GROSS VERSUS NET BALANCE SHEET PRESENTATION OF OFFSETTING DERIVATIVES ASSETS AND LIABILITIES

Stephen Ryan*
NYU Stern School of Business
sryan@stern.nyu.edu

Barbara Seitz
Nordea Group
barbara.christine.seitz@nordea.com

February, 2021

*Corresponding Author. We are grateful for helpful comments from an anonymous referee, Anwer Ahmed, Aleksander Aleszcyk, Gauri Bhat, Yiwei Dou, Gerald Lobo, Jed Neilson, Scott Richardson (editor), Dushyant Vyas, Philip Wang, Biqin Xie, and Steve Zeff. The views expressed here are the authors' and are not representative of the views of Nordea Group.

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Abstract: Accounting rules allow the net balance sheet presentation of offsetting assets and liabilities only when the reporting firm has the right to set off these positions. Derivatives dealers and their frequent counterparties engage in master netting agreements (MNAs) that cover many derivatives with largely offsetting gross fair values. MNAs provide a limited right of setoff that is insufficient (sufficient) for net presentation under IFRS (US GAAP), and they provide control rights to the non-defaulting counterparty that render the timing, completeness, and fairness of any net settlement of the covered derivatives uncertain. To provide comparable information regarding the effects of MNAs on financial statements, as of 2013 both IFRS and US GAAP require firms to disclose the gross, reported, and net fair values of derivatives assets and liabilities that are presented net on the balance sheet or are presented gross and covered under enforceable MNAs.

We posit that dealers want their net derivatives exposures to be viewed as small and low risk by market participants. Because the 2013 disclosures provide new information about net derivatives fair values for IFRS dealers but not for US GAAP dealers, we hypothesize and provide evidence that the 2013 disclosure requirements have larger and more significant real effects for IFRS dealers, which reduce the extent of their offsetting gross derivatives and increase the effectiveness of their use of MNAs, than for US GAAP dealers. Because MNAs provide a limited and right of setoff and non-defaulting parties the ability to exercise discretion over that right, we hypothesize and provide evidence that dealers' reported net derivative fair values and disclosure quality under the 2013 requirements help users of financial reports evaluate the dealers' credit risk uncertainty. These results suggest that MNAs do not eliminate all significant risks of the covered derivatives assets and liabilities.

Keywords: Derivatives; dealers; master netting agreements; gross versus net balance sheet presentation; disclosure; real effects; credit risk uncertainty.

JEL Codes: G130, G21, M41.

I. INTRODUCTION

A longstanding principle governing balance sheet presentation is that "the offsetting of assets and liabilities in the balance sheet is improper except where a right of setoff exists" (ASC 210-20-05-1).[1] Despite this principle, many accounting rules and practices require or allow net balance sheet presentation of assets and liabilities when the right of setoff does not exist (e.g., the projected benefit obligation and plan assets for defined benefit pension plans under ASC 715-30) or is limited (e.g., derivatives covered by master netting agreements that provide for net settlement only upon default of a covered position under ASC 210-20). Indeed, most types of "off-balance sheet financing"— operating leases [short-term leases] under ASC 840 [842], transfers of financial assets accounted for as sales under ASC 860, and "executory contracts" under longstanding accounting practice—effectively involve the net presentation of offsetting economic assets and liabilities on the balance sheet. The most direct effect of net presentation is to reduce firms' reported financial leverage, the focus of investors' analysis of firm solvency.

Reflecting this focus, extant empirical research examining gross versus net balance sheet presentation mostly examines whether specific types of off-balance sheet financing constitute financial leverage for the purposes of firm valuation and risk assessment, typically finding that they do.[2] To our knowledge, only Neilson et al. (2020) and our study empirically examine the role of the right of setoff in determining gross versus net balance sheet presentation. Like Neilson et al. (2020), we focus on this role in the context of derivatives dealers'[3] derivatives covered by master netting agreements (hereafter, MNAs).

While involving some complexity for readers not familiar with derivatives dealing and the financial reporting for derivatives, this setting is interesting, highly important both

[1] As discussed in detail in Section II, the right of setoff is the legal right to receive (obligation to pay) the net asset (liability) valuation upon the close out of a specified set of gross economic assets and liabilities.

[2] See, for example, Bowman (1980), Ely (1995), and Dhaliwal, Lee, and Neamtiu (2011) re operating leases, Dhaliwal (1986) and Hsieh and Liu (2021) re pensions, and Niu and Richardson (2006) and Chen, Liu, and Ryan (2008) re securitizations accounted for as sales.

[3] A derivatives dealer is a bank or other financial services firm that transacts on both the buy and sell sides of derivatives markets in order to satisfy customer needs and thereby earn bid-offer spreads and/or other fee income.

economically and for financial reporting purposes, and currently salient for the following reasons. First, derivatives dealers' gross derivatives holdings are both massive and interconnected and thus raise concerns about the stability of individual dealers and the financial system as a whole. Second, derivatives dealers present derivatives assets and liabilities covered by MNAs at the gross fair values on the balance sheet under IFRS but at the net fair values under US GAAP. This provides a natural setting for research on the differential impact of recognition versus disclosure, which is a primary focus of Neilson et al. (2020). Third, these differing balance sheet presentations of derivatives covered by MNAs constitute the "single largest quantitative difference in reported numbers in statements of financial position prepared in accordance with IFRS or US GAAP", and thus have first-order effects on dealers' and aggregate financial report numbers.[4] Fourth, effective as of 2013, IFRS and US GAAP require derivatives dealers to disclose gross and net fair values of derivatives covered by MNAs. These disclosures enable empirical analysis of the distinct information about financial leverage conveyed by net fair values (i.e., the amounts that do not offset) versus the difference between the gross and net fair values (i.e., the amounts that do offset), which our primary focus.

