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Neglected Risk: Evidence from Structured Product Counterparty Exposure

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Evidence from Structured Product Counterparty Exposure

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Abstract

We show that initial offering prices of simple structured products do not reflect issuer credit risk before the Lehman default. After this event, credit risk is no longer neglected. Issuers then compensate general and even product-specific counterparty exposure. We find that investor attention toward issuer credit risk is a critical determinant of the occurrence of neglected risk. Additionally, banks have a propensity to construct products with larger counterparty exposure. Overall, our results shed light on whether and under which conditions financial engineering generates neglected risk in the economy.

JEL-Code: D8, G34, M52

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1 Introduction

A long-standing literature argues that financial innovations benefit the economy because they contribute to completing markets, and due to the possibility to tailor these securities to the needs of investors (Allen and Gale, 1988, 1991; Gale, 1992; Boot and Thakor, 1993; Duffie and Rahi, 1995; Grinblatt and Longstaff, 2000). For example, structured securities may help to ameliorate agency conflicts (Ross, 1989), transaction costs (McConnell and Schwartz, 1992), the impact of taxes and regulations (Santangelo, Tufano, and Poetzscher, 1996), or counterparty credit risk (Chidambaran, Fernando, and Spindt, 2001).

Recently, however, academics, practitioners, and regulators worry that financial innovations harm society (see the Presidential address of Zingales (2015) for an overview). One important dimension is that issuers may exploit investors by issuing overly complex products. A second main concern, not necessarily limited to complex products, is the "neglected risk hypothesis." In particular, Gennaioli, Shleifer, and Vishny (2012) argue that intermediaries over-issue financially engineered securities exposed to neglected risk. Investors end up bearing risk without recognizing it, and are lured into an inefficient risk allocation. This situation can entail market instability because of the flight to quality when investors suddenly become aware of the true risks of their products.

Many questions regarding this hypothesis remain unexplored. First, does the neglected risk concern occur with structured securities that are, in fact, quite simple? Second, does the neglect of risk vanish as soon as the risk's magnitude increases, or does investor attention also play a role? Third, are issuers structuring their products toward neglected risk? Answering these questions is important for appropriate policy recommendations that mitigate neglected risk.

We investigate these questions by analyzing the counterparty credit risk of structured products. Structured products are medium-term notes issued by financial institutions that promise a payment dependent on a certain underlying. In case of a default of the issuer, investors are considered as unsecured creditors. Hence, if investors do not neglect counterparty risk, issuers should compensate this risk through lower issue prices of these products. Counterparty risk is a material risk of financially engineered securities. For example, the Lehman bankruptcy liquidation only provided six cents on a dollar for investors of Lehman structured products.[1]

We study the compensation of counterparty risk in a novel, comprehensive data set that

[1] http://www.bloomberg.com/apps/news?pid=conewsstory&tkr=LEM:GR&sid=a8uO4Gr1khck

encompasses all structured products issued in Switzerland (the global leader in terms of structured products asset volume invested on custody accounts (Swiss Bankers Association, 2011)) between 2005 to 2010. The data set provides a unique opportunity to investigate the issue time, price, and detailed terms at which these products are sold by banks to relatively less financially sophisticated investors. Additionally, the sample time period entails substantial variation with respect to both credit risk levels and salience of credit risk, which helps us to dissect the reasons behind neglected risk. For our analysis, it is important to select product issuers that frequently launch the same product categories over the entire sample period. Otherwise, our inference about the time-variation of neglected risk could be driven by the fact that different issuers operate, or different product categories are offered in the subperiods of our sample period. Fortunately, two fairly homogeneous large market participants with liquid CDS spreads, which we use to measure credit risk, issue three popular simple structured product categories throughout our sample period from 2005 to 2010. In total, we study 509 products on single stock underlyings. Our sample of priced products is considerably larger than existing data sets.[2]

We present three main novel results regarding the compensation of counterparty risk. First, issuers compensate counterparty risk through the issue prices of structured products after the default of Lehman in September 2008. Before this default, counterparty risk is not compensated. This finding is consistent with the fact that the Lehman Brothers collapse had a tremendous impact on the market awareness of counterparty risk (Arora, Gandhi, and Longstaff, 2012). Arguably, this salience particularly sharpened for structured products because many investors found themselves stuck with Lehman products that became basically worthless over night.

Second, issuers do not only compensate the pure issuer credit risk after the Lehman default, but also the product specific counterparty risk exposure. Specifically, investors should require less compensation for a given degree of issuer credit risk if the promised payments of a structured product are more positively correlated with the issuer's financial health measured by, for example, the equity value. A high correlation implies that the issuer tends to be financially healthy when the contractual repayments to the investor are large, and distressed when the contractual obligations are small. Therefore, the investor is less exposed to issuer credit risk than if the correlation between the issuer's financial

[2]For example, Benet, Giannetti, and Pissaris (2006) investigate 31 reverse-exchangeable securities issued by ABN-AMRO between 2001 and 2003. Henderson and Pearson (2011) consider 64 SPARQS launched by Morgan Stanley between 2001 and 2005.

health and the promised product payments is low. Our results provide strong evidence that credit risk compensation is less pronounced for structured products with underlyings that are more correlated with the issuer.

Third, we want to discern whether issuers of structured products start compensating credit risk exposure due to the elevated attention towards this risk factor, or simply due to an increase in the level and variation of issuer credit risk. Therefore, we compare the at-issue-pricing of structured products between (i) the pre-crisis period with low credit risk levels (until July 2007) and (ii) the crisis-pre-Lehman period from the onset of the crisis in July 2007 until the default of Lehman Brothers, a time interval during which credit spreads were already high and variable. Strikingly, issuers do not compensate credit risk exposure in either of these two periods. They do so, however, in the period after the salient Lehman event.

Following the recent text analytic literature in finance (see, e.g., Tetlock, 2007; Da, Engelberg, and Gao, 2011), we also construct proxies for investors' attention toward issuer credit risk through the Internet search behavior of households in English and German, respectively. Specifically, we aggregate the volumes of Internet search queries that are associated with issuer credit risk to construct attention indices. We find that these indices are - both absolutely and relatively to the CDS level of issuing banks - low during the crisis-pre-Lehman period, and high during the post-Lehman period. This finding confirms that investor attention increased with the Lehman default. Moreover, the indices allow us to directly test whether time-varying investor attention explains variation in credit risk compensation. We find that counterparty risk exposure is compensated more when attention is higher.

All our results are robust to alternative specifications, and to the inclusion of a large set of controls such as proxies for hedging cost, aggregate market uncertainty, and risk aversion. Overall, these findings imply that investors are well prepared to judge risk exposures of engineered products if there is sufficient attention towards the risk. Without awareness, however, neglected risk occurs even in the simple product categories that we analyze.

Turning to the last research question, we note that our results about neglected counterparty risk are of particular importance if banks have a propensity towards structuring their products such that they entail larger counterparty exposure, i.e., towards loading counterparty exposure into the financial system. Therefore, we investigate whether banks are, in fact, more likely to issue structured products with a higher implied counterparty risk exposure, that is, with lower equity correlation between issuer and underlying. Using a matched sample of underlyings that were not chosen for products, we find evidence that underlyings on which products are issued have substantially lower correlation with the issuer than do comparison underlyings.

This paper makes several contributions. First, our study is most closely related to the literature on the concern that financial engineering leads to market fragility (see, e.g., Rajan, 2006; Gorton and Metrick, 2012; Stein, 2012). We illuminate the empirical conditions under which financial engineering generates neglected risk, a fundamental component in Gennaioli, Shleifer, and Vishny's (2012) model of financial fragility. In particular, we uncover counterparty exposure as an important risk that is neglected by investors if attention toward that risk is low. Our results also show that the neglect of this risk disappears upon the arrival of new information. As such, our paper is complementary to the study of Coval, Jurek, Pan, and Stafford (2013) on the repricing, by sophisticated market participants, of insurance products (such as equity index options or CDOs) after the occurrence of unusual events. Importantly, we additionally provide evidence on banks' tendency to construct products with relatively large counterparty risk exposure.

Second, we speak to the literature on the impact of information asymmetry between financial engineers and investors in the market for structured products. This literature argues that due to their informational advantage, product issuers exploit investors. Henderson and Pearson (2011), for example, find a significant average issuance premium, that is, a large difference between the price investors pay for the structured product and the cost of replicating this product. Due to this initial mispricing (and also due to bad trading decisions during the lifetime of the product), investors achieve poor investment performance with structured products (Bergstresser, 2008; Entrop, McKenzie, Wilkens, and Winkler, 2014; Henderson and Pearson, 2011). Piskorski, Seru, and Witkin (2015) demonstrate that intermediaries even disclose false quality information about the assets underlying residential mortgage-backed securities, and that these misrepresentations are costly to investors.

A particular focal point of the literature has been complexity. Célérier and Vallée (2015) document increasing complexity of retail structured products and show that more complex products have higher markups. Indeed, Carlin (2009) and Carlin and Manso (2011) study theoretically how the rents to issuers decline with investor sophistication for a given degree of product complexity. Furfine (2014) and Ghent, Torous, and Valkanov (2014) argue that even institutional investors find it difficult to see through obfuscation efforts of issuers, and do not fully process the information in elaborate securities. Similarly, Coval, Jurek, and Stafford (2009) propose that the lack of understanding of pooled and tranched securities was shared by rating agencies, regulators, and investors before the subprime crisis.

We contribute to this literature by showing that the problem that investors do not fully process information is not only associated with complex engineered securities but also with the simple single-name product structures that we analyze. Hence, we argue that instead of standardization, enhancing the attention of investors is necessary to avoid neglected risk. Our approach to analyzing the impact of the Lehman default on the compensation of counterparty risk is related to Arora, Gandhi, and Longstaff (2012), who investigate counterparty risk pricing in the CDS market. Their results, however, are affected by the market practice to fully collateralize, or even overcollateralize, CDS liabilities. In our sample, the issuer's obligation to the investor from a structured product is not collateralized. Additionally, information asymmetry and neglected risk should mainly be a concern for less sophisticated investors, and not for the professional institutional investors that trade on the CDS market.

Third, we speak to recent studies on the role of investor attention in financial markets showing that attention can affect asset prices, buying behavior, the shareholder base, stock liquidity, and trading (Grullon, Kanatas, and Weston, 2004; Barber and Odean, 2007; Griffin, Nardari, and Stulz, 2007; Andrei and Hasler, 2015; Sicherman, Loewenstein, Seppi, and Utkus, 2016). We complement this literature by documenting that investor attention is also important to avoid neglected risk.

Finally, we expand the literature that considers credit risk for the pricing of structured securities. Chidambaran, Fernando, and Spindt (2001) show, in the context of a clinical study of a gold-mining company, that investors are willing to pay more for bundled securities that promise high payouts in states when the issuer is doing well.[3] Several studies investigate the pricing of implicit credit risk on the secondary market for structured products (Wilkens, Erner, and Röder, 2003; Baule, Entrop, and Wilkens, 2008; Ruf, 2011; Petry, 2015). They do not, however, address the neglected risk hypothesis. We argue that the primary market, on which issuers sell structured products to less sophisticated agents such as retail investors, constitutes a more appropriate setting to analyze the reflection of neglected risk in security prices. On the secondary market, prices tend to adjust towards their fair values because well-informed issuers need to buy and sell the structured products as market makers (Gruenbichler and Wohlwend, 2005; Stoimenov and Wilkens, 2005). Moreover, while the structure of the products on the secondary market is fixed,

[3]Benet, Giannetti, and Pissaris (2006) mention such credit enhancement as a possible explanation of why structured products create value but do not test this hypothesis.

our analysis on the primary market also allows us to test whether products are structured towards neglected risk.

The paper is organized as follows. In Section 2, we briefly discuss the market for structured products, and present our data set. Section 3 discusses our empirical strategy and presents the results regarding the compensation of credit risk exposure. Section 4 analyzes the issue behavior of banks. Finally, Section 5 concludes.

2 The overall market for structured products and our sample

This section describes the market for structured products and discusses our product sample.

2.1 The market for structured products

Structured products can be described as bundled investment products with a payoff that is linked to the performance of one or several underlyings. This payoff is usually defined by a pre-specified formula that determines how the product will perform in any possible future scenario. Structured products typically entail embedded derivatives. There is a wide variety of underlings for the options such as equity, commodity, or fixed income securities.

Legally speaking, structured products are obligations for whose fulfilment the issuer is liable with all of its assets. In the event that a structured product issuer becomes insolvent and defaults, investors of the products are considered as unsecured creditors and have no preferential claims to any assets held by the issuer.

Structured products have been successfully marketed to unsophisticated European investors (Célérier and Vallée, 2015). As of December 2012, their outstanding amount totalled around EUR 770bn in Europe (Bouveret, Crisóstomo, Gentile, Mendes, Pereira da Silva, and Silva, 2013). This volume accounts for about 4% of household financial wealth, or 12% of mutual funds' assets under management in Europe.

