

Investor protection

Structured Retail Products – the EU market

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Structured products sold to retail investors in the EU are a significant vehicle for household savings. Certain features of the products – notably their complexity and the level and transparency of costs to investors – warrant a closer examination of the market from the perspective of investor protection. Breaking down the EU market geographically into national retail markets reveals a very high degree of heterogeneity in the types of product sold, although among the vast array of different structured products available to retail investors each market is concentrated around a small number of common types. Changes in typical product characteristics are not uniform across national markets. Analysis both at an EU-wide level and in the French, German and Italian retail markets suggests, however, that the search for yield has been a common driver of several changes observed in the distribution of product types.

A vast array of different kinds of structured products is sold to retail investors across the EU. This article studies the development of the market EU-wide and in selected national markets in recent years.

The total outstanding amount of structured products held by EU retail investors at the end of 2017 was around EUR 500bn.⁷³ In contrast, holdings in UCITS were around EUR 9tn.⁷⁴ Structured products therefore comprise a significant vehicle for household savings in the EU, but are far from being the leading destination for such savings. Previous work by ESMA has determined that the systemic risks associated with the market are low.⁷⁵ However, understanding the evolution of the market is important from the perspective of ESMA's objective to protect investors, due to the characteristics of the products. In particular, the variety of products on offer, their complexity and

the existence of significant costs and charges for retail investors call for continued market surveillance and analysis.

The sheer variety of products on offer can help cater for the different needs of investors by providing different risk and return profiles – such as a degree of participation in an underlying asset with limited downside risk – but at the same time, the breadth of the product range may make it hard for some investors to compare and understand different products. High-quality advice in such situations may be important for these investors.

Product complexity is another potential source of risk for retail investors. Taken individually, the many structured products that fall under MiFID are by definition complex, as they are derivative instruments.⁷⁶ For further insight into market developments and the related risks to retail investors, the binary categorisation into complex

⁷² This article was authored by Esther Hamourit, Alexander Harris and Maximilian Reisch.

⁷³ This figure includes structured products in insurance wrappers, which do not fall within the MiFID framework. It has not been possible to identify the precise proportion of non-MiFID products in the total, but they appear to represent a minority of the outstanding volumes reported.

⁷⁴ See Chart A.110.

⁷⁵ ESMA (2013), "Retailisation in the EU", Economic Report, No. 1, p17. Available at: <https://www.esma.europa.eu/document/retailisation-in-eu>. More detailed analysis of this point is provided in Bouveret, A. and Burkhart, O., (2012), "Systemic risk due to retailisation?", ESRB Macro-prudential Commentaries No.3, July 2012.

⁷⁶ Article 25(4) of directive 2014/65/EU (MiFID II) (in continuation with the previous MiFID framework) allows

investment firms, subject to certain conditions, to provide investment services consisting only of execution, reception or transmission of orders without obtaining client information necessary to assess the appropriateness of the product or the service for the client (so-called "execution-only" regime). One of the conditions for the application of Article 25(4) of MiFID II is that the services relate to products which are non-complex. The relevant framework for the definition of complex products for the purposes of the execution-only regime is thus provided by Article 25(4) of MiFID II as complemented by Article 57 of delegated regulation (EU) 2017/565 (MiFID II delegated regulation on organisational requirements and operating conditions of investment firms) and by the ESMA guidelines on complex debt instruments and structured deposits (ESMA/2015/1787).

and non-complex products under MiFID can be viewed alongside other notions of complexity used in the academic literature explored further below. These notions include the number of payoff features of a product and the number of component financial instruments required to replicate a structured product's payoffs.

Another reason why the retail market for structured products is relevant from an investor protection perspective is that such products may involve substantial costs for investors. Costs, in turn, may relate to complexity. First, complexity - in the sense that a product requires many components - generates costs of manufacture, sometimes known as 'hedging costs', which form part of the costs investors face. Not only the level but also the transparency of such costs is an issue from an investor protection standpoint. Second, recent academic research suggests that greater complexity may be associated with greater levels of risk and that complexity can be used to facilitate the offering of higher 'headline rates' (i.e. potential returns quoted in the names of products or otherwise prominently displayed in product documentation) in a low-yield environment.⁷⁷ Transparency in the levels of risk and return is therefore an issue for investors.

While the provision of structured products to retail investors is of interest for investor protection reasons, some academic research highlights potential benefits of structured products for such investors. Tufano (2003) surveys the wider literature on financial innovation, noting that a common theme in theoretical work is how innovation can address market inefficiencies. This theory posits that structured products may fill a gap in an incomplete market and cater for different investor preferences. Along these lines, recent empirical research by Calvet, C  lerier, Sodini and Vall  e (2018) suggests that the introduction of retail structured products thereby raises both the likelihood and extent of stock market participation among households. The authors offer the explanation that such products are beneficial in mitigating behavioural biases such as loss aversion among retail investors.

The next section of this article defines structured products and describes their different types. Subsequent sections present and analyse data from a commercial provider to identify key market developments, first at an EU-wide aggregate

level and then by focusing on popular types of products sold in selected large national markets. Notable trends are a steady overall decline in EU-wide outstanding volumes over the last 5 years, with investors turning to shorter-term products (mostly substituting from medium-term products) and increasingly to equity-linked products, which now make up the vast majority of structured product sales to retail investors by volume. However, within the three EU countries with the largest sales volumes – France, Germany and Italy – there is considerable variation in the types of products sold and their overall characteristics. For example, in France the term length across all the most popular types of products increased in the 5 years to end-2017, a clear trend not observed at the EU-wide level.

The article goes on to explore the theme of product complexity via certain simple text-based metrics, drawing on approaches and insights recently developed in the academic literature. The results are consistent with the account that product complexity has been somewhat higher following the financial crisis, but more detailed work is needed to substantiate this possibility and to analyse the possible determinants of such a development.

A final topic examined is the level and transparency of the costs investors face. Commercial data are available for the German market for the period 2014-2017, based on structured product providers' self-reported own estimates of intrinsic costs to investors. These data suffer from certain limitations, in that: (i) they are only available for a minority of volume-weighted sales; (ii) intrinsic costs can be measured in different ways; and (iii) by definition intrinsic costs exclude possible extrinsic costs that investors may face when purchasing a product. Subject to these caveats, indicative results suggest that the intrinsic costs borne by retail investors in Germany during the period were broadly comparable across common payoff types and in line with estimates in some previous studies. Furthermore, costs appear to have moderated somewhat in recent years for some payoff types.