We begin by briefly describing the economic and institutional features of the setting. Individual derivatives generally have small fair values relative to the capitalization of derivatives dealers, but these dealers engage in very high volumes of derivatives with correspondingly large gross fair values. In order to mitigate what would otherwise be the unacceptably large risk that one or more of their major derivatives counterparties might default on these large gross positions, dealers typically engage in bilateral MNAs with these counterparties. These agreements cover large numbers of derivatives for which the gross fair values, but not necessarily the transferred risks, largely offset (Bliss and Kaufman 2006). MNAs typically are specified under International Swaps and Derivatives Association (ISDA)

[4] http://www.fasb.org/cs/ContentServer?pagename=FASB/FASBContent_C/NewsPage&cid=1176158186333 (15 Aug 2017).

agreements in which the covered positions are closed out (i.e., liquidated) and settled for a single net amount only in the event of a default by either party on any covered position. In this event, MNAs grant substantively all control rights to the non-defaulting party to close out the covered positions, subject only to that party exercising those rights in a commercially reasonable fashion consistent with industry practice. The limitation of the right of setoff to an event of default and the frictions involved in closing out the covered positions upon default yield uncertainty about the extent, timing, and fairness of any future net settlement.

We now turn to the financial reporting requirements for derivatives covered by MNAs. As of January 1, 2013, public firms must disclose the gross, reported, and net fair values of derivatives that are subject to enforceable MNAs or are presented net on the balance sheet in their financial reports under both IFRS (amendments to IFRS 7) and US GAAP (ASU 2011-11, ASC 210-20-50-3). The IASB and FASB jointly developed and issued these disclosure requirements because firms present their derivatives covered by MNAs differently on the balance sheet under IFRS and US GAAP. IFRS (IAS 32) requires firms that hold economically offsetting derivatives to present these positions as gross assets and liabilities unless the firms have the *unconditional* right to set off the positions. Transactions with derivatives clearinghouses[5] provide this right, but MNAs, which only provide the counterparties with the right to set off the positions *conditional* on a default by a counterparty on any covered position, do not. In contrast, US GAAP (FIN 39, ASC 210-20-45 and 815-10-45) allows presentation of derivatives covered under enforceable MNAs as net assets or liabilities. For our sample dealers, the mean of net (gross) derivative asset fair values equals 30 (437) percent of tangible common equity, a very sizeable difference. Figure 1 summarizes the 2013 disclosure requirements and provides a numerical example and visual depiction of a given set of positions that illustrates the disclosed gross, reported on balance sheet, and net amounts of these positions for IFRS and US

[5] Derivatives clearinghouses are designated intermediaries between buyers and sellers of derivatives that validate and finalize trades and ensure that both parties to a trade honor their contractual obligations.

GAAP dealers.[6] Appendix 1 provides examples of financial report disclosures by representative IFRS and US GAAP dealers.

We expect the 2013 disclosure requirements to have different effects on IFRS and US GAAP dealers. For IFRS dealers that present derivatives (mostly) gross on the balance sheet, the 2013 disclosure requirements provide new information about net derivative fair values, because these dealers previously were not required to disclose, and typically did not voluntarily disclose, these values. In particular, the required disclosures provide the first clear indication of the extent of IFRS dealers' offsetting gross derivatives that rely on MNAs to effect net settlement in the event of default. In contrast, for US GAAP dealers that present derivatives (mostly) net on the balance sheet, the disclosures provide minimal new information, because these dealers typically are banks which have long been required to report the gross fair values of derivatives assets and liabilities in their public regulatory filings. Moreover, over half of the sample US GAAP dealers voluntarily provide similar disclosures in their 2008−2012 financial reports. The 2013 requirements may increase the visibility of US GAAP dealers' gross fair values of derivatives, however, by requiring these dealers to disclose these gross fair values in their financial reports.

We examine two effects of dealers' disclosures under the 2013 requirements. First, we examine how the disclosures lead dealers to reduce unnecessary offsetting gross derivatives and to increase the effectiveness of the coverage of their remaining gross derivatives under MNAs. Second, we examine how an important type of user of financial reports, sellers of credit default swaps (CDS),[7] use these disclosures to evaluate dealers' credit risk uncertainty.

[6] For both IFRS and US GAAP dealers, the 2013 disclosure requirements do not affect the calculation of regulatory leverage or risk-based capital ratios, which reflect netting to the extents specified by regulators. For example, under Basel III in Europe and the US, regulatory leverage capital ratios reflect netting of derivatives fair values for groups of single-product derivatives covered by enforceable MNAs that meet certain qualifying conditions (Basel Committee on Banking Supervision 2014a,b).

[7] A CDS is a derivative in which the seller of the derivative provides the purchaser with insurance against default of a referenced financial asset in exchange for up-front and/or periodic premium payments.

We examine a global sample of 47 dealers (26 IFRS, 21 US GAAP) that hold significant amounts of derivatives covered under MNAs (Duffie 2010). We identify this sample from lists of dealers from global regulators and other criteria for dealers. We hand collect gross, reported, and net derivatives fair values for the 2012–2017 year ends from dealers' 2013–2017 annual financial reports. Because the reported fair values of derivatives are not comparable across IFRS and US GAAP dealers and unlike Neilson et al. 2020 we do not examine the effect of recognition versus disclosure, we focus the empirical analysis on three components of tangible financial leverage that are comparable across the two sets of dealers: (1) reported tangible leverage after removing the reported fair values of derivatives assets from the numerator (hereafter, non-derivatives leverage); (2) leverage associated with net derivatives fair values (hereafter, net derivatives leverage); and (3) leverage associated with the difference between gross and net derivatives fair values (hereafter, gross minus net derivatives leverage).

Reductions of offsetting gross derivatives directly decrease dealers' gross minus net derivatives leverage and likely indirectly decrease their net derivatives leverage. More effective coverage of given gross derivatives under MNAs decreases dealers' net derivatives leverage.