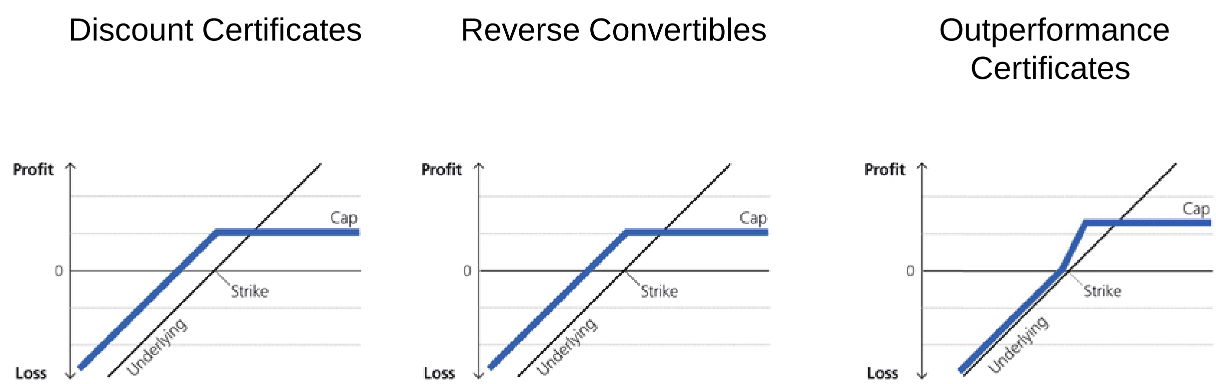
Switzerland is the global leader in terms of structured products asset volume invested on custody accounts (Swiss Bankers Association, 2011). At the end of 2012, CHF 168bn were invested in structured products on Swiss bank deposits, which corresponds to 22% of the total amount of structured products in Europe. Institutional investors such as pension funds hold the main share of the listed products (57%), followed by private investors (36%), and commercial investors (7%). Most structured products are issued by banks. The market is relatively concentrated. The sales on the Swiss trading platform for structured products (Scoach) of the three largest issuing banks in Switzerland comprise around 70% of all listed structured products. (See SVSP (2013) for a statistical overview.)

2.2 Structured products sample and data sources

We draw on a new comprehensive term sheets database containing all structured products issued in Switzerland to European investors between January 2005 and December 2010. The database is provided by Derivative Partners. The issuers target households/retail investors and relatively unsophisticated institutional investors. Structured products can be purchased in notionals of as little as CHF 1000 and CHF 5000, and there are no requirements regarding investor sophistication.

We focus our analysis on Discount Certificates, Reverse Convertibles, and Outperformance Certificates on single stock underlyings. Although all three product types have a concave payoff structure with a maximum redemption (cap), they differ in their structure.

Figure 1
Payout profiles



Discount Certificates enable the investor to buy the underlying stock at a discount. The initial maturity is usually between one and three years. If the stock quotes above the cap at maturity, the investor obtains the predetermined maximum redemption. Otherwise, he receives the stock.

While *Reverse Convertibles* have the same payout profile as Discount Certificates at maturity, they differ in two aspects. First, Reverse Convertibles pay coupons over their lifetime. Second, they are not written on one unit of a stock but on a larger number of units of a single stock.

Outperformance Certificates enable the investor to participate disproportionately in the performance of a stock within a certain range. If the stock quotes above the cap at maturity, the investor obtains the maximum redemption. Between a lower threshold and this cap, the investor participates disproportionately in the return of the stock. Below the threshold, a cash amount that corresponds to the level of the underlying stock is redeemed to the investor.

We focus on these three product categories because they are the only ones that jointly satisfy the following conditions. First, they have been regularly issued by both banks throughout our observation period. Second, they can easily be replicated with standard plain vanilla options and fixed income instruments. Hence, there is little reason for a sophisticated investor to buy these products. Third, because many of the products are relatively short-term and have a single underlying stock, useful implied volatility information can be extracted from the prices of frequently traded EUREX options. The availability of appropriate implied volatility information to price the implicit options of structured products is important to reduce the risk that valuation errors in our replication approach affect the conclusion. We consider all Discount Certificates, Reverse Convertibles, and Outperformance Certificates issued by the two largest participants in the structured products market in Switzerland with traded CDSs.

From the structured product term sheets, we hand-collect detailed information to price the products. Depending on the product characteristics, we collect the product issuer, pricing date, initial fixing, payment date, final fixing, product maturity, coupons, lower threshold, maximum redemption, conversion ratio, and an identifier for the underlying stock. Additionally, we use the database to extract the number of active product issuers per month.

Due to the potential concern that our results are driven by the turmoil around the default of Lehman Brothers, in the primary analysis we omit products issued during the three months surrounding the default of Lehman Brothers, i.e., August, September, and October 2008. Additionally, this approach gives investors some time to process the new information and form their believes (see e.g., Daske, Hail, Leuz, and Verdi, 2008). Our results remain valid if we do not introduce a transition period.

We define three subsample periods. The period from January 2005 until July 9, 2007 is the *pre-crisis period*. Following Eichengreen, Mody, Nedeljkovic, and Sarno (2012) and Gennaioli, Shleifer, and Vishny (2012), we set the start date of the crisis to the second week of July 2007, i.e., to July 9, 2007. The period between July 9, 2007 and the default of Lehman Brothers is the *crisis-pre-Lehman period*. These two periods together form the *pre-Lehman period*. The period after the default of Lehman Brothers until December 2010 is the *post-Lehman period*.[4] Prior literature has documented that the Lehman Brothers collapse had a tremendous impact on the market awareness of counterparty risk (Arora, Gandhi, and Longstaff, 2012).

After excluding all products on multiple underlyings, on indices, or with missing data, we are left with a total of 509 structured products, including 358 Discount Certificates, 97 Reverse Convertibles, and 54 Outperformance Certificates on 66 different single stock underlyings. We omit products on multiple underlyings because there are no corresponding EUREX options, and products on indices because they are only issued by one bank in the first two subsample periods. 271 products are issued in the pre-crisis period, 100 products in the crisis-pre-Lehman period, and 138 products in the post-Lehman period. Of the 509 products we study, 492 have their underlying stock in either the SMI (the main index of the Swiss stock exchange), the Eurostoxx 50, or the Eurostoxx 600 index. 360 products have their underlying stock in the SMI index.

As a proxy for credit risk, we collect issuer CDS spreads from Bloomberg. Consistent with the literature (Houweling and Vorst, 2005; Jorion and Zhang, 2009), we use the five-year CDS on senior unsecured debt to measure the default risk of an issuer because these are the most liquid CDS contracts. We also obtain one-year CDS spreads on senior unsecured debt from Markit.

The volatility indices VSMI and VSTOXX are retrieved from the SIX and EUREX, respectively. The stock returns of the issuer, the (excess) returns of the underlying stock, the underlying's market capitalization, and the underlying's trading volume are gathered from Datastream. The historical quotes of the interbank rates (LIBOR) are collected from Bloomberg. Settlement option quotes based on mid prices and trading volumes for each day are extracted from the EUREX option database. Finally, data on the amount of funds invested in structured products and in securities in general is provided by the Swiss National Bank.

[4]Lehman Brothers defaulted on September 15, 2008. As stated above we omit products issued in August, September, and October 2008 in the primary analysis. Therefore, the crisis-pre-Lehman period ends on July 31, 2008, and the post-Lehman period starts on November 1, 2008.

3 Compensation for credit exposure

In this section, we investigate whether investors are compensated for counterparty risk exposure.

3.1 Replication pricing of structured products

Our analysis requires a measure of the attractiveness of structured products, i.e, of the markups investors are paying over and above what the cost of creating a structured product are. To calculate this measure, we use a standard replication approach. Each structured product is replicated by an investment in a bond and options that yields the same payout profile (see Figure 1 in Section 2.2 for the payoff profiles).

Discount Certificates (DC) can be replicated by an investment in a bond and a short put option. Hence, their replication value is

$$DC = \frac{M}{exp(rT)} - P(M,T), \tag{1}$$

in which M is the maximum redemption of the product, r the interest rate using the 30/360 day-count convention, T the time to maturity of the product, and $P(M,T)$ the value of a put option on the underlying stock of the product with strike M and time to maturity T.

Reverse Convertibles (RC) are constructed by investing in a coupon bearing bond and short put options, which implies a replication value of

$$RC = \frac{N}{exp(rT)} + \sum_{t_i \leq T} \frac{c_{t_i}}{exp(rt_i)} - \alpha P(X,T), \tag{2}$$

in which N is the nominal amount, t_i are the coupon payment dates, c_{t_i} are the coupon amounts paid at time t_i, and $P(X,T)$ is the value of a put option on the underlying stock of the product with strike X and time to maturity T. $\alpha = N/X$ denotes the number of put options securitized to the nominal amount of the certificate.

Finally, we replicate Outperformance Certificates (OC) as a bond minus a put plus low strike calls minus high strike calls. Their replication value is

$$OC = \frac{M}{exp(rT)} - P(M,T) + (\alpha - 1)C(Y,T) - (\alpha - 1)C(M,T), \tag{3}$$

in which M is the maximum redemption of the product, Y the lower threshold of the underlying stock above which the product pays an outperformance, α the total participation rate between Y and M, $C(Y,T)$ the value of a call option with strike Y, and $C(M,T)$ the value of a call option with strike M.[5]

We compute the replication value of a structured product as of the date at which the final terms of a product are fixed. The calculation requires interest rates at each pricing date, expected dividends, and volatilities of the underlying stock of the structured products. The remaining pricing parameters are directly obtained from the final term sheet of the structured products.

As a measure of the interest rate, r, in our primary analysis, we follow market practice and the literature by using interpolated London Interbank Offered Rates (LIBOR) in the currency of the structured product for different maturities as proxies (Henderson and Pearson, 2011). In the robustness analysis, we show that the results are robust to using the overnight index swap rates instead. Most of the time, the maturity of the structured product does not exactly match the maturity of publicly available LIBOR rates. In these cases, we linearly interpolate between the LIBOR rates with the closest longer and the closest shorter maturities to obtain an estimate for the appropriate interest rate.

We estimate the dividend amounts and dates expected between the pricing date and the maturity of the structured products by projecting the dividends of the year prior to the pricing date of the products reported in Datastream into the future. Instead of calculating a dividend yield, we incorporate each projected discrete dividend payment into our calculations. If we were using a dividend yield instead, we might underestimate or overestimate the expected dividend payments over the lifetime of a structured product if the product just expires before or after an expected discrete dividend payment date.

The volatility of the underlying stock of a structured product is estimated from the implied volatilities of traded EUREX Options. In particular, for each option used to replicate a structured product, we search for four EUREX Options. One EUREX option with the closest lower strike price and the closest longer maturity, one option with the closest lower strike price and the closest shorter maturity, one option with the closest higher strike price and the closest longer maturity, and one option with the closest higher strike price and the closest shorter maturity. To extract the implied volatilities from these four EUREX Options, we proceed as follows. As EUREX options are of American type, we

[5]We incorporate the exact maturity of each component of a structured product. In particular, we consider the time between the dates at which the investor pays the issue price and receives the repayment of the structured product as the maturity of the bond component, and the time between the start and the end dates of the implicit option as the maturity of the option component.

develop a binomial tree model in the spirit of Cox, Ross, and Rubinstein (1979) for each underlying stock. We use a daily discretization for the tree with $p = (exp(r(1/360)) - d)/(u - d)$, $q = 1 - p$, $u = e^{\sigma\sqrt{(1/360)}}$, and $d = 1/u$, where p (q) is the probability of an increase (decrease), and u (d) is the discrete factor for an increase (decrease) in the stock price. This approach also allows us to incorporate our discrete dividend projections, which is important because a EUREX option may just expire before or after a projected dividend payment. Each day, an option can be prematurely exercised optimally in the tree. The implied volatility of an EUREX option then corresponds to the σ that equates the American option price in the tree with the observed EUREX option price. To estimate the implied volatility for an option used in the replication of a structured product with a certain maturity and strike, we linearly interpolate the implied volatilities from the corresponding four EUREX options in the two-dimensional space formed by maturity and strike.

In case we do not find four EUREX options for a certain option used in the replication, we follow the approach suggested by Henderson and Pearson (2011) and extract the implied volatility of the option contract in the EUREX database that (i) has a time to expiration that most closely matches the final fixing date of the structured product, and (ii) has a strike price closest to the strike price of the option in the structured product replication.

As the structured products that we analyze are of European type, we finally value the options used in the structured product replication via the Black-Scholes formula for puts and calls, applying the estimated interest rate, dividends, and implied volatility.

