Salient Attributes and Household Demand for Security Designs

Petra Vokata*

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Abstract

Using a large 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 rates of headline return and downside protection—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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*Fisher College of Business, The Ohio State University, 2100 Neil Avenue, 43210 Columbus, Ohio, USA. vokata.1@osu.edu. I thank Daisy Wang and Hoa Briscoe-Tran for their excellent research assistance. I thank seminar and conference participants at the 6th CFPB Research Conference, AFA (New Orleans) AFFECT Workshop, Finance Down Under, 10th HEC-McGill Winter Finance Workshop, Midwestern Finance Association Conference, NZFM, Annual Meeting of the Swiss Society for Financial Market Research, WAPFIN Conference at New York University, Aalto University, Lund University, University of Washington (Foster), Ohio State University (Consumer Economics), Ohio State University (Finance), and Lauren Cohen, David Feldman, Samuel Hartzmark, Victoria Ivashina, Matti Keloharju, Samuli Knüpfer, Jennifer Koski, Juhani Linnainmaa, David McLean, Cameron Peng, Gustavo Schwenkler, Kelly Shue, Richard Townsend, and Chen Wang for comments and discussions that benefited this paper. The paper subsumes results reported in the second chapter of my dissertation, for which I gratefully acknowledge financial support from the Academy of Finland, the OP Group Research Foundation, and the Foundation for Promoting the Finnish Securities Market. I am especially grateful to the commercial data platform for providing the data.

1 Introduction

The goal of financial engineering is to enhance 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 choice 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 retail 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 both of 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 banks often issue close substitutes that are identical in all attributes except for security de-

[1] Although many accounts of financial innovations share this narrative of overweighting of salient attributes while neglecting 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), who show that the pricing of mortgage backed securities 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, with America and Europe each accounting for approximately $0.5 trillion and Asia accounting for $1 trillion (see `https://www.structuredretailproducts.com/news/details/78173`).

sign. 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 the design of securities is distinct from the timing of demand decisions about purchased amounts. 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: investors receive 9.5% return unless the price of the underlying falls by more than 20% protection level at maturity. Otherwise, the return declines by the fall in the price of the underlying below the protection level. I call this security design plain-vanilla because it is equivalent to writing a plain-vanilla European 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 substitution of inferior security design for higher headline rates, 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 (i.e., embedded fees) and production costs. I use these variables to isolate the fraction of headline rates attributable to additional

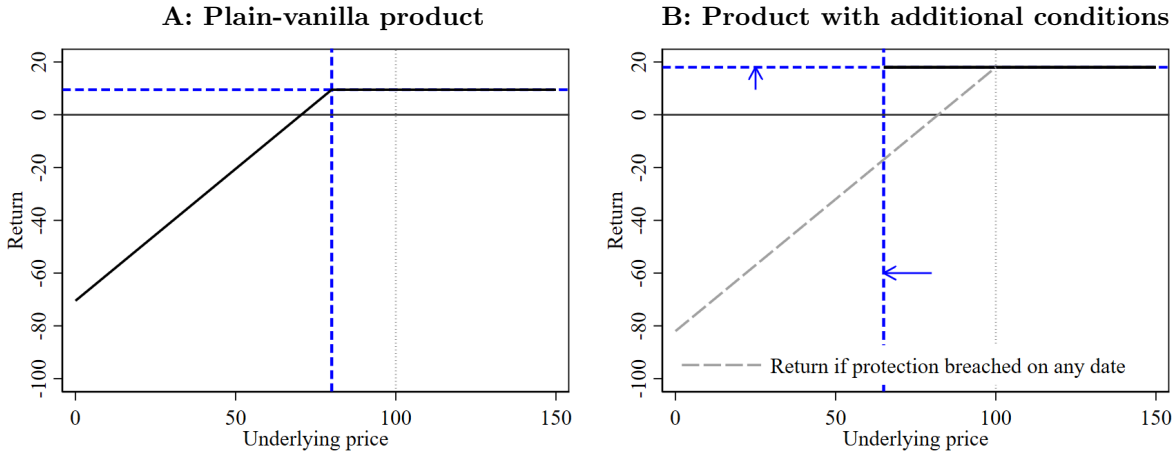

Figure 1. Payoff Diagrams
The figures show payoff diagrams for two nearly identical products issued on the same date by the same bank and linked to the same underlying stock that differ only in their security design. Plain-vanilla product (Panel A) pays a 9.5% headline return (marked with a horizontal 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 to 18% headline return and 35% protection level.

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. While enhancement is powerful in increasing headline rates, it fails to enhance realized returns. Net of fees, one percentage point higher enhancement is associated with 40 basis points lower returns. Controlling for fees, enhancement is largely irrelevant for realized, expected, as well as benchmark returns.

With the enhancement measure in hand, I show that it is associated with higher sales in a sample of more than 28,000 U.S. YEPs. 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 key 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 $\times$ underlying $\times$ issuer $\times$ maturity fixed effects, which capture any underlying-time-specific, bank-time-specific, and maturity-time-specific demand shocks. In addition, the results are robust to controlling for the commissions paid to brokers and therefore hard to explain with stories based on marketing intensity or conflicted brokers' advice.

While the evidence is consistent with investor demand being distorted by "artificially" enhanced headline rates, a potential concern is that an omitted variable such as background risk may drive the result. I next show that I obtain similar results using a cost-based instrumental variable that better accounts for potential omitted factors. I define the instrument as structuring costs of enhancement calculated from option prices. The key identifying assumption behind this approach is that structuring costs are not related to demand shocks. I exploit the distinct timing of supply and demand to design a falsification test that supports the validity of this assumption. Specifically, I use the fact that headline rates are fixed prior to the beginning of the offering period over which investors can purchase the products. I show that consistent with the interpretation that cost shocks affect demand only through their impact on headline rates, cost shocks that occur before the start of the offering period affect demand, but those that occur after do not.

To assess whether the results generalize to other countries, I next turn to data on another almost 60,000 products issued globally. To overcome the limitation that this data does not cover fair values, I shift from granular product-level to coarser security-design level variation in headline enhancement. On security-design level, enhancement correlates with lower fair values and subsequent lower returns and therefore not controlling for fair values makes the estimates conservative. I find that despite delivering lower returns, security designs with more enhanced headline rates attract larger sales with a magnitude comparable to the U.S. product-level analysis.

These and other empirical findings (outlined in Table 1) do not fit well into models with standard preferences and rational beliefs. I consider potential explanations including background risk, subjective beliefs, conflicted advice, reaching for income, and preferences for higher-order moments and frequency of outperformance, which can individually reconcile some of the findings.

The most parsimonious explanations involve forms of salient thinking whereby agents overweight the salient headline rates. I consider two formalizations of such thinking based on Bordalo, Gennaioli, and Shleifer (2022): 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 add early termination features that obscure the comparison of annual fees implied from 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. Simple back-of-the-envelope approximation taking the point estimates as given implies that lowering headline enhancement by one standard deviation could save investors more than $1 billion in fees over my sample period.[3] In addition, 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 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. On the other hand, the evidence on changes in security design after mandated disclosure highlights regulatory challenges. Since banks can use security design as

[3]Extrapolating to the current size of the market would imply even larger potential welfare implications. The U.S. sales of structured notes in 2021 exceeded $100 billion (see `https://www.structuredretailproducts.com/news/details/77846`).

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

a tool of regulatory arbitrage, regulators should shift focus to manipulation-proof disclosure.

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 (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 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; Li, Subrahmanyam, and Yang, 2018; Egan, 2019; Henderson, Pearson, and Wang, 2020, 2022; Vokata, 2021; Gao, Hu, Kelly, Peng, and Zhu, 2022; Ammann, Arnold, and Straumann, 2022) and innovative securities more generally. The findings resonate both with the evidence on reaching for yield (Célérier and Vallée, 2017) and loss aversion of investors (Calvet, Célérier, Sodini, and Vallée, 2022). My paper contributes

to this literature by providing new evidence that innovative security design can cater to both yield-seeking and safety-seeking at the same time. I thereby link these two previously disparate stylized facts to a unified cognitive mechanism.

