Salient Attributes and Household Demand for Security Designs

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Abstract

Using a novel database of complex securities, I study how salient attributes of security design distort household investment decisions. I show banks add non-standard (fine-print) conditions to artificially increase advertised headline returns—a phenomenon I term "enhancement." Enhancement increases headline returns by 11 percentage points, on average, but does not increase realized returns. Flexibly controlling for all other product attributes and using high-frequency shocks to structuring costs of enhancement for identification, I find demand is highly elastic to enhancement. Enhancement is costly to investors: a one standard deviation decrease implies savings of more than $1 billion in fees.

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1 Introduction

The goal of financial engineering is often to enhance some desired product attributes. For example, pooling and tranching of mortgages creates safer AAA-rated securities, portfolio insurance decreases downside risk, and packaging mutual funds into variable annuities increases equity exposure. The rational theory assumes investors can accurately assess all attributes and choose products that maximize utility. Evidence from psychology, however, suggests that the framing and presentation of product attributes may induce systematic choice errors. Such errors have been argued to play a role in the proliferation of innovative securities, such as when salient AAA ratings of mortgage-backed securities likely exaggerated the perception of safety prior to the 2008 crisis. Recent models of behavioral inattention and salience (see Bordalo, Gennaioli, and Shleifer 2022 and Gabaix 2019 for reviews) provide the psychological mechanisms for why consumers are overly affected by the product salient attributes and how such salient thinking generates reaching for yield (Bordalo, Gennaioli, and Shleifer, 2016).[1]

In this article, I test whether households are overly influenced by salient product attributes in one particular complex environment: the multi-trillion market for structured products.[2] The products I study (yield enhancement products, or YEPs) are characterized by two saliently advertised rates: headline return and downside protection level. I show issuers add non-standard conditions to artificially increase these rates—a phenomenon I term "enhancement". Enhancement is artificial in the sense that it is largely irrelevant for both expected and realized returns. The key empirical finding is that, nevertheless, demand is highly elastic to enhancement.

I choose to focus my attention on a market for packaged securities for three reasons. First, the payoffs of the products are entirely characterized by a few pre-determined attributes and

[1] While many financial innovations share this narrative of initial overweighting of salient attributes and neglect of others (Gennaioli, Shleifer, and Vishny, 2012), careful empirical investigations of these issues have been scarce. Indirect evidence includes, e.g., Coval, Jurek, and Stafford (2009a), wh show that the pricing of MBSs is consistent with neglect of risk and overweighting of AAA ratings. Célérier and Vallée (2017) show that the design of European structured products is consistent with catering to yield-seeking investors.

[2] As of May 2022, global outstanding volume is estimated at $2 trillion. America and Europe each account for approximately $0.5 trillion and Asia for $1 trillion (see `https://www.structuredretailproducts.com/news/details/78173`).

banks often issue near-identical substitutes that differ only in their security design. This allows me to flexibly control for all other attributes and determinants of expected returns and demand. Second, using prices of listed options I observe high-frequency variation in YEP production costs which lend themselves well to a cost-based instrument. Importantly, the timing of supply decisions about salient attributes and demand decisions about purchased amounts are cleanly separated. These unique features of the setting allow me to isolate the causal effect of enhancement on investor demand. Third, investors—purchasing on average more than $50,000 of a single product—attempt to choose the best product. Therefore, finding distortion in this high-stake environment is a particularly compelling case for the importance of behavioral inattention in individual decision-making.

To fix ideas, consider the following product examples. Figure 1, Panel A, describes the payoff diagram of the simplest product variant: an investor receives 9.5% return unless the price of the underlying falls by more than 20% protection level at maturity. Otherwise, the return is lowered by the fall in the price of the underlying below the protection level. I call this security design plain vanilla as it does not include any additional conditions, and it is equivalent to writing a plain-vanilla put option. Figure 1, Panel B, describes the payoff diagram of a nearly identical product issued on the same date by the same issuer and linked to the same underlying stock. In addition to the simple design, however, this product includes a knock-in barrier option which effectively weakens the downside risk protection: if the price of the underlying falls below the protection level on *any date* before maturity (i.e. not only at maturity), the investors participate in *any fall* (i.e. not only fall below the protection level) in the price of the underlying. This weaker protection allows the issuer to offer more attractive headline rates: 18% headline return and 35% protection level. I call this mechanism headline enhancement.

In an ideal test, one would compare products with the same state-dependent payoffs that differ only in the display or framing of headline rates and additional conditions. In reality, headline rates vary for many reasons. On top of the role of additional conditions, a product may also offer a higher headline rate because its fair value or pricing conditions (such as the risk-free rate or implied volatility) are more favorable. A key advantage of my data is that I observe the products' (mark-to-market) fair values and production costs. I use these

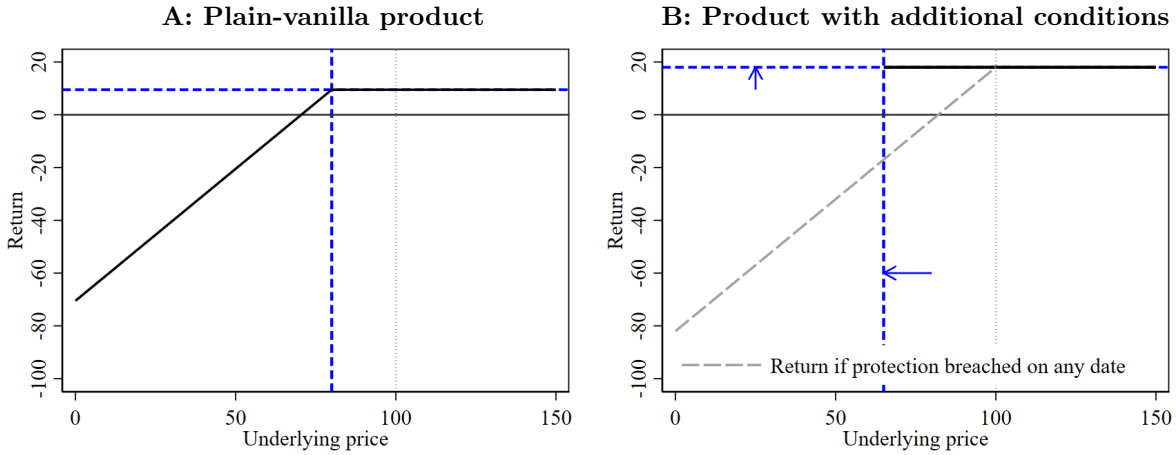

Figure 1. Payoff Diagrams
The figures show payoff diagrams for two nearly identical products issued on the same date by the same bank and linked to the same underlying stock that differ only in their security design. Plain-vanilla product (Panel A) pays a 9.5% headline return (marked with a horizontal blue line) if the price of the underlying does not fall by more than 20% downside protection (marked with a vertical blue line). The product with additional conditions (Panel B) includes a knock-in barrier option which enhances its headline rates: 18% headline return and 35% protection.

variables to isolate the fraction of headline rates attributable to additional conditions. To that end, I quantify a measure of headline enhancement defined as the spread in headline returns between the product and a plain-vanilla counterfactual product of the same fair value. A salient fact revealed by my analysis is that the enhancement of headline rates is substantial. The average product offers an 11 percentage point higher headline return than what a plain-vanilla product could offer.

With the enhancement measure in hand, I show that it is associated with higher sales. The economic magnitudes are large. The coefficients imply that enhancing the headline return by one percentage point increases sales by an amount equivalent to a 50 basis points reduction in fees. In dollar terms, a one percentage point increase in headline enhancement in associated with a $86,660 increase in sales, or 4% of the sample average.

Of course, other factors could affect the relation between headline enhancement and sales. However, a notable advantage of my setting is that the payoffs of YEPs are entirely characterized by a few pre-determined attributes. Moreover, each month the issuing banks offer a menu of products sharing the same attributes, such as maturity and the underlying asset. The setting thus allows me to flexibly control for all product attributes and determinants of

expected returns. In my most saturated specification, I control for the product fair value, which effectively controls for the expected return under the risk-neutral measure, as well as for the interaction of month × underlying × issuer × maturity fixed effects, which capture any underlying-time-specific, bank-time-specific, and maturity-time-specific demand shocks. I also show that the result is robust to controlling for the commissions paid to brokers and therefore is unlikely driven by sales-force incentives.

While the evidence is consistent with investors being affected by headline enhancement, it remains possible that an omitted variable drives the result. I next show that I obtain similar results using a cost-based instrumental variable that better accounts for potential omitted factors. I instrument for headline enhancement with the structuring cost of enhancement which I calculate from the prices of listed options. The instrument is based on the standard approach exploiting variables shifting supply to identify demand and combines variation in implied volatility across time and underlying assets with cross-sectional variation in the sensitivity of security designs to changes in volatility.

A unique feature of the setting is that the timing of supply decision about design and demand investment decision are separated. The headline rates are fixed prior to the beginning of the offering period over which investors can purchase the products. At these fixed rates, issuers offer fully elastic supply and issue the total subscribed amount at the end of the offering period. I show that, consistent with the validity of the instrument and causal interpretation, shocks to the structuring costs that occur before the start of the offering period affect demand, but those that occur after do not. The patterns are thus consistent with cost shocks affecting demand, but only through their impact on headline rates.

As an alternative way to illustrate the role of headline enhancement, I test its relation with product fees and subsequent returns. Positive relation between headline enhancement and markups indicates that enhancement allows banks to manipulate prices by making YEPs appear more attractive. I find enhancing the headline return by one percentage point is associated with 60 basis points higher fees and 40 basis points lower returns. The magnitude of the relation suggests headline enhancement may be of first-order importance in explaining the high fees and low returns of the products. The average fee documented by Vokata (2021) of 6-7% p.a. implies the fees are large enough to wipe out all of the equity premium. The

results in this paper imply that a one standard deviation increase in headline enhancement translates into a 3.2 percentage point increase in product fees or about half of the average fees in the market.

The results likely generalize to other countries. I use data on another almost 60,000 products issued globally. One limitation of this data is that I do not observe the product fair values and thus cannot control for them. While only suggestive, the evidence from the global sample is consistent with my main results. Products with more enhanced headline rates attract larger sales, and the magnitude of the relation is comparable. Again, headline enhancement is also associated with lower ex-post returns: one percentage point higher headline enhancement translates to 30 basis points lower returns.

What psychological mechanisms can explain the evidence? I consider two mechanisms of salient thinking (Bordalo, Gennaioli, and Shleifer, 2022) that generate overweighting of headline rates: prominence and contrast. Under the prominence channel, investors overweight attributes that are prominently displayed. Under the contrast channel, investors overweight attributes that stand out compared to alternatives. I find evidence consistent with the unique predictions of each of the channels suggesting that both may be operational. Consistent with the prominence channel, I find banks enhance headline rates more when fair value disclosure makes the impact of additional conditions on product fees more prominent. Specifically, banks more often add early termination features that obscure the comparison of fees implied by fair values. Consistent with the contrast channel and its diminishing sensitivity property, I find banks distort headline rates more when interest rates are low.

The findings have policy and welfare implications. The magnitude of the effect implies potentially large savings in investor fees. In my data alone, lowering headline enhancement by one standard deviation would save investors more than $1 billion. Using the current sales of retail structured products in the U.S., such savings exceed $2 billion per year, subject to the caveats of back-of-the-envelope extrapolation.[3] Moreover, non-linear and exotic design features similar to the ones explored in this paper are common in the $1.5 trillion market for variable annuities (Koijen and Yogo, 2022), $17 billion market for defined outcome

[3]The U.S. sales of structured notes in 2021 exceeded $100 billion (see `https://www.structuredretailproducts.com/news/details/77846`). The extrapolation assumes average product maturity of eight months.

ETFs or on fintech platforms offering custom security designs.[4] Identifying and potentially preventing behavioral distortions in these markets due to the interaction of security design and behavioral inattention can thus have significant welfare consequences. The evidence on changes in security design after disclosure change suggests that banks also use design as a tool of regulatory arbitrage. This implies that optimal policy response crucially hinges not just on the content of disclosure but also on its framing and ease of interpretation, which can be manipulated by innovations in security design.

The article is related to several strands of literature. First, it adds to the literature documenting the role of behavioral biases and inattention in economics and finance (e.g. Barber and Odean 2008, see DellaVigna 2009; Barberis 2018; and Beshears, Choi, Laibson, and Madrian 2018 for reviews). My paper documents a new distortion—due to security design—that may allow sophisticated institutions to affect the price sensitivity of households. The underlying mechanism may be similar to the work documenting behavioral distortions due to contract (DellaVigna and Malmendier, 2004) or pricing design. In the context of financial markets, such distortions have been documented in the credit (Ru and Schoar, 2016; Gurun, Matvos, and Seru, 2016), payment (Stango and Zinman, 2014), and insurance markets (Hendel and Lizzeri, 2003). On the asset side, previous work documents important role of fee salience (Anagol and Kim, 2012; Barber, Odean, and Zheng, 2005; Kronlund, Pool, Sialm, and Stefanescu, 2021) and dividend yield (Harris, Hartzmark, and Solomon, 2015) in consumer choice.

Second, the findings are relevant for theories explaining the motives for financial innovation and security design (Tufano, 2003; Grinblatt and Longstaff, 2000; Gennaioli, Shleifer, and Vishny, 2012; Bordalo, Gennaioli, and Shleifer, 2016; Pérignon and Vallée, 2017). Bulk of the standard literature assuming full rationality builds on the state-dependent representation of payoffs (e.g. Allen and Gale 1988; Duffie and Rahi 1995, see Allen and Barbalau 2022 for a review). Under these models normatively irrelevant variation in the representation of payoffs does not affect choice. My results suggest that this may not always be the case. As a result, making inferences from choices between securities under full rationality may lead

[4]Examples of fintech platforms offering custom designs include `https://simon.io/`, `https://lumafintech.com/`, or `https://haloinvesting.com/`.

to biases in revealed beliefs or preferences for state-dependent payoffs. My paper also gives support to more recent theories of behavioral financial innovation (Heidhues, Koszegi, and Murooka, 2016).