Description of structured products

Structured products are investments whose return is linked to the performance of one or more

⁷⁷ C  lerier, C. and Vall  e, B. (2017), "Catering to Investors Through Security Design: Headline Rate and Complexity". *Quarterly Journal of Economics*, Volume 132, Issue 3, 1 August, pp.1469–1508, <https://doi.org/10.1093/qje/qjx007>. See also Henderson,

B., and Pearson, N. (2011), "The Dark Side of Financial Innovation: A Case Study of the Pricing of a Retail Financial Product", *Journal of Financial Economics*, vol. 100, 2011, pp.227–47.

reference indices, prices or rates ('reference values'). Such reference values may include stock indices, the prices of individual equities or other assets, and interest rates. The return on a structured product is determined by a pre-specified formula, which sets out how the product performs in different scenarios defined with respect to the reference value(s). To take just one possible example, if the price of a stock index falls during a given period of time, the formula may determine that the product yields zero return for the investor, who participates to some extent if the index increases in value.

Structured products can be categorised in different ways, but the European Structured Investment Products Association (EUSIPA) provides a reference framework used within the industry, as follows.

Investment products are products for which any downside exposure is no greater than any given percentage price fall in the underlying. These products make up the vast majority (>95%) of the market by volume, and are the focus of this article.⁷⁸ They include the following.

- *Capital protection products* guarantee that a fraction of the investment (usually but not necessarily 100%) will be returned to the investor at maturity, unless a default occurs. There is therefore little scope for major losses, outside of counterparty risk. Within this category there are capped products (which specify a maximum return) and uncapped products.
- *Yield enhancement products* offer capped returns and expose investors to potential losses, which are mitigated by a discount.
- *Participation products* offer uncapped participation in any increase in value of the underlying. The upside participation rate may be greater than 100%, e.g. for outperformance certificates. There is also a 1:1 participation in the decline of the underlying.

Leverage products are products with downside exposure that can exceed a price fall in the underlying in percentage terms. Leverage

products are mostly sold as warrants and include the following.

- *Leverage products with knock-out features.* 'Knock-out' means the product expires prematurely in certain conditions. For example, expiry may be triggered if the underlying increases – or decreases – by a certain amount, or may be triggered if the underlying decreases by a certain amount.
- *Leverage products without knock-out features.* For example, a leveraged tracker certificate.
- *Constant leverage products*, which are often recalibrated on a daily basis.

Many different variants of payoffs are possible within each of these categories. For example, the way a knock-out is triggered can be varied by changing the threshold level of the underlying or the period over which the underlying is measured. Knock-outs may even be triggered based on various statistics calculated from a basket of reference assets. Equally, 'barriers' (which offer limited or conditional capital protection), coupons and participation rates can be varied by the product designer. The large number of different types of payoff precludes an exhaustive analysis of every product type. Instead, to gain insight into key market developments the analysis in this article focuses on certain common payoff types among investment products.⁷⁹ These include the following.

- *Auto-Callable (AC)*, also known as *Knock-Out (KO)*: Typically short-term capital protection products offering a fixed return if the reference asset reaches a given level before a predetermined date, in which case the product matures early. In the event that the provider has the right to trigger early maturity in such a case but this is not effected

⁷⁸ According to the dataset used in this article, around 97% of sales volumes to retail clients across Europe in 2017 were investment rather than leverage products and around 95% of outstanding amounts by volume were investment rather than leverage products.

⁷⁹ Many of the payoffs for investment products have analogous payoffs for leverage products. For example, a Protected Tracker, as described below, offers 1:1 participation in the underlying, typically between a knock-

out on the upside and a barrier on the downside. A leverage product with knock-out features could be similarly structured but offer greater than 1:1 participation over a range of values of the reference asset. An exception to this correspondence between investment and leverage product payoffs is that by definition leverage products cannot offer 100% capital protection, so products with such protection must be investment products.

automatically, the product is designated *Callable (CA)*.

- *Capped Call (CC)*: A capital protection product that offers capped participation in any increase in value of the underlying.
- *Floater (FL)*: A capped capital protection product that offers a coupon with a fixed element and a variable element, with the latter depending on the performance of a reference value.
- *Portfolio Insurance (PI)*: An uncapped capital protection product that typically offers synthetic participation in the performance of a fund.
- *Protected Tracker (PT)*: A participation product with 1:1 participation in the underlying, typically up to a knock-out level (at which point the product expires with a maximum return). The ‘protection’ in a PT may be a positive minimum return but is often a barrier set considerably below the strike price, meaning that if the underlying price falls below this barrier there is then 1:1 downside participation.
- *Reverse Convertible (RC)*: A yield enhancement product. Some RCs have a ‘knock-out’ feature, meaning that under certain conditions the product expires prematurely. Typically, the product is knocked out if the price of the underlying rises above a certain level. Some RCs have a ‘knock-in’ feature, also known as a ‘barrier’, meaning that under certain conditions the payoff function changes. For example, if the underlying price never falls more than 20% below the strike price prior to expiry, the investor receives at least 100% of their capital at expiry, but if the price does fall more than 20% below the strike price prior to expiry, there is 1:1 downside participation.
- *Uncapped Call (UC)*: An uncapped capital protection product that replicates the payoffs of a call option.

Some of these popular payoff types involve greater levels of risk, return or complexity (in the sense of the number of features of the payoff

function) than others. For example, a CC involves an additional feature – namely, a capped return – compared to a UC. Both products provide capital protection but may offer different expected returns even if they have the same underlying.

Additionally, within each of the popular payoff types listed above there is scope for varying levels of risk, return and complexity. For instance, RCs may include a ‘barrier’, as described above, to mitigate some downside risk (while retaining downside tail risk). Alternatively, downside risk may be mitigated by applying a discount.