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 returns 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. While doing so, I expand the focus to include the second salient attribute—protection level, which governs product risk. 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 structured retail product market is categorized into three main types: (1) yield-enhancement products (YEPs), (2) capital protected products, and (3) participation products. Among these, YEPs have the most standardized security designs and are most often linked to single-name equities, which makes them easier to study. Additionally, YEPs are issued in larger numbers. For these reasons, in this article I focus solely on YEPs.

YEPs are characterized by a small number of attributes that fully define their security design. The *headline return* is the annual coupon rate paid by the product, while the *protection level* governs the product's downside risk. If the underlying price does not fall

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. Banks designing these securities have considerable flexibility as regulation does not heavily constrain the design of additional conditions. However, in practice, banks tend to use largely standardized designs, possibly due to the cost of explaining new designs to brokers and advisors.[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 define the product's cash flows, subject to the issuer's default risk.

One of the well-known examples of YEPs is reverse convertible, such as the one described in Internet Appendix Figure A.1. This product offers a 10% annual headline return and a 25% protection level. These two headline rates are prominent for two reasons. First, consistent with the use of 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, these two rates are the only numerical determinants of the product payoff that are explicitly quantified in the term sheet, while other important factors that investors need to consider, such as the likelihood of downside risk or product fees, are not disclosed.

The product embeds two additional exotic conditions on top of a plain-vanilla security design: knock-in and call feature. The role of these conditions is less apparent since investors need option pricing techniques to quantify their impact on the payoff. The conditions also tend to be less prominently displayed than the headline rates and require processing several sentences of technical language to fully grasp their definition.

2.2 Empirical Framework

I lay out a simple version of the salience model in Bordalo, Gennaioli, and Shleifer (2022) to illustrate the logic of salient thinking in the domain of security design attributes. I then

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

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 on expected returns, $a_3 = \mu_c$, and positive impact on risk, $a_4 = \sigma^2_c$, 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: $V_i = \pi_1(\mu_h - \mu_c) - \pi_2(\sigma^2_c - \sigma^2_p)$. By contrast, salient thinkers in the model are inattentive to hidden attributes $(m_k < 1)_{k=3,4}$ and therefore overweight headline return and protection level in their valuations.

The bank engineering the product 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. Consider the following example. Suppose that a plain-vanilla product *vnl* and its enhanced variant i have the same intrinsic value ($V_{vnl} = V_i$). The bank makes one prominent attribute ($k \in P, \pi_k > 0$) of the enhanced product more attractive ($a_{i,k} > a_{vnl,k}$) by substituting with

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

a less attractive ($a_{i,l} > a_{vnl,l}$) hidden attribute ($l \in H, \pi_l < 0$) to maintain the same intrinsic value. In the context of YEPs, the bank may increase the headline return in exchange for less valuable additional conditions such that the product's expected return remains unchanged. When the recalled values of hidden attributes are affected by investors' past experiences 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 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 label this variable *Headline enhancement* and derive its measure within the framework of yield enhancement products in Section 2.3. Under rational mean-variance preferences $(m_k = 1)_{k=3,4}$, demand is increasing in and solely determined by V_i, and therefore would predict $\beta_1 = 0$ and $\beta_2 > 0$. In the presence of partial salient thinking $(m_k \in (0,1))_{k=3,4}$, enhancement of prominent attributes increases demand and therefore would predict $\beta_1 > 0$ and $\beta_2 > 0$. In the most extreme version of salient thinking where investors are fully inattentive to hidden attributes $(m_k = 0)_{k=3,4}$, demand is perfectly inelastic to intrinsic values and predicts $\beta_1 > 0$ and $\beta_2 = 0$.

Of course, in practice, intrinsic valuations, V_i, are private and unobserved in the data. However, since YEP payoffs are fully characterized by a small number of observable attributes, I can flexibly control for its determinants.

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. There are two reasons why I argue that this assumption is likely a reasonable approximation in my setting. First, the previous evidence showing the products are often statewise dominated by listed options (Vokata, 2021), charge fees high enough to wipe out all of the equity premium (Henderson and Pearson, 2011), and select

highly overvalued underlying equities (Henderson, Pearson, and Wang, 2022) is hard to reconcile with investors sophisticated enough to use the products for hedging background or portfolio risk. Second, in Section 3.2 I design a falsification test to isolate the role of headline enhancement from other alternative explanations such as background risk.

2.3 Measuring Headline Enhancement

To bring Equation (3) to the data, I next derive a measure of headline enhancement which quantifies the impact of additional conditions on headline rates. The basic idea behind the measure to quantify the role of additional conditions by constructing synthetic counterfactual products striped out of all the additional conditions. The counterfactual products thus have a plan-vanilla design[7] and inherit from the original product all other attributes other than the headline return: issue date, maturity, underlying asset, fair value, and protection level.[8] When constructing the counterfactual products, I leverage the advantage of my setting that I can accurately observe the input costs of products in the prices of listed options.

Because the payoff of a plain-vanilla product is equivalent to a bond and a short position in a plain-vanilla European put option, I can calculate its headline return with a closed-form formula building on the Black-Scholes-Merton framework. 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 define *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

[7] I refer to the design without additional conditions as plain-vanilla as it is equivalent to a short position in plain-vanilla European put option. The designs with additional conditions, on the other hand, embed exotic options, most frequently digital, knock-in, or knock-out barrier options.

[8] Additional conditions jointly enhance both headline return and protection level. To derive a single measure that has an intuitive economic interpretation and can be conveniently used as the dependent variable, I fix the protection level of the counterfactual products (equal to the original products) and express enhancement in units of headline returns.

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.[9] I calculate the option price using bilinearly interpolated implied volatility, σ, from the volatility surface of OptionMetrics. The formula follows from the fact that the plain-vanilla payoff is equivalent to writing a put option and investing the proceeds together with the fair value of the product at the risk-free rate. The buyer of the product pays an upfront embedded fee to the issuing bank and therefore only the fair value is effectively invested in the product. Table 2 shows details of the calculation for the example products in Figure 1.

I abstract from the role of discrete dividends, day-count conventions, coupon payment frequency, and issuer's credit risk when calculating headline enhancement because they are second-order. Both the fair values of YEPs and headline rates of counterfactual products are based on mid-quotes consistent with the SEC valuation guidelines.[10] Insofar as the effect of bid-ask spread is the same for the actual and the counterfactual product, the headline enhancement measure is unaffected by bid-ask spreads.

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. Because enhancement measure unadjusted for fair values could spuriously reflect variation in product fair values rather than variation in the role of additional conditions (in other words, a product may have a higher headline return not because of enhancement, but because its embedded fee is smaller), I next define security-design level measure of enhancement which does not suffer from this problem. On security-design level, both fair values and subsequent realized returns are negatively correlated with enhancement (see Section 3.5), and therefore using security-design level measure of enhancement unadjusted for fair values makes my results conservative.

Because I use the measure to examine bank responses to changes in pricing conditions, I further make sure that the measure itself is not affected by changes in the risk-free rate and volatility. To that end, I define *Headline enhancement*$_g$ for security design g as the predicted value at the means of volatility, risk-free rate, dividend yield, and maturity from

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

[10] The guidelines are expressed, for example, in the communication with Morgan Stanley, available at `https://www.sec.gov/Archives/edgar/data/895421/000000000013009967/filename1.pdf`.

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.

Although I express the degree of enhancement in units of headline returns for expositional simplicity, I validate that banks use enhancement to increase both headline rates. Internet Appendix Table A.1 shows results of the regression of the headline returns and protection levels on the security-design level measure of enhancement. The coefficients imply that about 70% of the additional conditions translate to enhanced headline returns, while the remaining portion enhances protection levels.

I note that the measure of headline enhancement reflects a similar, albeit more nuanced mechanism, as explored in Célérier and Vallée (2017). Internet Appendix Figure A.2 shows that headline enhancement is strongly positively correlated with their three measures of complexity which is not surprising given that more additional conditions contribute to higher complexity. The main empirical advantage of my measure is richer product-level variation which allows me to control for security-design fixed effects subsuming complexity. The main distinction in the economic channels we study is that Célérier and Vallée (2017) focus on the use of complexity to shroud the fact that some securities expose investors to complete losses, whereas I focus on the use of additional conditions to make both salient attributes—headline return and protection level—look more attractive in nominal terms. Consequently, Célérier and Vallée (2017) exploit variation between products that do and do not expose investors to complete losses, whereas I exploit variation only among products that expose investors to complete losses but vary in how attractive their nominal protection levels and headline returns are.