Third, my results contribute to the growing literature on retail structured products (Henderson and Pearson, 2011; Célérier and Vallée, 2017; Li, Subrahmanyam, and Yang, 2018; Egan, 2019; Henderson, Pearson, and Wang, 2020, 2022; Vokata, 2021; Calvet, Célérier, Sodini, and Vallée, 2022; Gao, Hu, Kelly, Peng, and Zhu, 2022; Ammann, Arnold, and Straumann, 2022) and innovative securities more generally. My results help shed light on explanations for the popularity of new securities. In related work, Vokata (2021) documents that yield enhancement products have negative returns both ex ante and ex post and are often statewise dominated by listed options. Investors' salient thinking and overweighting of headline rates may explain these puzzling results. I find that headline enhancement is an important determinant of fees. In this way, the results also contribute to the literature on fee dispersion in finance.

My setting is most similar to Célérier and Vallée (2017), who show that when interest rates fall, European banks *supply* products that have higher advertised headline rates and are more complex and riskier. They argue that the evidence is suggestive of banks catering to yield-seeking investors while leaving open the question of whether and how the design of securities impacts investor *demand*. My results complement and extend those of Célérier and Vallée (2017) by providing, to the best of my knowledge, the first detailed analysis of demand distortions due to enhancement of salient attributes. I also use a more comprehensive dataset which enables flexible controls for other product attributes and a new identification strategy based on structuring cost shocks to rule out alternative explanations.

The rest of the paper unfolds as follows. Section 2 describes my data and empirical framework. Section 3 presents the results. Section 4 discusses potential psychological mechanisms generating my results, and Section 5 concludes.

2 Data and Empirical Framework

2.1 Security Design of YEPs

The market for structured retail products can be divided into three main categories: (1) yield-enhancement products (YEPs), (2) capital protected products (CPPs), and (3) participation products. Compared to the other categories, YEPs have more standardized security designs and are more often linked to single-name equities which makes the products easier to study. They are also issued in larger numbers. For these reasons, in this article I focus exclusively on YEPs.

The security design of each YEP can be fully characterized by a relatively small number of attributes. *Headline return* is the annual coupon rate paid by the product. *Protection level* governs the product downside risk. If the underlying price does not drop by more than the protection level, investors receive back their invested nominal amount. Both of these headline rates are subject to *additional conditions* which are embedded in the design with exotic options. The design of additional conditions is rarely constrained by regulation, and banks have therefore significant degrees of freedom when designing the securities. In practice, banks often use largely standardized designs of additional conditions, possibly because explaining new designs to brokers and advisors is costly.[5] I define *Security designs* as unique combinations of exotic embedded options. Together with the product *underlying asset*, *issue date*, and *maturity*, the headline rates and security design fully characterize the product cash flows, subject to the issuer's default risk.

Well-known examples of YEPs are reverse convertibles, such as the one described in Figure 2. The product offers a 10.3% annual headline return and 25% protection level. These two headline rates are prominent for two reasons. First, consistent with using salient display to affect choice (Frydman and Wang, 2020), they are prominently advertised in the term sheet. Both are highlighted in bold and displayed early on the first page. The headline return also features in the header. Second, the two rates are the only numerical determinants of the product payoff that are explicitly quantified in the term sheet. The other key factors

[5]The ability to manipulate headline rates and security design is similar to the ability of firms to choose price formats to affect the ability of consumers to compare products as in Piccione and Spiegler (2012); Carlin (2009).

that the investor needs to take into account, such as the probability of downside risk or the product fees, are not disclosed.

On top of a plain-vanilla security design, the additional conditions the design includes are knock-in and call feature. These conditions are less salient since investors need option pricing techniques to quantify their impact on the payoff. The additional conditions also tend to be less prominently displayed in the term sheet than the headline rates and require processing of several sentences of technical language to grasp their definition.

2.2 Empirical Framework

I adopt a simple version of the salience model in Bordalo, Gennaioli, and Shleifer (2022) to demonstrate the hypothesis of salient thinking in the context of security-design attributes. I then discuss alternative formalizations in Section 4. A product i is defined as a bundle of K attributes $(a_1, ..., a_K)$ and its objective intrinsic valuation equals:

$$V_i = \sum_k \pi_k a_{i,k}, \tag{1}$$

where π_k is the optimal decision weight attached to attribute k. Suppose that only a set of attributes P are prominently visible to the investor and the remaining attributes H are not observed. Investors are inattentive to hidden attributes and their subjectively perceived values are distorted towards typical values recalled from memory: $a^S_{i,k} = m_k a_{i,k} + (1 - m_k)a^n_k$, with an attention parameter $m_k \in [0, 1]$ and a recalled norm a^n_k.[6] The subjective intrinsic valuation is then given by:

$$V^S_i = \sum_{k \in P} \pi_k a_{i,k} + \sum_{k \in H} \pi_k [m_k a_{i,k} + (1 - m_k)a^n_k] \tag{2}$$

In the context of YEPs, one can consider the increase in expected return due to headline return, $a_1 = \mu_h$, and the decrease in risk due to protection level, $a_2 = \sigma^2_p$, as prominent attributes carrying positive weights $(\pi_k > 0)_{k=1,2}$. The negative impact of additional conditions

[6] This formalization incorporates partial inattention to hidden attributes, as formalized by Gabaix (2019). Partial attention is consistent with the evidence that demand is sensitive to fees even when they are not disclosed (see, e.g., Table 5).

on expected returns, $a_3 = \mu_c$, and positive impact on risk, $a_4 = \sigma_c^2$, are hidden attributes carrying negative weights: $\pi_3 = -\pi_1$ and $\pi_4 = -\pi_2$. Rational mean-variance investors are fully attentive to the impact of additional conditions ($m_3 = m_4 = 1$) and their intrinsic valuation thus simplifies to the quadratic utility function: $V_i = \pi_1(\mu_h - \mu_c) - \pi_2(\sigma_c^2 - \sigma_p^2)$. By contrast, salient thinkers in the model are inattentive to hidden attributes $(m_k < 1)_{k=3,4}$ and therefore may overweight headline return and protection level in their valuations.

The bank engineering the products observes all the attributes and its marginal costs are equal to the objective intrinsic values. Financial engineering allows the bank to create product variants that share the same intrinsic value but differ on certain attributes. For example, suppose that a plain-vanilla product vnl and its enhanced variant i have the same intrinsic value ($V_{vnl} = V_i$). For the enhanced product, the bank makes one prominent attribute ($k \in P, \pi_k > 0$) more attractive ($a_{i,k} > a_{vnl,k}$) and at the same time makes a hidden attribute ($l \in H, \pi_l < 0$) less attractive ($a_{i,l} > a_{vnl,l}$). In the context of YEPs, the bank may increase the headline return and, at the same time, increase the negative impact of additional conditions such that the product expected return remains unchanged. When the recalled values of hidden attributes are affected by investors' past experience with plain-vanilla products, salient thinkers underweight the impact of hidden attributes on product return and risk. As a result, enhancement of prominent product attributes increases the subjective intrinsic valuation, $\mathrm{V}_i^S > V_{vnl}^S$.

This model of salient thinking yields predictions for the relation between product sales and enhancement of prominent attributes, which can be tested with the following estimating equation:

$$q_i = \beta_0 + \beta_1 X_i + \beta_2 V_i + \epsilon_i, \tag{3}$$

where q_i is product sales volume and $X_i \equiv a_{i,k} - a_{vnl,k}$ is a variable capturing the improvement in prominent attributes due to financial engineering. I call this variable *Headline enhancement* and present its formula in the context of yield enhancement products in Section 2.3. In the presence of salient thinking $(m_k < 1)_{k=3,4}$, controlling for the product intrinsic value enhancement of prominent attributes increases demand, and therefore $\beta_1 > 0$.

Of course, in practice, intrinsic valuations, V_i, are private and unobserved in the data. However, to the extent that they are characterized by observable security attributes, I can control for intrinsic values using product fair values and saturated fixed effects or product attributes. Controlling for product fair values captures the variation in product expected returns under the risk-neutral measure. Month by underlying fixed effects capture time-series variation in the underlying expected return due to variation in risk, risk premia, or sentiment. Issuing bank and maturity fixed effects capture clientele effects and investment horizon preferences. Security design fixed effects control for design-invariant preferences and therefore encompass complexity aversion of unsophisticated investors (Brown, Kapteyn, Luttmer, Mitchell, and Samek, 2017; Umar, 2022). In some specifications, I also control for the interaction of year-month, underlying, maturity, and issuer fixed effects and therefore the identifying variation comes only from headline rates and their enhancement through additional conditions.

I note that the empirical framework implicitly assumes narrow framing and abstracts from the potential impact of background risk or other assets in investors' portfolios on the intrinsic valuation of YEPs. I argue that this assumption is reasonable given the sparse evidence of households hedging behavior and previous work showing the products are unlikely used for hedging. In particular, the evidence that a large fraction of the market is statewise dominated by listed options and the significant overpricing and underperformance of the products is hard to square with a high degree of sophistication required to use the products for hedging (Vokata, 2021; Henderson and Pearson, 2011; Henderson et al., 2022).

2.3 Measuring Headline Enhancement

To bring equation 3 to the data, I define a measure of headline enhancement which captures the improvement in headline return due to only additional conditions added on top of a plain-vanilla security design.

Specifically, I define headline enhancement as the spread between the product headline return and the headline return of a synthetic plain-vanilla counterfactual that inherits from the product all attributes other than the additional conditions and headline return, i.e., protection level, underlying, term, issue date, and fair value. Such plain-vanilla counterfac-

tual products are typically not offered by the banks, but I can construct them using option pricing data. For product i with headline return H_i, fair value FV and maturity T linked to the underlying stock s issued on day t with a protection level p, I calculate *Headline enhancement*$_i$ as:

$$X_i = H_i - H_{vnl} = H_i - \frac{(FV + \overbrace{Ke^{-rT}N(-d_2) - S_0e^{-qT}N(-d_1)}^{\text{option price}})(1+r)^T - 1}{T}, \tag{4}$$

where H_{vnl} is the headline return of plain-vanilla counterfactual, r is an interpolated swap rate for product maturity T, S_0 is the initial underlying price, K is the strike price of the embedded put option calculated as $K = S_0(1-p)$, and q is the continuous dividend yield. d_1 and d_2 are defined as in the Black-Scholes-Merton formulas for option prices of assets paying known dividend yield.[7] I calculate the option price using bilinearly interpolated implied volatility, σ, from OptionMetrics volatility surface. The formula follows from the fact that the plain-vanilla payoff is equivalent to writing a put option and investing the proceeds and the amount invested in the product with the risk-free rate. In addition, the holder of the plain-vanilla product pays an upfront embedded fee to the issuing bank, so only the fair value is effectively invested in the product. Table 1 shows an example of the calculation.

I abstract from the role of discrete dividends, day-count conventions, coupon payment frequency, and issuer's credit risk in the definition of headline enhancement. Given the large magnitude of the distortion I document, as well as its large variation across security designs, the impact of these factors on headline enhancement is of second-order. I find quantitatively similar results when limiting the sample to products with non-dividend paying underlyings.

For products issued outside of the U.S., I do not observe the product fair values, and therefore cannot calculate the same measure of headline enhancement. One could calculate the distortion without the fair values, but that raises the concern that the measure is instead capturing variation in product quality. Products may have higher headline returns because their payoff is more distorted, or because the product has a higher fair value. I overcome these

[7] Specifically, $d_1 = \frac{\ln(S_0/K)+(r-q+\sigma^2/2)T}{\sigma\sqrt{T}}$ and $d_2 = d_1 - \sigma\sqrt{T}$.

challenges by defining *Headline enhancement*$_g$ on security-design level without adjusting for fees. Ignoring fees makes the measure conservative and shrinks the variation, as fees and headline enhancement are negatively correlated on design level, but it preserves the same rank ordering as enhancement adjusted for fees.

Since I use the measure to examine bank response to changes in pricing conditions, I further make sure that the measure itself is not affected by changes in pricing conditions. To that end, I define *Headline enhancement*$_g$ as the predicted value at the means of volatility, risk-free rate, dividend yield, and maturity from regression of the unadjusted product-level headline enhancement (i.e., using equation 4 with $FV = 1$) on security design fixed effects, volatility, risk-free rate, dividend yield, and product maturity.

2.4 Data and Summary Statistics

I combine detailed data on more than 28,000 products issued in the U.S., 59,000 products issued outside the U.S., and standard data on pricing inputs. The original product data comes from the same commercial platform as used by Célérier and Vallée (2017). As far as I am aware, the resulting dataset is the most comprehensive data on retail structured products both in terms of products (nearly 90,000) and variables covered.

I have the most detailed data on more than 28,000 products issued in the U.S.between 2006 and 2015. The data comes from Vokata (2021) and covers both headline rates, indicators for additional conditions (embedded exotic options), issue date, maturity, issuing bank, underlying asset, fair values, and realized returns. I also observe the commissions paid to the brokers distributing the products. For the non-U.S. products, I observe the same variables except for the fair values.

I merge the product data with data on pricing inputs. Implied volatility is from OptionMetrics. Swap rates are from Bloomberg for USD and from Datastream for other currencies. The dividend yield is extrapolated from the Center for Research in Security Prices (CRSP) for U.S. single name underlyings or from OptionMetrics.

Table 2 shows the descriptive statistics for both the U.S. (Panel A) and non-U.S. products (Panel B). The first salient fact that emerges from my analysis is the large magnitude of headline enhancement present in both samples. Even using the conservatively measured

Headline enhancement$_g$, the average product offers a 5-7 percentage point larger headline return than plain-vanilla products. Adjusting the headline enhancement for the embedded fees leads to 11 percentage points average enhancement. Given the average headline return of 13 pp, these results suggest additional conditions play a first-order role in the design and performance of the securities.

The average U.S. product offers a protection level of 26% and the average non-U.S. product of 35%, which may give investors the impression that breaching the protection level is unlikely. For a simple comparison, the annual returns of S&P500 were lower than -26% only in four out of 96 years since 1926. Of course, since the products are mostly linked to single-name equities and the downside protection is subject to additional conditions, the protections are more often breached. This results in relatively low returns compared to the headline returns, of -6% for the U.S. products and 1.2% for the non-U.S. products. The average fee (defined as the annualized markup, or the difference between the product price and fair value)[8] is 7%, of which almost half goes to the compensation of brokers.