We first examine real effects of the 2013 disclosure requirements on dealers' gross minus net derivatives leverage and net derivatives leverage. We posit that dealers prefer market participants to view their net derivatives leverage as small and thus low risk. Because these disclosure requirements provide new information about net derivatives leverage for IFRS dealers, we hypothesize that the requirements provide strong financial reporting (as opposed to risk mitigation) incentives for these dealers to reduce unnecessary offsetting gross derivatives and to use MNAs more effectively after the effective date of the requirements. In contrast, because these requirements provide no new information for US GAAP dealers, we hypothesize that the 2013 disclosure requirements provide lesser and possibly no financial reporting incentives for these dealers to reduce their offsetting gross derivatives or to increase the effectiveness of their use of MNAs.

We test these hypotheses using difference-in-differences models with dealer fixed effects that distinguish each post treatment year to demonstrate the sharpness of the effects around the effective date of the 2013 disclosure requirements and to help rule out the possibility that any uncontrolled for sources of cross-sectional variation, which are likely to arise in such a dynamic environment as derivatives dealing, drive or obscure our findings. As expected, we find that both gross minus net derivatives leverage and net derivatives leverage decrease sharply and significantly for IFRS dealers from 2012 to 2013, when the disclosure requirements become effective. We further find that gross minus net derivatives leverage continues to decrease for these dealers through 2017, consistent with them reducing excess offsetting derivatives as their portfolios turn over, whereas net derivative leverage is flat through 2017.

In contrast, we find that the changes from 2012 to 2013 in US GAAP dealers' gross minus net derivatives leverage and net derivatives are much smaller in magnitude than for IFRS dealers (37 [20] percent as large for gross minus net [net] derivatives leverage), and are only weakly significant. As for IFRS dealers, there is a perceptible downward trend in gross minus net derivatives leverage from 2013 to 2017, while net derivatives leverage is flat through 2017. The difference-in-differences is weakly significant in 2013 and 2014 for gross minus net derivatives leverage and in 2014 for net derivatives leverage. In future years, the difference-in-differences does not diminish in magnitude but loses statistical significance, reflecting the rise of other sources of cross-sectional variation in the leverage variables and the relatively few dealers of each type in each year in our sample. These findings illustrate that dealers prefer that market participants view their net derivatives exposures as small and thus low risk.

We next examine the associations of dealers' disclosed leverage components discussed above with their credit risk uncertainty, as proxied by the ratio of one-year to five-year maturity CDS spreads. Duffie and Lando (2001) show theoretically that uncertainty about the value of a firm's assets, and thus about how close the firm is to default, raises short-term credit spreads relative to long-term spreads, flattening (or possibly even inverting) the credit spread curve. Yu

(2005), Kim, Kraft, and Ryan (2013), and Arora, Richardson, and Tuna (2014) provide empirical support for this theoretical finding using alternative proxies for asset uncertainty.

We first hypothesize that dealers' net derivatives leverage, which we use as the best available proxy for the incomplete and otherwise imperfect right of setoff provided by MNAs, is positively associated with their credit risk uncertainty. Our three bases for this hypothesis are as follows. First, we expect that the incompleteness and imperfections of the right of setoff provided by MNAs to yield (credit risk) uncertainty about the extent, timing, and fairness of any future close out. Second, net derivatives leverage reflects the extent to which dealers expect the derivatives covered under MNAs *not* to offset, *even absent* the limitation of the offsetting of the covered derivatives to the event of default and the frictions involved in closing out the derivatives covered under these agreements upon default. Third, we expect credit risk uncertainty to increase with the extent to which the covered gross derivatives do *not* offset and thus with net derivatives leverage.[8] Consistent with this hypothesis, we provide evidence that credit risk uncertainty rises with net derivatives leverage. We further find that this effect is stronger when net derivatives leverage is higher relative to gross derivatives leverage, consistent with less effective offsetting of gross derivatives,[9] and that it is primarily attributable to one-year maturity CDS spreads rising with net derivatives leverage, consistent with this leverage capturing credit risk uncertainty rather than the level of credit risk.

Consistent with prior research showing the credit risk uncertainty decreases with disclosure quality (e.g., Yu 2005 and Akins 2018), we further hypothesize that dealers that provide more transparent financial report disclosures about their derivatives under the 2013 requirements reduce their credit risk uncertainty related to the effectiveness of their MNAs, all else being equal, thereby attenuating the association between net derivatives leverage and credit

[8] Net derivatives leverage also reflects the extent to which any derivatives subject to unconditional netting in transactions with derivatives clearinghouses are currently expected *not* to offset. In contrast with incomplete conditional netting upon default under MNAs, we do not expect such incomplete unconditional netting to raise appreciable credit risk uncertainty, because no imbalance of control rights exists between the contracting parties.

[9] We thank the anonymous reviewer for suggesting this analysis.

risk uncertainty. We measure the transparency of the disclosures using an index that captures the findability, readability, ease of use, and completeness of the disclosures. We provide evidence consistent with this hypothesis.

We do not propose similar hypotheses about dealers' gross minus net derivatives leverage, because it is a noisy measure of credit risk uncertainty. In particular, gross minus net derivatives leverage includes both the offsetting and non-offsetting portions of the fair values of derivatives that are covered by MNAs or otherwise presented net on the balance sheet. Credit risk uncertainty arising from closing out derivatives upon default under MNAs is logically unrelated to this *non-offsetting* portion. We find that the association of gross minus net derivatives leverage with credit risk uncertainty is insignificantly different from zero both on average and regardless of the quality of dealers' disclosures about their derivatives under the 2013 requirements, consistent with CDS sellers viewing gross minus net derivatives leverage as noise with respect to credit risk uncertainty.

We emphasize that our empirical analysis is subject to two limitations. First, it is limited by the relatively few, but typically very large (average total assets of about $900 billion) dealers in our sample, which combined with only six years of data yields a small full sample. We examine this sample because dealers are the paradigm firm type that holds offsetting positions covered by MNAs. However, this sample size precludes including dealer fixed effects in our credit risk uncertainty analysis as well as meaningfully addressing the endogeneity of dealers' derivatives holdings, use of MNAs, and related disclosure transparency. Hence, while we propose formal hypotheses to sharpen the exposition, readers should interpret all of the results reported herein as descriptive.