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 of 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 the number 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 extends the data used in Vokata (2021) and covers both headline rates, indicators for additional conditions (types of embedded exotic options), issue date, maturity, issuing bank, underlying asset, fair values, commissions paid to brokers, and realized, benchmark, and expected returns. For details on the construction of the variables, refer to Vokata (2021). 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 the volatility surface of OptionMetrics. Swap rates are from Bloomberg for the U.S. dollar and from Datastream for other currencies. The dividend yield is extrapolated from dividend payments and ex-dates coming from the Center for Research in Security Prices (CRSP) for U.S. stocks or from OptionMetrics for other underlyings.

Table 3 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 security-design level Headline enhancement$_g$, the average product offers a 5-7 percentage point larger headline return than what plain-vanilla products could offer. The fair-value adjusted Headline enhancement$_i$ is 11 percentage points on average. Given the average headline return of 13 percentage points, these results reveal additional conditions play a first-order role in the design of the securities.

The average U.S. product offers a protection level of 26%, while the average non-U.S. product offers protection of 35%. These nominally attractive rates may give investors the impression that breaching the protection level is unlikely. For instance, the annual return of S&P500, which may be the easiest to retrieve from memory, was lower than -26% only in four out of 96 years since 1926. Because the products are predominantly linked to single-name equities, which are riskier than the S&P500, and because the downside protection is subject to additional conditions, the protection levels are regularly breached. In my sample, more than a quarter of the products breach the protection level. As a result, the average realized return is significantly lower than the headline return: -6% for the U.S. products and 1.2% for the non-U.S. products. Realized returns cover only products with fixed maturity, because

annualized realized returns of autocallable products are significantly biased upward (Vokata, 2021). The average fee—defined as the annualized markup, or the difference between the product price and fair value[11]—is 7%, of which almost half goes to the compensation of brokers.

The average sales volume in the U.S. is $2 million, while the average sales volume outside of the U.S. is $3.7 million. The sales volume represents the issuance size, i.e., the total volume issued at the end of the offering period over which investors can subscribe the products. The data covers only products categorized as retail by the data provider, and therefore excludes private placements targeted at institutional investors.

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 and X_i refers to the product-level headline enhancement measure. The remaining variables flexibly control for the determinants of the product intrinsic value. Specifically, P_i is the fee which captures the variation in product fair values and consequently the variation in product expected returns under the risk-neutral measure. The specification with fees (rather than fair values) allows for direct benchmarking of demand slopes, i.e., the coefficients attached to fees and headline enhancement, as both variables are in units of annual percentage rates.

[11] 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.

Fixed effects encompass issuing bank b, issuance year-month t, maturity rounded to quarters T, underlying stock s, and security design g of the products. Month by underlying fixed effects capture both time-series and cross-sectional variation in the underlying expected return due to variation in risk, risk premia, sentiment, or any other determinant of underlying expected returns.[12] Issuing bank and maturity fixed effects capture clientele effects and investment horizon preferences. Security design fixed effects control for design-invariant preferences and therefore subsume product complexity measures of Célérier and Vallée (2017). I am therefore controlling for any role of complexity aversion of unsophisticated investors (Brown, Kapteyn, Luttmer, Mitchell, and Samek, 2017; Umar, 2022) and exploit variation in headline rates keeping product complexity fixed. In some specifications, I also control for the interaction of year-month, underlying, maturity, and issuer fixed effects and therefore exploit variation in headline enhancement in menus of closed substitutes.

Table 4 presents my baseline results. I find strong evidence that headline enhancement is associated with larger sales volume. In Column 1, I employ the full sample of U.S. products and control for individual fixed effects. Both the coefficients attached to fees and headline enhancement are highly statistically and economically significant. The coefficient attached to the fees suggest that investors are being able to compare the products and tend to pick those with higher fair values. All else equal, products with more attractive headline rates must have higher fair value and therefore selecting the products based on headline rates, after adjusting for the role of additional conditions, would lead to fee-elastic demand.

The coefficient attached to the headline enhancement, however, suggests that investors are not fully adjusting for the role of additional conditions. Precise adjustment for additional conditions requires the use of sophisticated option pricing techniques to price exotic and often path-dependent options. Such operation is likely far outside the skill set of most retail investors.

The magnitude of the coefficient is economically important. 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

[12]The month by underlying fixed effects thus also encompass variation in the underlying (subjective) expected returns due to behavioral factors, such as extrapolation (Greenwood and Shleifer, 2014), familiarity (Keloharju, Knüpfer, and Linnainmaa, 2012), or various drivers of attention (Barber and Odean, 2008).

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 an $86,660 increase in sales, whereas a one percentage point decrease in fees is associated with a $113,620 increase in sales.[13]

In Column 2, 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 equity and having the same maturity. 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. These saturated fixed effects also subsume variation in bank competition over time and across underlying assets.

A related concern is that the results may be driven by conflicted interests of brokers, which have been shown to affect demand (Egan, 2019; Egan, Ge, and Tang, 2020). For instance, banks may use headline enhancement to 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 control for the incentives of brokers because their commissions are disclosed in pricing supplements. In Column 3, I find that controlling for brokers' commissions has little impact on the main result. Hence brokers have little incentives to recommend products with higher enhancement. To be clear, this is not to say that brokers do not play an important role in the market or that their biases could not play a role in the demand for the securities. It is conceivable that brokers recommending the securities may themselves be subject to salient thinking and therefore potentially contribute to the effect of headline enhancement.

In Figure 2, I explore the shape of the volume-headline enhancement relation. In Panel

[13]The magnitude is similar to the role of headline return (coupon) documented by Egan (2019). What sets my results apart from the previous work is that I isolate the role of headline enhancement from other factors affecting headline returns, such as embedded fees and input prices which have different economic interpretation.

A, I plot a binned scatterplot equivalent to Column 1 in Table 4. 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 3 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 both 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 my most saturated specification controls for many sources of demand shocks, it remains possible that an omitted variable is driving the positive relation between headline enhancement and demand. For example, through the lens of standard portfolio choice models, the key but unobserved variable driving demand for non-linear payoffs are investor hedging needs and background risk. 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 costs of headline enhancement are associated with a significantly lower sales volume. The key identifying assumption of this approach is that shocks to structuring costs are unrelated to demand. To assess the validity of this assumption, I design a falsification exercise that exploits the fact that headline rates are fixed at the beginning of the offering period. I show that the instrument is associated with higher demand only for cost shocks arriving before the beginning of the offering period. During the offering period, when headline rates are fixed but demand is not, cost shocks are unrelated to sales volume. This falsification exercise thus lends credibility to the validity of the instrument.

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.3 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 I_g are indicator variables for each security design $g \in G$ 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 5. 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 economically significant. Increasing headline enhancement by one percentage point is as effective in increasing demand as lowering fees by 40 basis points.

A useful feature of my setting 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 (see Internet

Appendix Figure A.4 for an example). 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.5 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, which is shorter for some products, shows only a modest decrease in the variation in cost shocks.

I first validate that the cost shocks have a significant impact on headline rates before the start of the offering period but not after. Figure 4, 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 Table A.3 provides tabulated results). Internet Appendix Figure A.6, 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 4, 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 6 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 shocks to the instrument prior to the start of the offering period is significant and the confidence intervals of the respective coefficients are not overlapping. Hence, the evidence is hard to reconcile with hedging motives explaining the results. If, for example, investors demanded enhancement as a by-product because shorting volatility had hedging benefits, their demand should also be increasing in volatility (i.e., in the instrument) during the offering period.

3.3 Global Evidence

To assess the generalizability of the results, I next analyse data on 59,000 products issued outside of the U.S. Since I do not observe fair values for products issued outside of the U.S., I instead take advantage of the security-design level measure of enhancement. The patterns and magnitude of the relation between headline enhancement and volume I find in this sample are in line with the results from the U.S. market.