3 Results

3.1 Volume and Headline Enhancement

I start this section by exploring the relation between sales volume and headline enhancement. I first discuss the results using saturated OLS regressions and then discuss results obtained using instrumental variable approach.

Following the empirical framework in Section 2.2, I estimate versions of the regression:

$$q_i = \beta_0 + \beta_1 X_i + \underbrace{\beta_2 P_i + \lambda_{t\times T\times b\times s} + \lambda_g}_{\substack{\text{controls for}\\ \text{intrinsic value}}} + \epsilon_i, \tag{5}$$

where q_i represents the natural logarithm of sales volume. P_i is the fee which captures the variation in product fair values. The specification with fees allows for direct economic

[8] Specifically, $fee_i = (1 - FV_i)/\mathbb{E}[T]$, where $\mathbb{E}[T]$ is the expected product maturity under the risk-neutral measure. Effectively, the markup is a front-load fee which includes the compensation to brokers. If held until maturity, the products charge no additional ongoing fees. If sold prior to maturity, issuers often charge additional markdowns which I abstract from.

interpretation of demand sensitivities, i.e., the coefficients attached to fees and headline enhancement, as both variables are in units of annual percentage rates. X_i refers to the product-level headline enhancement measure. Control variables include fixed effects for issuing bank b, year-month t, maturity rounded to quarters T, underlying stock s, security design g, and annualized commissions paid to brokers.

Table 3 presents my baseline results. I find strong evidence that headline enhancement is associated with larger sales volume. In Column 2, I employ the full sample of U.S. products and control for individual fixed effects. In Column 3, I include the interaction of year-month, issuer, maturity, and underlying fixed effects and therefore explore variation in demand in narrow sets of products offered in a given month by the same bank, linked to the same underlying stock and having the same maturity. Effectively, the remaining variation in product attributes is only due to additional conditions and their impact on headline rates. The sample size shrinks to about a third, but the main result remains qualitatively unchanged. The results are therefore robust to flexibly controlling for bank-time-specific demand shocks, underlying-time-specific demand shocks, or maturity-time-specific demand shocks. This specification suggests the results are not driven by time-series or cross-sectional variation in the expected return or sentiment for the underlying equity.

One may wonder whether the result could be driven by brokers' conflicted interests which have been shown to affect demand (Egan, 2019; Egan, Ge, and Tang, 2020). Banks may use headline enhancement to be able charge higher fees and share a fraction with brokers. Under this explanation, the positive relation between demand and headline enhancement is a by-product of incentivizing brokers rather than a demand distortion due to salient thinking. One advantage of my setting is that I am able to test this channel because the brokers' commissions are disclosed in pricing supplements. In Column 4, I find that controlling for brokers' commissions has little impact on the main result.

The magnitude of the result is large. The coefficient attached to the headline enhancement is about half of the magnitude of the coefficient on fees. This implies that distorting the headline rate by a one percentage point is as effective in increasing sales volume as lowering the product fee by almost 50 basis points. In dollar terms (see Internet Appendix Table A.2), a one percentage point increase in headline enhancement in associated with a

$86,660 increase in sales, whereas a one percentage point decrease in fees is associated with a $113,620 increase in sales.[9]

In Figure 3, I explore the shape of the volume-headline enhancement relation. In Panel A, I plot the binned scatterplot equivalent to Column 1 in Table 3. The figure shows a strong monotonic relation between volume and headline enhancement implying that the result is unlikely driven by a few influential observations. The shape of the relation is concave, consistent with headline enhancement becoming less effective at high levels of headline rates.

I find similar results when replacing headline enhancement with the two headline rates: headline return and protection level. Figure 4 plots the relation of volume with each of the headline rates individually and shows similar monotonic and diminishing patterns. These patterns are consistent with demand being elastic both with respect to headline return and protection level, giving issuers incentives to enhance the headline rates with additional conditions.

3.2 Instrumental Variable Based on Structuring Costs

The OLS results presented so far are consistent with salient thinking affecting demand. Although I have controlled for bank-time-specific and underlying-time specific demand shocks, it remains possible that an omitted variable is driving the positive relation between headline enhancement and demand. In this section, I present an instrumental variable (IV) approach that better controls for any remaining omitted variable bias. I provide evidence that product-specific time-varying cost shocks to headline enhancement are associated with a significantly lower sales volume. While these cost shocks may not be completely exogenous to demand shocks, I show that the instrument is associated with higher demand only for cost shocks arriving before headline rate fixing at the beginning of the offering period. During the offering period, when headline rates are fixed but demand and volume are not, cost shocks are unrelated to sales volume. These findings lend credibility to the instrumental variable approach.

[9]The magnitude is similar to the role of headline return (coupon) documented by Egan (2019). What sets my results apart from these previous results is that I isolate the role of headline rate enhancement from other factors affecting the headline return, such as issuers' fees and input prices.

The instrument for headline enhancement is cost-based. The most important input determining the pricing of headline enhancement is the implied volatility of the underlying. How much implied volatility affects headline enhancement depends on the security design. Internet Appendix Figure A.5 shows that (1) headline enhancement is positively related to implied volatility, and (2) security designs vary in their sensitivity of headline enhancement to implied volatility, $\nu_g = \frac{\partial X_i}{\partial \sigma_s}$. Motivated by these patterns, I define the product-specific structuring cost of headline enhancement as:

$$\phi_i = \nu_g \times \sigma_{s,t}, \tag{6}$$

where $\sigma_{s,t}$ is the implied volatility of the product underlying s on pricing date t and ν_g is the security design g sensitivity of headline enhancement to volatility. I consider the sensitivity of headline enhancement to be constant at the security design level and estimate it using regression:

$$X_i = \nu_1 I_1 \sigma_{s,t} + ... + \nu_G I_G \sigma_{s,t} + \lambda_T + \epsilon_i, \tag{7}$$

where ν is a vector of coefficients for security designs $g \in G$, I_g are indicator variables for each security design, and λ_T are maturity fixed effects rounded to quarters. Identifying variation comes from variation in underlying volatility over time and across underlying equities and from variation in ν_g across security designs. The F-statistic from the first stage is above 5,000 and therefore far above the conventional threshold for rejecting weak instruments (Stock and Yogo, 2005), indicating a strong instrument.

I report the results of the instrumental variable estimation in Table 4. As in the OLS regressions, the coefficient on instrumented headline enhancement is highly statistically significant. The magnitude of the coefficient is slightly smaller compared to the OLS regression, 1.1 compared to 1.5, suggesting that the OLS estimate may be slightly biased upwards due to unobserved confounders. The coefficient remains also economically significant. Increasing headline enhancement by one percentage point is as effective in increasing demand as lowering fees by 40 basis points.

A unique advantage of studying YEPs is that I observe significant variation in cost shocks over short horizons and the offering process of YEPs features separate periods of supply and demand timing. After the start of the offering period headline rates are fixed. At these fixed rates, issuers offer fully elastic supply and issue the total subscribed amount at the end of the offering period. These features allow me to credibly attribute the effect of the cost-based instrument to headline enhancement rather than unobserved demand shocks. Specifically, if the relation between the instrument is driven by the impact of costs on headline enhancement, it should not be present for cost shocks that appear after the start of the offering period.

I observe the start of the offering period lasting at least one week for 5,414 products issued between 2006–2009. For this sample of products, I measure weekly changes in the instrument $\Delta\phi_{i,h} = \nu_g \times \Delta\sigma_{s,h}$, where $\Delta\sigma_{s,h}$ is a weekly change in the underlying implied volatility. I consider four weeks before and two weeks after the start of the offering period, where the second week lasts only until the issue date and is therefore shorter for products with offering period shorter than two weeks. Internet Appendix Figure A.6 shows significant variation in these weekly instrument shocks that share similar distribution both before and after the start of the offering period. The last week of the offering period has more values clustered around zero because for some products the period is shorter than a week. Still, even the second week retains sufficient variation to examine the role of cost shocks.

I start by exploring the role of weekly cost shocks on product headline rates. Figure A.7, Panel A, plots $\beta_{\mathbf{h}}$ coefficients from estimating regression:

$$\text{Headline return}_i = \beta_0 + \beta_{\mathbf{h}}\phi_{\mathbf{i,h}} + \lambda_{t,T,b,s} + \lambda_g + \epsilon_i, \tag{8}$$

where $\phi_{\mathbf{i,h}}$ is either the level of the instrument measured four weeks prior to the start of the offering period or its weekly changes, $\Delta\phi_{i,h}$, defined above. Consistent with the headline return being fixed over the offering period, I find that cost shocks affect headline return before the start of the offering period, but the relation turns insignificant for the two weeks of the offering period. Internet Appendix Figure A.1, Panel A, shows similar patterns for the protection level. Panel B of the same figure shows that because the headline rates are fixed over the offering period, the variation in cost shocks translates into higher fees.

In Panel B of Figure A.7, I next explore the effect of weekly cost shocks on demand with the following regression:

$$q_i = \beta_0 + \beta_{\mathbf{h}}\phi_{\mathbf{i,h}} + \beta_2 P_i + \lambda_{t,T,b,s} + \lambda_g + \epsilon_i, \tag{9}$$

where $\phi_{\mathbf{i,h}}$ is defined as in equation 8. Note that the regression controls for total fees and therefore also for the increase in fees caused by cost shocks over the offering period.

Prior to the start of the offering period and headline rate fixing, the instrument or its weekly changes are positively and significantly related to demand (except for the last week preceding the offering period which is positive but insignificant). Consistent with the instrument being valid, weekly changes to the instrument have no significant impact on demand during the offering period. Table 5 presents similar patterns in a regression specification that collapses all weeks before and all weeks after the start of offering period to two variables. Only the effect of changes in the instrument prior to the start of the offering period is significant and the confidence intervals of the respective coefficients are not overlapping.

3.3 Global Evidence

I next complement the evidence from the U.S. market with suggestive evidence from products issued outside the U.S. I do not observe product fair values in this sample, and therefore cannot carefully control for the role of fees in demand. I also cannot use the product level headline enhancement measure adjusted for fair values, but instead need to use the security-design level measure. However, because on the security design level, headline enhancement is associated with higher fees (as evidenced by lower returns in the non U.S. sample as well as higher fees in the U.S. sample documented in the next two sections), I can still conservatively estimate the effect of headline enhancement on demand. The patterns and magnitude I find are in line with the results from the U.S. market.

Table 6 presents results of regressions of the natural logarithm of sales volume on the security design-level distortion measure. In Column 1, I employ the full sample of more than 59,000 products and control for year-month, country, issuer, and maturity fixed effects.

Because many of the products issued outside of the U.S. are linked to multiple underlyings (baskets), I do not control for the underlying fixed effects. In Column 2, I restrict the sample only to the products that are linked to a single underlying and add underlying fixed effects. In both specifications, the coefficient attached to headline enhancement is highly statistically significant and of a similar magnitude as the coefficients in the U.S. sample shown in Table 3. In Column 3, I further control for the interaction of fixed effects to control for time-varying stock-specific sentiment, similarly as in the analysis of the U.S. market. Again, the coefficient is highly statistically significant and of a similar magnitude as the results in the U.S. market, suggesting similar economic importance.

3.4 Headline Enhancement and Fees

As an alternative way to demonstrate the economic importance of my results, I examine the relation between headline enhancement and fees. If investors overweight prominent headline rates in their purchase decisions, as in the empirical framework of section 2.2, they will be willing to pay higher fees for the products that enhance headline rates more. Therefore, an alternative prediction of the model is that headline enhancement should be associated with higher fees. The evidence in Section 3.5 already hints that this is the case as headline enhancement is associated with lower realized returns.

Table 7 examines the relation between headline enhancement and fees directly and shows that distorting the headline rate by one percentage point is associated with about 60 basis points higher fees. The relation holds both across security designs (using the security design-level measure in Column 1) as well as within security designs (using the product-level measure and security design fixed effects in Column 2). In Column 3, I further control for the interaction of month, issuer, underlying, and maturity fixed effects and show that the result holds within these narrow sets of products.

The magnitude of the result suggests that investors' demand for salient headline rates may play a first-order role in explaining the high fees of the products. Vokata (2021) shows that the average fee of 6-7% annually implies that the fees are large enough to wipe out all the equity premium. The estimates in Table 7 imply that a one standard deviation increase in headline enhancement translates into a 3.2 percentage point increase in product fees or

about a half of the total average fees.

Salient thinking may also explain why investors choose the products over cheaper standardized options. Vokata (2021) shows that thousands of YEPs are statewise dominated by listed options ruling out that fully informed sophisticated investors prefer to buy YEPs for hedging purposes. The mechanism of salient thinking (as documented by Lian, Ma, and Wang, 2018) or failure to think in proportions (Shue and Townsend, 2021) offers a potential explanation for this puzzling result. While YEPs appear attractive to salient thinkers who overweight their headline rates, standard listed options may not necessarily appear attractive. Prices of options are displayed in dollars (see Figure A.3 in the Internet Appendix), which makes the percentage annual income from selling options less salient. To derive the equivalent headline return, investors need to first divide the option price by the spot price and then annualize the income. Under this mechanism, listed options are less attractive due to the different numerical representation of normatively equivalent information.

3.5 Headline Enhancement, Risk, and Return

Finally, I show that headline enhancement is also associated with lower realized returns. I estimate the relation between headline enhancement and returns with the regression:

$$R_i = X_i + \lambda_{c,t,T,b} + \epsilon_i, \tag{10}$$

where $\lambda_{c,t,T,b}$ is the interaction of country, month, maturity, and issuer fixed effects which controls for the role of market factor in returns. In all specifications, I use only products with fixed maturity to avoid the bias caused by early termination products documented in Vokata (2021). To account for correlated observations due to the role of common underlying equities and their overlapping return horizons, I cluster standard errors by the issuer as in Célérier and Vallée (2017).