Second, due to our effort to obtain similar numbers of IFRS and US GAAP dealers in the full sample, our sample IFRS dealers are larger, more leveraged, and hold more derivatives than our sample US GAAP dealers. We conduct two supplemental analyses to provide comfort that our distinct results for the two sets of dealers are not attributable to these or other non-

accounting differences between them. First, we replicate our primary analyses on balanced and more similar but much smaller subsamples of primary dealers according to the New York Federal Reserve. Second, using entropy balancing (Hainmueller 2012), we reweight the observations for the control subsample of US GAAP dealers to match the first and second moments of three key dealer features—size, trading derivatives assets, and the ratio of derivative liabilities to derivatives assets—in that subsample with those in the treatment subsample of IFRS dealer observations. Both of these approaches yield substantially improved (but not perfect) covariate balance, and yield similar but somewhat weaker results than in the primary analyses using the full sample.

Despite these caveats, our study contributes in two ways to the large literatures in banking (see Ryan 2011, Beatty and Liao 2014, and Acharya and Ryan 2016 for surveys) and mandatory disclosure (see Leuz and Wysocki 2016 for a survey). First, we provide evidence that the 2013 disclosure requirements led IFRS dealers to reduce offsetting gross derivatives and to increase the effectiveness of their coverage of the remaining gross derivatives under MNAs. These real effects of mandatory disclosure seem likely to reduce individual IFRS dealers' overall risk, although the former effect may involve some decrease in economic hedging. They also seem likely to reduce systemic risk by decreasing the possibility for counterparty risk externalities to develop (Acharya and Bisin 2014).

Second, we provide evidence that net derivatives leverage informs about dealers' credit risk uncertainty resulting from the incomplete and imperfect right of setoff provided by MNAs. While Ryan (2011) and Acharya and Ryan (2016) discuss MNAs from an accounting perspective, only Neilson et al. (2020) and our study empirically examine these implications. We discuss Neilson et al. (2020) and the differences between this study and ours in Section II.

II. BACKGROUND, PRIOR LITERATURE, AND HYPOTHESES DEVELOPMENT

Derivatives, Dealers, and Master Netting Agreements

Derivatives exhibit two general types of risk: transferred risks and counterparty risk. The risks transferred by a derivative depend on its type. A market risk derivative (such as an interest rate swap) transfers the risk of movements of a market price (such as an interest rate) on the value or cash flows of an underlying financial asset (such as a bond). A credit derivative (such as a CDS) transfers the risk that a referenced credit (such as a borrowing firm) will default on an underlying financial asset. Counterparty risk is the possibility that a party to a derivative does not pay the amounts owed to the other party. Counterparty risk and transferred risks interact because the amounts owed under derivatives reflect their transferred risks, and because default by a counterparty prevents the transfer of those risks. At the level of derivatives portfolios, default on a derivative eliminates the ability of the derivative to offset the realized transferred risks of the remainder of the portfolio. For portfolios covered by MNAs, the ensuing portfolio closeout eliminates the ability of all the constituent derivatives of the portfolio to offset the future transferred risks of the portfolio.

Dealers engage in large amounts of derivatives with both end users and other dealers, generally trying to maintain reasonably well-matched asset and liability positions (Duffie 2010). These large amounts arise in part because, when dealers hold derivatives for which they do not wish to retain the transferred risks, rather than negotiating with the counterparties to close out the derivatives contractually, they historically have found it more feasible, faster, and cheaper to engage in new derivatives with offsetting transferred risks. This approach leads dealers' derivatives to have correspondingly large gross asset and liability fair values.

To mitigate counterparty risk, dealers typically engage in bilateral MNAs with their frequent derivatives counterparties, both dealers and repeat clients (i.e., end-users), that cover many over-the-counter derivatives with largely offsetting fair values (Bliss and Kaufman 2006). MNAs generally are specified under ISDA agreements. Under these agreements, covered

positions are closed out and net settled only in the event of a default by either counterparty to any covered position. In that event, MNAs grant substantively all control rights to the non-defaulting party to close out the covered positions, subject only to the commercial reasonableness of that party's exercise of those rights in accordance with industry practice.

These control rights are important primarily because of two frictions that arise in closing out derivatives. First, the covered derivatives usually comprise various different types that transfer distinct risks (Summe 2010; Hoenig 2013), and even derivatives of the same type often have significantly different contractual terms. The non-defaulting party may not be able to close out disparate covered derivatives as a single net position; it may instead have to close the derivatives out at lower levels of aggregation or even individually. Second, it is possible and perhaps even likely that certain relevant markets become dislocated when a major dealer defaults (e.g., Lehman Brothers on September 15, 2008), dumping large volumes of derivatives on the market, some of which may be illiquid. Such dislocation provides the non-defaulting party with room to exercise judgment in closing out derivatives. The non-defaulting party has incentives to exercise this judgment to strategically close out derivatives at favorable levels of aggregation (e.g., individually for hard-to-value derivatives to exercise maximal discretion to increase gains or reduce losses) and at favorable times (e.g., deferring the close out of derivatives for which it currently owes the defaulting party).

Such strategic close out has been the subject of time-consuming and expensive litigation in some notable cases (e.g., Lehman Brothers' bankruptcy, as discussed by Fleming and Sarkar 2014). Moreover, cases in different jurisdictions have been decided differently, yielding legal ambiguity (Hoenig 2013). Because of the non-defaulting party's control rights to close out the derivatives covered under MNAs upon default, as well as legal and other frictions in that party's exercise of those rights, (credit risk) uncertainty exists about the extent, timing, and fairness of any future close out of the covered derivatives upon default.

The credit risk uncertainty arising due to these features of MNAs is most likely to be realized during economic stress periods such as the 2007-2009 financial crisis and the ongoing pandemic, although this uncertainty should be reflected in CDS spreads (i.e., priced) during non-crisis periods. In this respect, credit risk uncertainty is similar to the "crash risk" examined in numerous empirical papers since the crisis (see Habib, Hasan, and Jiang 2018 for a survey).