Table 7 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 underlying assets (baskets), I do not control for the underlying fixed effects in this baseline specification.

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 4. In the most saturated specification In Column 3, I add the interaction of fixed effects to control for time-varying stock-specific, bank-specific, and country-specific demand shocks 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 corroborating the generalizability of the results.

3.4 Headline Enhancement and Fees

The analyses in Sections 3.1 and 3.2 focused on estimating the controlled direct effect of headline enhancement, that is, the effect of headline enhancement when the effect of fees is accounted for. A separate, but equally interesting, question is how headline enhancement affects the willingness to pay fees. Overweighting of salient attributes as formalized in Section 2.2 implies that headline enhancement is associated with higher subjective valuations and thus higher willingness to pay.

I examine the relation between headline enhancement and fees in Table 8. Across different specifications, I find that enhancing headline return 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 close substitutes.

I use the coefficients in Table 8 for another quantification of the economic importance of the results. Taking the point estimates as given and multiplying them by a one-standard-deviation change in headline enhancement (5.4 percentage points) and average product maturity of 0.8 years implies that lowering headline enhancement by one standard deviation could save investors 2.5% in fees per product. In absolute terms, such savings would translate in more than $1 billion over my sample period which covers more than $56 billion in sales volume.

3.5 Headline Enhancement, Risk, and Return

In the final part of this section, I assess the relation between enhancement and various measures of returns and risk. The salient thinking interpretation of the results in this paper relies on the assumption that headline enhancement does not reflect higher intrinsic values. For instance, if higher headline enhancement did in fact generate higher returns, than even rational mean-variance investors may prefer to choose more enhanced products. Table 9 shows that this is not the case.

I estimate the relation between headline enhancement and returns with versions of 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 to adjust realized returns for time-varying country- and bank-specific market returns. All specifications include only products with fixed maturity to avoid the bias stemming from early terminations of autocallable products documented by 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 9, Column 1, and Panel A, Figure 5, report the results for annualized realized returns. The results reveal a strong negative and monotonic relation between enhancement and returns. As the fees of the products are embedded in the payoff, realized returns are by design net of fees. In the next two columns I therefore assess the relation between gross returns and enhancement. In Column 2, I control for fees directly by adding them as control and find that the negative relation between realized returns and enhancement is completely driven by fees. Controlling for fees, the coefficient turns positive and is both economically and statistically insignificant. In Column 3, I obtain similar results by instead regressing benchmark returns defined as returns from delta-equivalent daily-adjusted position in the underlying equity and risk-free rate. Hence, using actual realized returns, there is little evidence headline enhancement generates higher returns.

On one hand, these results are not surprising as the substitution of higher headline rates

with inferior security designs must imply that a significant part of enhanced returns cannot translate to higher realized returns. Put differently, by construction the slope from regressing realized on enhanced returns must be significantly lower than one. On the other hand, headline enhancement may also enhance the delta/beta of the products and as a result also expected returns. To assess the plausible magnitude of such channel, I next model expected product returns under additional assumptions on the expected return on the underlying.

The dependent variable in Column 4 is the product expected return assuming the underlying expected return equals $\hat{\beta} \times 6\%$. While the relation with enhancement is statistically significant the economic magnitude implies that a one-percentage-point increase in enhancement increases expected returns only by less than 8 basis points. The evidence thus shows that even giving enhancement the best chance to generate higher expected returns by implicitly assuming that its higher betas would directly translate to higher expected returns, the impact on expected returns is minimal. My main takeaway is that more than 90-95% of enhancement is artificial—in the sense that it does not translate to higher realized returns.

In Column 5, I explore the relation between realized 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. Finally, Figure 5, Panel B, shows that enhancement is also associated with 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. Again, this result is not surprising given than enhancement is positively associated with product delta, vega, and underlying volatility.

4 Psychological Mechanisms

I now consider which frictions or psychological mechanisms could generate the findings outlined in Table 1. On top of the new findings presented in this paper so far (Findings 1–3), I also consider two puzzling findings previously documented by Vokata (2021): negative expected returns and statewise dominance by existing securities (Findings 4–5). 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 additional evidence in favor of each of these mechanisms (Findings 6–7). I then discuss which alternative mechanisms can and cannot explain the findings.

4.1 Salient Thinking

I first note that both mechanisms of salient thinking can generate Findings 4–5. Since both mechanisms yield overweighting of headline rates, they both predict positive bias in the subjectively perceived expected returns. As a result, investors may not perceive the expected returns of the products as negative (Finding 4) or lower than the expected returns of dominating options (Finding 5). The standard display of option contracts, as in the Internet Appendix Figure A.7, does not emphasize headline returns or downside protection and therefore does not reinforce their overweighting.

4.1.1 Prominence

The first mechanism postulates that an investor may overweight 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 Laibson, 2006), and salient thinking focused on prominent attributes (Bordalo, Gennaioli, and Shleifer, 2020, 2022).

The empirical framework in Section 2.2 demonstrates how prominence can generate Findings 1–3. The way issuers describe the products in marketing materials (see Internet Appendix Figure A.8, term sheets and prospectuses (see Internet Appendix Figure A.1) 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.[14]

A unique prediction of the prominence channel is that changes in the prominence of the display of an attribute may affect choice. In turn, disclosure of hidden attributes incentivizes

[14]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 an issue price of $1,000 or $7.7 for a product with an issue price of $7.95.

issuers 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 disclosing product fair values. The disclosure was implemented throughout 2013 and Vokata (2021) finds that it did not have a discernible impact on product fees or volume.

In Figure 6, I test whether the change had an impact on headline enhancement. In Panel A, I plot yearly coefficients, β_t, from regression:

$$X_g = \beta_0 + \beta_t y_t I_{US} + \beta_1 \sigma_{s,t} + \beta_2 r_{f,t} + \lambda_{t,T,b,s,c} + \epsilon_i, \tag{11}$$

where I_{US} is an indicator equal to one for products issued in the U.S. and therefore subject to the disclosure change. The controls include fixed effects for month-year, country, issuer, maturity, and underlying. By controlling for the issuers, the specification exploits the variation in security design within the same issuer across countries. I also control for the implied volatility of the underlying ($\sigma_{s,t}$) and swap rate ($r_{f,t}$) 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 shows that after the disclosure change, products issued in the U.S. enhance headline rates more (Finding 6). 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 models of strategic obfuscation, which predict that educational initiatives may increase complexity (Carlin and Manso, 2010).

The disclosure required issuers to disclose the estimated dollar value of the products rather than the annualized embedded fees. Therefore, one creative way to counteract the effect of the disclosure is to engineer products with short and hidden maturities, which obscure and inflate the per-period embedded fees. Figure 6,Panel B, examines this mechanism by replacing the outcome variable with an indicator for products with an early termination feature. Such products, also called autocalls, have a typical maturity of one year or more but about half of the time are automatically terminated as early as three months after issuance. The figure shows that the frequency of their issuance increases by almost 20 percentage

points in the U.S. after the fair value disclosure. Again, Internet Appendix Table A.4 shows the difference is also highly statistically significant. Hence, the evidence is consistent with issuers using security design also as a tool of regulatory arbitrage to counteract the effect of the disclosure.

4.1.2 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.[15]

[15]Such inconsistency in benchmarking different YEP attributes to different asset classes—headline return to fixed income and protection level to equities—implies a form of frame dependence.

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 2 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 separately in Figure 3 show similar patterns consistent with diminishing sensitivity.

Second, diminishing sensitivity also predicts that the incentives for headline enhancement are higher when interest rates or volatility are low. While increasing enhancement in low volatility periods may be consistent with mean-variance preferences, increased enhancement or risk-taking in a low-interest environment is not (Lian, Ma, and Wang, 2018).

Table 10 provides evidence consistent with these predictions (Finding 7). 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 the swap 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 a one-percentage-point decrease in interest rates is associated with a 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 hold 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 a relatively high reference rate retrieved from their 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 alternative 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).