The Issue Premium (IP) is defined as the issue price of a structured product minus its replication value, scaled by the issue price:

$$IP = \frac{IssuePrice - ReplicationValue}{IssuePrice} \tag{4}$$

We trim the dependent variable at the 0.01 percentile to avoid an impact of outliers on our results. This leaves us with 498 products. As we do not incorporate issuer specific credit risk exposure in the calculation of IP, the latter represents a percentage measure of the attractiveness of the non-credit risk related terms of a structured product. We ignore this risk in the calculation of the IP to avoid that our inferences about the relation between IP and credit risk exposure are driven by the way in which issuer credit risk exposure is incorporated in the calculation of the IP.[6] We consider both the issue price and the

[6]Existing studies such as Baule, Entrop, and Wilkens (2008) and Wilkens, Erner, and Röder (2003) seek to apply the "right" model for credit risk in the valuation of a structured product. In our approach, we are agnostic as to the correct theoretical pricing model and instead focus on the empirical predictions

replication value net of any issuance fee or commission. While they may affect the gross Issue Premium, fees and commissions are unlikely to be correlated with issuer credit risk.

3.2 Empirical approach

To analyze the relationship between the IP of product i issued by issuer j and the counterparty risk exposure of a product, we employ OLS regression models. We cluster standard errors at the underlying level.[7] Our inferences in the main specification are based on the following pooled regression model,

$$\begin{aligned} IP_{ij} \;=\; & \beta_0 + \beta_1 CDS\ Spread_{ij} + \beta_2 Correlation_{ij} + \beta_3 CDS\ Spread_{ij} * Correlation_{ij} + \\ & \gamma_1 Post\ Lehman_i + \gamma_2 Post\ Lehman_i * CDS\ Spread_{ij} + \\ & \gamma_3 Post\ Lehman_i * Correlation_{ij} + \gamma_4 Post\ Lehman_i * CDS\ Spread_{ij} * Correlation_{ij} + \\ & Controls_{ij}\delta + issue\ month_i + issuer_j + product\ type_{ij} + \varepsilon_{ij}. \end{aligned} \tag{5}$$

CDS Spread$_{ij}$ is the five-year senior unsecured CDS spread of the structured product issuer j for product i. Since products are issued at different points in time, index i also indicates time, and so *CDS Spread*$_{ij}$ varies over time for each issuer (though we control for common time trends by including issue month fixed effects). The issuance of a structured product is usually preceded by a subscription period, in which investors can opt to buy the product. To take the product subscription period into account, and to mitigate the influence of outliers, we use the average of the daily CDS spreads over the ten day period preceding the product issuance date.

$Correlation_{ij}$ is the correlation coefficient between the stock returns of the underlying of the structured product i and the stock returns of the product issuer j over the 100-day period prior to the issuance date of product i. We choose 100 days in the main analysis because we divide the observation period in different subperiods. With 100 days, we mitigate the impact of returns in subperiods before the relevant subperiod on the measured $Correlation_{ij}$ of a product. We show in the robustness section that our qualitative and quantitative inferences are robust to choosing a 252-day period. For the products in our sample, there are not sufficient secondary market trades to directly calculate the correlation between the returns of the structured product prices and the stock returns of the product

regarding the relationship of credit risk and IPs.

[7] Clustering at the product category level does not affect our qualitative results.

issuer. We consider $Correlation_{ij}$ instead because for our structured products that are all long underlying, relatively short term, and path-independent, the underlying stock return is the main determinant of the product price fluctuations.[8]

$Post\ Lehman_i$ is a binary indicator variable equal to one for products issued in the post-Lehman period, and zero otherwise.

In addition to the pooled sample approach with interactions with the Post-Lehman indicator, we also conduct our tests by separately running regressions for the three subsample periods defined in Section 2.2.

Throughout our regressions, we include issue month, product category, and issuer fixed effects. As the analysis concerns three product categories and two issuers, we include two binary product category indicators and one binary issuer indicator. We incorporate Implied Market Volatility, i.e., the level of the volatility index VSMI of the SMI index at the product pricing date, to control for aggregate market risk and risk aversion (see, e.g., Bekaert and Hoerova, 2014). To control for CDS liquidity, we include quote quality control dummies for the quote quality classification provided by Markit. Moreover, we follow Henderson and Pearson (2011) and control for the underlying market value of equity and the excess return of the underlying over a market index during the three and 12 months periods before product issuance. As our two primary proxies for hedging costs, we use the three months trading volume (turnover) of the underlying stock[9] as well as the option trading volume of the underlying that is the number of traded options on the underlying over all maturities and exercise prices during the month prior to the product issuance normalized by the number of all EUREX options traded in that month. $Controls_{ij}$ is this vector of control variables. All control variables (where applicable) are winsorized at the 0.01 percentile.

3.3 Descriptive statistics

Table 1 presents the summary statistics of the variables used in our analysis. The average IP of the structured products in our sample is 0.93%. Reverse Convertibles have the highest average IP of around 1.27%, followed by Discount Certificates with 0.82%, and

[8]While changes in the interest rate and the underlying's volatility also influence product prices, their importance declines when a product approaches maturity. At maturity, only the stock return is relevant for a product's payoff and, hence, for its price.

[9]Although Henderson and Pearson (2011) also include the one month trading volume of the underlying asset, we abstain from including this variable. For our sample, the three months and one month trading volumes exhibit a correlation close to unity, introducing multi-collinearity issues.

Outperformance Certificates with 0.75%. Reverse Convertibles, Discount Certificates, and Outperformance Certificates have an average maturity of 1.12, 0.96, and 0.79 years, respectively. Hence, our finding that Reverse Convertibles have the highest average IP, followed by Discount Certificates, and Outperformance Certificates is consistent with the literature that reports a positive relationship between product maturity and issue premium (see e.g., Baule, Entrop, and Wilkens, 2008). Another reason for the relatively high IP of Reverse Convertibles could be the additional complexity due to their coupon payments (see the replication formulas in Section 3.1). Célérier and Vallée (2015), for example, find that the IP of structured products is positively associated with product complexity.

The mean five-year CDS spread is 0.55%; the large difference to its median of 0.12% is mainly driven by the strong increase in spreads during the months surrounding the collapse of Lehman Brothers. The average correlation coefficient between the equity returns of the issuer and the equity returns of the underlying of the structured products is 0.49. 15 products in our sample have a correlation coefficient of one because their issuer simultaneously corresponds to their underlying stock. Two products have a negative correlation (very close to zero). The average market capitalization of the equity of the underlyings is USD 64.34bn. Most structured products in our sample have a maturity that is slightly below one year. Discount Certificates and Outperformance Certificates with a maturity below one year obtain a privileged tax treatment in Switzerland. Hence, these products seem to be structured towards the tax advantage.

Table 1 about here

In Panels A, B and C of Table 2, we separately consider the three subsample periods (see Section 2.2). The IP is considerably smaller in the post-Lehman period than in the crisis-pre-Lehman period. Average issuer CDS spreads are, not surprisingly, largest in the post-Lehman period, but they are already much larger in the crisis-pre-Lehman period than in the pre-crisis period. This overall pattern is a first indication that issuers of structured products need to offer more attractive product terms (smaller IPs) when their credit risk is larger *and* if investors are more aware of the issuer default risk. As expected, the underlyings' market caps, trading volumes, returns, and option trading volumes are lower in the post-Lehman period.

Table 2 about here

3.4 Results

Table 3 presents results of our pooled OLS regression over the entire observation period from January 2005 to December 2010. We begin by considering the overall effect of credit risk in Column (1). Columns (2) and (3) then investigate product-specific counterparty risk.

Insert Table 3 about here

If investors are aware of credit risk, we expect CDS spreads to be negatively related to the issue premium, which indicates that issuers compensate investors for the implicit risk of issuer default. Regression (1) shows that this is indeed the case in the post-Lehman period: After the default of Lehman, the point estimate on the CDS spread (obtained by adding the coefficients on the CDS spread and the interaction term with the Post-Lehman indicator) is highly significantly negative. In the pre-Lehman period, there is, looking across all specifications, no significant relation between IPs and bank-specific credit risk. We discuss the quantitative implications of the analysis in Table 3 further below.

Next, we explore the idea that the compensation of counterparty risk should not only depend on the issuer's credit risk, but also on the investor's product-specific counterparty risk exposure. The lower the correlation between the issuer's equity and the product payoff, the more critical issuer credit risk should be to investors. The reason is that an issuer default tends to be associated with a large product payoff, which results in a high expected loss to the investor upon default. By contrast, structured products bundled such that the correlation between the performance of the issuing bank and the payoffs of the products is medium or large impose relatively limited issuer credit risk exposure on the investor because such products tend to yield low payoffs to investors when the issuer defaults. Therefore, investors demand lower compensation for issuer credit risk of products with higher correlation, i.e., their relative willingness to pay for such products is higher. This prediction is consistent with the observation in Chidambaran, Fernando, and Spindt (2001) that issue proceeds are larger for securities bundled to mitigate counterparty credit exposure.

Our findings regarding the role of the investor's product-specific counterparty risk exposure are shown in Columns (2). In the post-Lehman period, not only is the effect of the CDS spread itself significantly negative, but the effect of the interaction CDS spread * Correlation is significantly positive. The regression results also imply that there is no compensation for issuer credit risk exposure (either general or product-specific) during the pre-Lehman period.[10]

The quantitative interpretation of the findings is in principle straightforward. When considering counterparty risk, investors of structured products with a maturity of one year should approximately be compensated by a one percentage point decrease in IP for a one percentage point increase in the CDS spread of the same maturity and seniority as the products. As the correlation between the issuers' equity and the products' payoff is, in general, positive, investors would demand less than a one percentage point decrease in IP on average because this correlation mitigates the counterparty risk exposure. The average maturity of the products in our sample is around one year. However, because the five-year CDS spread is the most common and liquid proxy for credit risk, we use that CDS spread in our main analysis (and use the one-year spread in the robustness checks). The estimates in Column (3) imply that for a product with an underlying stock at the first quartile of correlation (0.37), a one percentage point increase in the five-year CDS spread is associated with a 2.45 percentage point (t-statistic: 2.9) decrease in the IP after the Lehman default. By contrast, for a product with an underlying at the third quartile of correlation (0.62), a one percentage point increase in the five-year CDS spread is associated with a 1.36 percentage point decrease in the IP (t-statistic: 1.3). In that period, however, the standard deviation of the one-year CDS spread is roughly 33% larger than the standard deviation of five-year CDS spreads, see Table 2. Hence, the quantitative impact of a change in the one-year CDS spread on the IP is likely to be smaller compared to what is suggested by the coefficients in Table 3. We confirm this conjecture in Section 3.6.

In sum, these findings imply that the compensation for credit risk exposure is driven by the period after the default of Lehman Brothers. The results also indicate that issuer default risk matters less when the investors' actual exposure to the counterparty is smaller.

We additionally find that the coefficient on Correlation Issuer with Underlying itself tends to be negative in the post-Lehman period, which supports the arguments in Allen, Bali, and Tang (2012). The authors argue that investors demand a premium for equity portfolios of nonfinancial firms that are highly correlated with systemic risk from the financial sector relative to portfolios that are uncorrelated with this risk. Consistent with

[10] This finding is also important because the CDS spread itself could conceivably proxy for, or could be correlated with, a tendency of riskier banks to issue more products. Thus, the reduced issue premium for a bank with a high CDS spread in the post-Lehman period observed in Column (1) could indicate that prices falls more for banks who previously issued a large number of products. This alternative story cannot explain the results for the interaction CDS spread * Correlation.

this view, we show that banks need to offer lower IPs after the Lehman default when issuing structured products that entail a higher correlation of their payoff to the issuing bank's equity return and, hence, to the banking sector.[11] Hence, investors seem to be aware of both the counterparty risk exposure and the systemic risk from the financial sector after the Lehman default.

Throughout these regressions, we control for market volatility and the liquidity of the CDS spread. Column (3) shows that our results are robust to the inclusion of a large set of underlying-specific controls that are proposed in Henderson and Pearson (2011). The coefficients of the controls are very similar to the ones reported in Henderson and Pearson (2011).[12] Just as in their regression, none of the controls in Column (3) are significant. Importantly, the coefficient on the interaction of the CDS spread and Post-Lehman is significantly negative throughout these regressions, and the coefficient on the interaction of the CDS spread, Correlation, and Post-Lehman is significantly positive.

The pricing of structured products and, thereby, the IPs seem to undergo a structural break during our observation period. The binary Post-Lehman variable could also pick up firm-invariant effects that emerge from the financial crisis. To investigate this issue, we split our sample into products issued before and after the default of Lehman Brothers, respectively, and repeat the regressions separately. Table 4 presents the main results in Columns (1) and (2). Columns (3) to (4) add the controls of Henderson and Pearson (2011).

Insert Table 4 about here.