Gross versus Net Balance Sheet Presentation

Accountants and others have long debated the conditions under which gross versus net balance sheet presentation of economically offsetting positions better conveys information about the reporting firm's rights, obligations, and risks related to those positions.[10] Because of dealers' extensive use of MNAs, and because derivative assets and derivative liabilities covered by an enforceable MNA contractually offset in default, gross presentation likely significantly overstates dealers' counterparty risk. On the other hand, as discussed above, MNAs provide a limited right of setoff and are subject to frictions in closing out derivatives that create uncertainty about the extent, timing, and fairness of any future net settlement, so that net presentation may suppress dealers' counterparty risk.

Net presentation may also suppress the transferred risks of dealers' derivatives. Even if the close out upon default of the derivatives covered under MNAs occurs without friction, the offset of the transferred risks of the covered derivatives likely is imperfect, uncertain, and manipulable for the following reasons. First, the derivatives assets covered under MNAs usually transfer at least somewhat different risks than the covered derivatives liabilities (Kiff et al. 2009; Hoenig 2013). MNAs generally offset different transferred risks imperfectly, if at all.[11]

[10] The early debate is evident in the discussion in ARB 14 (1942), in particular, in William Paton's qualified assent and Sidney Winter's dissent to that standard. The Basis for Conclusions sections of FTB 88-2, FIN 39, and FIN 41 illustrate the more fully articulated debate during the late 1980s and early 1990s.

[11] To provide a simple illustration of this point, assume a netting agreement covers only two plain vanilla interest rate swaps with the same fixed and floating rates but with differing notional amounts so that they have equal but opposite fair values: (1) a received fixed swap with five-year remaining tenor (larger notional amount) and (2) a pay fixed swap with 10-year remaining tenor (smaller notional amount). By assumption, the net fair values of the swaps are zero. Despite this fact and the facts that the swaps are the same type of derivative exposed to the same underlying rate spread, the smaller notional amount and longer tenor of the second swap means that the transferred

Second, MNAs do not provide the contracting parties with the ability to close out derivatives in the absence of default, potentially constraining their ability to manage the transferred risks in real time. Third, most derivatives trade over-the-counter, and dealers typically fair value these derivatives by inserting (judgmental) Level 2 or 3 inputs into (imperfect) valuation models based on numerous assumptions. This approach may yield differential noise or bias in the estimated fair values of different covered derivatives (Fischer 2013). Fourth, to fair value their large portfolios of derivatives cost effectively, dealers often make numerous additional assumptions (e.g., bucketing of derivatives based on their maturities, other contractual features, and relevant market price variables) to calculate significant fair value adjustments, such as bid-offer reserves and credit and debt valuation allowances, at the portfolio level (EY 2020).[12] These additional assumptions can suppress valuation-relevant differences between the covered derivative assets and liabilities. For these reasons, neither gross nor net balance sheet presentation of derivatives fully captures their transferred and counterparty risks (Kiff et al. 2009; Ryan 2011; Acharya and Ryan 2016).

Requirements for Net Balance Sheet Presentation under IFRS and US GAAP

The longstanding accounting principle governing gross versus net balance sheet presentation, expressed no later than in ARB 43 (1953, ¶3B), is "the offsetting of assets and liabilities in the balance sheet is improper except where a right of setoff exists" (ASC 210-20-05-1).[13] The question is what constitutes a (sufficient) right of setoff. In US GAAP, FIN 39

interest rate risks of the two swaps do not fully offset; specifically, the risk transferred by the first swap dominates that of the second swap over the first five years of tenor, while only the second swap covers the second five years of tenor. The coverage of the two swaps under the MNA does nothing to remedy this mismatch. The derivatives covered by dealers' MNAs generally transfer far more diverse risks than the two very similar swaps in this example, and so the offsetting of the transferred risks of dealers' covered derivatives generally will be less.

[12] For example, to adjust the fair values of CDS for the bid-offer spread that CDS dealers would bear were they to exit the CDS they hold (i.e., to comply with the definition of fair value as exit value), these dealers typically bucket (i.e., categorize) their derivatives into a limited number of remaining maturity buckets and a limited number of credit spread (i.e., CDS premium) buckets and estimate a valuation adjustment for each two-dimensional bucket based on historical data. They then apply that adjustment to the modeled fair value for the CDS in that bucket. A major CDS dealer's use of this approach can be found on p. 31 of https://web.stanford.edu/~jbulow/Lehmandocs/docs/BARCLAYS/LBEX-BARFID%200011765-0011862.PDF

[13] ARB 11 (1942) previously expressed the first part of this principle, but without the second part regarding the right of setoff. Hence, the importance of the right of setoff in financial accounting appears to have crystalized in

(1992) first clearly addressed this question in the context of derivatives and similar instruments. Paragraph 5 of FIN 39 (ASC 210-20-45-1) states that the right of setoff "exists when all of the following conditions are met: a. Each of two parties owes the other determinable amounts. b. The reporting party has the right to set off the amount owed with the amount owed by the other party. c. The reporting party intends to set off. d. The right of setoff is enforceable at law." MNAs generally do not satisfy condition b, because the counterparties do not have the right to set off the amounts owed absent default, or condition c, because contractual terms can be waived or rewritten if the parties' intent changes. However, paragraph 10 of FIN 39 (ASC 210-20-45-5) allows, but does not require, net balance sheet presentation of the derivatives covered by an enforceable MNA that specifies net settlement only in the event of default, regardless of the reporting firm's intent.

In IFRS, IAS 32 (1995) first addressed this question. Paragraph 42 of IAS 32 allows net presentation only when the reporting firm "(a) currently has a legally enforceable right to set off the recognized amounts; and (b) intends either to settle on a net basis, or to realize the asset and settle the liability simultaneously." The two key differences between IFRS and US GAAP are the inclusion of "currently" in condition (a) of paragraph 42 of IAS 32, which implies that the right of setoff must be unconditional, not conditional on default, and the absence of a provision in IFRS similar to paragraph 10 of FIN 39. Because of these differences, MNAs do not satisfy the IFRS criteria for the right of setoff. Hence, IFRS dealers present much larger derivative assets and liabilities on the balance sheet than do US GAAP dealers, all else equal.