4.2 Alternative mechanisms

4.2.1 Background Risk

Findings 1, 2, and 4 could be, in theory, rationalized with investor hedging needs due to background risk. As discussed in Section 3.2, Finding 3 is, however, inconsistent with the hedging explanation. Moreover, the high degree of sophistication required to use these complex products for hedging is hard to reconcile with the lack of sophistication to instead purchase dominating and cheaper options (Finding 4).

4.2.2 Subjective Beliefs

An alternative explanation of Findings 1–4 are investor subjective beliefs. If investors disagree with market expectations and sufficiently overestimate the probability of the states when YEPs deliver positive returns, they will perceive their returns to be positive (Finding 4) and their demand will be elastic to headline enhancement (Finding 3). Banks will in turn cater to these subjective beliefs (Finding 1–2). Subjective beliefs alone, however, cannot explain why investors prefer YEPs over dominating options (Finding 5) as well as Findings 6–7.

4.2.3 Conflicted Advice

While brokers have incentives to recommend YEPs over cheaper options and therefore their incentives can explain Finding 4,[16] they do not have incentives to recommend products with higher enhancement and therefore their conflicted interests do not explain other findings.

4.2.4 Preferences for Higher-Order Moments

Given the non-linear payoffs of YEPs, a natural question is whether their demand could be explained by preferences for higher-order moments. 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

[16] See Vokata (2021) for comparison of commissions from recommending options and YEPs.

(see Internet Appendix Table A.5), their design is hard to square with the prospect theory or lottery preferences (Kumar, 2009; Bali, Cakici, and Whitelaw, 2011).[17]

4.2.5 Preferences for High-Income Paying Assets

Another alternative mechanism that could explain 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 preferences for high income is to increase headline return and lower protection levels. The observation that banks simultaneously enhance both headline returns and protection levels and that demand appears sensitive to both attributes suggests that reaching for income alone cannot explain the evidence.

4.2.6 Frequency of Outperformance

As the last alternative explanation, I note that Findings 1, 3, 4, and 5 are consistent with the recent experimental evidence that investors prefer assets that frequently outperform even at a cost of large infrequent underperformance (Ungeheuer and Weber, 2023).

5 Conclusion

This paper provides evidence consistent with investors overweighting of salient attributes of security design. Previous work shows that banks use complexity, or what I call additional

[17] 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.

conditions, to boost headline returns of structured retail products. I show banks use the same mechanism to also enhance salient rates of downside protection. The main takeaway is that enhancement is associated with higher demand despite not delivering higher returns.

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.[18] 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[19] and where the neglected attributes were hard to quantify even for sophisticated investors, YEPs were expected to perform poorly even under market expectations priced in listed options and under pricing models used by the issuing banks. The inferiority of YEPs, however, was not directly observable when evaluating the products solely on their salient attributes.

[18] 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.

[19] 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

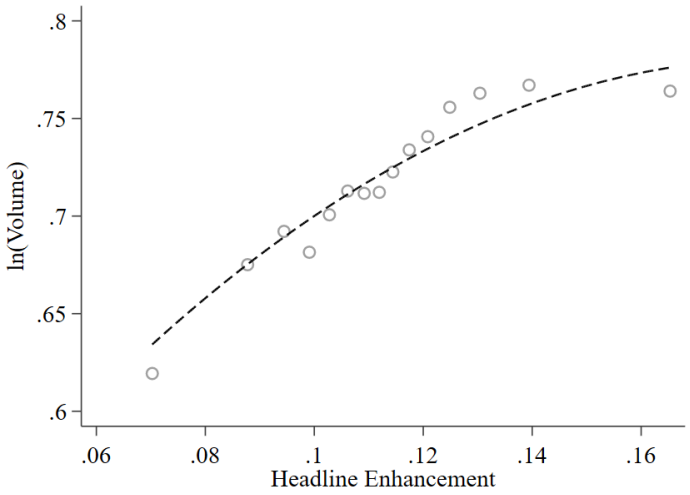


Figure 2. Volume and Headline Enhancement
The figure displays a binned scatter plot with a quadratic fit line of the logged sales volume and *Headline enhancement*$_i$ measure, as previously defined in Section 2.3. The controls include fees and fixed effects for year-month, issuer, maturity, underlying, and security design. The sample consists of 28,383 products issued in the U.S. between January 2006 and September 2015.

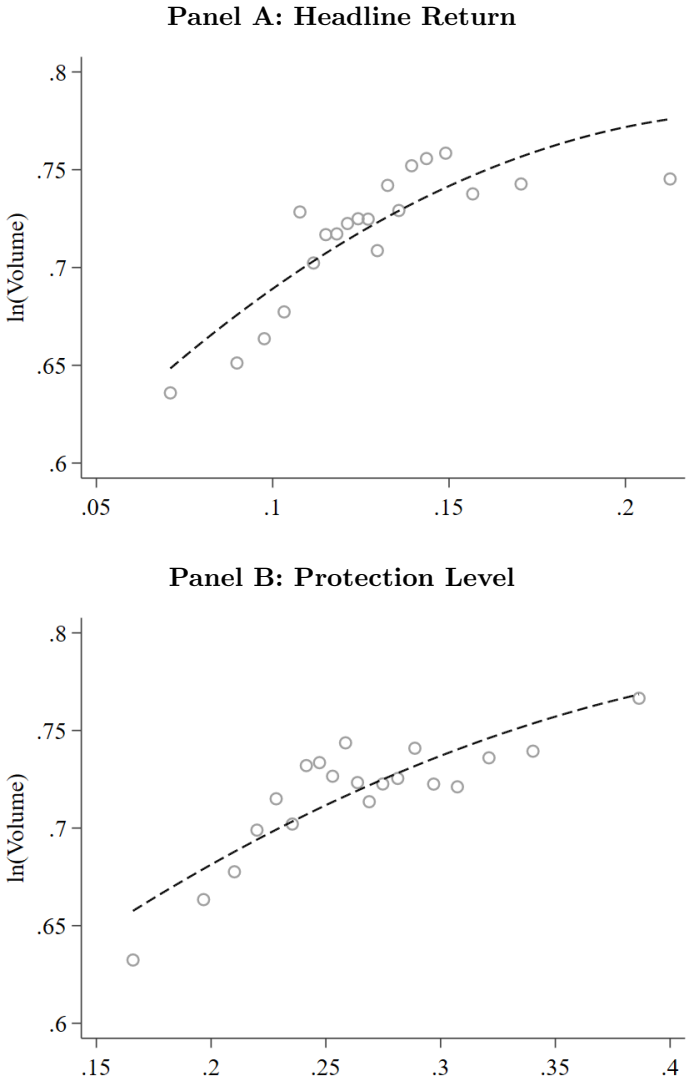


Figure 3. Volume and Headline Rates

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.

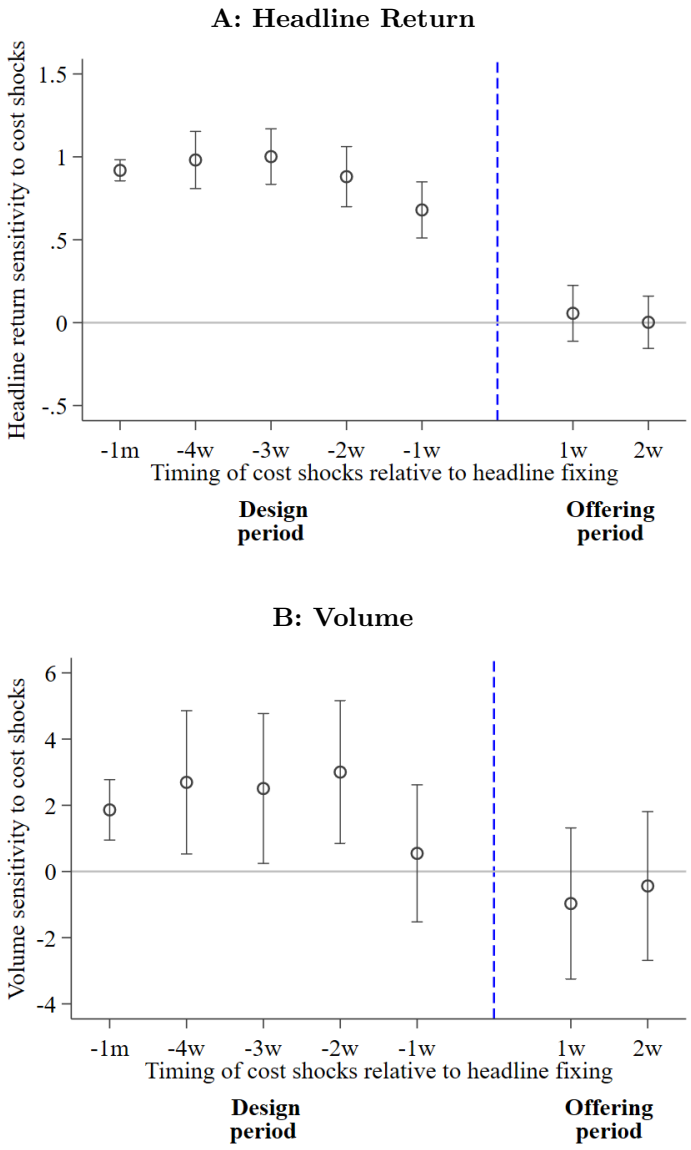


Figure 4. Sensitivities to Cost Shocks at Different Horizons

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.