The results in Table 4 are consistent with those in Table 3. After the Lehman Brothers default, the coefficient on the CDS spread is negative and significant, and the interaction term of the CDS spread and Correlation is significantly positive. Consistent with the results of Column (2) in Table 3, the total effect of CDS spreads on the IP in the post-Lehman period of Column (2) in Table 4 is highly significantly negative for products with a median correlation coefficient and significantly negative on the 10% level for correlations up to 0.58 (just below the top quartile). In the pre-Lehman period, by contrast, the CDS spread and the interaction of the CDS spread and Correlation are both insignificant.

[11]Even if this premium is already reflected in the initial price of the option component of the structured product, the bond component is also correlated with the banking sector, which justifies a compensation to investors via a lower IP.

[12]Henderson and Pearson (2011) calculate the option trading volume from puts and calls separately, while we incorporate both options in the single measure Option Trading Volume Underlying.

Overall, Table 4 confirms that after the default of Lehman Brothers, investors of structured products are compensated for counterparty risk exposure.

One response to the results presented so far could be that the absence of compensation for credit risk exposure before the default of Lehman Brothers occurred because credit risk was very small in this period. If investors do not get compensated for small risks, our policy implications may be limited. Moreover, the significant results in the post-Lehman period could simply be driven by a higher variability of the independent variable. From the fact that compensation does occur in the post-Lehman period, we cannot infer whether this happens because counterparty risk was high or because credit risk was salient. Clearly, the two factors are intertwined and hard to separate. Yet, we can make progress by considering a more fine-grained sample split.

Specifically, in Table 5, we split our sample period into the three non-overlapping subperiods. Recall that the period from January 2005 until July 9, 2007 is the *pre-crisis period*. The period between July 9, 2007 and the default of Lehman Brothers is the *crisis-pre-Lehman period*. The period after the default of Lehman Brothers until December 2010 is the *post-Lehman period*.

Table 5 about here

As seen in Columns (1) and (4), CDS spreads played no role during the pre-crisis period, and the coefficient on the interaction term of the CDS spread and Correlation is also insignificant throughout the regressions in the pre-crisis period.

By contrast, important results arise when comparing the crisis-pre-Lehman period, shown in Columns (2) and (5), to the post-Lehman period in Columns (3) and (6). The average credit spread in the crisis-pre-Lehman period is 62 bps, and its standard deviation is 0.36. While these values are still below the average post-Lehman CDS spread and standard deviation of 144 bps and 0.68, respectively, they are considerably above the levels in the initial pre-crisis period with an average CDS spread of 8 bps and a standard deviation of 0.03. Strikingly, the coefficient on the CDS spread is only significantly negative and the coefficient on the interaction of CDS spread and Correlation is only significantly positive in the post-Lehman period.

The results in Table 5 suggest that the counterparty risk exposure of structured products is not compensated simply when credit risk is large, but is compensated when investors are actually aware of this risk after obtaining new information. Hence, our results cannot be explained just by the idea that individuals may make financial mistakes only when the financial consequences of mistakes are negligible (see, e.g., Agarwal, Chomsisengphet, and Souleles, 2015). Our finding that credit risk exposure is not compensated in structured product prices despite the increase in credit spreads in the crisis-pre-Lehman period is consistent with the view that some agents exhibit local thinking (Gennaioli and Shleifer, 2010; Gennaioli, Shleifer, and Vishny, 2012) or have different access to information or abilities to process information than others (see, e.g., King and Wadhwani, 1990; Barlevy and Veronesi, 2003; Hong and Stein, 2003). In particular, a typical investor on the structured products market may have more difficulties in assessing counterparty risk exposure than the sophisticated investors that participate in the over-the-counter credit derivatives market. According to this notion, certain events can reveal substantial news to the former agents that induce them to reassess previously neglected risk. This re-evaluation explains the compensation of credit risk exposure that we find in the post-Lehman period.

3.5 Attention toward issuer default risk

Throughout Section 3.4, we interpret our results by suggesting that time variation in investors' attention toward issuer credit risk plays a role for the compensation of credit risk. We now construct a proxy of this attention to shed additional light on this interpretation.

To proxy for investor attention, we investigate Internet search behavior in Google Trends. We focus on this approach because Da, Engelberg, and Gao (2011) show that the aggregate search frequency in Google is a direct, unambiguous, and objective measure of the attention of less sophisticated retail investors. These investors are typical clients targeted by structured product issuers.

We start by building a list of search terms that reveal attention toward credit risk. Our starting point are the Harvard IV-4 and the Lasswell Value Dictionaries that place English words into various categories. From these dictionaries, we select the words that are tagged "economic" as well as "negative," and are associated with credit risk. This step leaves us with a set of eleven words such as "bankrupt" or "liquidate." We then need to understand how these words are searched in Google. As in Da, Engelberg, and Gao (2015), we, therefore, input the words into Google Trends to obtain the ten top searches associated with each word during our sample period from January 2005 to December 2010. This step generates 109 search terms after removing duplicates, such as "going bankrupt," or "liquidate company."

Next, we remove search terms that are not clearly related to finance. For example, “default password” is omitted. This step leaves us with 50 final terms. For each of these final terms, we download the worldwide weekly search volume over our sample period. We only record the search volume of final terms for which the volume is available with a weekly frequency.[13] Hence, 30 individual time series $I_{i,t}$ of weekly worldwide search volumes remain in our data set.

To address concerns about outliers, seasonality, trends, and heteroscedasticity in the search volume data, we proceed as follows (see, Da, Engelberg, and Gao, 2015). First, we winsorize each individual time series at the 5% level (2.5% at the top and the bottom). Second, we regress $I_{i,t}$ on weekly dummies and keep the residuals. Third, we standardize each time series by scaling them with their time series standard deviation. We label the resulting time series “adjusted” series.

Finally, we run regressions of the adjusted series on a CDS index. To build the relevant CDS index, we collect average weekly CDS levels for all issuers of structured products in Switzerland with traded CDS quotes, and calculate the weekly average of these levels. The regressions allow us to identify the importance of the search terms behind the adjusted series for issuer credit risk attention. As in Kogan, Ross, Wang, and Westerfield (2009) and Da, Engelberg, and Gao (2015), using historical regressions for selecting the most relevant search terms is a way to make sure that terms are not only ex ante obvious, but also objectively relevant from the data. As expected, the contemporaneous relationship between the adjusted series and the CDS index is almost always positive. Only five out of the 30 series have a negative regression coefficient. We use the adjusted series that have a positive regression coefficient to focus on the search terms that are most important for investors’ attention toward credit risk.[14] From these adjusted series, we construct our weekly attention index as

$$Attention_t = \sum_{1}^{25} I_{i,t}. \tag{6}$$

$Attention_t$ is, in spirit, very similar to the attention measure introduced by Da, Engelberg, and Gao (2011) that also reflects average de-trended and de-seasonalized aggregate Google search frequencies.

One potential concern with our attention proxy is that the worldwide English search

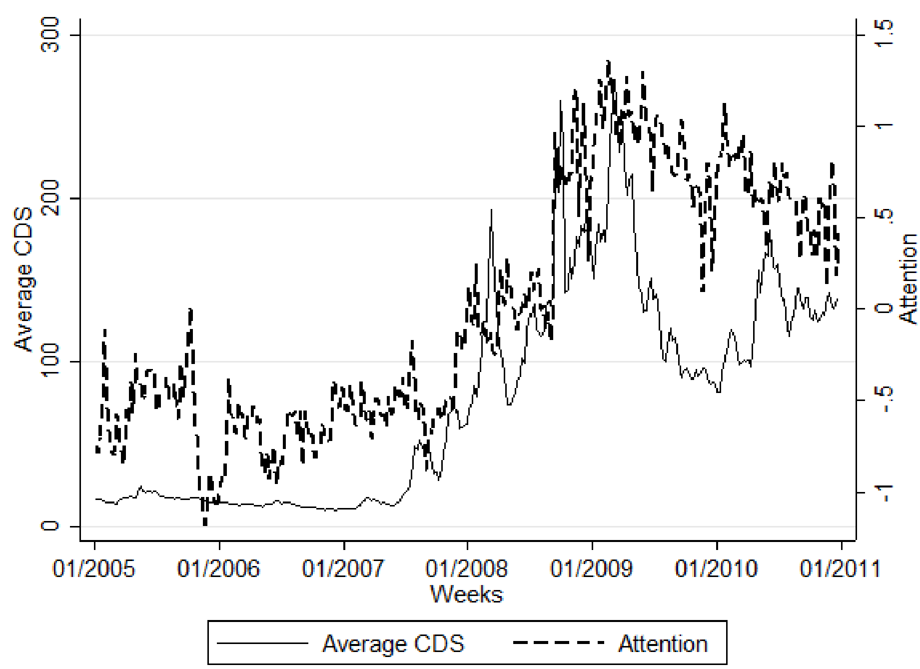
[13]The data frequency is decided by Google Trends based on search popularity. Low popularity search terms only have monthly data available.

[14]Our qualitative results are not affected by alternative series selections, such as the ten adjusted series with the highest positive t-value.

behavior could be driven by the attention of US investors, and not of European investors to which our products were sold. Search frequencies are too low during our sample period to collect country-specific search volumes from Google Trends. Hence, to address this concern we also construct an attention index out of German search frequencies. The worldwide search volumes in German should mainly be driven by German speaking countries in Europe such as Germany, Switzerland, and Austria.[15] The attention indices in English and German have a correlation of 0.83. Thus, issuer credit risk attention does not seem to be a local phenomenon. The two indices also imply qualitatively identical results in what follows. Therefore, we only describe the results for our English index.

We first plot our attention index against the CDS index in Figure 2. The figure provides a graphical indication that attention can diverge from the level typically warranted by the magnitude of credit risk.

Figure 2
Attention index and CDS levels



[15]We construct the German index by translating our set of eleven English words into German. Specifically, for each English word we take the first German translation in the "Online Duden translator" that has an economic tag, and is neither an equally spelled English expression nor a duplicate from another translated word. We then obtain the German top ten searches for each translated word, and proceed in exactly the same steps as for the English attention index. While Switzerland has four official languages, for two thirds of the population German is the primary language.

We next show how this proxy of investor attention toward issuer default risk varies during our three subperiods. As can be seen in Panel A of the summary statistics in Table 6, the average $Attention_t$ is low in the pre-crisis and crisis-pre-Lehman periods, and high in the post-Lehman period. In Panel B, we investigate Abnormal Attention, that is, the attention above or below the one expected for a given level of issuer credit risk. In particular, we regress $Attention_t$ on the contemporaneous CDS index level, and report summary statistics for the weekly residuals during the subperiods. The results are consistent with our conjecture in Section 3.4 regarding investors' credit risk attention. Specifically, they demonstrate that the abnormal investor attention was low in the crisis-pre-Lehman period, but high after the default of Lehman.[16] The mean of -0.33 in the crisis-pre-Lehman period, for example, implies that $Attention_t$ was on average 0.33 lower than the level of $Attention_t$ that is typically expected (predicted) for the corresponding CDS index level in each week. Hence, while it is obvious that investor attention generally rises with issuer default risk, we show that this increase was atypically low in the crisis-pre-Lehman period, and atypically high post Lehman.

Finally, we use our data driven attention index to conduct a more refined test of the hypothesis that issuers compensate credit exposure when attention towards issuer credit risk is high. Table 7 shows a replication of Table 3, in which we replace the post-Lehman dummy by $Attention_t$. We use the one week lag, $Attention_{t-1}$, in the regressions because it usually takes some days to launch a structured product. Our results are qualitatively similar without lagging, or with a two week lag of $Attention_t$. The results show that the compensation of counterparty risk exposure is driven by weeks with high attention. Specifically, the coefficient on the interaction between CDS Spread and Attention is negative, and the coefficient on the triple interaction between CDS Spread, Correlation, and Attention is positive. The total effect of CDS Spread on the IP in Column (3) provides a good exposition of the impact of attention. For a product with a correlation of 0.37 (the first quartile of Correlation), the total impact of CDS Spread is only significantly negative if attention is high, i.e., in the top quartile of Attention. Attention is also quantitatively important. Specifically, when Attention increases by one standard deviation, the CDS Spread's impact on the IP is (absolutely) greater by 0.5 bps per one bp CDS Spread. Overall, these results confirm the intuition that the neglect of counterparty exposure in the issue prices

[16] To test for significance, we regress the weekly residuals on subperiod dummies. The crisis-pre-Lehman dummy is significantly negative, and the post-Lehman dummy significantly positive, both below the 1% levels.

of structured product is, indeed, driven by missing attention toward issuer credit risk.

Table 7 about here

3.6 Additional results and robustness

In this section, we provide additional results and several robustness tests regarding the pricing of structured products. We consider (1) counterparty risk in CDS spreads, (2) an alternative interest rate, (3) the one-year CDS as a proxy for credit risk, (4) additional controls such as the maturity of products, the issuers' recent past returns, and an alternative proxy for hedging costs, (5) the role of correlation of the issuer's CDS with the underlying equity and longer estimation periods for correlations, and (6) further robustness checks. We only tabulate the additional regressions for our main specification with the post-Lehman dummy from Section 3.4. The results in Table 7 of Section 3.5 with the attention index are robust to these variations, and available upon request.