These significantly different balance sheet presentations undermine the comparability of the numbers produced under the two sets of accounting standards (IASB 2011). Compared to net presentation, gross presentation yields higher leverage measured using reported numbers.

accounting sometime between 1942 and 1953. Likely roots of the notion of the right of setoff in financial accounting are the law regarding settlements of partnership and other claims (Zeff 1957), the ability for taxpayers to pay taxes using certain US federal government securities during World War II (ARBs 14 and 43), and the focus on solvency in the development of financial accounting due to the central use of financial statements by banks (Heath 1978).

Empirical research provides evidence that reported leverage is a key factor in investors' assessments of firm risk (Blankespoor et al. 2013). [14] For this reason, in this study we focus on the differential effects of gross versus net presentation on financial leverage.

2013 Disclosure Requirements

After the financial crisis, the IASB and FASB tried and failed to converge their balance sheet presentation requirements for derivatives and other types of contractually offsetting financial instruments, such as repurchase agreements. To mitigate the consequences of this failure and enhance the comparability of financial statements provided under IFRS versus US GAAP, the two accounting standard setters jointly developed and in December 2011 issued common disclosure requirements. As of January 1, 2013, IFRS (amendments to IFRS 7) and US GAAP (ASU 2011-11, ASC 210-20-50-3) require reporting firms to disclose, for all financial assets and financial liabilities that are presented net on the balance sheet or that are presented gross but are subject to enforceable MNAs: (a) the gross amounts of the financial assets and financial liabilities prior to any netting; (b) the amounts netted on the balance sheet in accordance with IFRS or US GAAP, whichever applies; (c) the amounts presented on the balance sheet (i.e., a minus b); (d) the amounts that are not netted on the balance sheet, including financial collateral; and (e) the fully net amounts (i.e., c minus d). US GAAP requires these disclosures to be made for the current period and "all comparative periods presented." For both IFRS and US GAAP dealers, their 2013 annual reports usually contain the disclosures for 2012 (i.e., one prior year).

On the balance sheet, IFRS dealers present derivatives (mostly) gross, while US GAAP dealers present derivatives (mostly) net. Hence, item (b) generally is large for US GAAP dealers and small for IFRS dealers, while item (d) generally is large for IFRS dealers but limited to non-netted collateral for US GAAP dealers. Figure 1 presents a numerical example and visual

[14] Koonce, Leiter, and White (2019) conduct experiments to examine the related issue of linked balance sheet presentation of gross amounts of offsetting assets and liabilities.

depiction comparing these required disclosures for the same set of derivatives for firms that prepare their financial statements under IFRS versus under US GAAP. Since non-netted collateral generally is a minor amount, to keep the discussion simple, in the remaining text and Figure 1 (but not in the empirical analysis) we ignore any non-netted collateral, so that item (d) is portrayed as zero (equivalently, item c equals item e) for US GAAP dealers. Appendix 1 provides examples of disclosures under the 2013 disclosure requirements in the 2013 annual of UBS Group AG, an IFRS dealer, and JPMorgan Chase & Co, a US GAAP dealer.

The 2013 disclosure requirements provide new information for IFRS dealers, because these dealers previously were not required to disclose, and typically did not voluntarily disclose, these net fair values. In particular, these disclosures provide the first clear indication of the extent of IFRS dealers' economically offsetting gross derivatives that rely on MNAs to effect net settlement in the event of default. In contrast, the 2013 disclosure requirements provide no new information for US GAAP dealers, because they have been required to report the gross fair values of derivatives in their (public) bank regulatory filings (Schedule HC-L of FR Y-9C) since 1995. Moreover, unlike IFRS dealers, 11 (12) of the 21 US GAAP dealers in our sample had previously voluntarily disclosed gross fair values (usually items a, b, and c, but not d or e, in Figure 1) in their 2008 (2009-2012) financial reports. The disclosure requirements may increase the visibility of US GAAP dealers' gross fair values of derivatives, however, by ensuring that they also provide these fair values in their financial reports.

Prior Literature: Neilson et al. (2020)

While our study is related to the large literature on off-balance sheet financing beginning with Bowman (1980) cited in footnote 2, it is most directly related in its setting and focus to Neilson et al. (2020). Hence, in this section we describe Neilson et al. (2020) and discuss how our study provides additional empirical results and insights beyond that study.

Like our study, Neilson et al. (2020) examine disclosures under the 2013 requirements by a sample of IFRS and US GAAP banks. Neilson et al. (2020) provide evidence that the

difference between gross and net derivatives fair values scaled by total assets, which they refer to as "offsetable derivatives",[15] is positively associated with banks' credit risk, as measured by CDS spreads, and also with their systemic risk, as measured by the decline in share price conditional on a severe market decline (Acharya, Pedersen, Philippon, and Richardson's 2017 marginal expected shortfall, or MES). These findings are consistent with MNAs not fully eliminating the transferred and counterparty risks of gross derivatives. In this respect, these findings are similar in spirit to ours regarding the association between net derivatives leverage and credit risk uncertainty. Neilson et al. (2020) further find that recognition rather than disclosure of offsetable derivatives increases the association of offsetable derivatives with MES, which is determined in substantial part by less sophisticated equity investors, but not with CDS spreads, which are determined by sophisticated CDS investors. This finding is consistent with prior findings in the recognition versus disclosure literature that financial statement presentation, which can be thought of as the most prominent form of disclosure, helps less sophisticated users of financial reports to identify information relevant for their decisions.