Table 8 and Panel A, Figure 6 report the results. Columns 1 and 2 show that in the univariate regressions, both headline enhancement and fee are associated with lower realized returns. In Column 3, I add both explanatory variables and show that the negative relation between headline enhancement and returns is driven by headline enhancement being asso-

ciated with higher fees. Controlling for fees, headline enhancement does not significantly increase returns implying that any increase headline returns due to additional conditions is offset by higher risk and lower probability of receiving both the headline return and invested capital.[10]

In Column 4, I explore the relation between returns and headline enhancement in the non-U.S. sample. I find the same sign and similar magnitude as in the U.S. sample, suggesting that the negative relation between fees and headline enhancement generalizes outside of the U.S. and the payoff-level distortion measure is therefore unlikely to instead pick up payoffs of higher fair values.

Panel B, Figure 6 further corroborates that products with higher headline enhancement also have a higher risk, where risk is measured as standard deviation of returns in subsamples of products divided by terciles of headline enhancement and year-months. Moving from the first to the third tercile of headline enhancement increases standard deviation by ten percentage points.

4 Psychological Mechanisms

In this section, I discuss potential psychological mechanisms that generate positive demand elasticity to normatively irrelevant product attributes. I first focus on two manifestations of salient thinking: overweighting of either prominent or high-contrast attributes, as the two most likely explanations and discuss evidence in favor of each of these mechanisms. I then briefly discuss the potential role of alternative explanations.

4.1 Prominence

The first mechanism is that an investor may overweight the headline rates because of their prominence compared to other attributes, which are hard to observe. Such intuition has been formalized by models of shrouded attributes, add-on pricing (Ellison, 2005; Gabaix and

[10]Table A.5 in the Internet Appendix shows that headline enhancement is not associated with significantly higher risk-adjusted benchmark returns. Table A.6 in the Internet Appendix explores the relationship between expected returns estimated in Vokata (2021) and shows that the vast majority (90-95%) of headline enhancement does not lead to higher expected returns either.

Laibson, 2006), and salient thinking focused on prominent attributes (Bordalo, Gennaioli, and Shleifer, 2020, 2022).

The empirical framework in Section 2.2 explains how prominence can explain the effects I find. The way issuers describe the products in marketing materials (see Internet Appendix Figure A.2, term sheets and prospectuses (see Figure 2) is consistent with this mechanism. Both headline rates are prominently displayed in the prospectus, while the fees or the probability of downside losses are not disclosed.[11] Investors subject to this type of salient thinking will overweight headline rates in their decision.

A unique prediction of the prominence channel is that changes in how prominently displayed an attribute is may affect choice. In turn, disclosure of certain hidden attributes gives issuers the incentive to use financial engineering to make the displayed attributes more attractive. In my context, I can use the change in fair value disclosure demanded by the U.S. Securities and Exchange Commission (SEC) to test some of these predictions. In 2012, the SEC announced that issuers should start to disclose the product fair values in the prospectus, and the disclosure change was implemented throughout 2013. Vokata (2021) finds that the disclosure change did not have a discernible impact on product fees or volume.

In Figure 7, I test whether the change had an impact on headline enhancement. In Panel A, I plot yearly coefficients, β_t, from regression:

$$X_g = \beta_0 + \beta_t y_t I_{US} + \lambda_{t,T,b,s,c} + \epsilon_i, \tag{11}$$

where I_{US} is an indicator equal to one for products issued in the U.S. and therefore subject to the disclosure change. Controls include fixed effects for month-year, country, issuer, maturity, and underlying. By controlling for the issuers, the specification exploits variation in security design for products issued by the same issuing bank in the U.S. and abroad. In addition, I control for implied volatility of the underlying and swap rate of the product denomination currency, as the next section (and Célérier and Vallée, 2017) show that these pricing inputs are important determinants of YEPs' security design. The figure

[11] The disclosure demanded by the SEC in 2012 requires issuers to disclose the issuer's estimated value, not the respective annual fee. The value is disclosed in dollars and less prominently than the headline rates. For example, the pricing supplement may state that the issuer's estimated value is $965 for a product with issue price of $1,000 or $7.7 for a product with issue price of $7.95.

shows that after the disclosure change, products issued in the U.S. enhance headline rates more. The respective difference-in-differences specification reported in Internet Appendix Table A.4 shows the difference of 80 basis points is also statistically significant. The evidence is thus consistent with the theoretical predictions that educational initiatives may increase complexity (Carlin and Manso, 2010).

Given the format of the disclosure where issuers have to disclose the estimated dollar value of the products rather than the annualized embedded costs (which I call fees), one creative way to counteract the effect of the disclosure is to engineer products with relatively high fair values but short and hidden maturities which increases the unobserved per-period embedded cost. To test such channel, in Panel B of Figure 7 I replace the outcome variable with an indicator for products with an early termination feature. There products, called autocalls by practitioners, often have a maximum maturity of one year or more but are automatically called in about half of the cases as early as three months post issuance. The figure shows that the frequency of autocall issuance increases by almost 20 percentage points in the U.S. post the fair value disclosure. Again, Internet Appendix Table A.4 shows the difference is also highly statistically significant.

4.2 Contrast

The second mechanism is motivated by the observation that people tend to focus more on attributes that stand out compared to the alternatives. Such mechanism has been formalized by theories of salient thinking (Bordalo, Gennaioli, and Shleifer, 2013) or focusing (Kőszegi and Szeidl, 2013).

The mechanism can be nested in the subjective valuation function (equation 2) through the salience function of Bordalo, Gennaioli, and Shleifer (2013):

$$V_i^S = \sum_{k \in P} \sigma_k \pi_k a_{i,k} + \sum_{k \in H} \sigma_k \pi_k a_{i,k}^S, \tag{12}$$

where σ_k is the salience function satisfying ordering and diminishing sensitivity, $\sigma_k(a, \bar{a}) = \frac{|a-\bar{a}|}{|a+\bar{a}|}$. According to ordering, investors overweight attributes when the value of the attribute, a_k, is more different from the average in the choice set, $\bar{a_k}$. That is, all else equal, consumers

will overweight more enhanced headline rates under this salience function. Diminishing sensitivity captures the Weber-Fechner law of sensory perception: enhancing headline rates by five percentage points is more salient when the prevailing rates are 1% than when they are 5%.

Therefore, under the contrast mechanism, investors overweight headline rates not because they are prominently displayed but because they stand out compared to alternatives. In my context, such alternatives may be other fixed-income instruments that offer lower headline returns (the average risk-free rate over my period is less than 1.5% compared to the 13% headline rate offered by YEPs) or other YEPs. The natural benchmark to compare the downside protection level are other YEPs or a direct investment in the underlying stock that does not offer any downside protection. Under such interpretation, the security design of YEPs may induce investors to benchmark each headline rate to a different asset class.

Two predictions are unique to the contrast channel. First, because the salience function features diminishing sensitivity, demand should be more sensitive to headline enhancements when headline rates are low. Figure 3 provides some evidence consistent with this prediction. The slope of the relation between volume and headline enhancement is steeper at low enhancement levels and becomes nearly flat at high enhancement levels. The binned scatter plots of volume and each of the two headline rates in Figure 4 show similar patterns consistent with diminishing sensitivity.

Second, diminishing sensitivity also predicts that the incentives for headline enhancement are higher when interest rates are low. Therefore, if the contrast mechanism is operational, we should see headline rates being distorted more in times of low interest rates. Note that such reaching for yield (Becker and Ivashina, 2015) is hard to rationalize with the prominence channel or standard mean-variance preferences (Lian, Ma, and Wang, 2018).

Similarly, for changes in risk (measured with implied volatility of the underlying), diminishing sensitivity predicts that the incentives for headline enhancement are higher when volatility is low. I note, however, that unlike in the case of variation in interest rates, the relation between volatility and enhancement can be rationalized with the standard mean-variance framework.

Table 9 provides evidence consistent with these predictions. The table shows the results

of regressions of headline enhancement measured at the security design level and the two pricing inputs: swap rate, r, and underlying implied volatility, σ:

$$X_g = \beta_0 + \beta_1 r_{t-1} + \beta_2 \sigma_{s,t-1} + \lambda_{t,T,b,s,c} + \epsilon_i, \tag{13}$$

where both rates are measured at the end of the calendar month preceding the pricing date. I measure headline enhancement at the security design level to avoid any mechanical relation between implied volatility and product-level headline enhancement documented in Section 3.2. Instead, the regressions capture banks' switches to security designs that enhance headline rates more on average. I find the choice of security design is significantly influenced by the prevailing pricing inputs. Specifically, when interest rates are low, banks are more likely to choose designs that yield higher headline rates. Similarly, when implied volatility of the underlying is low, which all else equal would lead to lower headline returns and protection levels, banks switch to designs that enhance headline rates more.

Column 1 shows that the relation with risk-free rate holds in the global sample controlling for month and country fixed effects and therefore exploiting differences in prevailing interest rates across countries. I also control for underlying fixed effects and therefore the relation between implied volatility and enhancement exploits variation in underlying implied volatility over time. The coefficient attached to the swap rate in Column 3 implies that one percentage point decrease in interest rates is associated with 32 basis points increase in headline enhancement. In other words, issuers offset about one third of a decline in prevailing interest rates with additional conditions of the security design. Columns 2 and 3 show that the patterns prevail both in the U.S. and the non-U.S. sample.

One alternative psychological channel that generates higher enhancement in low interest times are reference points which have been shown to play a role in various contexts (Odean, 1998; Grinblatt and Keloharju, 2001; Frydman, Hartzmark, and Solomon, 2018; Andersen, Badarinza, Liu, Marx, and Ramadorai, 2022). Investors may demand products with enhanced headline returns because of relatively high reference rate retrieved from memory. Célérier and Vallée (2017) provide evidence consistent with this channel using European products and cross-country variation in historical interest rates. To control for this alterna-

tive explanation, in Column 4, I exploit the fact that in Switzerland, banks often issue both products denominated in the local currency (Swiss franc) as well as products denominated in the U.S. dollar. This allows me to test the relation within the clientele of the same bank buying products linked to the same underlying and having the same maturity. To the extent these investors share the same memory, any remaining relation between interest rates and headline enhancement is hard to explain with the reference point channel. I find that banks choose designs that enhance headline rates more when the currency of denomination offers lower rates of return. Similarly, in Column 5, I show in the global dataset the relation holds when controlling for the interaction of month $\times$ country $\times$ issuer $\times$ maturity fixed effects.

Taken together, the results suggest that both prominence and contrast of headline rates may be operational. This is perhaps not surprising given the existing evidence in other work showing that reaching for yield appears to be driven both by salience and reference-dependence (Lian, Ma, and Wang, 2018) and that behavioral biases are often correlated (Birru, Chague, De-losso, and Giovannetti, 2020).

4.3 Alternative mechanisms

4.3.1 Preferences for Higher Order Moments

One may wonder whether non-standard preferences for higher-order moments can explain the behavior I document. The most successful alternative to mean-variance utility is the (cumulative) prospect theory (Kahneman and Tversky, 1979). The theory generates preferences for right-skewed assets, which have been shown to play a role in asset prices (Barberis and Huang, 2008). Because YEPs exhibit left-skewed returns (see Internet Appendix Table A.1), their design is hard to square with the prospect theory or lottery preferences (Kumar, 2009; Bali, Cakici, and Whitelaw, 2011).

I note that a version of salient thinking where investors evaluate payoffs in different states (Bordalo, Gennaioli, and Shleifer, 2013), rather than across product attributes, also predicts preference for right-skewed payoffs and therefore cannot explain the design of YEPs. Salient thinking is context dependent (Bordalo, Gennaioli, and Shleifer, 2022) and given the way the products are presented, investors in YEPs are more likely to focus on product attributes

(such as the headline rates) rather than state-dependent payoffs.

4.3.2 Preferences for High-Income Paying Assets

Another alternative mechanism that could explain investor demand for YEPs with high headline returns are classes of utility functions that give rise to preferences for high-income paying assets. Such reaching for income, for example, arises as a commitment device of investors with quasi-hyperbolic preferences (Daniel, Garlappi, and Xiao, 2021). It can also arise under a version of realization utility (Barberis and Xiong, 2012) where investors derive positive utility from high realized coupon payments over the life of the product and sufficiently discount potential losses at product maturity.

While such preferences can explain the demand for headline returns, they do not generate preferences for products with high protection levels. The easiest way to accommodate the preference for high income is to increase headline return and lower protection levels. The observation that banks simultaneously distort both headline returns and protection levels and that demand appears sensitive to both headline rates suggests that reaching for income alone cannot explain the evidence.

5 Conclusion

Using a novel dataset, I find evidence consistent with investors overweighting salient attributes of security design. Previous research focused on the supply side shows that banks use complexity, or what I call additional conditions, to enhance the salient headline rates of retail structured products. In a large sample of U.S. yield enhancement products I show that headline enhancement is associated with larger sales, higher fees, and lower returns. Based on my estimates, lowering headline enhancement by one standard deviation could lead to substantial investor savings in fees, exceeding three percentage points.

The evidence in this paper shares some similarities with other financial innovations. Coval, Jurek, and Stafford (2009b,a) show that the pricing of mortgage-backed securities (MBS)

and credit default obligations neglected the correlation in defaults of individual mortgages.[12] The pricing also neglected the higher prices of states when the securities were expected to perform poorly. The authors argue that the evidence is most consistent with investors evaluating the securities based on their credit ratings, which are prominent and potentially subjective (Griffin and Tang, 2012), rather than on state pricing, which requires sophisticated pricing techniques similar to pricing additional conditions of YEPs.

Although similar, the neglect of certain product attributes in the context of YEPs appears to be even more striking. Unlike in the case of MBSs, where prevalent rosy expectations of house prices complicate the story,[13] YEPs were expected to perform poorly even under market expectations priced in listed options and under pricing models used by the issuing banks. Even for an investor disagreeing with the market expectations, many YEPs were unambiguously dominated by listed options. But, of course, the inferiority was not directly observable when evaluating the products based only on their salient headline rates.

[12] Ghent, Torous, and Valkanov (2018) provide evidence that also within the market for mortgage-backed securities, securities with more complex conditions performed worse ex-post without offering better yields, consistent with some of the conditions being neglected.

[13] Cheng, Raina, and Xiong (2014) show that the behavior of managers in securitized finance is consistent with optimistic house price expectations.