Data used

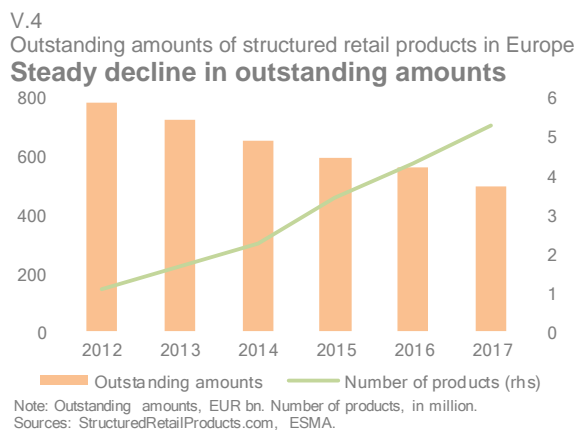
The analysis in this article uses data from *StructuredRetailProducts.com*, a large commercial database of structured retail products issued internationally in many different jurisdictions.⁸⁰ The sample covers Euro-denominated issuances in EU countries since 2006, for which the database includes around 60 different products. Many variables are reported for each product, including a text description in English (composed by the data provider) of the product and its payoffs, the volume issued, the minimum return,⁸¹ the offer date, strike date and expiry date. Some variables are only available for products that have already matured, such as ex-post annualised returns. Coverage of different variables varies. Annualised returns are recorded for less than 2% of products by volume and by number, and so ex-post returns are not studied in this article. According to an estimate by the data provider, coverage of the volume variable in the dataset used is around 80% of all the products on which some data are available. One reason for this incompleteness is that in a significant number of cases products are offered in the retail market but never sold. Market intelligence suggests that there may also be significant private placements for which firms choose not to provide data in the first place. As issuers provide data to the data provider on a voluntary basis and there is no exhaustive register of such products in a single source elsewhere, it is not possible to derive a reliable estimate of the coverage in the database of numbers of products, compared to the product population as a whole.

⁸⁰ No regulatory data are available on structured retail products in the EU, and ESMA has no legal basis to request relevant data from market participants. ESMA cannot ascertain the quality or accuracy of the data used from *structuredretailproducts.com* and does not therefore take responsibility for any errors or omissions resulting from the content of this commercial data source.

⁸¹ The level of capital protection for different products can be inferred from the minimum return.

Overview of the EU retail market

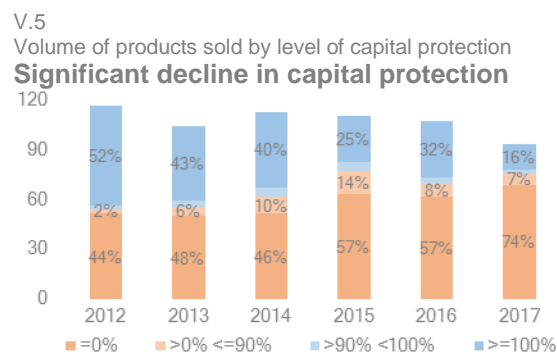
The retail market for structured products accounts for around 4% of EU households' financial net worth.⁸² A long-term trend for the past several years has been a steady and gradual decline in **outstanding amounts** of structured products (V.4).



In 2017, volumes outstanding stood at around EUR 500bn, down from almost EUR 800bn in 2012. At the same time, the number of outstanding contracts continued to rise, passing the five million mark. The decline in volumes may be related to the supply side, also in the light of changes in market practices, and the regulatory environment. An increasing number of products have been listed on exchanges. On-exchange products tend to be issued in smaller volumes than OTC products, the latter typically being sold through large distribution networks. Several regulatory changes have characterised this market in recent years, both country-specific and EU-wide, aimed at enhancing consumer and investor protection.⁸³

Structured products can be classified by the level of **capital protection** they offer the investor, ranging from products with a capital guarantee of greater than 100% (i.e. a guaranteed return) to those with no capital protection (i.e. the capital is at risk if underlying assets fall in value). In the six years to 2017, the share of 100% capital-protected products declined by 36pps; the share of capital-at-risk products increased accordingly by the same amount (V.5). This trend is likely to be at least partly attributable to the low interest rate environment and the consequent search for

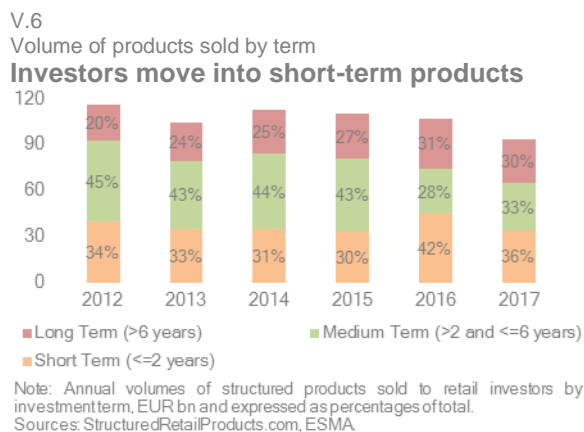
yield by investors, though supply factors may of course also be an important determinant. Consistently, more than 99% of products issued by number (as opposed to around two-thirds of market share by volume) have zero capital protection. Capital-protected products tend to be more standardised and are thus typically larger in volume but far fewer in number than capital-at-risk products. This development also implies, ceteris paribus, that the risks to retail investors in structured products increased significantly on average over the period.



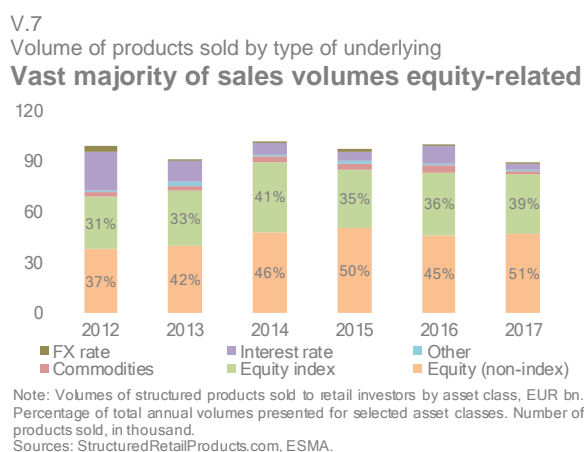
Another variable of interest is the **term** of a structured product (V.6). While the vast majority of products (with respect to the number of products issued) are short-term (< 2 years), as regards volumes the split is more even between short-term, medium-term (2–5 years) and long-term (> 5 years) products. In 2016 short-term products registered higher sales by volume (42%) than either long- or medium-term products (V.6). Data for 2017 indicate a less marked but somewhat similar split among the different term categories of structured retail products, with short-term products still making up a larger share of sales volumes than from 2012 to 2015.