First, we consider the possible concern that our results are driven by a change in the reflection of counterparty risk in CDS spreads, or in EUREX options around the Lehman default. As both CDS trades and EUREX options are fully collateralized, however, counterparty risk is of negligible importance in these derivatives. Arora, Gandhi, and Longstaff (2012), for example, argue that due to collateralization the credit spread of a CDS dealer would have to increase by 645 basis points to result in a one-basis-point decline in the price of credit protection. The authors also show that this result is only marginally affected by the default of Lehman.

In our methodological setup, γ_2 in Equation (5) could be driven by a correlation between the CDS spread of a product issuer and the LIBOR interest rate r used in the calculation of the IP. We present two lines of argument to address this concern. First, Abrantes-Metz, Kraten, Metz, and Seow (2012) show that the correlations between individual banks' LIBOR quotes and their CDS spreads are positive. As we discount the implicit bond of the structured products with LIBOR, a positive correlation between an issuer's CDS spread and the LIBOR implies that the IP tends to increase with the CDS level, which stimulates a positive rather than a negative γ_2. If anything, this relation introduces a bias *against* finding our result.

Second, as an explicit test that the choice of the interest rate does not drive our results, we repeat our analysis using the overnight index swap (OIS) rate from Bloomberg for various maturities as an alternative interest rate. The OIS is an interest rate swap in which the floating leg is linked to the interest rate of overnight loans made between banks. The two parties in the swap agree to exchange at maturity the difference between interest accrued at the agreed fixed rate and interest accrued through the geometric average of the daily floating rate. As the floating leg is linked to the TOIS (Tom-Next Overnight Indexed Swap rate) for CHF, and to the EONIA (Euro OverNight Index Average) for EUR, the OIS rates bear only negligible credit risk. Indeed, Beirne (2012) argues that banks prefer to lend in the overnight market compared to the term interbank market when credit risk is present. The counterparty risk associated with OIS contracts is also small because no principal is exchanged. If the maturity of a structured product does not exactly match the maturity of publicly available OIS rates, we linearly interpolate between the OIS rates with the closest longer and the closest shorter maturity. The IPs calculated with the OIS rate and the IPs in the main analysis have a correlation of 0.93. The results in Table 8 show that our qualitative results are not affected by using the OIS rate. The same qualitative results as in the main analysis also hold in the sample split regressions (not tabulated).

Insert Table 8 about here.

The point estimates indicate that in the post-Lehman period, the total effect of the CDS spread on the IP in Columns (2) and (3) is significantly negative (at the 10% level) for products up to a Correlation below around 0.6, respectively. The point estimate for the effect of the CDS spread remains negative over the whole correlation range. Overall, the impact of CDS spreads is somewhat bigger for this alternative dependent variable.

Next, we conduct a number of additional checks. First, including only products with a correlation below one does not change the qualitative results; see Column (1). Second, we use the one-year CDS from Markit instead of the five-year CDS. The one-year CDS tends to be less liquid. We include quote quality control dummies for this maturity for the quote quality classification provided by Markit. As can be seen in Column (2) of Table 9, the results are very similar. While the triple interaction is just below conventional statistical significance, economically the total effect of the CDS spread on the IP still depends on the correlation of the issuer with the underlying. In particular, the results imply that a one percentage point increase in the one-year CDS spread is associated with a 1.67 percentage point (t-statistic: 2.6) decrease in the IP after the Lehman default for a product with an underlying at the first quartile of correlation. For a product with a correlation at the third quartile, the effect is 0.83 percentage points (t-statistic: 1.1). As suggested in Section 3.4, the quantitative effects with the one-year CDS reflect our expectation of a compensation by less than a one percentage point decrease in IP for a one percentage point increase in the CDS spread. Third, our results are robust to adding a control for the maturity of a product; see Column (3). Fourth, in Column (4), we additionally include the issuer's past stock return over the six month before a product issuance. The idea is that a better reputation of the issuer, proxied by the past stock return, could negatively affect the issue pricing of structured products. If month fixed effects are not included, the regression results confirm this conjecture, but the results with month fixed effects suggest that in the cross-section, this reputation is not that important. Throughout, our main results remain robust. Fifth, hedging costs can be an important driver of the pricing of structured products (Petry, 2015). Our regressions so far already include two proxies for hedging costs, Turnover Underlying and Option Trading Volume Underlying. Here, we consider an additional proxy for hedging costs, namely ATM Call 180, i.e., the six months implied at the money call volatility of each underlying stock of a structured product as of one month before the issue date in the regression.[17] Column (5) in Table 9 shows that the proxy is positively associated with the issue premium, suggesting that hedging costs are indeed relevant for the pricing of structured products. Our predictions concerning the compensation of counterparty risk exposure are only slightly affected by this alternative measure.

Finally, in Columns (6) and (7) we apply alternative correlation measures. In Column (6), we use a 250-day time window to calculate the Correlation Issuer with Underlying. The results are essentially unchanged. In Column (7), we use the correlation of the issuing bank's CDS with the equity underlying (again measured over 100 days, though similar results hold with a 250-day measurement period). As expected, we find exactly the opposite sign for the triple interaction with CDS and the post-Lehman indicator.

We also conduct a battery of other robustness checks that are available on request. For example, we use the natural logarithm of CDS spreads to account for outliers; the significance of counterparty risk and product-specific counterparty exposure increases, though the overall explanatory power of the regressions does not increase. Moreover, we omit the days with the highest CDS (above 300 basis points), and the results remain very similar. Also, we consider the possibility that using implied volatilities of EUREX options extracted

[17] We include this measure from Henderson and Pearson (2011) because the underlying specific volatility may also positively impact the expected future hedging costs of a product on the corresponding underlying. The results in Column (5) could be affected by the fact that the ATM Call 180 variable is mechanically highly correlated with the dependent variable, as the latter is constructed using a similar implied volatility measure.

as of the pricing date of the structured products may introduce errors into the volatility estimates due to asynchroneity in the closing times of the stock and option exchanges, the inherent discreteness of option market bid and ask quotes, and other factors (Henderson and Pearson, 2011). Therefore, when calculating the issue premium, we also estimate the implied volatilities used in our replication pricing by averaging the implied volatilities of EUREX options over the five trading days up to and including the pricing date. We find that our main results are robust to this alternative approach. Finally, using raw underlying returns instead of excess returns does not affect the results.

Insert Table 9 about here.

4 Issue behavior and credit exposure

Neglected risk in engineered securities is of peculiar concern in the financial fragility hypothesis of (Gennaioli, Shleifer, and Vishny, 2012) if issuers have a propensity to structure the securities towards this risk. There are several potential reasons why banks could design structured products with particularly high counterparty risk exposure. For example, issuers may try to avoid the premium discovered by (Allen, Bali, and Tang, 2012) that investors require for investments that are highly correlated with systemic risk from the financial sector. Hence, they possibly offer structured products with underlyings that have a low correlation to the issuing bank (and, therefore, to the financial system) to increase the issue premium. An alternative reason is that the value of options increases with the correlation between the equity underlying and the interest rate (see e.g., Merton, 1973), and banks' internal interest rate (funding cost) is negatively associated with their financial performance (Babihuga and Spaltro, 2014). Because the structured products in our sample are characterized by a long option position for the bank[18], issuers may simply attempt to increase the value of their option by designing products with a low correlation between the underlying and their equity. In this section, we investigate whether banks effectively have a propensity to issue structured products that entail high implied counterparty risk exposure.

[18]The Outperformance Certificates also entail a short position in a call option for the bank (see Eqn. 3). The long positions in the put and the call, however, have a much larger combined absolute value than the short call for reasonable choices of Y and M.

4.1 Empirical approach

We first present our empirical approach to measuring the tendency of banks to issue low correlation products. To test this preference-for-low-correlation hypothesis, we need to compare the correlation of stock underlyings that are chosen by the issuer with the correlation of otherwise similar underlyings that could reasonably be chosen, but are not. We use a standard matched sample approach as described in Roberts and Whited (2012) and as employed, for example, in Kahl, Shivdasani, and Wang (2015). Thus, we construct a matched sample of underlyings and then test for the significance of the difference in correlations of actually chosen and non-chosen matched underlyings. This approach has the advantage that we do not compare the (relatively) small number of actually chosen stock underlyings with the potentially extremely large set of possible equity underlyings.

To construct the matched sample, we proceed as follows. We define, for each actually chosen stock underlying of a structured product, the choice set as the set of underlyings in the same index on the same date. We concentrate on the 492 products with an underlying in the SMI, Eurostoxx 50, or Eurostoxx 600 index and consider as an in principle eligible set of underlyings the shares traded in one of the three indices. For the 17 remaining products, it is not clear what the comparable set would be. Among the 492 products, 360 have their underlying in the Swiss SMI index. We conduct a separate analysis for this subset of products in Section as they are arguably the products for which the comparable equity underlyings, namely, other major Swiss shares, are most evident.

Among set of underlyings in the same index on the same date, we select the five underlyings that are the closest neighbors with respect to the Mahalanobis distance from the implied volatility, market capitalization, and turnover of the actually chosen underlying. The market capitalization, and the turnover of each underlying in the choice set are collected from Datastream. The implied volatilities are extracted from 180 days at-the-money call options from EUREX according to the procedure described in Section 3.1. EUREX option prices are available for all SMI underlyings over the complete sample period, for most Eurostoxx 50 underlyings, but only for some of the Eurostoxx 600 underlyings. It is, therefore, conceivable that our inferences are confounded when including some underlyings from the Eurostoxx 600 index because we may not select the correct choice set. Therefore, we show that our inferences also hold when using SMI underlyings only. As recommended by Roberts and Whited (2012) we check that qualitatively and quantitatively similar results maintain if we additionally match on other criteria (such as on historical volatility), and/or if we choose three, four, or more than five matched underlyings, and/or if we discard, for example, the 1% of the worst matches.[19] For each resulting observation, we then compute the standardized rank difference

$$DIFF-RANK = (Rank\ Issued-Rank\ Matched)/number\ of\ underlyings\ in\ the\ index. \tag{7}$$

$Rank\ Issued$ is the rank, in terms of the correlation coefficient of the actually chosen underlying with the issuing bank over the past 100 days, within the relevant index. Higher numbers correspond to higher correlation. $Rank\ Matched$ is the average rank of the matched non-issued underlyings in terms of that correlation. We compute the ranks based on the correlation coefficients ten days before the relevant issue date because the implementation of structured products typically starts one to two weeks before this date. The results are not sensitive to this assumption. We scale the difference in ranks by the number of underlyings in the respective index because an absolute rank difference of, for example, two has a different interpretation in the SMI with 20 stocks than in the Eurostoxx 50 with 50 stocks. Thus, our dependent variable is a standardized rank difference that is between minus one and one. In our main analysis, we focus on ranks instead of absolute correlations. The reason is that absolute correlations depend on business cycles. As business cycles may also influence the decision of banks to issue structured products, we are concerned that an apparent preference for low absolute correlation products could, in fact, be driven by this dependence.

We also use

$$DIFF-CORR = (Correlation\ Issued - Correlation\ Matched). \tag{8}$$

$Correlation\ Issued$ is the correlation coefficient of the actually chosen underlying with the issuing bank and $Correlation\ Matched$ is the correlation coefficient of the matched non-issued underlyings with the issuer returns. We apply the same timing conventions as for $DIFF-RANK$.

4.2 Results

Table 10 presents the results of OLS regressions in which the dependent variable is $DIFF-RANK$, that is, a measure of the difference in the correlation of the actually chosen

[19] For a few products, we do not find a matching underlying within the same index.

underlying minus the average correlation of the non-chosen matched underlyings.[20] Our focus in these regressions is on the constant term that shows the average difference in the correlations. We include year-month fixed effects in each regression. We cluster standard errors on the issuance day level to account for the fact that for each issued product we have multiple control underlyings.

Column (1) shows that the chosen equity underlyings have a significantly smaller correlation with the issuer than the matched underlyings that are not chosen. Economically, the coefficient -0.159 in Column (1) means that on average, chosen underlyings have a 15.9 points lower standardized correlation rank than non-chosen underlyings. This magnitude is about one half of a standard deviation of DIFF-RANK, a sizable effect. Notably, these results hold controlling for index fixed effects and for month-year fixed effects.

In Column (2), we incorporate the issuer's CDS spread, and the Mean CDS spread that is the average credit spread of all active banks in Switzerland with traded CDSs. The negative coefficient on CDS spread implies that issuing banks have a stronger propensity to issue low correlation products if their credit risk is larger. Column (3) considers the issuer's prior equity return as an alternative measure for a bank's financial condition. The coefficient on Bank's Prior 250 Day Return is positive, which also suggests that banks have a higher tendency to issue low correlation products when their financial condition is weaker.