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Figures and Tables

Pricing supplement no. 1196
To prospectus dated November 21, 2008,
prospectus supplement dated November 21, 2008 and
product supplement no. 108-A-III dated February 7, 2011

Registration Statement No. 333-155535
Dated March 24, 2011
Rule 424(b)(2)

JPMORGAN CHASE & CO.

Structured Investments

JPMorgan Chase & Co.
$1,050,000
5.00% (equivalent to 10.00% per annum) Upside Auto Callable Reverse Exchangeable Notes due September 29, 2011 Linked to the Common Stock of Ford Motor Company

General

- The notes are designed for investors who seek a higher interest rate than either the current dividend yield on the Reference Stock or the yield on a conventional debt security with the same maturity issued by us or an issuer with a comparable credit rating. Investors should be willing to forgo the potential to participate in the appreciation in the Reference Stock, to accept the risks of owning equities in general and the common stock of Ford Motor Company, in particular, to assume the risk that the notes will be automatically called and the investors will receive less interest than if the notes are not automatically called and, if the notes are not automatically called, to lose some or all of their principal at maturity.
- If the notes are not automatically called, the notes will pay 5.00% (equivalent to 10.00% per annum) interest over the term of the notes. **However, the notes do not guarantee any return of principal at maturity. Instead, if the notes are not automatically called, the payment at maturity will be based on the Final Share Price of the Reference Stock and whether the closing price of the Reference Stock is less than the Initial Share Price by more than the Protection Amount ($3.76 initially) on any day during the Monitoring Period, as described below. If the notes are automatically called, you will receive, for each $1,000 principal amount note, $1,000 plus accrued and unpaid interest. Any payment on the notes is subject to the credit risk of JPMorgan Chase & Co.**
- Senior unsecured obligations of JPMorgan Chase & Co. maturing September 29, 2011*
- If the notes are not automatically called, payment at maturity for each $1,000 principal amount note will be either a cash payment of $1,000 or delivery of shares of the Reference Stock (or, at our election, the Cash Value thereof), in each case, together with any accrued and unpaid interest, as described below.
- Minimum denominations of $1,000 and integral multiples thereof

Key Terms

Reference Stock:	The common stock, par value $0.01 per share, of Ford Motor Company (New York Stock Exchange symbol "F"). We refer to Ford Motor Company as "Ford Motor."
Interest Rate:	• **5.00% if the notes are not automatically called; or** • **2.50% if the notes are automatically called** **(in each case equivalent to 10.00% per annum),** paid monthly and calculated on a 30/360 basis
Automatic Call:	If on the Call Date, the closing price of the Reference Stock is greater than the Initial Share Price, the notes will be automatically called.
Payment if Called:	If the notes are automatically called, on the Call Settlement Date, for each $1,000 principal amount note, you will receive $1,000 plus any accrued and unpaid interest to but excluding the Call Settlement Date.
Protection Amount:	**$3.76, which is equal to 25.00% of the Initial Share Price, subject to adjustments**
Pricing Date:	March 24, 2011
Settlement Date:	On or about March 29, 2011
Call Date*:	June 24, 2011
Call Settlement Date*:	June 29, 2011, which is the third business day after the Call Date
Observation Date*:	September 26, 2011
Maturity Date*:	September 29, 2011
CUSIP:	48125XKK1
Interest Payment Dates:	Interest on the notes will be payable monthly in arrears on the 29th calendar day of each month (each such day, an "Interest Payment Date"), commencing April 29, 2011, to and including the Maturity Date, unless the notes are automatically called. If the notes are automatically called, interest will accrue to but excluding the Call Settlement Date, and will be payable on each Interest Payment Date occurring before the Call Settlement Date and on the Call Settlement Date. See "Selected Purchase Considerations — Monthly Interest Payments" in this pricing supplement for more information.
Payment at Maturity:	If the notes are not automatically called, the payment at maturity, in excess of any accrued and unpaid interest, will be based on the performance of the Reference Stock. If the notes are not automatically called, for each $1,000 principal amount note, you will receive $1,000 plus any accrued and unpaid interest at maturity, unless: (1) the Final Share Price is less than the Initial Share Price; and (2) on any day during the Monitoring Period, the closing price of the Reference Stock is less than the Initial Share Price by more than the Protection Amount. If the notes are not automatically called and the conditions described in both (1) and (2) are satisfied, at maturity you will receive, in addition to any accrued and unpaid interest, instead of the principal amount of your notes, the number of shares of the Reference Stock equal to the Physical Delivery Amount (or, at our election, the Cash Value thereof). Fractional shares will be paid in cash. **The market value of the Physical Delivery Amount or the Cash Value thereof will most likely be substantially less than the principal amount of your notes, and may be zero.**
Monitoring Period:	The period from the Pricing Date to and including the Observation Date
Physical Delivery Amount:	66.4894 shares of the Reference Stock, per $1,000 principal amount note, which is the number of shares equal to $1,000 divided by the Initial Share Price, subject to adjustments
Cash Value:	The product of (1) $1,000 divided by the Initial Share Price and (2) the Final Share Price, subject to adjustments
Initial Share Price:	$15.04, the closing price of the Reference Stock on the Pricing Date. The Initial Share Price is subject to adjustments in certain circumstances. See "Description of Notes – Payment at Maturity" and "General Terms of Notes – Anti-Dilution Adjustments" in the accompanying product supplement no. 108-A-III for further information about these adjustments.
Final Share Price:	The closing price of the Reference Stock on the Observation Date

Figure 2. Display of Headline Rates and Additional Conditions
The figure shows the beginning of the product pricing supplement available at `https://sec.report/Document/0000891092-11-001958/e42822_424b2.pdf`. The product offers a 10% headline return (advertised in the header and under Interest Rate) and protection against up to 25% drop in the underlying price (defined under Protection Amount). Additional conditions affecting the product payoff are described, e.g., under Payment at Maturity, Automatic Call, and Payment if Called.

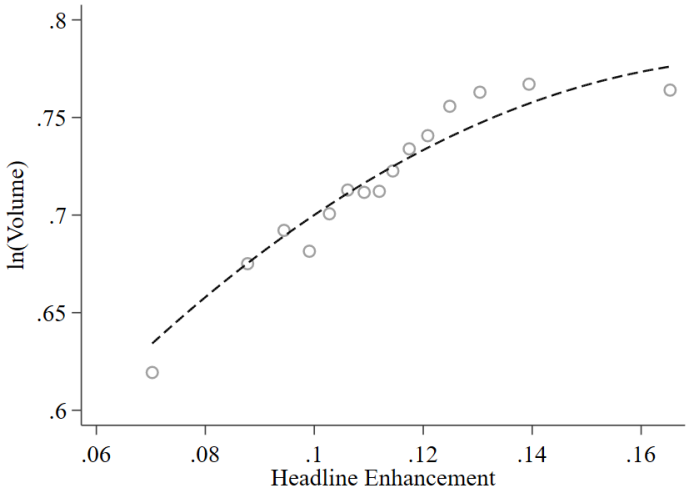


Figure 3. Volume and Headline Enhancement
The figure displays a binned scatter plot with a quadratic fit line of the logged sales volume and *Headline enhancement*$_i$ measure, as previously defined in Section 2.3. The controls include fees and fixed effects for year-month, issuer, maturity, underlying, and security design. The sample consists of 28,383 products issued in the U.S. between January 2006 and September 2015.

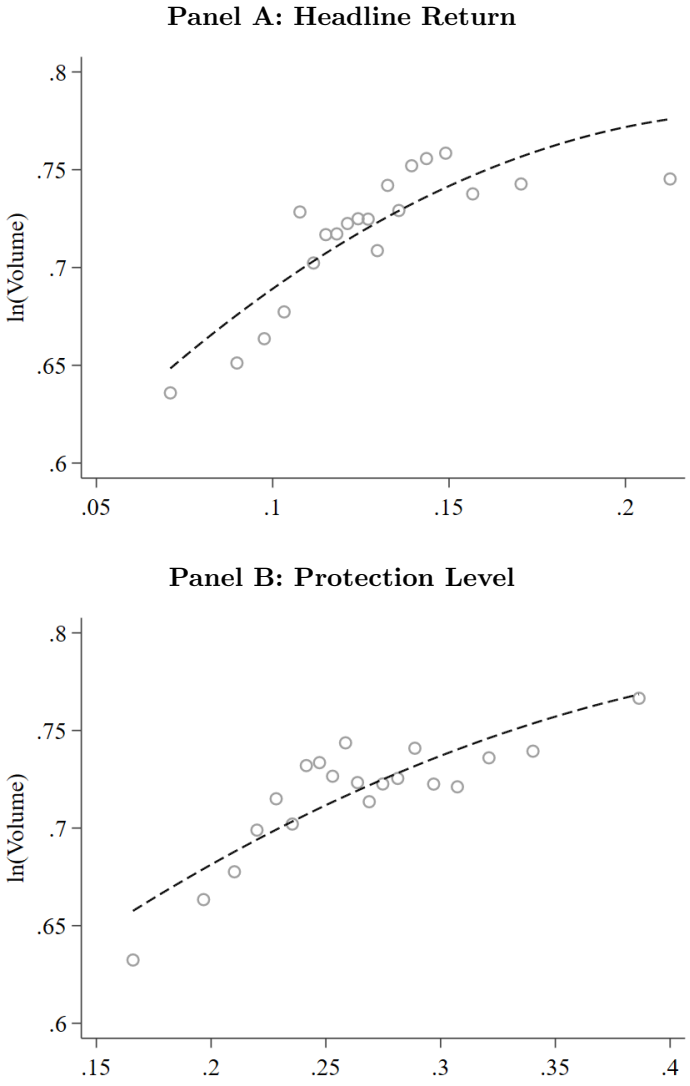


Figure 4. Volume and Headline Rates
The figures display binned scatter plots with quadratic fit lines of the logged sales volume and the two headline rates: headline return and protection level. Each plot controls for fees, the other headline rate, and fixed effects for year-month, issuer, maturity, underlying, and security design. The sample consists of 28,383 products issued in the U.S. between January 2006 and September 2015.

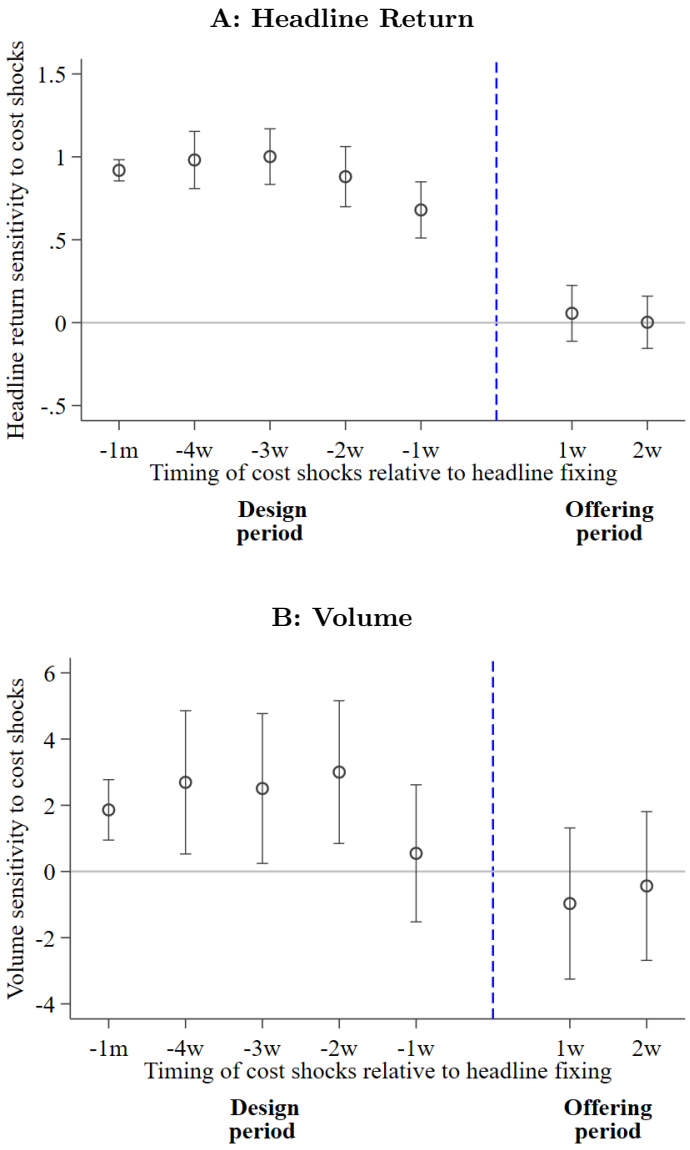


Figure 5. Sensitivities to Cost Shocks at Different Horizons

The figures plot coefficients β_h and the associated robust confidence intervals from estimating regressions 8, and 9, respectively. Cost shocks are defined in Section 3.2 and are measured either as level four weeks before the start of the offering period $(-1m)$ or weekly changes for four weeks prior to the offering period $(-4w, -3w, -2w, -1w)$ or the first two weeks of the offering period $(1w, 2w)$. The sample covers 5,414 products issued between 2006–2009 with offering period lasting at least one week. The vertical blue dashed line depicts the beginning of the offering period when headline rates remain fixed and are therefore immune to cost shocks.