⁸² EU households' financial net worth stood at around EUR 24tn in 4Q17 (A.153), compared with outstanding amounts of structured retail products in the EU of around EUR 500bn in Dec 2017, according to the dataset used in this article. By way of comparison, total NAV in UCITS was around EUR 9tn (A.110).

⁸³ For further details on the evolution of the EU regulatory framework, see ESMA Opinion (2014), "Structured Retail Products – Good practices for product governance arrangements".



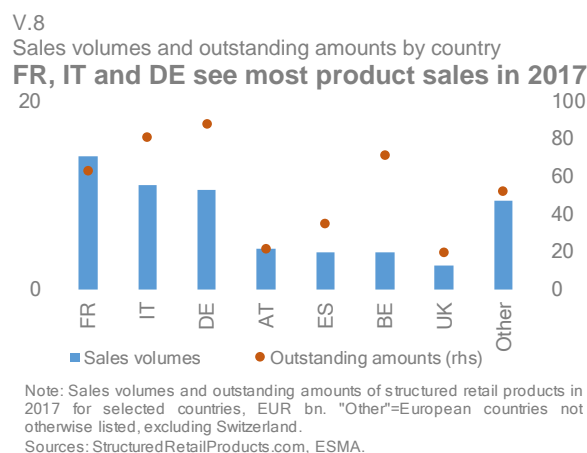
The vast majority of **sales volumes** – around 90% in 2017 – relate to products that take equities or equity indices as their underlying, as opposed to other types of underlying such as interest rates, exchange rates or commodities (V.7). This share has grown over the last few years, while sales volumes of products with the next-most popular type of underlying, interest rates, fell to 4% in 2017, down from 23% in 2012. This trend may be connected with the very accommodative monetary environment. Retail investors may have come to expect interest rates would remain near the lower bound during this period and hence looked to riskier assets for real returns.



Country-specific case studies

In addition to focusing on the most commonly-sold products in terms of payoff types, analysis of some of the largest national retail markets for structured products in the EU also provides detail to complement the EU-wide picture. In particular, attention in this section is devoted to the most popular payoff types (specifically, the top five products by volume sold from 2005 to 2017) in three large national markets – France, Germany

and Italy – as measured by sales volumes. One reason for focussing on these markets is their size: they were the leading three countries by sales volumes in 2017, together comprising around 60% of total sales (V.8). In terms of outstanding amounts, Germany and Italy came first and second respectively, followed by Belgium, then France. Sales volumes in 2017 in Belgium were relatively low, however, having suffered a large drop in volumes in 2008 following the financial crisis. France, Germany and Italy together comprised around half of outstanding volumes of structured products in 2017. Another reason for a country-specific analysis in these markets is that they exhibit considerable heterogeneity, highlighting the variation in national market characteristics according to factors such as (i) investor preferences; (ii) different tax regimes; (iii) historical differences in distribution channels, e.g. the popularity of exchange-based products in Germany versus predominantly bank-based distribution to retail investors in Italy.



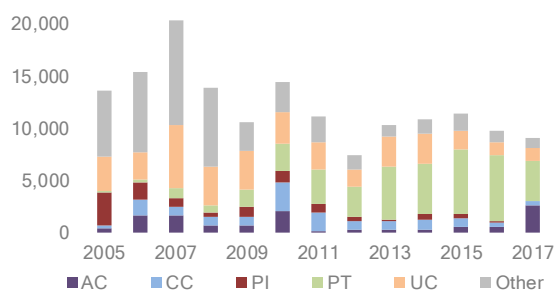
Country-specific analysis reveals certain changes in the types of product and the risk-return profile taken on by investors. In some cases, further insight is gained by examining the extent to which additional features are present among certain types of product. For instance, the prevalence of a “worst of” feature among reverse convertibles monitoring for other features such as barrier level may indicate a change in risk profile within this segment of the market.

France: AC and PT products on the rise

The retail market for structured products in France has been characterised in recent years by a move from capital protection products such as Portfolio Insurance products and uncalled calls to protected trackers (V.9). The latter are participation products, offering some downside

protection but retaining exposure to downside tail risk, as explained above. A driver for this development may be increasing search for yield among retail investors in the country.

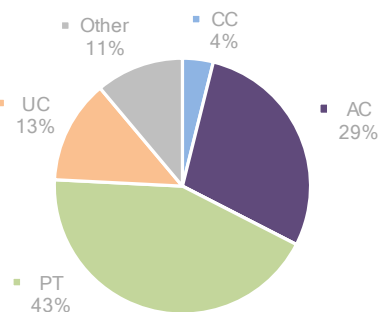
V.9
Sales volumes by payoff type in France
More protected trackers sold in recent years
25,000



Note: Sales volumes of products in France by year and by selected payoff types, EUR mn. "AC"=Autocallable. "CC"=Capped Call. "KO"=Autocallable (or Knock-Out). "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call. Sources: StructuredRetailProducts.com, ESMA.

For clarity, sales volumes in 2017 are set out in Chart V.10.

V.10
Sales volumes by payoff type in France in 2017
Protected trackers lead 2017 sales



Note: Shares of sales volumes in France in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible. Sources: StructuredRetailProducts.com, ESMA.

Another variable of interest in characterising the structured products sold to retail investors is the term of the product. All else being equal, longer-term products may offer higher annualised expected returns than shorter-term products, as investors tie up their capital for longer, but other influencing factors are the outlook for the underlying market and the interest rate environment. Relative demand for shorter-term compared to longer-term products is also likely to be increasing in households' liquidity requirements. In the case of the retail market in France, the period 2005-2017 saw an upward trend in the average term of all the most popular payoff types (V.11), in contrast to the declining trend seen EU-wide (V.7).