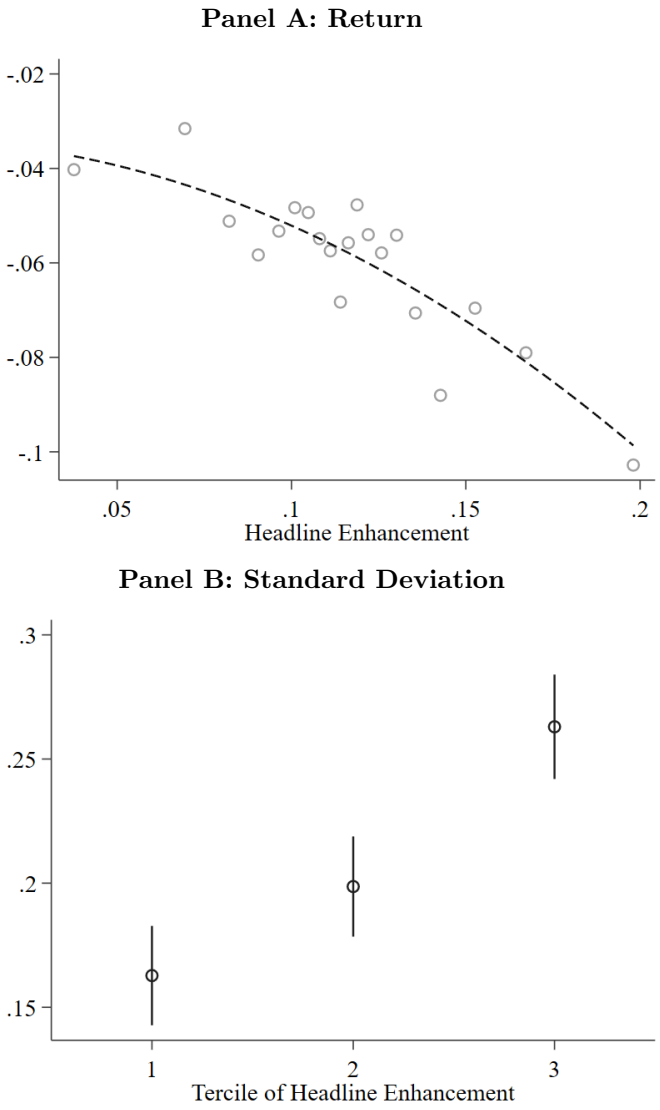


Figure 5. Return, Risk, and Headline Enhancement

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.

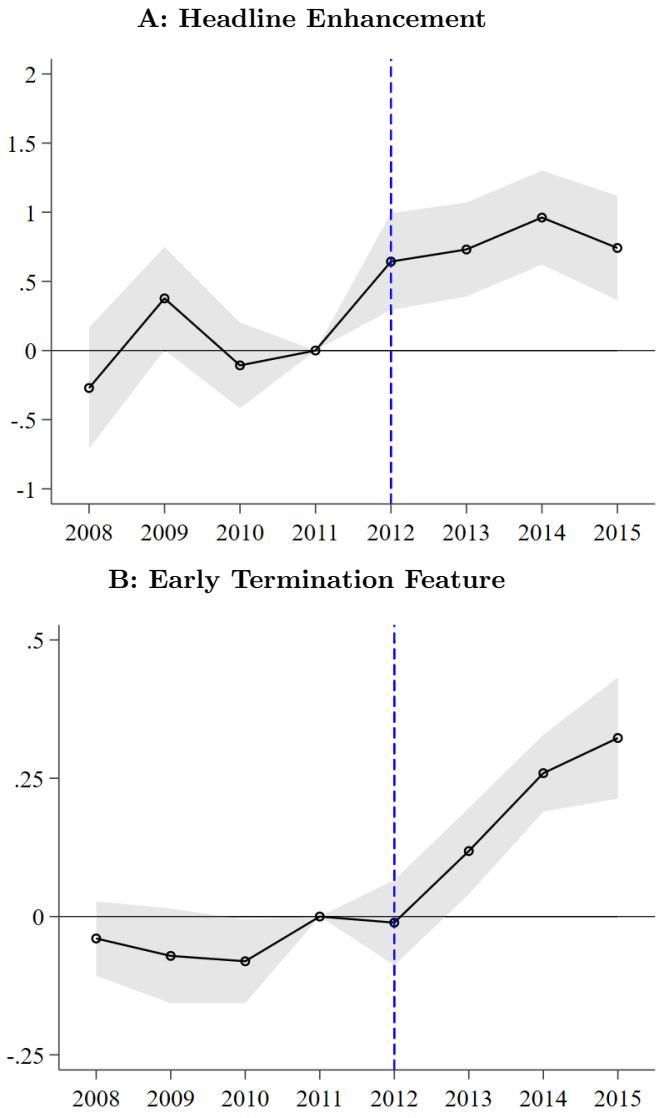


Figure 6. Security Design Around Disclosure Change

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. Empirical Findings and Possible Explanations

The table explains the empirical findings in this paper and Vokata (2021) through the lens of alternative theories.

	Background risk	Subjective beliefs	Conflicted advice	Preference for income	Frequency of outperformance	Salient thinking
1. Banks enhance headline returns	Catering to hedging needs	Catering to beliefs		Catering to income preferences	Increasing outperformance in frequent states	Catering to salient thinking
2. Banks enhance protection levels	Catering to hedging needs	Catering to beliefs				Catering to salient thinking
3. Demand elastic to enhancement		Overestimation of high states		Income ↑ in enhancement	Frequent outperformance ↑ in enhancement	Overweighting of headline rates
4. Negative expected returns	Outweighted by hedging benefits	Overestimation of high states			Biased expected returns due to frequency of outperformance	Overweighting of headline rates
5. Products dominated by options			Brokers push dominated products		More frequent outperformance relative to options	Overweighting of headline rates
6. Banks enhance more after fair value disclosure						Overweighting of headline rates due to prominence
7. Banks enhance more when r_f low				Reaching for income		Overweighting of headline rates due to contrast

Table 2. Measuring Headline Enhancement

The table presents calculations of headline enhancement for the example products described in Figure 1. 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.