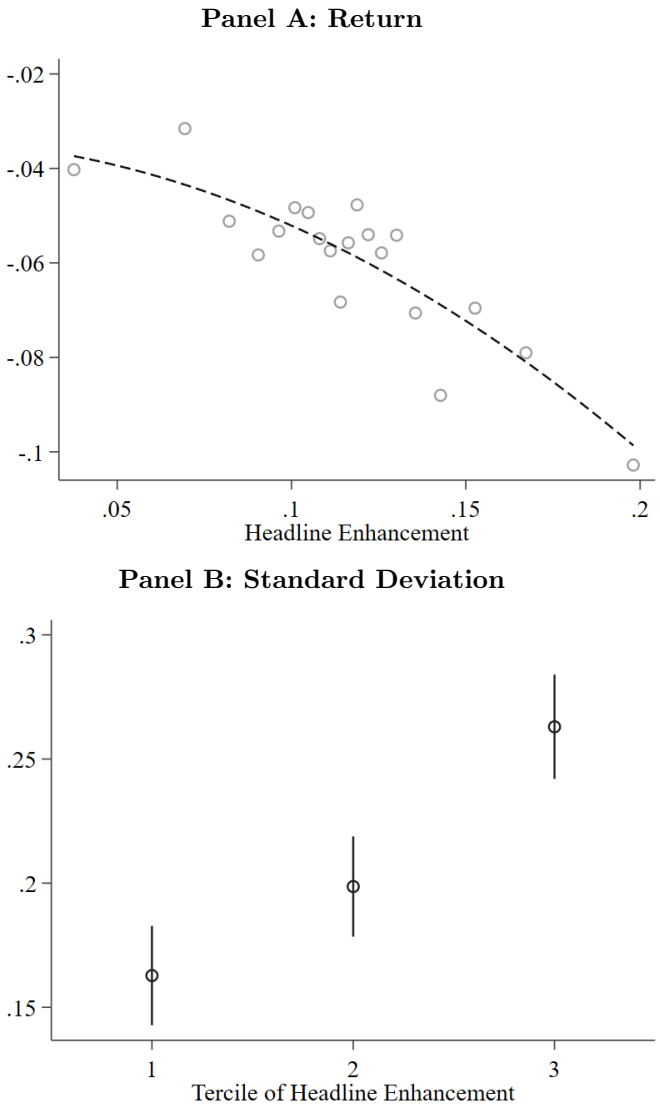


Figure 6. Return, Risk, and Headline Enhancement

Panel A displays a binned scatter plot with a quadratic fit line of the realized returns and *Headline enhancement*$_i$, as previously defined in Section 2.3. The plot controls for the interaction of year-month, maturity, and issuer fixed effects. Panel B displays the coefficients attached to indicators of *Headline enhancement*$_i$ terciles, indexed by j, in the regression:

$$SD_{tj} = I_j + \epsilon_{tj},$$

where t is year-month and SD_{tj} is the standard deviation of realized returns in headline enhancement tercile j and year-month t. The sample in both figures consists of 20,024 U.S. products with fixed maturity.

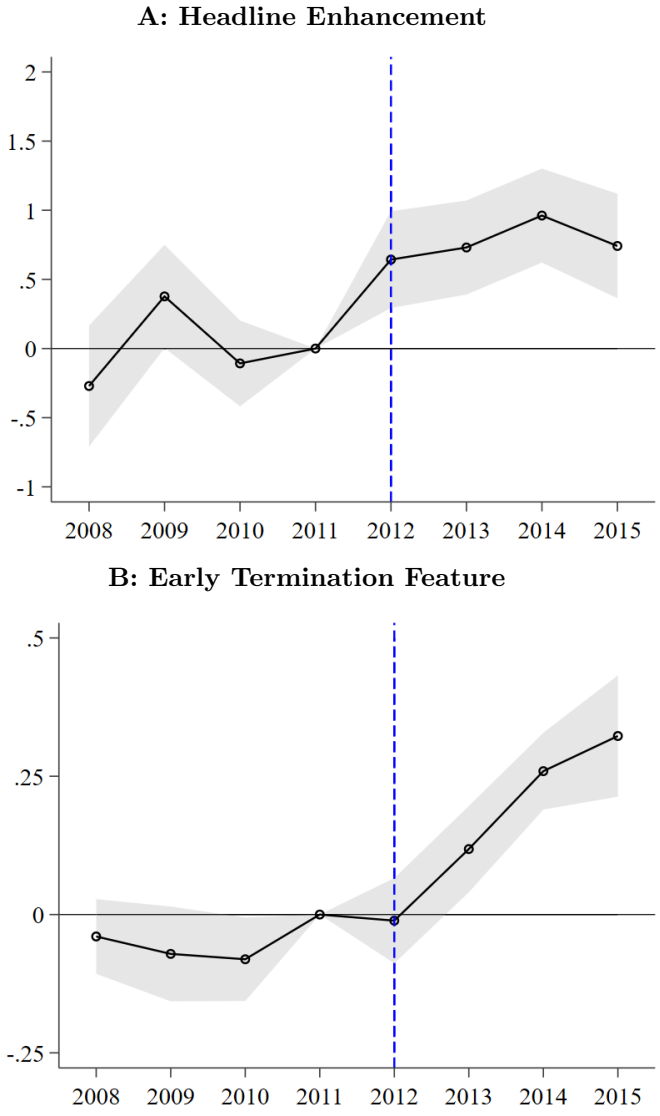


Figure 7. Security Design Around Disclosure Change

The figures plot annual coefficients β_t from estimating equation 11 for four years before and after the disclosure change. The vertical blue dashed line marks the year of the announcement of the disclosure in 2012. In Panel A, the outcome variable is the security design-level *Headline enhancement*$_g$ measure, as previously defined in Section 2.3. In Panel B, the outcome variable is an indicator for products with an early termination feature.

Table 1. Measuring Headline Enhancement

The table presents an example calculation of headline enhancement. The measure captures the impact of additional conditions in security design on product headline rates and is defined as the spread in headline return between the product, H_i, and its plain-vanilla synthetic counterfactual, H_{vnl}. This counterfactual product inherits from the original product all attributes except for additional conditions and headline return and has a plain-vanilla design, as depicted in Panel B of Figure 1. Its headline return is calculated as:

$$H_{vnl} = \frac{(FV_i + P_{s,p,T,t}/S_0)(1+r)^T - 1}{T},$$

where FV_i is the product fair value, r is an interpolated swap rate for product maturity T, and $P_{s,p,T,t}/S_0$ is the price of the embedded put option divided by the initial underlying price. The pricing inputs are from OptionMetrics and further described in Section 2.3. The example covers the product described in Figure 2.

	Product		Plain-vanilla synthetic counterfactual
Fair value	——	97.4%	——
Initial pricing date	——	March 24, 2011	——
Term	——	6 months	——
Underlying	——	Ford Motor Company	——
Protection level	——	25%	——
Additional conditions	knock-in barrier automatic call		none
Headline return	10%		−1.1%
Headline enhancement$_i$ = 10% − (−1.1)% = 11.1%			

Table 2. Summary Statistics

The table reports summary statistics for 28,383 products issued in the U.S. between January 2006 and September 2015 (Panel A) and 59,120 products issued outside of the U.S. between January 2002 and September 2015 (Panel B). *Headline enhancement*$_i$ is measured on product level and is adjusted for fees. *Headline enhancement*$_g$ is measured on the security design level and is not adjusted for fees. Both variables measure the spread of product headline return to plain-vanilla counterfactual securities as described in Section 2.3. *Headline return* is the product annual return if the underlying price does not fall by more than the *Protection level*, subject to additional conditions. *Fee* is the product markup annualized using the expected product maturity. *Volume* is sales volume in million $. *Return* is the annualized realized return and is reported only for products without early termination conditions. *Maturity* (in years) is the maximum term of a product. *Commission* is the annualized broker's commission.

Panel A: U.S. Sample

	Mean	Std. Dev.	p1	p25	p75	p99	Observations
Headline enhancement$_i$	11.3	5.4	2.7	7.4	14.2	25.8	28,383
Headline enhancement$_g$	5.2	2.3	-1.7	4.4	8.6	8.6	28,383
Headline return	12.8	4.7	5.8	9.6	15.0	28.7	28,383
Protection level	26.4	7.6	10.0	20.0	30.0	50.0	28,383
Fee	6.9	4.4	0.1	3.8	9.0	19.6	28,383
Volume	2.0	5.3	0.0	0.2	2.0	20.2	28,383
Return	-6.0	32.2	-95.0	-22.1	13.6	30.2	20,024
Maturity	0.8	0.7	0.2	0.5	1.0	5.0	28,383
Commission	3.2	2.6	0.5	1.5	4.3	12.6	25,241

Panel B: Non U.S. Sample

	Mean	Std. Dev.	p1	p25	p75	p99	Observations
Headline enhancement$_g$	6.8	3.0	1.5	5.0	7.7	15.0	59,120
Headline return	8.9	5.3	2.0	5.5	10.5	30.0	59,120
Protection level	34.6	10.2	15.0	25.0	41.0	55.0	59,120
Volume	3.7	7.3	0.0	0.9	4.0	27.8	59,120
Return	1.2	15.7	-58.5	0.0	9.4	30.1	10,046
Maturity	2.0	1.5	0.2	1.0	3.0	6.0	59,120

Table 3. Volume and Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variable is the natural logarithm of the product sales volume. The explanatory variable is the previously defined (Section 2.3) measure of headline enhancement and fee. The sample consists of 28,383 U.S. products. Maturity fixed effects are rounded to quarters. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: ln(Volume)		
	(1)	(2)	(3)
Headline enhancement$_i$	1.464***	1.084***	1.176***
	(0.133)	(0.238)	(0.223)
Fee	-3.035***	-2.329***	-2.562***
	(0.122)	(0.234)	(0.245)
Controls			
Month FE	Yes	No	No
Issuer FE	Yes	No	No
Maturity FE	Yes	No	No
Underlying FE	Yes	No	No
Design FE	Yes	Yes	Yes
Commission	No	No	Yes
Month × Maturity × Issuer × Und. FE	No	Yes	Yes
Observations	28,177	10,124	9,321
R^2	0.516	0.749	0.748

Table 4. Volume and Instrumented Headline Enhancement

This table displays the instrumental variable (IV) estimates from equation 3.2 in which the dependent variable is the natural logarithm of the product sales volume. Headline enhancement is instrumented with the structuring cost defined as $\nu_g \sigma_{s,t}$, where $\sigma_{s,t}$ is the underlying implied volatility and ν_g is the security design g sensitivity of headline enhancement to volatility. The first column reports the corresponding OLS regression. The second column reports the instrumental variable estimates. The sample consists of 28,383 U.S. products. Maturity FE are rounded to quarters. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: ln(Volume)	
	OLS	IV
	(1)	(2)
Headline Enhancement$_i$	1.464***	1.067***
	(0.133)	(0.255)
Fee	-3.035***	-2.821***
	(0.122)	(0.167)
Controls		
Month FE	Yes	Yes
Issuer FE	Yes	Yes
Maturity FE	Yes	Yes
Underlying FE	Yes	Yes
Design FE	Yes	Yes
Observations	28,177	28,177
F-stat		5,361

Table 5. Volume Sensitivity to Cost Shocks at Different Horizons

The table reports regression of the natural logarithm of sales volume on the cost-based instrument (as defined in Section 3.2) measured at different horizons: four weeks before the start of the offering period ($-1m$), change between four weeks and the start of the offering period ($-4w-1w$), and change over the first two weeks of offering period ($1w-2w$). The sample consists of 5,414 products issued between January 2006 and December 2009 with offering period of at least one week. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: ln(Volume)
	(1)
ϕ_{-1m}	1.890***
	(0.462)
$\Delta\phi_{-4w-1w}$	2.269***
	(0.696)
$\Delta\phi_{1w-2w}$	-0.286
	(0.917)
Fee	-1.164***
	(0.204)
Controls	
Month FE	Yes
Issuer FE	Yes
Maturity FE	Yes
Underlying FE	Yes
Design FE	Yes
Observations	5,414
R^2	0.583

Table 6. Volume and Headline Enhancement Outside of the U.S.
This table displays the coefficients from OLS regressions in which the dependent variable is the natural logarithm of the product sales volume. The explanatory variable is the previously defined (Section 2.3) security design-level measure of *Headline enhancement*$_g$. The sample consists of 59,120 products issued outside of the U.S. In Columns 2 and 3, I exclude products with multiple underlyings. Maturity fixed effects are rounded to quarters. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: ln(Volume)		
	(1)	(2)	(3)
Headline enhancement$_g$	1.883***	2.349***	1.493***
	(0.139)	(0.200)	(0.268)
Controls			
Month FE	Yes	Yes	No
Country FE	Yes	Yes	No
Issuer FE	Yes	Yes	No
Maturity FE	Yes	Yes	No
Underlying FE	No	Yes	No
Month × Country × Issuer × Und. × Maturity FE	No	No	Yes
Sample:	Full	Single underlying	Single underlying
Observations	59,066	32,924	16,107
R^2	0.477	0.457	0.668

Table 7. Fees and Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variable is the product fee. The explanatory variables are the previously defined measures of headline enhancement (Section 2.3). Maturity fixed effects are rounded to quarters. The sample consists of 28,383 U.S. products. Standard errors clustered at the issuer level are in parentheses. *, *, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Fee		
	(1)	(2)	(3)
Headline enhancement$_g$	0.573***		
	(0.0541)		
Headline enhancement$_i$		0.635***	0.584**
		(0.113)	(0.264)
Controls			
Month FE	Yes	Yes	No
Issuer FE	Yes	Yes	No
Maturity FE	Yes	Yes	No
Underlying FE	Yes	Yes	No
Design FE	No	Yes	Yes
Month × Und. × Issuer × Maturity FE	No	No	Yes
Observations	28,177	28,177	10,124
R^2	0.499	0.681	0.838

Table 8. Returns and Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variable is the product realized return. The explanatory variables are the previously defined measures of headline enhancement. Maturity fixed effects are rounded to quarters. Standard errors clustered at the issuer level are in parentheses. *, *, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Return			
	(1)	(2)	(3)	(4)
Headline enhancement$_i$	-0.381***		0.0492	
	(0.113)		(0.198)	
Fee		-0.599***	-0.635***	
		(0.0587)	(0.126)	
Headline enhancement$_g$				-0.317**
				(0.129)
Controls				
Country × Month × Issuer × Maturity FE	Yes	Yes	Yes	Yes
Sample	U.S.	U.S.	U.S.	Non U.S.
Observations	19,613	19,613	19,613	9,206
R^2	0.468	0.470	0.470	0.425

Table 9. Determinants of Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variable is the security design-level measure, *Headline enhancement*$_g$, as defined in Section 2.3. The explanatory variables are the one-year swap rate of the product denomination currency and the implied volatility of the product underlying. Implied volatility is measured on the last trading day of the month preceding the pricing date at -50 delta and maturity of 365 days. The sample consists of 123,409 product-underlying pairs covering products issued both in the U.S. and outside. Maturity fixed effects are rounded to quarters. Standard errors clustered at the issuer level are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Headline enhancement$_g$				
	(1)	(2)	(3)	(4)	(5)
Swap rate	-0.232***	-0.238***	-0.323***	-0.116***	-0.157***
	(0.0768)	(0.0418)	(0.0733)	(0.0325)	(0.0461)
Implied volatility	-0.0155***	-0.0327***	-0.00981***	0.00349	-0.00899***
	(0.00289)	(0.00435)	(0.00246)	(0.00838)	(0.00263)
Controls					
Month FE	Yes	No	Yes	No	No
Issuer FE	Yes	Yes	Yes	No	No
Maturity FE	Yes	Yes	Yes	No	No
Country FE	Yes	Yes	Yes	No	No
Underlying FE	Yes	Yes	Yes	No	Yes
Month × Country × Issuer × Maturity × Underlying FE	No	No	No	Yes	No
Month × Country × Issuer × Maturity FE	No	No	No	No	Yes
Sample:	Global	U.S.	Non-U.S.	Switzerland	Global
Observations	123,409	33,620	89,637	34,685	118,035
R^2	0.605	0.442	0.506	0.533	0.750

Internet Appendix for "Salient Attributes and Household Demand for Security Designs"

This version: February 2023

FWP 1 e45836fwp.htm TERM SHEET

Term sheet
To prospectus dated November 21, 2008,
prospectus supplement dated November 21, 2008 and
product supplement no. 34-A-II dated February 7, 2011

Term Sheet to
Product Supplement No. 34-A-II
Registration Statement No. 333-155535
Dated October 17, 2011; Rule 433

JPMORGAN CHASE & CO.