V.11
Average term by payoff type in France
Term increasing across payoff types

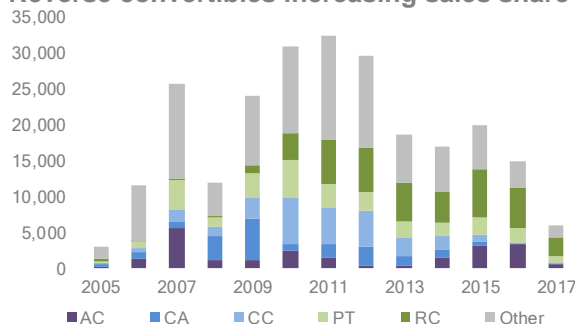


Note: Average term of products sold in France, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CC"=Capped Call. "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call. Sources: StructuredRetailProducts.com, ESMA.

Germany: drop in sales in 2017

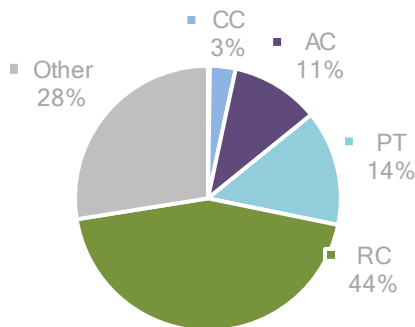
Following the financial crisis, the retail market for structured products in Germany has seen growth in demand for reverse convertibles, while sales volumes of products such as capped calls and auto-callables have declined sharply (V.12). The latter effect has dominated the former, leading to lower overall sales volumes through 2017. As in other markets, search for yield is likely to have been a significant driver of these developments; but specific to the German market as opposed to the other domestic markets examined in depth here (France and Italy) is the resulting demand for reverse convertibles which, as yield-enhancement products, do not offer complete capital protection. To the extent downside risk may be mitigated by a barrier, such products also take on additional complexity.

V.12
Sales volumes by payoff type in Germany
Reverse convertibles increasing sales share



Note: Sales volumes of products in Germany by year and by selected payoff types, EUR mn. "CA"= Callable. "CC"=Capped Call. "KO"=Autocallable (or Knock-Out). "PT"=Protected Tracker. "RC"=Reverse Convertible. Sources: StructuredRetailProducts.com, ESMA.

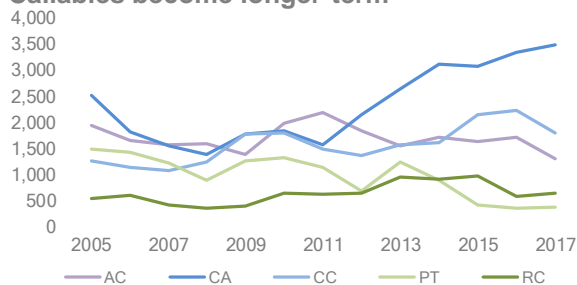
V.13
Sales volumes by payoff type in Germany in 2017
Reverse convertibles lead 2017 sales



Note: Shares of sales volumes in Germany in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

Examining the average term length of products sold in Germany over time reveals widening dispersion between different payoff types, with reverse convertibles consistently fairly short-term on average – under three years throughout 2005-2017 – while callables have increased significantly from a low in 2008 of around four years to over nine years in 2017 (V.14). At the same time, such products have become a more niche part of the market (V.13), suggesting the profile of the average investor may be different, resulting in changes in demand.

V.14
Average term by payoff type in Germany
Callables become longer-term



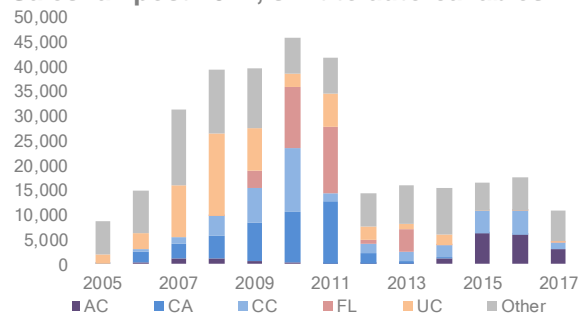
Note: Average term of products sold in Germany, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CA"= Callable. "CC"=Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

Italy: subdued sales, ACs dominate

In Italy, the market for investment products in general has traditionally featured significant holdings of debt instruments, rather than other investments such as equities. This tendency has also been broadly observed specifically in the retail market for structured investment products, with coupon-bearing products such as floaters and callables representing the majority of sales in

2010 and 2011, for example, and auto-callables the top-selling payoff type in each of the three calendar years to end-2017 (V.15). However, following 2011 the Italian retail market for structured products appears to have witnessed a collapse in sales volumes overall, possibly influenced by concerns at the time around the creditworthiness of issuers in corporate and sovereign debt markets.

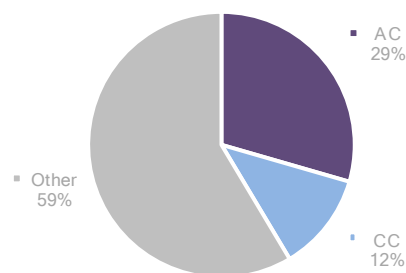
V.15
Sales volumes by payoff type in Italy
Sales fall post 2011, shift to auto-callables



Note: Sales volumes of products in Italy by year and by selected payoff types, EUR mn. "CA"=Callable. "CC"=Capped Call. "FL"=Floater. "KO"=Autocallable (or Knock-Out). "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA

In Italy, average terms appear fairly stable across popular payoff types from 2005 to 2017, with the exception of uncapped calls, whose average term increased substantially to around eight years in the two years to end-2017 (V.16).⁸⁴

V.16
Sales volumes by payoff type in Italy in 2017
Auto-callables and capped calls popular



Note: Shares of sales volumes in Italy in 2017, selected payoff types. "AC"=Auto-callable. "CC"=Capped Call.
Sources: StructuredRetailProducts.com, ESMA.

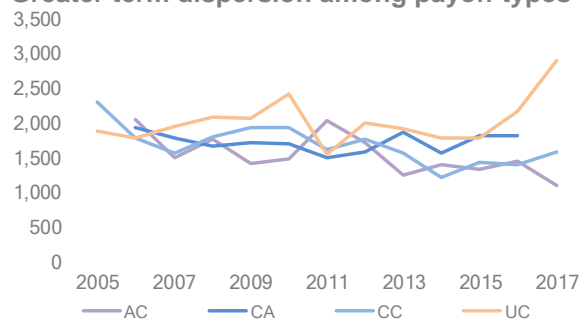
As other payoff types have, on the whole, seen moderate decreases in average term over the same period, this has generated an increase in the dispersion of average terms between different payoff types (V.17).