Panel A: Plain-vanilla product

	Product		Plain-vanilla synthetic counterfactual
Fair value	——	95.5%	——
Initial pricing date	——	March 31, 2009	——
Term	——	6 months	——
Underlying	——	Deere & Company	——
Protection level	——	20%	——
Additional conditions	none		none
Headline return	9.5%		9.5%
Headline enhancement$_i$ = 9.5% − 9.5% = 0%			

Panel B: Product with additional conditions

	Product		Plain-vanilla synthetic counterfactual
Fair value	——	95.2%	——
Initial pricing date	——	March 31, 2009	——
Term	——	6 months	——
Underlying	——	Deere & Company	——
Protection level	——	35%	——
Additional conditions	knock-in barrier		none
Headline return	18%		1.4%
Headline enhancement$_i$ = 18% − 1.4% = 16.6%			

Table 3. 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 4. 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 5. 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 6. 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 7. 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 8. 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 9. Returns and Headline Enhancement

This table displays the coefficients from OLS regressions in which the dependent variables are different measures of product returns and the explanatory variables are the measures of headline enhancement, as defined in Section 2.3. Net Return in Columns 1, 2, and 5 is the annualized product return. Benchmark Return in Column 3 is defined as the cumulative annualized return of delta equivalent daily adjusted positions in the underlying equity and risk-free rate. Expected Return is the annualized product expected return assuming the expected return on the underlying equal to $\hat{\beta} \times 6\%$. Betas are estimated using $24-60$ monthly returns preceding the initial valuation date. All return variables come from Vokata (2021). Maturity fixed effects are rounded to quarters. The samples consist of U.S. or non-U.S. products with fixed maturity and non-missing return values. Standard errors clustered at the issuer level are in parentheses. *, *, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

Dep. var.:	Net Return	Net Return	Benchmark Return	Expected Return	Net Return
	(1)	(2)	(3)	(4)	(5)
Headline enhancement$_i$	-0.381***	0.0492	0.0343	0.0787***	
	(0.113)	(0.198)	(0.116)	(0.00555)	
Headline enhancement$_g$					-0.317**
					(0.129)
Controls					
Fee	No	Yes	No	Yes	No
Country × Month × Issuer × Maturity FE	Yes	Yes	Yes	Yes	Yes
Underlying FE	No	No	No	Yes	No
Sample	U.S.	U.S.	U.S.	U.S.	Non U.S.
Observations	19,613	19,613	19,581	19,613	9,206
R^2	0.468	0.470	0.348	0.950	0.425

Table 10. 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"

Petra Vokata[1]

This version: April 2023

[1]Fisher College of Business, The Ohio State University, 2100 Neil Avenue, 43210 Columbus, Ohio, USA. vokata.1@osu.edu

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 A.1. 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.

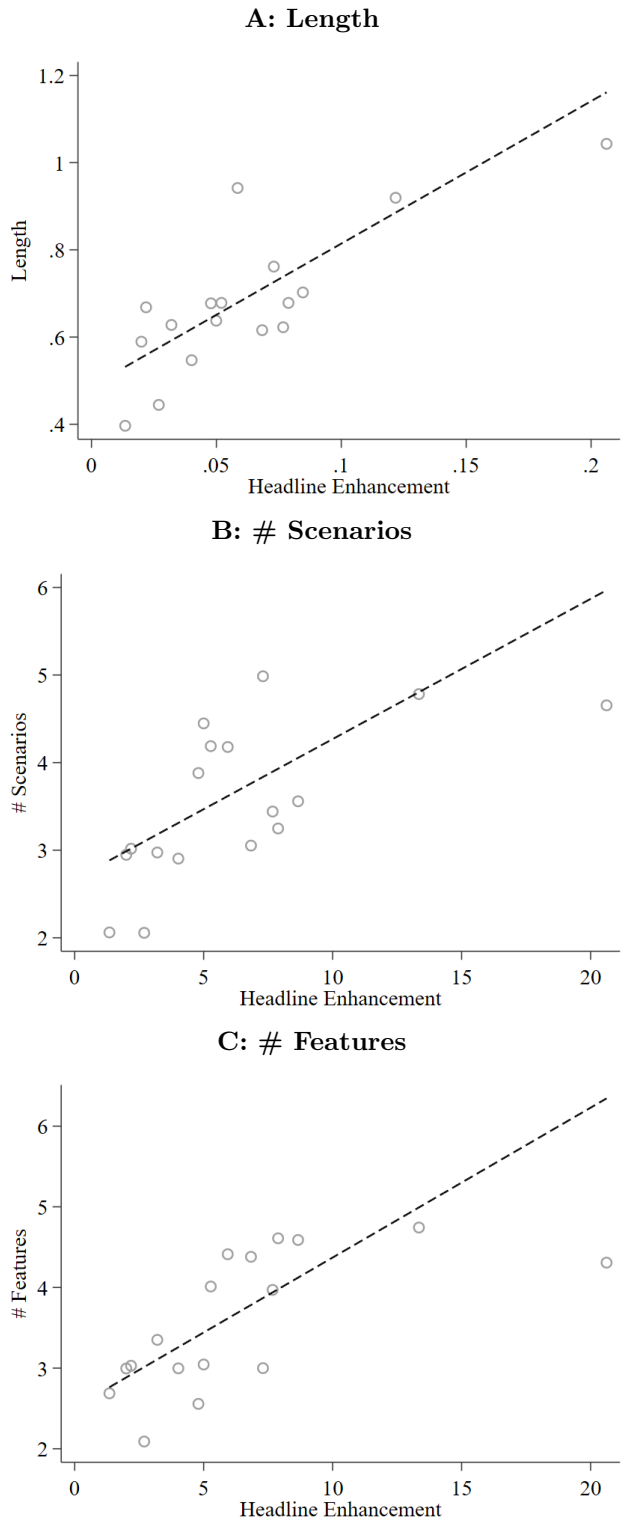


Figure A.2. Complexity and Headline Enhancement

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.

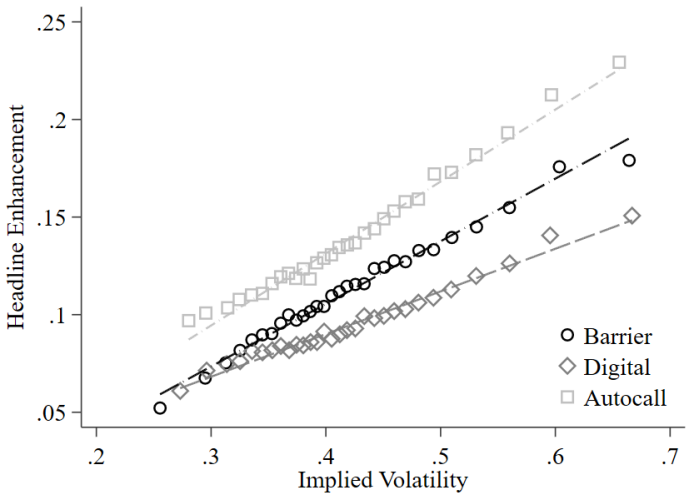


Figure A.3. Security-Design Vega

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).

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.4. 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.