Structured Investments

$
13.50% per annum Reverse Exchangeable Notes due October 24, 2012 Linked to the Common Stock of Caterpillar Inc.

General

- The notes are designed for investors who seek a higher interest rate than the current dividend yield on the Reference Stock or the yield on a conventional debt security with the same maturity issued by us or an issuer with a comparable credit rating. Investors should be willing to forgo the potential to participate in appreciation in the Reference Stock, be willing to accept the risks of owning equities in general and the common stock of Caterpillar Inc., in particular, and be willing to lose some or all of their principal at maturity.
- The notes will pay 13.50% per annum interest over the term of the notes. **However, the notes do not guarantee any return of principal at maturity. Instead, the payment at maturity will be based on the Final Share Price of the Reference Stock and whether the closing price of the Reference Stock is less than the Initial Share Price by more than the Protection Amount on any day during the Monitoring Period, as described below.**
- Senior unsecured obligations of JPMorgan Chase & Co. maturing October 24, 2012*.
- Payment at maturity for each $1,000 principal amount note will be either a cash payment of $1,000 or delivery of shares of the Reference Stock (or, at our election, the Cash Value thereof), in each case, together with any accrued and unpaid interest, as described below.
- Any payment on the notes is subject to the credit risk of JPMorgan Chase & Co.
- Minimum denominations of $1,000 and integral multiples thereof.

Key Terms

Reference Stock:	The common stock, par value $1.00 per share, of Caterpillar Inc. (New York Stock Exchange symbol "CAT"). We refer to Caterpillar Inc. as "Caterpillar."
Interest Rate:	**13.50% per annum**, paid monthly and calculated on a 30/360 basis.
Protection Amount:	An amount that represents at least **25.00% of the Initial Share Price, subject to adjustments.**
Pricing Date:	On or about October 19, 2011
Settlement Date:	On or about October 24, 2011
Observation Date:	October 19, 2012*
Maturity Date:	October 24, 2012*
CUSIP:	48125X6S0
Interest Payment Dates:	Interest on the notes will be payable monthly in arrears on the 24th calendar day of each month, up to and including the final monthly interest payment, which will be payable on the Maturity Date (each such date, an "Interest Payment Date"), commencing November 24, 2011. See "Selected Purchase Considerations — Monthly Interest Payments" in this term sheet for more information.
Payment at Maturity:	The payment at maturity, in excess of any accrued and unpaid interest, is based on the performance of the Reference Stock. You will receive $1,000 for each $1,000 principal amount note, plus any accrued and unpaid interest at maturity, unless: (1) the Final Share Price is less than the Initial Share Price; and

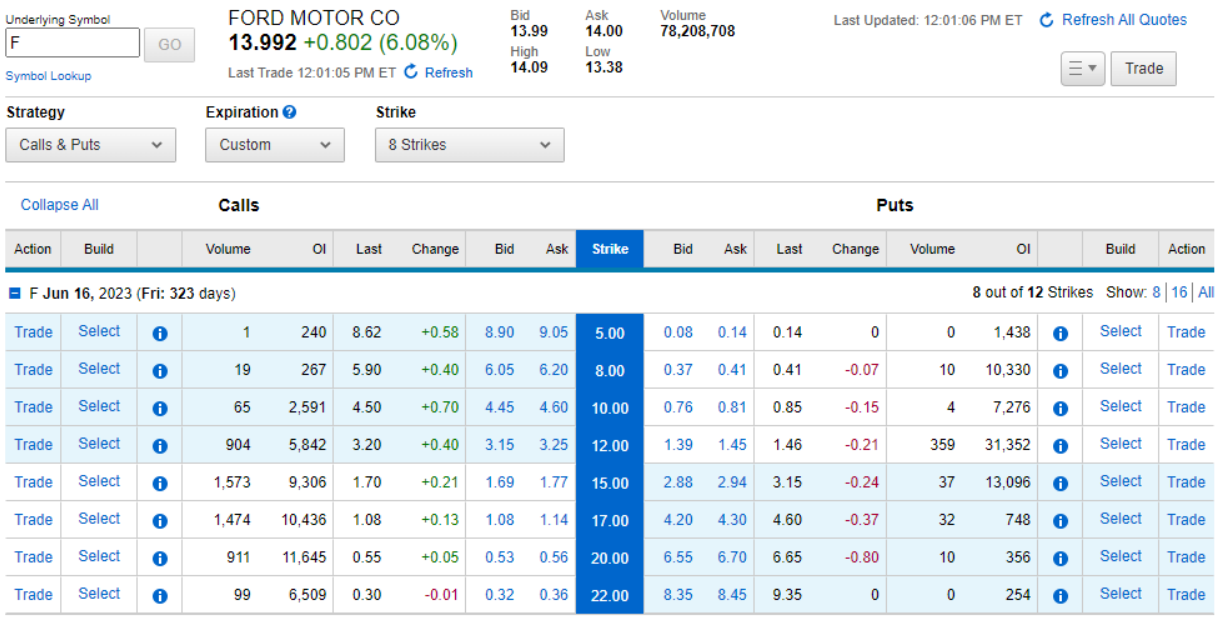
Figure A.1. Term Sheet with Headline Rate Fixing
The figure shows the beginning of the product term sheet available at `https://www.sec.gov/Archives/edgar/data/19617/000089109211007004/e45836fwp.htm`. The headline return (13.5%) and the minimum level of protection (25%) are fixed prior to the start of offering period.

The highly dynamic environment of today's financial markets creates new opportunities and challenges for investors. As a result, investors are looking for innovative ideas and creative solutions to mitigate risk and maximize return on their portfolios. A growing number of investors are seeking unique, sophisticated strategies that could help them meet their financial goals. There is an increasing need for efficient financial products that may allow investors to realize higher yields, reduce their risk exposure and achieve access to a wider range of asset classes, such as international equities, commodities, foreign currencies and various market indices. Due to this growing need, Structured Investments have become a key driver in today's global markets.

Structured Investments may help investors meet their specific financial goals and provide greater diversification to their investment portfolios. Structured Investments encompass a variety of structures and terms. The most typical are Structured Notes which consist of a debt security linked to the performance of a reference asset (equity, basket of equities, equity index, commodity, commodity index or foreign currency). Among the variety of structures available, most aim to help investors to achieve the following primary objectives: minimize the loss of principal (e.g. Principal Protected Notes), generate higher yields (e.g. Reverse Convertible and AutoCallable Notes) or participate in enhanced returns (e.g. SuperTrack^{SM} Notes).

1

Figure A.2. Marketing Brochure
The figure shows the first page of marketing brochure available at `https://www.sec.gov/Archives/edgar/data/312070/000119312511153695/dfwp.htm` (highlights added).



Underlying Symbol: F GO
Symbol Lookup

FORD MOTOR CO
13.992 +0.802 (6.08%)
Last Trade 12:01:05 PM ET Refresh

Bid 13.99 | Ask 14.00 | Volume 78,208,708
High 14.09 | Low 13.38

Last Updated: 12:01:06 PM ET Refresh All Quotes
Trade

Strategy: Calls & Puts | Expiration: Custom | Strike: 8 Strikes

Collapse All

Calls										Strike	Puts							
Action	Build		Volume	OI	Last	Change	Bid	Ask			Bid	Ask	Last	Change	Volume	OI		Build	Action
F Jun 16, 2023 (Fri: 323 days)																	8 out of 12 Strikes Show: 8 | 16 | All		
Trade	Select		1	240	8.62	+0.58	8.90	9.05		5.00	0.08	0.14	0.14	0	0	1,438		Select	Trade
Trade	Select		19	267	5.90	+0.40	6.05	6.20		8.00	0.37	0.41	0.41	-0.07	10	10,330		Select	Trade
Trade	Select		65	2,591	4.50	+0.70	4.45	4.60		10.00	0.76	0.81	0.85	-0.15	4	7,276		Select	Trade
Trade	Select		904	5,842	3.20	+0.40	3.15	3.25		12.00	1.39	1.45	1.46	-0.21	359	31,352		Select	Trade
Trade	Select		1,573	9,306	1.70	+0.21	1.69	1.77		15.00	2.88	2.94	3.15	-0.24	37	13,096		Select	Trade
Trade	Select		1,474	10,436	1.08	+0.13	1.08	1.14		17.00	4.20	4.30	4.60	-0.37	32	748		Select	Trade
Trade	Select		911	11,645	0.55	+0.05	0.53	0.56		20.00	6.55	6.70	6.65	-0.80	10	356		Select	Trade
Trade	Select		99	6,509	0.30	-0.01	0.32	0.36		22.00	8.35	8.45	9.35	0	0	254		Select	Trade

Figure A.3. Display of Option Prices in Online Brokerage Account

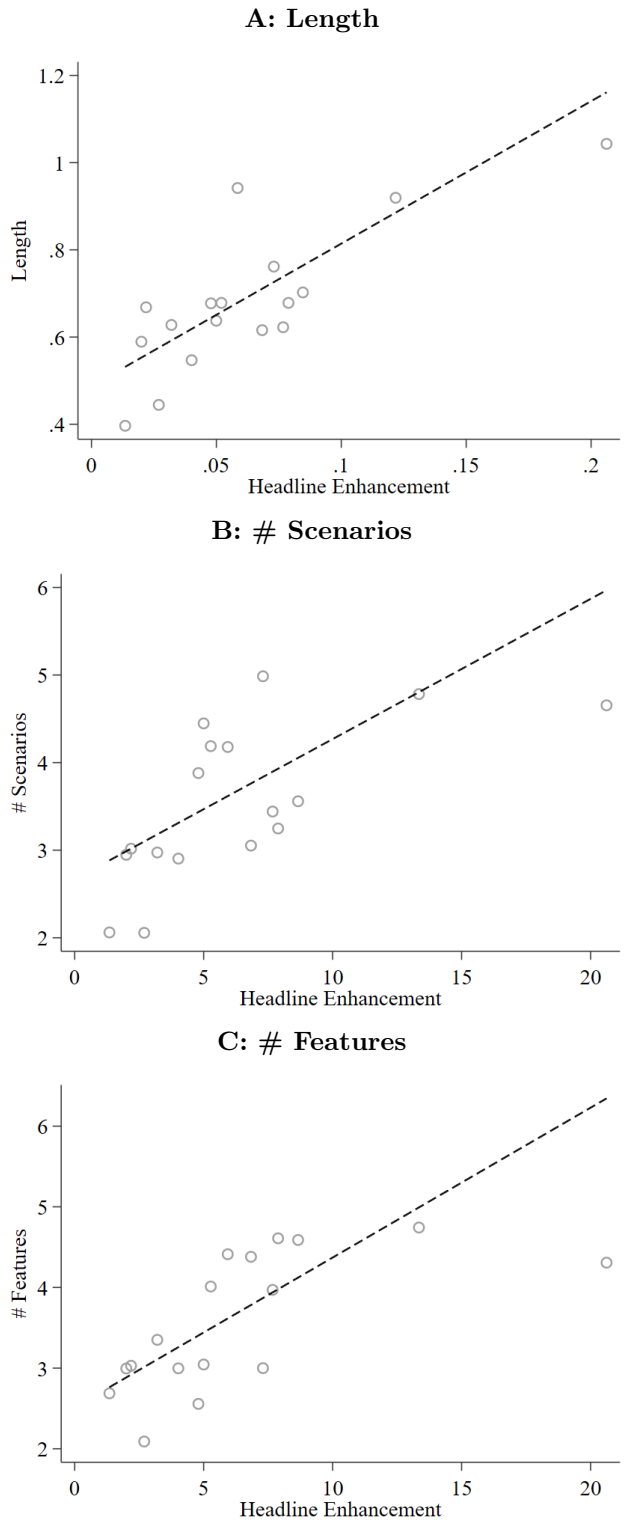


Figure A.4. Complexity and Headline Enhancement

The figures display binned scatter plots of three complexity measures defined by Célérier and Vallée (2017) against *Headline enhancement*$_g$. The sample covers 89,399 U.S. and non-U.S. products. The pairwise correlation with *Headline enhancement*$_g$ is 53%, 44%, and 56%, respectively.