⁸⁴ FL was the product type with the fifth-highest issuance volumes over the sample period. Average FL terms are

omitted from V.17 since zero volume was issued for this product in 2015, according to the data.

V.17

Average term by payoff type in Italy

Greater term dispersion among payoff types

Note: Average term of products sold in Italy, by selected payoff types, unweighted averages, in days. "AC"=Autocallable. "CA"=Callable. "CC"=Capped Call. "UC"=Uncapped Call.

Sources: StructuredRetailProducts.com, ESMA.

Product complexity

Another metric studied in the context of the national markets examined in this section is the length of the product description for different product types. Clearly, the length of the product description is a far from ideal measure of product complexity, since various factors besides complexity can influence it. For instance, differences in style between the analysts manually composing the descriptions may explain some variation. Another possibility is that a relatively long section of text may describe a single and intuitively simple or straightforward feature of a product. Finally, altered practices by providers, for instance following regulatory changes, can drive changes in product descriptions.

In interpreting complexity metrics, besides noting limitations in the metrics employed it is also worth considering that complexity may in some cases be the result of catering to investor risk preferences, as outlined in the Introduction. However, as also noted there, complexity nonetheless remains a concern from an investor protection perspective.

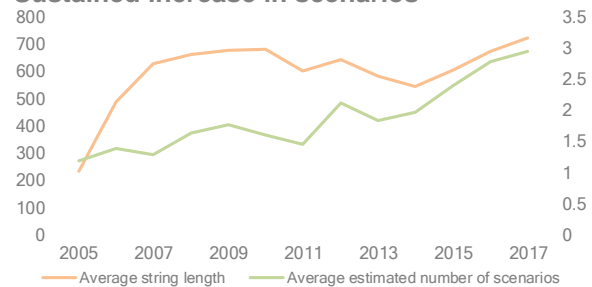
Recent academic research using a large sample of comparable data from the same commercial database as employed in the present analysis, and covering the years 2002-2010, analysed product complexity with reference to three metrics.⁸⁵ The most prominent of these was a measure of the number of features a product has that require lengthy manual analysis.⁸⁶ A second measure was the number of 'scenarios' involved

in a product's payoffs, estimated by calculating the number of conditional subordinating conjunctions in the product description such as "if", "when" and "whether" in the text description of the payoff formula. Examples of the scenarios which an approach of this kind attempts to measure are the breaching of a knock-in barrier below the strike price (thereby removing conditional downside capital protection) and a knock-out above the strike price capping the product's return. The final measure was the length of the description. The research indicated a reasonable degree of consistency of text length with the more sophisticated measures, motivating the examination of this simple measure in the present analysis. Where ostensible trends in product complexity based on the analysis of description length may be present, further quantitative and qualitative analysis could potentially uncover notable developments, as outlined below.

The use of two simple text-based complexity metrics – a measure of the number of characters used in the description of the product recorded in the data set, and a measure of the number of 'scenarios' as explained above, suggests a slight upward trend in complexity, consistent with academic research (V.18).

V.18

Text-based proxies for product complexity in France

Sustained increase in scenarios

Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by year, averages weighted by sales volume in a given year. "Average string length"=arithmetic mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=arithmetic mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.

Sources: StructuredRetailProducts.com, ESMA.

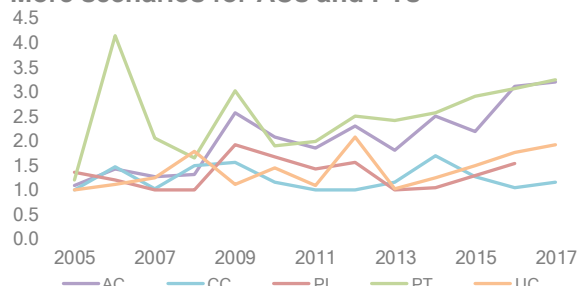
To gain further insight into the estimates of complexity, it is possible to break down the data by payoff type (V.19). This suggests that auto-callables and protected trackers exhibit higher complexity than some of the other popular types of product, possibly associated with the conditions around the knock-out feature of the

⁸⁵ Célérier, C. and Vallée, B. (2017), "Catering to Investors Through Security Design: Headline Rate and Complexity". Quarterly Journal of Economics, Volume 132, Issue 3, 1 August, pp.1469–1508, <https://doi.org/10.1093/qje/qjx007>

⁸⁶ 'Features' in this sense captures not only kinks in the payoff profile but also other dimensions such as path-dependence of payoffs.

former and the barrier feature of the latter. The increase in overall apparent complexity of products in France according to the text-based analysis described above appears to be largely attributable to an increase in complexity of the product descriptions for these products.

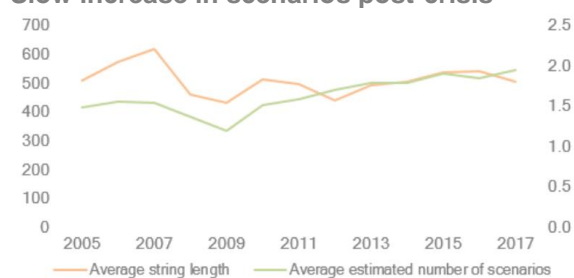
V.19
Text-based proxies for product complexity in France
More scenarios for ACs and PTs



Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-callable. "CC"=Capped Call. "PI"=Portfolio Insurance. "PT"=Protected Tracker. "UC"=Uncapped Call.
Sources: StructuredRetailProducts.com, ESMA.

Simple complexity metrics do not reveal a clear trend in recent years in Germany (V.20), although it does appear that average product complexity as proxied by textual analysis of numbers of scenarios may have been somewhat elevated from around 2010 to around 2015.