In Columns (4) to (6), we repeat our analysis from Columns (1) to (3) using only SMI underlyings. The results are economically and statistically more significant than when including all structured products.

Overall, these results provide evidence that issuers of structured products have a tendency to issue structured products that entail a large counterparty risk exposure, particularly when their credit risk is high.

5 Conclusion

This paper provides novel empirical evidence on the fundament of the financial fragility hypothesis of Gennaioli, Shleifer, and Vishny (2012), namely on neglected risk. We show that there are times during which investors neglect an important risk, namely, counterparty risk. Initial offering prices of simple structured products do not reflect issuer credit risk before the Lehman default, but only after this event. Interestingly, we find that this

[20]The results for $DIFF - CORR$ are qualitatively similar, and available upon request.

compensation after the Lehman default also depends on the extent to which the product specific payoffs are exposed to the default risk of the issuer. Investors are compensated more for issuer credit risk if a product tends to have a higher promised payoff at issuer default, that is, if a product entails higher counterparty risk exposure. By measuring investor attention through the Internet search behavior of households, we also show that the attention towards issuer credit risk was atypically low before, and atypically high after the Lehman default. Moreover, attention is a crucial determinant of counterparty risk exposure compensation.

Our analysis of banks' product issuance behavior additionally implies that issuers tend to structure their products towards more counterparty risk exposure. Hence, because issuers have a propensity to impose this risk into the economy, it is particularly important that investors are aware of the implicit counterparty risk of financially engineered securities.

Our findings have important policy implications. Motivated by the dramatic consequences of the subprime mortgage crisis, some market observers propose to severely curtail financial innovations. Others argue that there could be benefits from standardizing securitized products (Ghent, Torous, and Valkanov, 2014). Our evidence suggests that investors are able to assess risk features of financially engineered securities. In particular, the counterparty risk of structured products is compensated in a sophisticated, product-specific manner.

The compensation, however, critically depends on the level of attention toward issuer credit risk. Compensation does not happen when this risk is, in fact, important but not salient to investors. Without sufficient attention, issuer credit risk is not recognized although the product structures that we analyze are quite simple. Hence, standardization and reduction in complexity may not avoid the accumulation of neglected risk that leads to financial fragility. Our results also imply that instead of prohibiting the issuance of financially engineered securities to sophisticated investors, desirable policies should help investors to form realistic expectations by stimulating their attention toward the inherent risks of these securities. Existing work shows that, for example, experience sampling is a powerful mechanism for improving investors' risk choices (see, e.g., Kaufmann, Weber, and Haisley (2013), Bradbury, Hens, and Zeisberger (2015)). One needs to keep in mind, though, that unbiased advice is likely to be a necessary, not a sufficient condition for avoiding investment mistakes (Bhattacharya, Hackethal, Kaesler, Loos, and Meyer, 2012), and that issuers may respond to educational initiatives by obfuscatory actions (Carlin and Manso, 2011).

We explore one aspect of neglected risk, namely counterparty risk. Our results in Section 3.6 on the relation between volatility measures and the issue premium, however, suggest that additional aspects of potentially neglected risk should be analyzed. In particular, issuers may generate neglected volatility risk by issuing structured products, in which the investor is short volatility, on high volatility underlyings during high volatility times. It is possible that they, thereby, inject neglected volatility exposure into the system, contributing to financial fragility.

References

Abrantes-Metz, Rosa M., Michael Kraten, Albert D. Metz, and Gim S. Seow, 2012, Libor manipulation?, *Journal of Banking & Finance* 36, 136–150.

Agarwal, Sumit, Chunlin Liu Chomsisengphet, and Nicholas S. Souleles, 2015, Do consumers choose the right credit contracts?, *Review of Corporate Finance Studies* 4, 239–257.

Allen, Franklin, and Douglas Gale, 1988, Optimal Security Design, *Review of Financial Studies* 1, 229–263.

——— , 1991, Arbitrage, Short Sales, and Financial Innovation, *Econometrica* 59, 1041–1068.

Allen, Linda, Turan Bali, and Yi Tang, 2012, Does systemic risk in the financial sector predict future economic downturns?, *Review of Financial Studies* 25, 3000–3036.

Andrei, Daniel, and Michael Hasler, 2015, Investor attention and stock market volatility, *Review of Financial Studies* 28, 33–72.

Arora, Navneet, Priyank Gandhi, and Francis A. Longstaff, 2012, Counterparty credit risk and the credit default swap market, *Journal of Financial Economics* 103, 280–293.

Babihuga, Rita, and Marco Spaltro, 2014, Bank funding costs for international banks, *IMF Working Paper*.

Barber, Brad M., and Terrance Odean, 2007, All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors, *Review of Financial Studies* 21, 785–818.

Barlevy, Gadi, and Pietro Veronesi, 2003, Rational panics and stock market crashes, *Journal of Economic Theory* 110, 234–263.

Baule, Rainer, Oliver Entrop, and Marco Wilkens, 2008, Credit risk and bank margins in structured financial products: Evidence from the german secondary market for discount certificates, *Journal of Futures Markets* 28, 376–397.

Beirne, John, 2012, The EONIA spread before and dring the crisis of 2007-2009: The role of liquidity and credit risk, *Journal of International Money and Finance* 31, 534–551.

Bekaert, Geert, and Marie Hoerova, 2014, The VIX, the variance premium and stock market volatility, *Journal of Econometrics* 183, 181–192.

Benet, Bruce A., Antoine Giannetti, and Seema Pissaris, 2006, Gains from structured product markets: The case of reverse-exchangeable securities (RES), *Journal of Banking & Finance* 30, 111–132.

Bergstresser, Daniel, 2008, The retail market for structured notes: Issuance patterns and performance, 1995-2008, *Working Paper.*

Bhattacharya, Utpal, Andreas Hackethal, Simon Kaesler, Benjamin Loos, and Steffen Meyer, 2012, Is unbiased financial advice to retail investors sufficient? Answers from a large field study, *Review of Financial Studies* 25, 975–1032.

Boot, Arnoud, and Anjan V. Thakor, 1993, Security design, *Journal of Finance* 48, 1349–1378.

Bouveret, Antoine, Ricardo Crisóstomo, Monica Gentile, Victor Mendes, Paulo Pereira da Silva, and Fernando Silva, 2013, Economic report: Retailisation in the EU, *European Securities and Markets Authority.*

Bradbury, Meike, Thorsten Hens, and Stefan Zeisberger, 2015, Improving Investment Decisions with Simulated Experience, *Review of Finance* 19, 1019–1052.

Carlin, Bruce, 2009, Strategic price complexity in retail financial markets, *Journal of Financial Economics* 91, 278–287.

———, and Gustavo Manso, 2011, Obfuscation, learning, and the evolution of investor sophistication, *The Review of Financial Studies* 24, 755–785.

Célérier, Claire, and Boris Vallée, 2015, Catering to Investors through Product Complexity, *Working Paper.*

Chidambaran, N.K., Chitru S. Fernando, and Paul A. Spindt, 2001, Credit enhancement through financial engineering: Freeport McMoRan's gold-denominated depositary shares, *Journal of Financial Economics* 60, 487–528.

Coval, Joshua, Jakub Jurek, Kevin Pan, and Erik Stafford, 2013, How markets learn, *Working paper.*

Coval, Joshua, Jakub Jurek, and Erik Stafford, 2009, The economics of structured finance, *Journal of Economic Perspectives* 23, 3–25.

Cox, John, Stephen Ross, and Mark Rubinstein, 1979, Option pricing: A simplified approach, *Journal of Financial Economics* 7, 229–263.

Da, Zhi, Joseph Engelberg, and Pengjie Gao, 2011, In search of attention, *Journal of Finance* 66, 1461–1499.

———, 2015, The sum of all fears investor sentiment and asset prices, *Review of Financial Studies* 28, 1–32.

Daske, Holger, Luzi Hail, Christian Leuz, and Rodrigo Verdi, 2008, Mandatory IFRS reporting around the world: Early evidence on the economic consequences, *Journal of Accounting Research* 46, 1085–1142.

Duffie, Darrell, and Rohit Rahi, 1995, Financial market innovation and security design: An introduction, *Journal of Economic Theory* 65, 1–42.

Eichengreen, Barry, Ashoka Mody, Milan Nedeljkovic, and Lucio Sarno, 2012, How the subprime crisis went global: Evidence from bank credit default swaps, *Journal of Internation Money and Finance* 31, 1299–1318.

Entrop, Oliver, Michael McKenzie, Marco Wilkens, and Christoph Winkler, 2014, The performance of individual investors in structured financial products, *Review of Quantitative Finance and Accounting* September, 1–36.

Furfine, Craig, 2014, Complexity and loan performance: Evidence from the securitization of commercial mortgages, *Review of Corporate Finance Studies* 2, 154–187.

Gale, Douglas, 1992, Standard Securities, *Review of Economic Studies* 59, 731–755.

Gennaioli, Nicola, and Andrei Shleifer, 2010, What comes to mind, *Quarterly Journal of Economics* 125, 1399–1433.

———, and Robert Vishny, 2012, Neglected risks, financial innovation, and financial fragility, *Journal of Financial Economics* 104, 452–468.

Ghent, Andra C., Walter N. Torous, and Rossen Valkanov, 2014, Complexity in structured finance: Financial wizardry or smoke and mirrors?, *Working Paper*.

Gorton, Gary, and Andrew Metrick, 2012, Securitized banking and the run on repo, *Journal of Financial Economics* 104, 425–451.

Griffin, John M., Federico Nardari, and René M. Stulz, 2007, Do investors trade more when stocks have performed well? Evidence from 46 countries, *Review of Financial Studies* 20, 905–951.

Grinblatt, Mark, and Francis A. Longstaff, 2000, Financial innovation and the role of derivative securities: An empirical analysis of the treasury STRIPS program, *Journal of Finance* 60, 1415–1436.

Gruenbichler, Andreas, and Hanspeter Wohlwend, 2005, The valuation of structured products: Empirical findings for the Swiss market, *Financial Markets and Portfolio Management* 19, 361–380.

Grullon, Gustavo, George Kanatas, and James P. Weston, 2004, Advertising, breadth of ownership, and liquidity, *Review of Financial Studies* 17, 439–461.

Henderson, Brian J., and Neil D. Pearson, 2011, The dark side of financial innovation: A case study of the pricing of a retail financial product, *Journal of Financial Economics* 100, 227–247.

Hong, Harrison, and Jeremy C. Stein, 2003, Differences of opinion, short-sales constraints, and market crashes, *Review of Financial Studies* 16, 487–525.

Houweling, Patrick, and Ton Vorst, 2005, Pricing default swaps: Empirical evidence, *Journal of Internation Money and Finance* 24, 1200–1225.

Jorion, Philippe, and Gaiyan Zhang, 2009, Credit contagion from counterparty risk, *Journal of Finance* 64, 2053–2087.

Kahl, Matthias, Anil Shivdasani, and Yihui Wang, 2015, Short-term debt as bridge financing: Evidence from the commercial paper market, *Journal of Finance* 70, 211–255.

Kaufmann, Christine, Martin Weber, and Emily Celia Haisley, 2013, The role of experience sampling and graphical displays on one's investment risk appetite, *Management Science* 59, 323–340.

King, Mervyn A., and Sushil Wadhwani, 1990, Transmission of volatility between stock markets, *Review of Financial Studies* 3, 5–33.

Kogan, Leonid, Stephen Ross, Jiang Wang, and Mark Westerfield, 2009, Market selection, *Working Paper*.

McConnell, John J., and Eduardo S. Schwartz, 1992, The origin of LYONs: A case study in financial innovation, *Journal of Applied Corporate Finance* 4, 40–47.

Merton, Robert, 1973, Theory of rational option pricing, *Bell Journal of Economics and Managmeent Science* 4, 141–183.

Petry, Stefan, 2015, Determinants of secondary market prices for structured products during the 2007-2009 financial crisis, *Working Paper*.

Piskorski, Tomasz, Amit Seru, and James Witkin, 2015, Asset quality misrepresentation by financial intermediaries: Evidence from the rmbs market, *Journal of Finance* 70, 2635–2678.

Rajan, Raghuram G., 2006, Has finance made the world riskier?, *European Financial Managment* 12, 499–533.

Roberts, Michael, and Toni Whited, 2012, *Endogeneity in Empirical Corporate Finance* . vol. 2 of *Handbook of the Economics of Finance* (Elsevier: Amsterdam).

Ross, Steven A., 1989, Institutional market, financial marketing, and financial innovation, *Journal of Finance* 44, 541–556.

Ruf, Thomas, 2011, The dynamics of overpricing in structured products, *Working Paper*.

Santangelo, Robert, Peter Tufano, and Cameron Poetzscher, 1996, Financial engineering and tax risk: the case of times mirror PEPS, *Harvard Business School case number (297056)*.

Sicherman, Nachum, George Loewenstein, Duane J. Seppi, and Stephen P. Utkus, 2016, Financial attention, *Review of Financial Studies* 29, 863–897.