Our study differs from Neilson et al. (2020) in two primary sets of ways. First, the samples in the two studies differ reflecting their distinct focuses. Neilson et al. (2020) examine a substantially broader sample of 57 IFRS banks and 51 US GAAP banks that includes banks for which derivatives dealing, offsetting derivatives assets and liabilities, and MNAs are of minor significance. As one manifestation of this low significance, almost half of their US GAAP banks choose to present offsetting derivatives assets and liabilities gross on the balance sheet, whereas all of our US GAAP dealers choose net balance sheet presentation. Neilson et al.'s (2020) broader sample is motivated by their focus on the importance of recognition versus disclosure. In particular, this broader sample enables Neilson et al. (2020) to compare recognition versus disclosure of gross derivatives fair values for banks under US GAAP, not

[15] Neilson et al.'s (2020) offsetable derivatives variable has the same numerator as our gross minus net derivatives leverage variable but a different denominator: total assets as opposed to tangible common equity.

just recognition for IFRS banks versus disclosure for US banks. In contrast, our narrower sample of 26 IFRS dealers and 21 US GAAP dealers is motivated by our focus on three leverage components that users of financial reports can calculate and compare for the two sets of dealers from their common required disclosures effective as of 2013. Our more restrictive sample criteria ensure that these leverage components are significant for all sample dealers.

Second, we provide three sets of evidence beyond that reported in Neilson et al. (2020). (A) We provide entirely new evidence that the 2013 disclosure requirements have real effects on IFRS dealers' usage of gross derivatives and the effectiveness of their coverage of those derivatives under MNAs. (B) Extending Neilson et al.'s (2020) findings that offsetable derivatives are positively associated with the *level* of credit risk, as measured by the level of the five-year CDS spread, we show that net derivatives leverage is associated with *uncertainty* about credit risk, as measured by the ratio of one-year CDS spread to the five-year CDS spread. We also show that net derivatives leverage, but not gross minus net derivatives leverage, is associated with the levels of both one-year CDS spreads and five-year CDS spreads. These results differ from those in Neilson et al. (2020), likely reflecting our narrower dealer sample for which MNAs are more important and probably used more effectively. (C) We provide entirely new evidence that dealers that provide more transparent disclosures under the 2013 requirements exhibit a less positive association between net derivatives leverage and credit risk uncertainty.

Hypotheses about the Real Effects of 2013 Disclosure Requirements

As discussed above, under the 2013 disclosure requirements IFRS dealers provide new information about their net derivatives fair values. These dealers had no incentives to engage in MNAs prior to these disclosure requirements in order to manage their financial report numbers (rather than to mitigate their economic risks), as MNAs had no effects on their financial statements and required disclosures; moreover, IFRS dealers generally did not provide voluntary disclosures of the economic effects of MNAs. For these reasons, we expect that the

requirements provide new financial reporting incentives for IFRS dealers to reduce unnecessary offsetting gross derivatives, thereby directly reducing their gross minus net derivatives leverage and indirectly reducing their net derivatives leverage, and to increase the effectiveness of their coverage of gross derivatives under MNAs, thereby reducing their net derivatives leverage.

In contrast, US GAAP dealers provide no new information under the 2013 disclosure requirements. Moreover, these dealers have had a strong financial reporting incentive to engage in MNAs since the 1992 effective date of FIN 39, the standard that first allowed net presentation of derivatives covered by MNAs. For these reasons, we expect that the requirements have lesser and possibly no effects for US GAAP dealers.

We expect that dealers have considerable ability to reduce economically offsetting gross derivatives without increasing their risk or reducing their profit. Dealers that hold offsetting derivatives can negotiate with their counterparties to contractually close out the derivatives, say by engaging in bilateral or multilateral compression trades[16] that contractually eliminate offsetting trades. All publicly traded IFRS dealers have had the incentive to reduce the gross amounts of their derivatives after the effective date of the 2013 disclosure requirements, which should mitigate hold-up problems arising in close outs of offsetting derivatives. Similarly, dealers can prevent the accumulation of new offsetting derivatives over time by contractually closing out unwanted derivatives as soon as they determine that they do not wish to retain the transferred risks, rather than by engaging in new derivatives that economically offset these unwanted derivatives, the historically more common approach.

We also expect that dealers have considerable ability to enhance the effectiveness of MNAs. They can do so by covering more similar derivatives with more fully offsetting transferred risks under MNAs. They can also amend the contractual language of the ISDA

[16] A compression trade replaces a set of preexisting trades among two or more counterparties with a single trade that captures the net exposure created by the preexisting trades.

agreements to mitigate the ability of the non-defaulting party to close out positions in ways that harm the non-defaulting party.

Based on the discussion above, we formally state our first hypothesis in the alternative first for the treatment sample of IFRS dealers and then for the difference-in-differences between the treatment sample and the control sample of US GAAP dealers:[17]

> **H1(IFRS):** IFRS dealers reduce their gross minus net derivatives leverage and net derivatives leverage as a result of the 2013 disclosure requirements.
>
> **H1(DiD):** US GAAP dealers reduce their gross minus net derivatives leverage and net derivatives leverage less than IFRS dealers as a result of the 2013 disclosure requirements.

Hypotheses about the Association between Net Derivatives Leverage and Credit Risk Uncertainty

We next hypothesize that dealers' net derivatives leverage, which we use as the best available proxy for the incomplete and otherwise imperfect right of setoff provided by MNAs, is positively associated with their credit risk uncertainty. Our three bases for this hypothesis are as follows. First, we expect that the incompleteness and imperfections of the right of setoff provided by MNAs to yield (credit risk) uncertainty about the extent, timing, and fairness of any future close out, particularly from the perspective of the counterparty that is more likely to default. Second, net derivatives leverage reflects the extent to which the derivatives covered under MNAs are expected *not* to offset, *even absent* the limitation of the offsetting of the covered derivatives to the event of default and the frictions involved in closing out the derivatives covered under these agreements upon default. Third, we expect credit risk uncertainty to increase with the extent to which the covered gross derivatives do *not* offset and thus with net derivatives leverage. We formally state this hypothesis in the alternative as:

[17] In January 2013, the Basel Committee issued its liquidity coverage ratio requirements, a central component of Basel III. The phase-in of these requirements began in 2015, with the 100% minimum liquidity coverage ratio requirement applying as of 2019. As even the 2015 phase-in date follows the effective date of the 2013 disclosure requirements by two years, our tests of H1 should not be affected by the liquidity coverage ratio requirements.