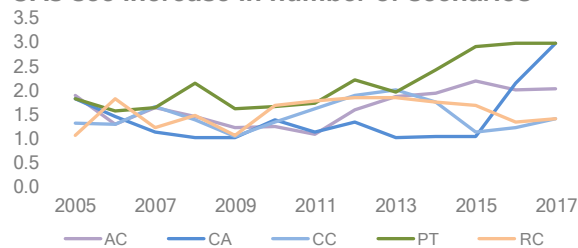
V.20
Text-based proxies for product complexity in Germany
Slow increase in scenarios post-crisis



Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com dataset for products sold in Germany, by year, averages weighted by sales volume in a given year. "Average string length"=weighted mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.
Sources: StructuredRetailProducts.com, ESMA.

Looking at the number of scenarios by payoff type, an interesting development over 2015 to 2017 is the apparent increase in complexity in callables, traditionally a relatively simple product according to the text-based metric.

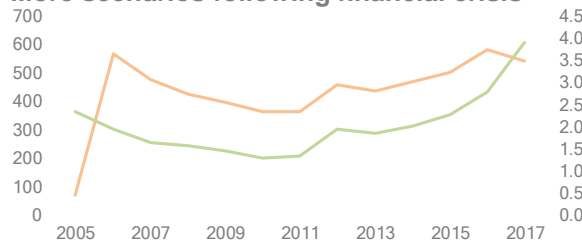
V.21
Text-based proxies for product complexity in Germany
CAs see increase in number of scenarios



Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in France, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-callable. "CA"= Callable. "CC"= Capped Call. "PT"=Protected Tracker. "RC"=Reverse Convertible.
Sources: StructuredRetailProducts.com, ESMA.

In Italy the estimated number of scenarios increased substantially from 2015 to 2017 (V.22). Earlier in the sample period, the number of scenarios had been relatively low compared to France and Germany, consistent with the profile of the products in terms of payoff types (V.21), indicating the popularity in the Italian retail market of debt securities that might be expected to have relatively simple payoffs.

V.22
Text-based proxies for product complexity in Italy
More scenarios following financial crisis

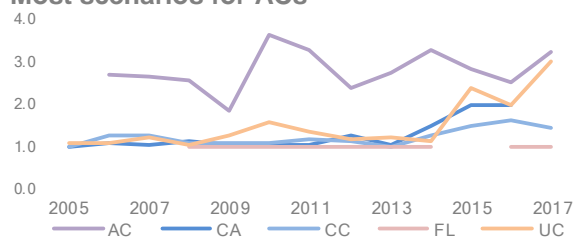


Note: Text-based metrics applied to product descriptions in StructuredRetailProducts.com dataset for products sold in Italy, by year, averages weighted by sales volume in a given year. "Average string length"=arithmetic mean of number of characters in product descriptions for this sample. "Average estimated number of scenarios"=arithmetic mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description.
Sources: StructuredRetailProducts.com, ESMA.

More insight is obtained by examining the metric as applied to individual payoff categories. As in the French and German markets, auto-callables are estimated to be relatively complex in terms of numbers of scenarios (V.22). The increase in popularity of these products in Italy (V.23) therefore explains the rise in overall measured complexity in the national market.

V.23

Text-based proxies for product complexity in Italy

Most scenarios for ACs

Note: Text-based metric of average estimated number of scenarios applied to product descriptions in StructuredRetailProducts.com dataset for products sold in Italy, by selected payoff types, by year, averages weighted by sales volume in a given year. Metric is weighted mean of the sum of 1 and the number of times the words/phrases "if", "or", "whereas", "in all other cases" are used in a product description. "AC"=Auto-Callable. "CA"= Callable. "CC"=Capped Call. "FL"=Floater. "UC"=Uncapped Call.

Sources: StructuredRetailProducts.com, ESMA.

Costs and pricing transparency

In addition to examining developments in the types of product payoff attracting demand, the data used provide insight into the costs and charges faced by retail investors in these products in Germany. Unlike in many other EU countries, issuers in Germany have for some time reported their *Estimated Initial Value* (EIV) of each product, values captured in the database.⁸⁷ EIV expresses the expected value of the product as a percentage of the estimated fair value. Taking the difference between EIV and 100% therefore yields an estimate of the intrinsic cost incurred by the retail investor.

Structured products can be understood as products that combine at least two single financial instruments, at least one of which is a derivative (Das (2000)). The law of one price thus suggests that a structured product's price can be calculated simply by adding together the prices of its components.

For example, in options markets a reverse convertible is a bond that can be exchanged for shares of common stock at the discretion of the issuer. A long position in a reverse convertible can therefore be replicated by a long position in a coupon-bearing bond issued by the issuer of the reverse convertible and a short position in a put option, i.e. a written put. A structured product with reverse convertible payoffs can be similarly priced or valued.

Approaches to replication

If prices are not disclosed by the issuer, or the credibility of the issuer's disclosure is questionable, own estimates can be made. To arrive at a fair price for a structured product, the components of the respective structured product must be identified. For every structured product, there are many ways to replicate its payoff structure. For example, a reverse convertible can be replicated by a long position in a bond and a short position in a put option or by a combination of bonds, a short call, and a forward contract. Nevertheless, economic reasoning suggests that the replication of the structured product with the least products possible is the most efficient one.

Two approaches exist to find the prices of different structured product components. One is to observe the prices of the components that are traded on an exchange and use a financial model for those that are not traded. This approach, used by e.g. Szymanowska et al. (2008), uses few assumptions. However, it will not always be possible to find the respective components on an exchange, as the component sometimes does not exist, or there is no incentive to trade it on an exchange.

Another approach is to use a financial model for all components of the structured product. This approach does not run the risk of issuer bias and virtually every option can be priced. However, using a financial model for the option component can be time-consuming. Additionally, decisions have to be taken with respect to the model that will be used and the inputs. These decisions, as for example the assumed volatility, can significantly impact the price. Replicating prices using financial models is by far the most common approach taken in research. A detailed summary of the results of this approach can be found in Bouveret et al. (2013).

Findings from the literature

Estimating prices requires specific data for each product and the use of a model for the underlying, as described above. A number of empirical studies on structured retail products have been carried out. Significant premia (intrinsic costs to investors) are typically found, with estimated average premia usually ranging between around 2% and 9%. As might be expected, the results

⁸⁷ Since May 2014 members of the German derivatives association, the Deutscher Derivate Verband (DDV), have disclosed to the For approval by written procedure (58) - 18.00 CET - Monday 20th August 2018 - Trends, Risks and Vulnerabilities (TRV) No.2, 2018, and the

vary by market, by the type of product analysed and by the analysis period.