Stein, Jeremy, 2012, Monetary policy as financial-stability regulation, *Quarterly Journal of Economics* 127, 57–95.

Stoimenov, Pavel A., and Sascha Wilkens, 2005, Are structured products 'fairly' priced? An analysis of the German market for equity-linked instruments, *Journal of Banking and Finance* 29, 2971–2993.

SVSP, Schweizerischer Verband für Strukturierte Produkte, 2013, Marktreport Strukturierte Produkte, *Quartalsbericht*.

Swiss Bankers Association, 2011, Wealth management in Switzerland: Status report and trends, *Basel*.

Tetlock, Paul C., 2007, Giving content to investor sentiment: The role of media in the stock market, *Journal of Finance* 62, 1139–1168.

Wilkens, Sascha, Carsten Erner, and Klaus Röder, 2003, The pricing of structured products in Germany, *Journal of Derivatives* 11, 55–69.

Zingales, Luigi, 2015, Presidential address: Does finance benefit society?, *Journal of Finance* 70, 1327–1363.

Table 1
Descriptive Statistics: Full Sample

This table presents descriptive statistics for the full sample. Our starting point is a term sheets database containing all structured products issued in Switzerland between January 2005 and December 2010. We collect data on products issued by the two largest participants in the structured products market in Switzerland with traded CDSs, and we include three types of structured products that can be replicated with bonds and traded EUREX options: Discount Certificates, Reverse Convertibles, and Outperformance Certificates. See Section 2 for details. Issue Premium (IP) is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS spread of the issuing bank is in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. 3m and 12m Excess Return Underlying are the 3 and 12 months continuous annual returns of the underlying in excess of the 3 and 12 months continuous annual returns of the Swiss Market Index (SMI), respectively. Ln (Market Cap Underlying) is the natural logarithm of the market value of equity of the underlying (in USDbn). Ln (Turnover Underlying) is the natural logarithm of the dollar value (in USDm) of the trading volume of the underlying during 60 days starting 3 months prior to the issuance. Option Trading Volume Underlying is the number of traded options on the underlying over all maturities and exercise prices during the month prior to the product issuance normalized by the number of all EUREX options traded in that month. Implied Market Volatility is the level of the VSMI index. Issue Premium OIS is the Issue Premium in percentage points, calculated using OIS rates as the risk-free rate; see Section 3.6 for details. 3m and 12m Return Underlying are the 3 and 12 months continuous annual raw returns of the underlying, respectively. Maturity of Product less than 1 Year is a binary indicator equal to 1 if the maturity of the structured product is less than one year, and 0 otherwise. 6m Return Issuer denotes the stock return of the issuer over the past six month. ATM Call 180 is the implied volatility of an at the money call option on the underlying of a structured product with a maturity of 180 days one month prior to the issue date.

	N	Mean	Std. Dev.	Q25	Median	Q75
Issue Premium	498	0.92	1.16	0.43	1.02	1.55
CDS Spread Issuer	498	0.55	0.70	0.07	0.12	0.88
CDS Spread Issuer (1 year)	498	0.42	0.72	0.02	0.04	0.52
Correlation Issuer with Underlying	498	0.49	0.19	0.37	0.49	0.61
3m Excess Return Underlying	498	1.29	11.01	-4.99	1.17	7.29
12m Excess Return Underlying	498	1.65	19.98	-9.97	0.66	12.09
Ln (Market Cap Underlying)	498	3.60	1.25	2.69	3.83	4.78
Ln (Turnover Underlying)	498	8.51	1.74	7.44	9.08	9.93
Option Trading Volume Underlying	498	1.72	2.20	0.22	1.12	2.39
Implied Market Volatility	498	18.68	8.23	12.79	15.77	21.37
Issue Premium OIS	491	0.77	1.09	0.21	0.95	1.47
3m Return Underlying	498	2.94	14.90	-4.69	4.96	11.53
12m Return Underlying	498	6.35	29.53	-5.96	9.91	22.58
Maturity of Product less than 1 Year	498	0.64	0.48	0.00	1.00	1.00
6m Return Issuer	498	-0.04	0.28	-0.26	0.03	0.13
ATM Call 180	493	25.99	13.19	18.71	22.28	28.84

Table 2
Descriptive Statistics: Subsamples

This table presents descriptive statistics for three subsample periods for the main variables. Panel A shows descriptive statistics for structured products issued from January 2005 until July 9, 2007, the *pre-crisis period*. Panel B shows descriptive statistics for structured products issued in the *crisis-pre-Lehman period*, i.e., after July 9, 2007 and before the default of Lehman Brothers. Panel C shows descriptive statistics for structured products issued after the date of the Lehman Brothers default until December 2010, i.e., in the *post-Lehman period*. Lehman Brothers defaulted on September 15, 2008. As explained in the text, we do not include products issued in August, September, and October 2008 in the primary analysis. Therefore, the crisis-pre-Lehman period ends on July 31, 2008, and the post-Lehman period starts on November 1, 2008. The variables are defined in Table 1.

Panel A: Pre Crisis Period	N	Mean	Std. Dev.	Q25	Median	Q75
Issue Premium	268	0.76	1.09	0.36	0.91	1.38
CDS Spread Issuer	268	0.08	0.03	0.05	0.08	0.10
CDS Spread Issuer (1 year)	268	0.03	0.01	0.02	0.02	0.03
Correlation Issuer with Underlying	268	0.47	0.17	0.36	0.46	0.57
3m Excess Return Underlying	268	1.53	8.89	-4.37	1.09	5.68
12m Excess Return Underlying	268	1.96	16.26	-9.47	0.18	8.62
Ln (Market Cap Underlying)	268	3.59	1.19	2.72	3.75	4.75
Ln (Turnover Underlying)	268	8.31	1.81	7.34	8.97	9.85
Option Trading Volume Underlying	268	1.70	2.19	0.24	1.12	2.38
Implied Market Volatility	268	13.28	1.99	12.10	13.10	13.91
Panel B: Crisis Period before Lehman Default	**N**	**Mean**	**Std. Dev.**	**Q25**	**Median**	**Q75**
Issue Premium	98	1.30	0.91	0.70	1.34	1.92
CDS Spread Issuer	98	0.62	0.36	0.32	0.51	0.76
CDS Spread Issuer (1 year)	98	0.30	0.22	0.11	0.24	0.37
Correlation Issuer with Underlying	98	0.56	0.19	0.42	0.54	0.69
3m Excess Return Underlying	98	-0.03	11.81	-7.75	-1.44	9.12
12m Excess Return Underlying	98	2.34	20.68	-11.17	0.70	14.45
Ln (Market Cap Underlying)	98	4.04	1.14	3.45	4.43	4.93
Ln (Turnover Underlying)	98	9.00	1.85	7.85	10.16	10.44
Option Trading Volume Underlying	98	1.83	2.34	0.31	1.38	2.47
Implied Market Volatility	98	22.59	4.19	19.65	21.47	24.97
Panel C: Period after Lehman Default	**N**	**Mean**	**Std. Dev.**	**Q25**	**Median**	**Q75**
Issue Premium	132	0.96	1.38	0.23	1.10	1.86
CDS Spread Issuer	132	1.44	0.69	0.95	1.16	1.94
CDS Spread Issuer (1 year)	132	1.30	0.92	0.58	0.97	2.05
Correlation Issuer with Underlying	132	0.48	0.21	0.38	0.52	0.62
3m Excess Return Underlying	132	1.78	13.91	-5.14	3.06	9.59
12m Excess Return Underlying	132	0.52	25.64	-10.87	3.16	15.97
Ln (Market Cap Underlying)	132	3.29	1.36	2.44	3.50	4.62
Ln (Turnover Underlying)	132	8.55	1.43	7.50	8.84	9.83
Option Trading Volume Underlying	132	1.67	2.15	0.17	1.03	2.35
Implied Market Volatility	132	26.74	9.95	19.06	21.33	37.77

Table 3
OLS Regressions of the Issue Premium

This table presents results of OLS regressions. The sample contains structured products issued between January 2005 and December 2010 in the structured products market in Switzerland. It contains three types of structured products that can be replicated with bonds and traded EUREX options. The dependent variable is the Issue Premium (IP), which is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS Spread is the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Post-Lehman is a binary indicator that is equal to one after the default of Lehman Brothers, and zero otherwise. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. The control variables are defined in Table 1. t-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
Dependent variable:	Issue Premium (IP)		
CDS Spread Issuer	1.150	1.347	1.199
	(1.64)	(1.34)	(1.16)
Post Lehman	7.183***	8.328***	8.636***
	(3.08)	(3.11)	(2.96)
CDS Spread * Post Lehman	-3.529***	-5.265***	-5.258***
	(-3.61)	(-4.22)	(-4.14)
Correlation Issuer with Underlying		-0.216	-0.235
		(-0.40)	(-0.41)
CDS Spread * Correlation		-0.164	0.089
		(-0.18)	(0.09)
Correlation * Post Lehman		-4.409*	-4.432*
		(-1.92)	(-1.91)
CDS Spread * Correlation * Post Lehman		4.308**	4.255**
		(2.28)	(2.34)
3m Excess Return Underlying			-0.011
			(-1.58)
12m Excess Return Underlying			0.004
			(0.81)
Ln (Market Cap Underlying)			0.011
			(0.24)
Ln (Turnover Underlying)			-0.002
			(-0.07)
Option Trading Volume Underlying			-0.039
			(-1.34)
Implied Market Volatility	0.081	0.076	0.081
	(1.42)	(1.34)	(1.39)
Constant	-1.591	-1.465	-1.624
	(-0.72)	(-0.64)	(-0.68)
Observations	498	498	498
R-squared	0.350	0.373	0.384
Issue month fixed effects	Yes	Yes	Yes
Product issuer fixed effect	Yes	Yes	Yes
Product category fixed effects	Yes	Yes	Yes
CDS liquidity control	Yes	Yes	Yes

Table 4

OLS Regressions of the Issue Premium: Before and After the Default of Lehman Brothers

This table presents results of OLS regressions. Columns (1) and (3) consider the period before the default of Lehman Brothers. Columns (2) and (4) consider the period after the default of Lehman Brothers. The dependent variable is the Issue Premium (IP). IP is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. The control variables are defined in Table 1. t-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)
Sample period:	Pre Lehman	Post Lehman	Pre Lehman	Post Lehman
Dependent variable:	Issue Premium (IP)			
CDS Spread Issuer	1.091	-4.186***	0.833	-2.443*
	(0.94)	(-4.12)	(0.68)	(-1.76)
EqCorr	-0.193	-5.034**	-0.212	-4.587**
	(-0.37)	(-2.32)	(-0.41)	(-2.24)
CDS Spread * Correlation	-0.385	4.459**	0.245	3.851**
	(-0.39)	(2.63)	(0.23)	(2.19)
3m Excess Return Underlying			-0.017**	-0.012
			(-2.26)	(-0.94)
12m Excess Return Underlying			0.011*	-0.006
			(1.85)	(-1.19)
Ln (Market Cap) Underlying			-0.024	0.287*
			(-0.49)	(1.89)
Turnover Underlying			0.011	-0.319***
			(0.30)	(-3.18)
Option Trading Volume Underlying			-0.066**	0.110**
			(-2.38)	(2.17)
Implied Market Volatility	0.077	0.187	0.087	0.138
	(1.38)	(0.96)	(1.58)	(0.68)
Constant	0.009	-1.607	0.254	0.154
	(0.01)	(-0.16)	(0.22)	(0.01)
Observations	366	132	366	132
R-squared	0.355	0.464	0.394	0.517

Table 5
OLS Regressions of the Issue Premium: More Detailed Sample Splits

This table presents results of OLS regressions. Column headers indicate the subsample periods. The dependent variable is the Issue Premium (IP) in percentage points. IP is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. The control variables are defined in Table 1. t-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample period:	Pre Crisis	Crisis Pre Lehman	Crisis Post Lehman	Pre Crisis	Crisis Pre Lehman	Crisis Post Lehman
Dependent variable:	Issue Premium (IP)					
CDS Spread Issuer	-3.627	1.015	-4.186***	-0.308	1.184	-2.443*
	(-0.32)	(0.77)	(-4.12)	(-0.02)	(0.79)	(-1.76)
Correlation Issuer with Underlying	0.165	-0.307	-5.034**	0.017	-0.068	-4.587**
	(0.14)	(-0.43)	(-2.32)	(0.01)	(-0.08)	(-2.24)
CDS Spread * Correlation	-5.608	0.087	4.459**	-3.626	0.081	3.851**
	(-0.54)	(0.08)	(2.63)	(-0.34)	(0.06)	(2.19)
3m Excess Return Underlying				-0.021**	-0.002	-0.012
				(-2.27)	(-0.19)	(-0.94)
12m Excess Return Underlying				0.012	0.002	-0.006
				(1.61)	(0.27)	(-1.19)
Ln (Market Cap) Underlying				-0.030	-0.019	0.287*
				(-0.57)	(-0.13)	(1.89)
60d Turnover Underlying				0.029	-0.040	-0.319***
				(0.56)	(-0.57)	(-3.18)
Option Trading Volume Underlying				-0.080**	-0.032	0.110**
				(-2.34)	(-0.84)	(2.17)
Implied Market Volatility	0.124	0.051	0.187	0.130	0.058	0.138
	(1.39)	(0.78)	(0.96)	(1.38)	(0.87)	(0.68)
Constant	1.219	-0.166	-1.607	-0.015	-1.042	0.154
	(0.69)	(-0.16)	(-0.16)	(-0.01)	(-0.34)	(0.01)
Observations	268	98	132	268	98	132
R-squared	0.357	0.304	0.464	0.411	0.315	0.517
Issue month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Product issuer fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Product category fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
CDS liquidity control	Yes	Yes	Yes	Yes	Yes	Yes

Table 6
Attention of Investors toward Issuer Default Risk during Different Subperiods

This table presents descriptive statistics of our index of investor attention toward issuer default risk. Attention in Panel A is our weekly index of the aggregate volume of Internet search queries that are associated with issuer credit risk (see Section 3.5 for details). Abnormal Attention in Panel B denotes the weekly residuals from regressions of Attention on a CDS index.