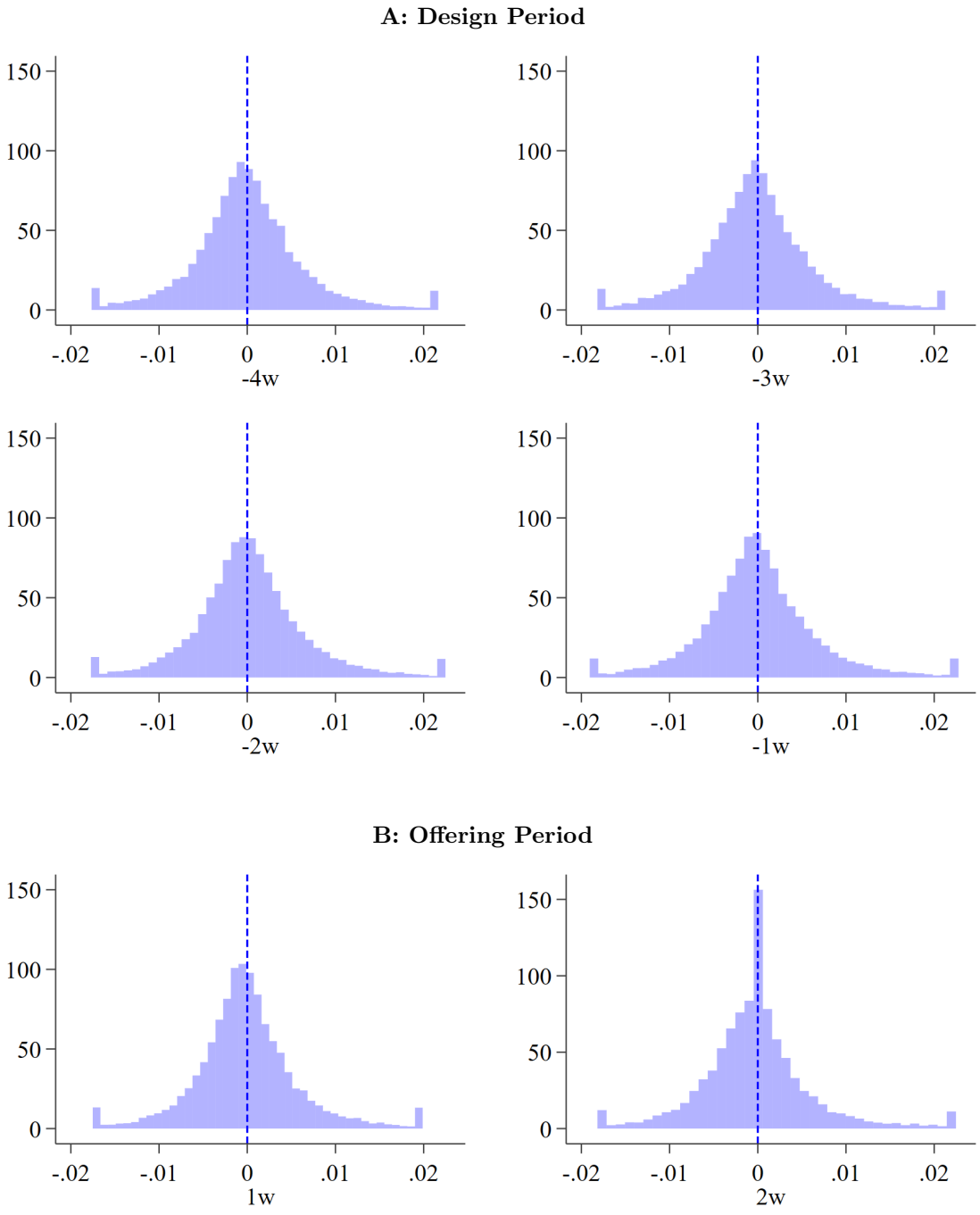


Figure A.5. Distribution of Cost Shocks over Design and Offering Period
The figures plot histograms of weekly changes in structuring costs, $\Delta\phi_i$, as defined in Section 3.2, with vertical blue dashed lines at 0.

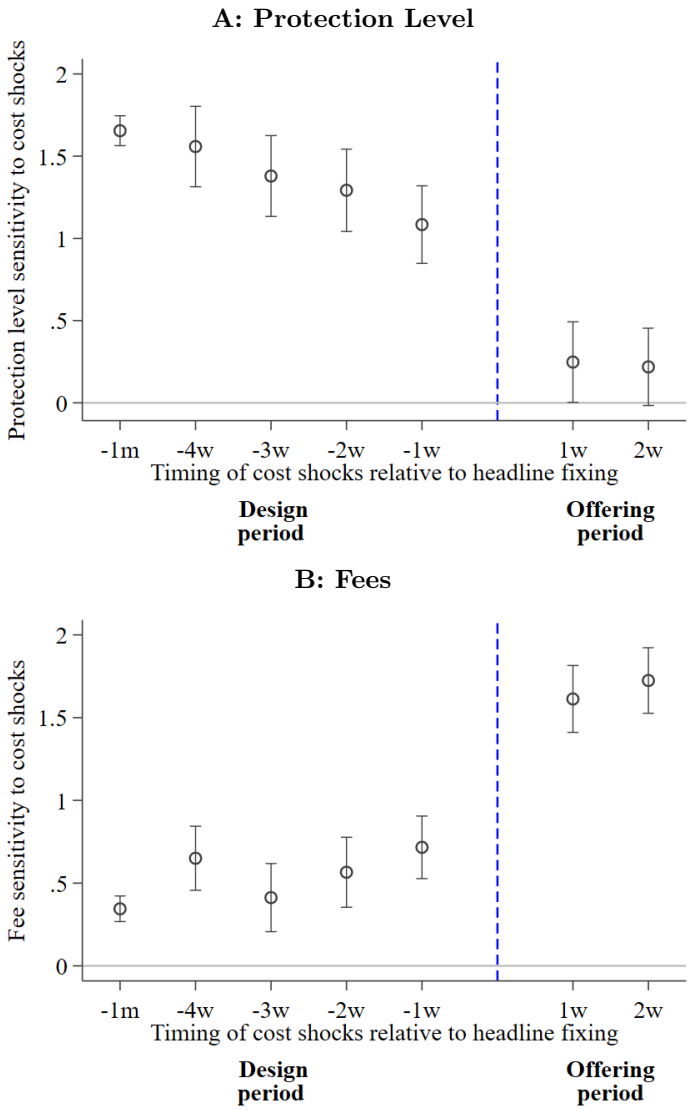
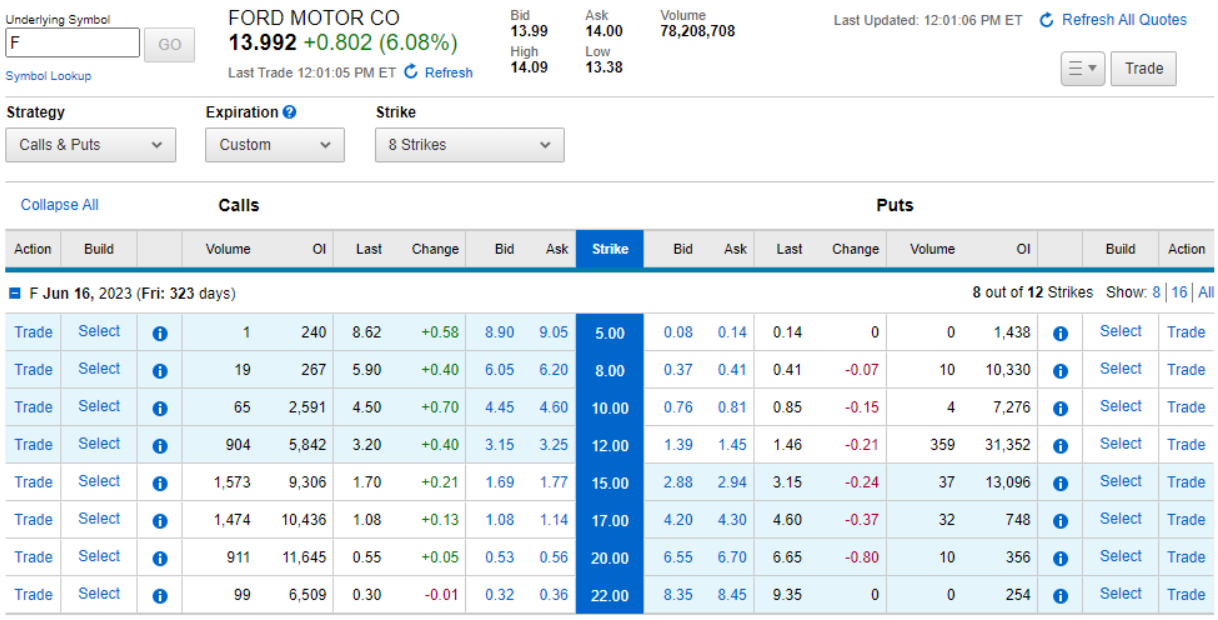


Figure A.6. Sensitivity of Protection Level and Fees to Cost Shocks at Different Horizons

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.



Action	Build		Volume	OI	Last	Change	Bid	Ask	Strike	Bid	Ask	Last	Change	Volume	OI		Build	Action
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.7. Display of Option Prices in Online Brokerage Account

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℠ Notes).

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Figure A.8. 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).

Table A.1. Headline Rates and Enhancement

The table reports regressions of headline returns and protection levels on the security-design level measure of enhancement (as defined in Section 2.3). The sample consists of U.S. products. Robust standard errors are in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1%, respectively.

Dep. var.:	Headline return	Protection level
	(1)	(2)
Headline enhancement$_g$	0.714***	0.807***
	(0.0108)	(0.00719)
Controls		
Month FE	Yes	Yes
Issuer FE	Yes	Yes
Maturity FE	Yes	Yes
Underlying FE	Yes	Yes
Observations	28,177	28,177
R^2	0.552	0.493

Table A.2. Volume and Headline Enhancement

This table displays the version of Table 4 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. 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 2 and 3. 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