In 2013, ESMA published a report on retailisation in the EU.⁸⁸ Part of the report estimated the costs faced by retail investors across a sample of different types of structured products, across several EU countries. EIV was 96% in the case of capital protection products and 94% in the case of other products, with yearly associated costs of 1.2% and 2.1% respectively. There was significant variation in the figures, with the 10th percentile of EIV standing at 90.0% and the 90th percentile at 99.6%.

The results of several similar studies in the US and for some European countries over the last two decades paint a broadly consistent picture (V.24), though there is some variation in results over time and between different payoff types and countries.⁸⁹ Other studies report that the mark-up differs from the primary market to the secondary market. Within the same type of SRPs, the time until expiration, the complexity of the product, the issuer's method of pricing and competition can also affect the level of mark-up.

V.24

Summary of literature on EIV of structured retail products

Study	Country & time period	Products	EIV	Cost
Bertrand & Prigent (2014)	FR, 2014	Structured funds	93%-98%	2%-7%
Burth et al (2001)	Switz., '01	RCs and DCs	97% (RCs); 99% (DCs)	3% (RCs); 1% (DCs)
Joergensen et al (2011)	DK, '98-'01	Principal protected notes	94%	6%
Stoimenov & Wilkens (2005)	DE, 2005	Equity-linked products	95%-99%	1%-5%
Szymanowska et al (2008)	NL, '99-'02	RCs	94%	6%
Wilkens et al (2003)	DE, '03	RCs and DCs	97% (RCs); 96% (DCs)	3% (RCs); 4% (DCs)

Note: "EIV"=average Estimated Initial Value of sample of products studied. Cost is estimated intrinsic cost to investor at issuance and is not annualised. Cost=1-EIV. "RCs"=Reverse Convertibles. "DCs"=Discount Certificates. Figures rounded to nearest percentage point.

Tentative evidence from Germany

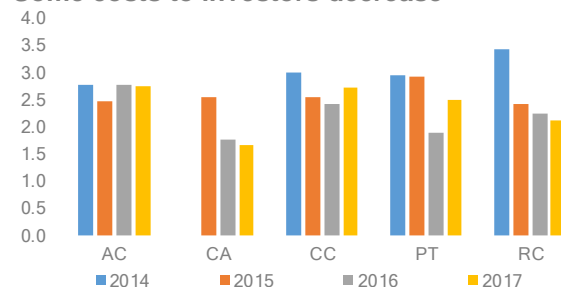
The intrinsic value of structured products typically comprises much of the premium paid by retail investors to the issuer, though it is also possible that products may be sold with additional fees or

charges. It is important to note that such fees and charges are not considered here.

In Germany, several issuers have reported EIV on a voluntary basis in the last few years, and coverage of the relevant variable in the data set was around 20% in each of the years 2014-2017 (having been zero before 2014). The simple averages of the relevant variable in the data set for these years may therefore not be representative of true average costs facing investors due to sample bias. The data are self-reported, and providers may use different pricing methodologies, as discussed above. However, the coverage of the variable is stable over time and across payoff types in the sample, meaning that trends within and across payoff types are likely to be informative.

V.25

Issuers' self-reported estimated initial values in Germany
Some costs to investors decrease



Note: Estimated intrinsic cost of product at issuance as a percentage of amount invested, as reported by issuer and recorded in StructuredRetailProducts.com data set. Costs are for term of product and not annualised. Sources: StructuredRetailProducts.com, ESMA.

Turning to these trends, the discernible increase in intrinsic cost in the case of callables and protected trackers (V.25) is not explained by changes in term length (V.14), as the terms for these products did in fact increase towards the end of the years sampled. Consequently, it appears that the costs facing retail investors in these products in Germany may have fallen somewhat from 2014 to 2017.

Conclusions

Monitoring the retail market for structured products in the EU is relevant to ESMA's objective of ensuring investor protection. Analysis of commercial data covering recent years highlights two important developments regarding the EU-wide retail market.

- Recent years have seen an overall decline in outstanding amounts, consistent with a declining trend in sales volumes despite a

⁸⁸ See ESMA (2013).

⁸⁹ For ease of exposition, the intrinsic cost (equal to 100% minus EIV) is presented alongside EIV in Table V.24 .

moderate shift from medium-term to shorter-term products.

- Capital protection products have declined as a share of sales and of outstanding volumes, indicating that investors are taking on more risk, possibly as part of search-for-yield behaviour.

Breaking down the EU market geographically into national retail markets reveals a very high degree of heterogeneity in the types of product sold, warranting a country-specific analysis to gain additional insight into key developments. Key insights from national markets are as follows:

- The data suggest that sales volumes in Italy fell sharply in 2012, unlike in France and Germany, the other two national markets examined.
- While the EU-wide trend has been towards decreasing product terms on the whole in recent years, average terms have increased steadily in France among all the most popular payoff types.
- A particular characteristic observed on the German market is that reverse convertibles have grown as a share of sales in recent years, suggesting that investors are willing to take on significant downside exposure in searching for yield.

The market in Germany is of particular interest because several issuers have, on a voluntary basis, provided estimates of costs to investors in recent years, supporting the following tentative finding:

- While the costs investors pay are sizeable, in keeping with the literature on the topic, there is some evidence of a moderation in costs over the years 2014 to 2017. However, more work will be needed in future to provide a fuller analysis and to gain insight into costs and charges elsewhere in the EU. This will be all the more important given the marked heterogeneity between different Member States.

Finally, simple text-based measures of product complexity, while far from definitive, provide some insight into this potential source of risk to investors. Applying these measures to the dataset suggests the following conclusions:

- Results in the different national markets examined – France, Germany and Italy – are consistent with findings from the literature

that complexity may have increased shortly following the financial crisis.

- Auto-callables and protected trackers are relatively popular products but appear to involve a comparatively large number of scenarios compared to other leading payoff types.
- In Italy in particular, increases in the estimated number of scenarios are associated with a higher uptake of auto-callable products.

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