Panel A: Attention	#Weeks	Mean	Std. Dev.	Min	Max
Pre-Crisis	132	-0.55	0.20	-0.92	0.08
Crisis-Pre-Lehman	62	-0.24	0.31	-0.90	0.84
Post-Lehman	119	0.73	0.23	0.23	1.38
Overall	313	0.00	0.63	-0.92	1.38
Panel B: Abnormal Attention	**#Weeks**	**Mean**	**Std. Dev.**	**Min**	**Max**
Pre-Crisis	132	-0.04	0.19	-0.42	0.57
Crisis-Pre-Lehman	62	-0.33	0.25	-1.15	0.12
Post-Lehman	119	0.21	0.35	-0.81	0.96
Overall	313	0.00	0.34	-1.15	0.96

Table 7

OLS Regressions of the Issue Premium: The Role of Investor Attention

This table presents results of OLS regressions. The table is a variation of Table 3. The difference is that in this table, we use Attention instead of the Post Lehman indicator to capture time variation in investor attention to issuer default risk. Attention is our weekly index of the aggregate volume of Internet search queries that are associated with issuer credit risk (see Section 3.5 for details). The dependent variable is the Issue Premium (IP) in percentage points. IP is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. The control variables are defined in Table 1. *t*-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
Dependent variable:	Issue Premium (IP)		
CDS Spread Issuer	-0.343	-1.109	-1.123
	(-0.49)	(-0.98)	(-0.94)
Attention	0.539	1.788***	1.710***
	(1.63)	(3.17)	(3.20)
CDS Spread * Attention	-0.908	-1.738**	-1.751**
	(-1.61)	(-2.34)	(-2.26)
Correlation Issuer with Underlying		-1.820**	-1.787**
		(-2.43)	(-2.22)
CDS Spread * Correlation		1.522	1.508
		(1.38)	(1.23)
Correlation * Attention		-2.554**	-2.525**
		(-2.43)	(-2.42)
CDS Spread * Correlation * Attention		2.587***	2.734***
		(2.79)	(2.87)
3m Excess Return Underlying			-0.012*
			(-1.81)
12m Excess Return Underlying			0.003
			(0.69)
Ln (Market Cap Underlying)			0.007
			(0.15)
Ln (Turnover Underlying)			0.009
			(0.24)
Option Trading Volume Underlying			-0.035
			(-1.16)
Implied Market Volatility	0.071	0.070	0.072
	(1.30)	(1.25)	(1.26)
Constant	0.668	1.642	1.583
	(0.69)	(1.42)	(1.44)
Observations	498	498	498
R-squared	0.341	0.370	0.381
Issue month fixed effects	Yes	Yes	Yes
Product issuer fixed effect	Yes	Yes	Yes
Product category fixed effects	Yes	Yes	Yes
CDS liquidity control	Yes	Yes	Yes

Table 8

OLS Regressions of the Issue Premium: The Role of the Risk-Free Rate

This table presents results of OLS regressions. The table is a variation of Table 3. The difference is that in this table, the dependent variable is the Issue Premium (IP) in percentage points, calculated using OIS rates as the risk-free rate; see Section 3.6 for details. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. Post-Lehman is a binary indicator that is equal to one after the default of Lehman Brothers on September 15, 2008, and zero otherwise. Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. The control variables are defined in Table 1. *t*-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)
Dependent variable:	Issue Premium (IP), calculated with OIS rate		
CDS Spread Issuer	1.064	1.318	1.191
	(1.57)	(1.27)	(1.14)
Post Lehman	4.366***	5.517***	5.596***
	(2.84)	(3.38)	(3.47)
CDS Spread * Post Lehman	-3.523***	-5.084***	-5.186***
	(-3.29)	(-3.53)	(-3.75)
Correlation Issuer with Underlying		-0.195	-0.198
		(-0.36)	(-0.35)
CDS Spread * Correlation		-0.258	-0.088
		(-0.31)	(-0.10)
Correlation * Post Lehman		-3.114	-3.234
		(-1.45)	(-1.50)
CDS Spread * Correlation * Post Lehman		3.864**	3.920**
		(2.23)	(2.32)
3m Excess Return Underlying			-0.008
			(-1.30)
12m Excess Return Underlying			0.003
			(0.76)
Ln (Market Cap Underlying)			-0.017
			(-0.37)
Ln (Turnover Underlying)			0.027
			(0.80)
Option Trading Volume Underlying			-0.033
			(-1.27)
Implied Market Volatility	0.072	0.068	0.074
	(1.49)	(1.42)	(1.48)
Constant	-1.480	-1.393	-1.386
	(-0.92)	(-0.81)	(-0.80)
Observations	491	491	491
R-squared	0.356	0.383	0.392
Issue month fixed effects	Yes	Yes	Yes
Product issuer fixed effect	Yes	Yes	Yes
Product category fixed effects	Yes	Yes	Yes
CDS liquidity control	Yes	Yes	Yes

Table 9

OLS Regressions of the Issue Premium: Additional Results

This table presents results of OLS regressions. It is a variant of Table 3. The dependent variable is the Issue Premium (IP). IP is the issue price of a structured product minus its replication value, scaled by the issue price, expressed in percentage points. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated as an average of CDS spreads in the ten day period prior to the product issuance. In all regressions except in regression (2), CDS spread is the five-year senior unsecured CDS spread of the issuer. In regression (2), we use the (less liquid) 1-year senior unsecured CDS spread, and we include the appropriate quote quality classification provided by Markit as a control. Post-Lehman is a binary indicator that is equal to one after the default of Lehman Brothers on September 15, 2008, and zero otherwise. In regressions (1) to (5), Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 100-day period prior to the issuance date. In regression (6), Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the issuer over the 250-day period prior to the issuance date. In regression (7), Correlation is the correlation coefficient between the equity returns of the underlying of the structured product and the CDS of the issuer over the 100-day period prior to the issuance date. Maturity of Product less than 1 Year is a dummy variable that is one if the maturity of the structured product is below one year. 6m Return Issuer denotes the stock return of the issuer over the past six months. ATM Call 180 is the implied volatility of an at the money call option on the underlying of a structured product with a maturity of 180 days one month prior to the issue date. All regressions also include our standard control variables: Ln (Market Cap) Underlying; 3m and 12m Excess Return Underlying; Turnover Underlying; Option Trading Volume Underlying; Implied Market Volatility. t-statistics, reported in parentheses, are calculated with robust standard errors clustered at the underlying level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	Issue Premium (IP)						
CDS type:	5y	1y	5y	5y	5y	5y	5y
Correlation type:	Eq<1	Eq	Eq	Eq	Eq	Eq250	EqCDS
CDS Spread Issuer	1.340	2.096	1.091	1.392	1.243	1.278	0.858
	(1.28)	(1.03)	(1.00)	(1.27)	(1.13)	(1.25)	(0.96)
Post-Lehman	6.298***	4.686*	8.568***	8.700***	3.613**	7.978**	8.378***
	(3.30)	(1.90)	(2.92)	(3.10)	(2.50)	(2.34)	(3.74)
CDS Spread * Post-Lehman	-5.622***	-5.015**	-5.157***	-5.407***	-5.002***	-5.059***	-4.540***
	(-4.10)	(-2.55)	(-4.02)	(-4.34)	(-3.75)	(-3.51)	(-4.04)
Correlation Issuer with Underlying	0.174	-0.310	-0.247	-0.255	-0.294	-0.051	-0.281
	(0.28)	(-0.56)	(-0.43)	(-0.45)	(-0.52)	(-0.08)	(-0.32)
CDS Spread * Correlation	-0.031	0.305	0.164	0.164	-0.102	-0.003	-0.428
	(-0.03)	(0.16)	(0.15)	(0.17)	(-0.10)	(-0.00)	(-0.31)
Correlation * Post-Lehman	-5.051**	-2.424	-4.413*	-4.429*	-4.381*	-4.005	6.515**
	(-2.07)	(-1.56)	(-1.91)	(-1.92)	(-1.91)	(-1.61)	(2.46)
CDS Spread * Correlation * Post-Lehman	4.616**	3.067	4.174**	4.158**	3.963**	4.011**	-4.441*
	(2.07)	(1.41)	(2.29)	(2.31)	(2.16)	(2.03)	(-1.70)
Maturity of product less than 1 year			-0.067				
			(-0.34)				
6m Return Issuer				0.544			
				(0.75)			
ATM Call 180					0.659*		
					(1.90)		
Constant	-1.760	-0.571	-1.562	-1.790	-1.510	-1.622	-1.596
	(-0.79)	(-0.35)	(-0.65)	(-0.78)	(-0.87)	(-0.68)	(-0.71)
Observations	483	498	498	498	493	498	497
R-squared	0.395	0.386	0.384	0.384	0.396	0.381	0.374
Standard controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Issue month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product issuer fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product category fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CDS liquidity control	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 10
Issuance Choice Patterns

This table presents OLS regressions. The sample contains stock underlyings of structured products issued between January 2005 and December 2010 in the structured products market in Switzerland, as well as matched equity underlyings. The sample contains three types of structured products that can be replicated with bonds and traded EUREX options, and that have an underlying that is either in the SMI, the Eurostoxx 50, or the Eurostoxx 600 index. The dependent variable is the standardized rank difference $DIFF - RANK =$ (Rank Issued minus Rank Matched) / number of underlyings in the index, in which Rank Issued is the rank, in terms of the correlation coefficient of the underlying with the bank over 100 days, within in the relevant index (higher numbers correspond to higher correlation). Rank Matched is the average rank of the matched non-issued underlying in terms of that correlation. We compute the rank based on the correlation coefficients 10 days before the relevant issue date. We scale the difference in ranks by the number of underlyings in the respective index. Thus, this dependent variable is a standardized rank difference that is between -1 and +1. A negative constant term means that on average the underlying-bank equity correlation of underlyings that are chosen for an issued structured product is lower than the underlying-bank equity correlation of similar (matched) underlyings that are not chosen. For each underlying on which a structured product is issued, we search for 5 underlyings on the same day that are (a) in the same stock market index (SMI, Euro50, or Eurostoxx 600), (b) have a similar implied volatility of at-the-money 180 days call options, (c) have a similar market capitalization, and (d) have a similar trading volume of the underlying during 60 days starting 3 months prior to the issuance. The matching variables, too, are measured 10 days before the relevant issue date. CDS Spread denotes the CDS spread of the issuing bank in percentage points, calculated ten days prior to the product issuance. Bank's Prior 250 Day Return is the equity return of the issuing bank over the 250 days before the product issuance. SMI's Prior 250 Day Return is the return of the SMI over the 250 days before the product issuance. t-statistics, reported in parentheses, are calculated with robust standard errors clustered at the issuance date level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	DIFF-RANK					
Sample:	ALL			SMI		
Average DIFF-RANK (= regression constant)	-0.159**	-0.146**	-0.161**	-0.306***	-0.306***	-0.311***
	(-2.54)	(-2.07)	(-2.47)	(-4.51)	(-4.00)	(-4.18)
CDS spread		-0.179*			-0.211**	
		(-1.88)			(-2.28)	
Mean CDS spread		0.039			0.098	
		(0.28)			(0.55)	
Bank's prior 250 day return			0.196*			0.372***
			(1.65)			(2.77)
SMI's prior 250 day return			-0.295			-0.623
			(-0.49)			(-0.96)
Observations	2,052	2,052	2,052	1,738	1,738	1,738
R-squared	0.129	0.130	0.130	0.126	0.129	0.131
Index fixed effects	Yes	Yes	Yes	No	No	No
Year-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes