, assume the existence of exchange traded options and futures on the same underlying asset and with the same maturity as the product. They also assume the availability of risk-free cash deposits for those maturities. A vanilla

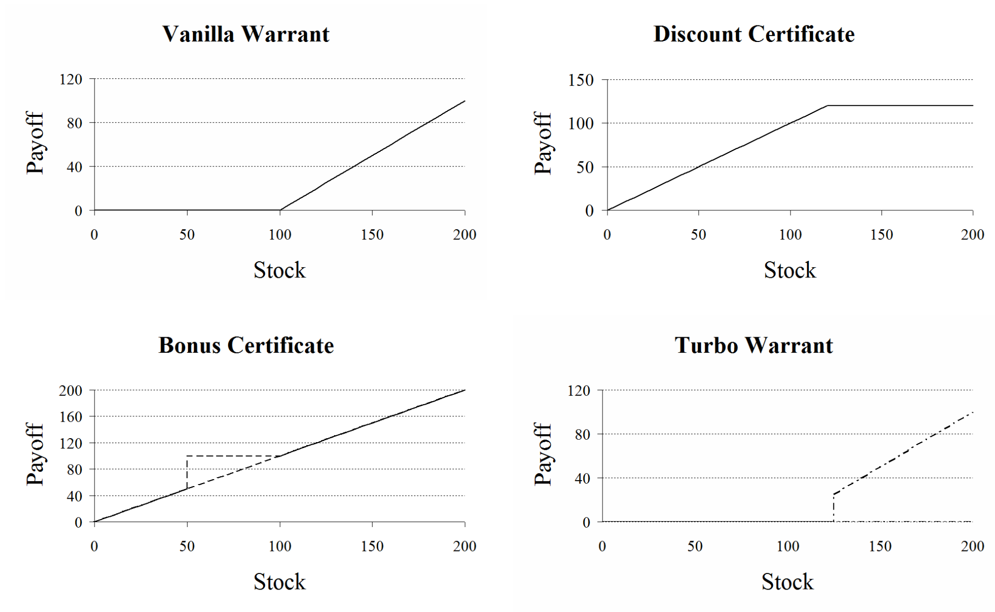

Figure 1: Payoff profiles of common structured products.

warrant has as static hedge an exchange traded option on the same underlying with the same strike and maturity. For call warrants, an exchange traded option with a lower strike constitutes a super hedge. The static hedge of a discount certificate is composed by: a short position on an exchange traded call, a long position on a future and a deposit of the total unused cash. A super hedge is obtained with a higher strike call. The price of bonus a certificate is always higher than the value of a portfolio with a future plus a deposit that pays out the contracted future price. A turbo warrant is a barrier option with the barrier located on the in-the-money side of the strike. There is no static hedge for it using the instruments we assumed. This is a typical case where an issuer may choose to assume a floor that introduces additional risks. Consider a turbo warrant call on a stock that does not pay dividends or on a total return index. Assume also a zero interest rate. A possible floor would be the intrinsic value of the turbo warrant, that is, just the difference of underlying price and strike. It is as if the turbo warrant were of American style, exercisable at any moment. To hedge this new liability, the issuer has to buy one unit of the underlying. If its price never touches the barrier the hedge works. If the price does touch the barrier, the issuer needs to sell the unit of underlying at the barrier level to maximize his result. At least, the issuer needs to sell the hedge above the strike to prevent a loss. However, this may not be possible because stock prices and indexes sometimes evolve in a discontinuous fashion. This is thus the extra risk this floor involves: the risk of not being able to unwind the hedge above the strike price. This is an example where stating a floor would generate a more valuable product and also justify charging a higher price for it.

4 Conclusion

The goal of this paper is to enable investors to be able to identify the best trade-off available in the structured products market. The trade-off is one of price versus benefit brought to the investor.

To do so we analyze existing tools that claim to contribute to this identification. In particular, we survey the effectiveness of rating schemes to this purpose. We conclude ratings are not effective for they are in essence arbitrary in their definition and, therefore, are only able to produce arbitrary orderings. In order to fairly analyze the schemes, we first present a list of principles we believe every effective rating scheme should have. The rating schemes are then analyzed in light of these principles. We conclude that none of the considered schemes satisfy them the principles. We also report to have failed to develop a rating scheme that would fulfill those principles.

We proceed with a simplification of the problem by removing the benefit to the investor from the analysis. We do so because the investor's benefit is an individual assessment that does not lend itself to modelling. We are then left with the price and realize that, even in price, there is currently no way to have a precise assessment.

Fortunately price is a more tangible concept that allows for modelling and formal description. We offer a framework to study the concept and then develop a proposal that enables a clear assessment of the price side of the trade-off. The proposal is a floor guarantee until the product's maturity. The floor is a quantity that can be freely defined by the issuer but is legally binding. It is the lowest price the issuer can bid at each moment for the structured product. In a way, it constitutes the time continuous counterpart of the discrete time commitments stated in the term sheet. The floor excludes some of the pricing policies referenced in the literature and seriously limits others. However, it still leaves room for regular and predictable pricing strategies that are essential for the issuer to be able to profit from its products. We complete the proposal with examples of application to the most common types of structured products.

Having a guaranteed floor, or the lack of it, quoted by an issuer for a complex product is probably the best rating the investor can get. Actual rating schemes, as we showed, are not primarily scientific constructions but instead, the result of accumulation of credibility over many years, even centuries, the most elegant scientific formulation would ever replace.

As to the acceptance of these proposals, we do not expect market leader issuers to take them up promptly, as standardization may harm their margins and market share. As in any market, it is more likely that smaller players, that want to grow their market share, use these proposals as a mean to develop products that are objectively superior to the products of their competitors.

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