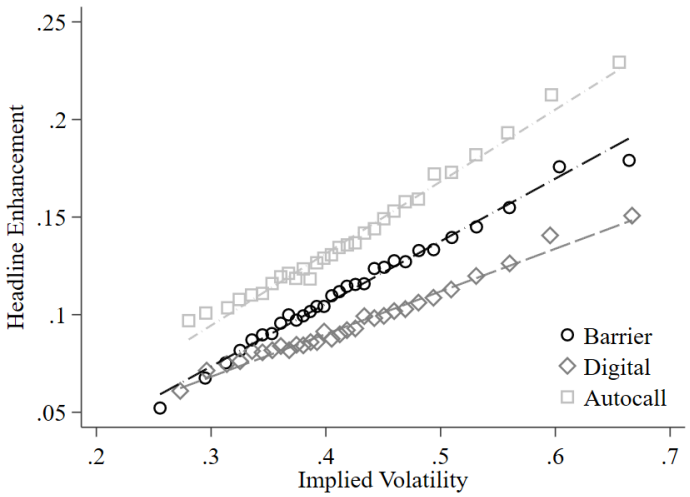


Figure A.5. Security-Design Vega

The figure displays a binned scatter plot of *Headline enhancement*$_i$, as previously defined in Section 2.3, and underlying implied volatility for three security designs. The plot controls for maturity fixed effects (rounded to quarters).

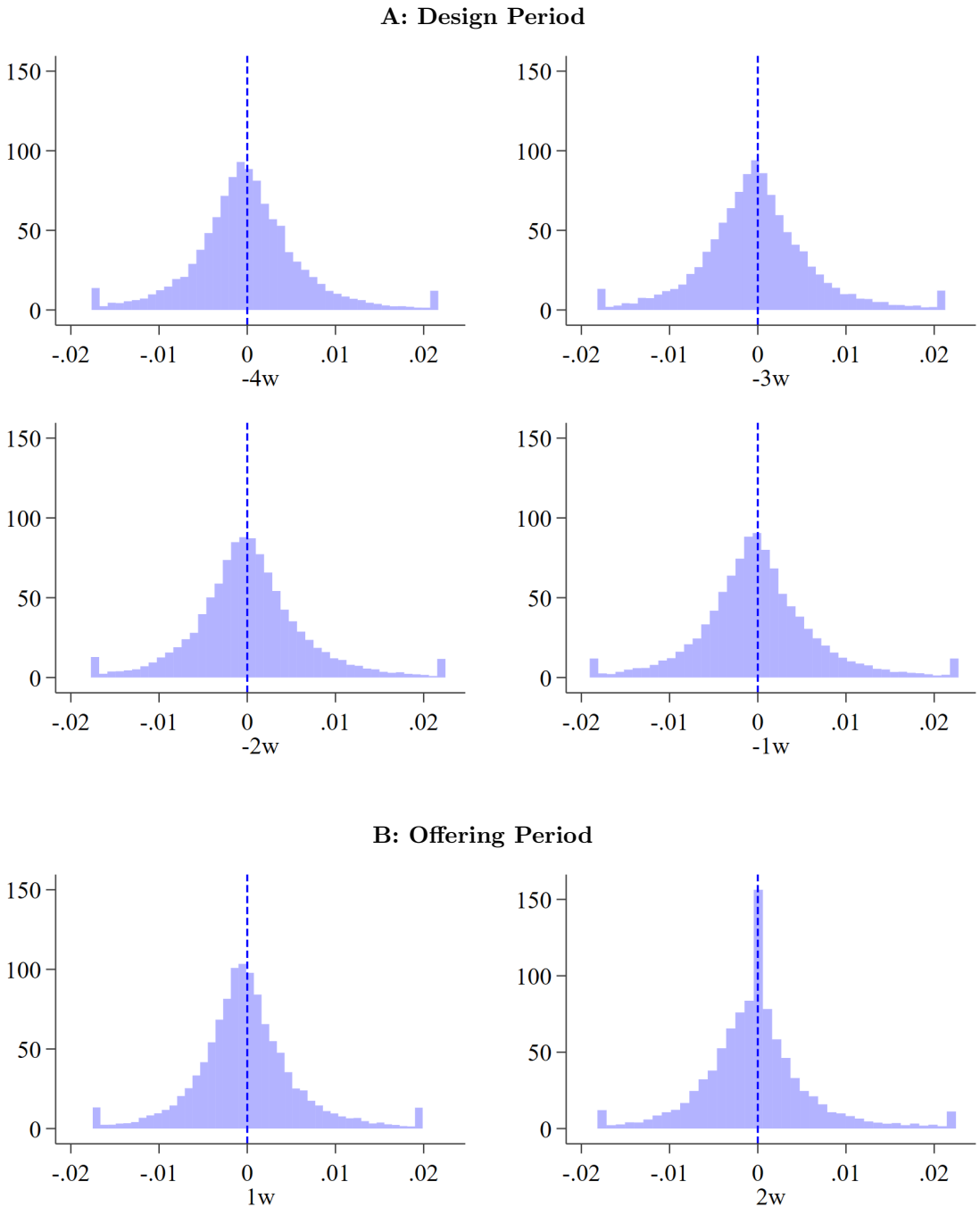


Figure A.6. Distribution of Cost Shocks over Design and Offering Period
The figures plot histograms of weekly changes in structuring costs, $\Delta\phi_i$, as defined in Section 3.2, with vertical blue dashed lines at 0.

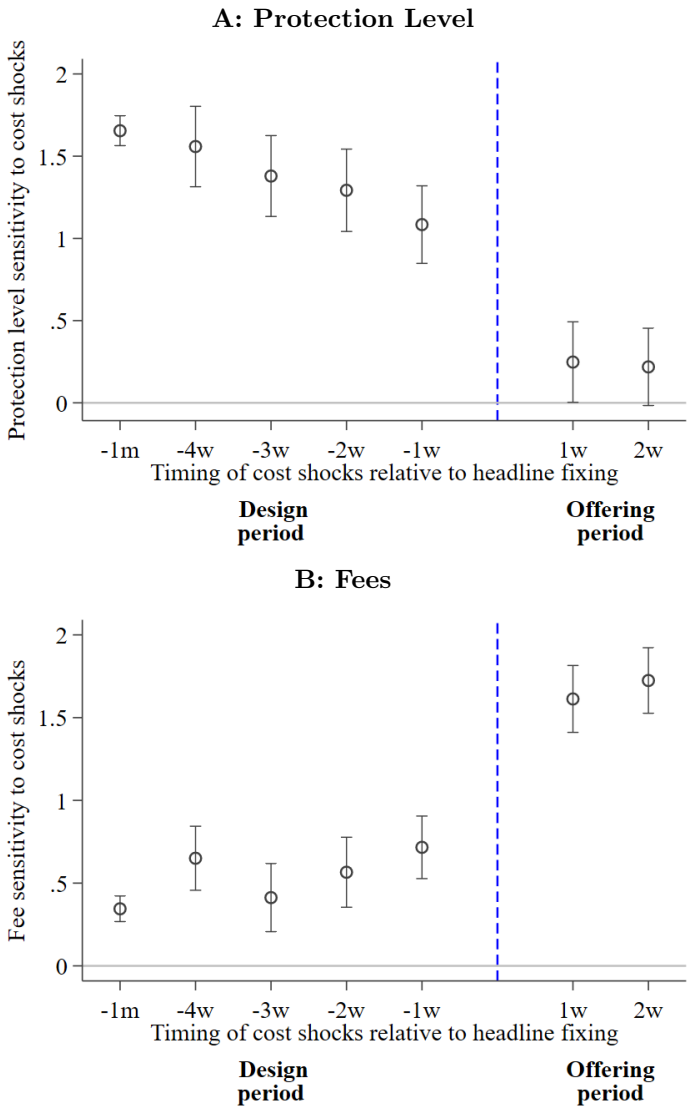


Figure A.7. Sensitivity of Protection Level and Fees to Cost Shocks at Different Horizons

The figures plot coefficients β_h and the associated robust confidence intervals from estimating regression 8. The dependent variable is protection level in Panel A, and product fees in Panel B. Cost shocks are defined in Section 3.2 and are measured either as level four weeks before the start of the offering period $(-1m)$ or weekly changes for four weeks prior to the offering period $(-4w, -3w, -2w, -1w)$ or the first two weeks of the offering period $(1w, 2w)$. The sample covers 5,414 products issued between 2006–2009 with offering period lasting at least one week. The vertical blue dashed line depicts the beginning of the offering period when headline rates remain fixed and are therefore immune to cost shocks.

Table A.1. Sample Split by Headline Enhancement

This table displays summary statistics for terciles split by *Headline enhancement*$_i$. Unless otherwise specified, the values represent means. The variables are defined in Table 1 and 2. The sample consists of 20,024 U.S. products with fixed maturity.

	Headline Enhancement Terciles		
	(1)	(2)	(3)
Return			
Mean	-3.9	-6.1	-7.9
Variance	5.6	9.4	16.1
Skewness	-1.6	-1.3	-1.0
Headline enhancement$_i$	6.0	10.5	18.4
Fee	3.6	6.1	11.8
Observations	6,675	6,675	6,674

Table A.2. Volume and Headline Enhancement

This table displays the version of Table 3 where the dependent variable is product sales volume in million $. The explanatory variable is the previously defined (Section 2.3) measure of headline enhancement and fee. The sample consists of 28,383 U.S. products. Maturity fixed effects are rounded to quarters. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Volume (million $)		
	(1)	(2)	(3)
Headline enhancement$_i$	8.666***	3.029**	3.609***
	(1.130)	(1.360)	(1.226)
Fee	-11.36***	-7.059***	-9.126***
	(0.930)	(1.486)	(1.534)
Controls			
Month FE	Yes	No	No
Issuer FE	Yes	No	No
Maturity FE	Yes	No	No
Underlying FE	Yes	No	No
Design FE	Yes	Yes	Yes
Commission	No	No	Yes
Month × Maturity × Issuer × Und. FE	No	Yes	Yes
Observations	28,177	10,124	9,321
R^2	0.386	0.660	0.678

Table A.3. Sensitivity of Headline Rates to Cost Shocks at Different Horizons

The table reports regressions of headline returns and protection levels on the cost-based instrument (as defined in Section 3.2) measured at different horizons: four weeks before the start of the offering period ($-1m$), change between four weeks and the start of the offering period ($-4w-1w$), and change over the first two weeks of offering period ($1w-2w$). The sample consists of 5,414 products issued between January 2006 and December 2009 with offering period of at least one week. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

Dep. var.:	Headline return	Protection
	(1)	(2)
ϕ_{-1m}	0.933***	1.670***
	(0.0332)	(0.0474)
$\Delta\phi_{-1m-1w}$	0.915***	1.368***
	(0.0563)	(0.0819)
$\Delta\phi_{1w-2w}$	0.107	0.202**
	(0.0674)	(0.101)
Controls		
Month FE	Yes	Yes
Issuer FE	Yes	Yes
Maturity FE	Yes	Yes
Underlying FE	Yes	Yes
Design FE	Yes	Yes
Observations	5,414	5,414
R^2	0.711	0.746

Table A.4. Security Design Around Disclosure Change

The table reports difference-in-differences coefficients from estimating regression:

$$X_g = \beta(Post_t \times I_{US}) + r_t + \sigma_{s,t} + \lambda_t + \lambda_T + \lambda_c + \lambda_s + \lambda_b + \epsilon_i,$$

where $Post_t$ is an indicator equal to one from 2012 onward, I_{US} is equal to one for products issued in the U.S., and λ denotes fixed effects for year-month, maturity, country, underlying, and issuer. The dependent variable in Column (2) is an indicator variable for products with an early termination feature. The sample consists of 123,409 product-underlying pairs covering products issued between 2006 and 2015 both in the U.S. and outside. Standard errors clustered at the issuer level are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

Dep. var.:	Headline enhancement$_g$	Early termination
	(1)	(2)
$Post_t \times I_{US}$	0.799***	0.173***
	(0.148)	(0.0374)
Controls		
Swap rate	Yes	Yes
Implied Volatility	Yes	Yes
Month FE	Yes	Yes
Issuer FE	Yes	Yes
Country FE	Yes	Yes
Maturity FE	Yes	Yes
Underlying FE	Yes	Yes
Observations	123,409	123,409
R^2	0.606	0.621

Table A.5. Benchmark Returns and Headline Enhancement

This table displays the coefficients from OLS regression in which the dependent variable is the benchmark return (from Vokata 2021) defined as the cumulative return of delta equivalent daily adjusted positions in the underlying equity and risk-free rate. The explanatory variable is the previously defined measure of headline enhancement. Maturity fixed effects are rounded to quarters. The sample consists of 19,992 U.S. products with fixed maturity before January 2018. Standard errors clustered at the issuer level are in parentheses. *, *, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Benchmark Return
Headline enhancement$_i$	0.0343
	(0.116)
Controls	
Month × Issuer × Maturity FE	Yes
Observations	19,581
R^2	0.348

Table A.6. Expected Returns and Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variables are the expected returns (from Vokata 2021) under different assumptions about the expected excess return of the underlying. The column labels indicate the model used to estimate the expected return on the underlying. $\hat{\beta}$ is the CAPM beta. $SVIX$ is the 1-year equity premium based on the SVIX index (Martin, 2017). $\hat{\boldsymbol{\beta}}$ is a vector of Fama and French (2015) factor loadings, and $\overline{\mathbf{FF5}}_t$ is a vector of the respective mean factor values. Betas are estimated using $24-60$ monthly returns preceding the initial valuation date. Average factor returns are over the period from January 1996 until the last month before the initial valuation date of the product. The explanatory variable is the previously defined measure of headline enhancement. Maturity fixed effects are rounded to quarters. The sample consists of 19,614 U.S. products with fixed maturity and available β estimates. Standard errors clustered at the issuer level are in parentheses. *, *, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

	Dependent variable: Expected Return p.a.			
Underlying return:	$\hat{\beta}\times$ 6%	$\hat{\beta}\times$ 8%	$\hat{\beta} \times SVIX_t$	$\hat{\beta} \cdot \overline{\mathbf{FF5}}_t$
	(1)	(2)	(3)	(4)
Headline enhancement$_i$	0.0691***	0.0977***	0.0911***	0.0606***
	(0.00944)	(0.0104)	(0.0106)	(0.0132)
Fee	-1.057***	-1.042***	-1.073***	-1.070***
	(0.0169)	(0.0170)	(0.0197)	(0.0172)
Controls				
Month FE	Yes	Yes	Yes	Yes
Issuer FE	Yes	Yes	Yes	Yes
Maturity FE	Yes	Yes	Yes	Yes
Underlying FE	Yes	Yes	Yes	Yes
Observations	19,405	19,405	19,405	14,804
R^2	0.941	0.926	0.873	0.943