H2: Dealers' credit risk uncertainty is positively associated with their net derivatives leverage.

Lastly, consistent with prior research showing the credit risk uncertainty decreases with disclosure quality (e.g., Yu 2005 and Akins 2018), we hypothesize that dealers that provide more transparent financial report disclosures about derivatives under the 2013 requirements reduce CDS writers' credit risk uncertainty related to the dealers' MNAs, all else equal, and that this reduction of credit risk uncertainty attenuates the association between dealers' net derivatives leverage and credit risk uncertainty. We formally state this hypothesis in the alternative as:

H3: Credit risk uncertainty is less positively associated with net derivatives leverage for dealers that provide more transparent disclosures in compliance with the 2013 disclosure requirements.

We do not propose hypotheses similar to H2 and H3 about dealers' gross minus net derivatives leverage, which we expect to be mostly or entirely noise with respect to the credit risk uncertainty arising from the control rights and frictions associated with closing out derivatives upon default under MNAs. In particular, gross minus net derivatives leverage includes both the *offsetting* and *non-offsetting* portions of the fair values of derivatives that are covered by MNAs or otherwise presented net on the balance sheet. Credit risk uncertainty arising from closing out derivatives upon default under MNAs is logically unrelated to this *non-offsetting* portion. This is the case even though, as with any other source of leverage, dealers' level of credit risk and overall risk should rise with (both portions of) gross minus derivatives leverage, consistent with the findings of Neilson et al. (2020).

III. RESEARCH DESIGNS

Leverage Components

The most direct effect of gross versus net balance sheet presentation of economically offsetting derivatives covered by MNAs is on dealers' reported leverage. Following

Blankespoor et al. (2013), we measure reported leverage (*RepLev*) as tangible assets (*TAss*) divided by tangible common equity (TCE). We measure reported derivatives leverage (*RepDerLev*) as reported derivatives assets (*RepDerAss*, i.e., item (c) for assets in Figure 1) divided by *TCE*. *RepLev* and *RepDerLev* are not comparable for IFRS and US GAAP dealers, which present derivatives covered by MNAs gross and net, respectively.

Accordingly, we focus on three non-overlapping leverage ratios that are comparable across the two sets of dealers. First, non-derivatives leverage (*NonDerLev*) equals *RepLev* minus *RepDerLev*. Second, net derivatives leverage (*NetDerLev*) equals net derivatives assets (*NetDerAss*, i.e., item (e) for assets in Figure 1) divided by *TCE*. Lastly, gross minus net derivatives leverage (*GroMinNetDerLev*) equals the difference between gross derivatives assets (*GroDerAss*, i.e., item (a) for assets in Figure 1) and *NetDerAss* divided by *TCE*.

To test Hypothesis H1 that the 2013 disclosure requirements, which became effective on January 1, 2013, led IFRS dealers to reduce their offsetting gross derivatives and increase the effectiveness of their coverage of derivatives under MNAs more than did US GAAP dealers, we conduct a difference-in-differences analysis using a regression model with the following features. First, we include dealer fixed effects in the model to capture the average pre-treatment year (2012) differences in *GroMinNetDerLev* and *NetDerLev* across IFRS and GAAP dealers. Second, we include indicators for each post-treatment year (2013 to 2017) to demonstrate the sharpness of the effects and to help rule out the possibility that any uncontrolled for sources of cross-sectional variation, which are likely to arise in such a dynamic environment as derivatives dealing, drive or obscure our findings. Third, we include US GAAP separately and interacted with the year indicators to distinguish the effects for US GAAP dealers versus IFRS dealers in each post-treatment year. These features are captured in the following regression model:[18]

[18] Equation (1) represents the treatment (actually more heavily treated) group (IFRS dealers) as the benchmark and includes interactions for the control (actually less heavily treated) group (US GAAP dealers) to capture differences between the two groups. While atypical, this representation is informationally equivalent to the typical representation and better captures our framing of H1, thereby allowing for a more linear exposition of the results of the tests of that hypothesis.

$$\begin{aligned}\text{GroMinNetDerLev or NetDerLev} = {} & \Sigma^{5}_{t=1}\,(b_t * \text{Year}_{2012+t}) + c * \text{US GAAP} \\ & + \Sigma^{5}_{t=1}\,(d_t * \text{Year}_{2012+t} * \text{US GAAP}) \\ & + \text{dealer fixed effects} + \varepsilon_{i,t}.\end{aligned} \tag{1}$$

We also estimate a nested version of equation (1) that replaces the five-year indicators with a single post-treatment indicator variable, *POST*. As the estimation results will indicate, this standard difference-in-differences model captures the treatment effects less powerfully and interpretably than does equation (1). Appendix 2 provides the definitions of all model variables.

Credit Risk Uncertainty

Following Duffie and Lando (2001), Yu (2005), Kim et al. (2013), and Arora et al. (2014), we measure dealers' credit risk uncertainty as the ratio of their current one-year maturity CDS credit spread (*CDS1y*) to their current five-year maturity CDS spread (*CDS5y*), denoted *CDS1y5y*.[19] Because credit risk uncertainty resolves over time, higher uncertainty results in higher *CDS1y* relative to *CDS5y* and thus higher *CDS1y5y*, that is, a flatter (or possibly more inverted) CDS spread curve.

Hypothesis H2 posits that dealers' credit risk uncertainty is positively associated with *NetDerLev*. Hypothesis H3 posits that this association is attenuated for dealers that provide more transparent disclosures in satisfying the 2013 disclosure requirements. We test both of these hypotheses using the following model:

$$\begin{aligned}CDS1y5y_{i,t} = {} & \alpha + \beta_1\, NonDerLev_{i,t} + \beta_2\, NetDerLev_{i,t} + \beta_3\, GroMinNetDerLev_{i,t} \\ & + \gamma_1\, QUAL + \gamma_2\,(NetDerLev_{i,t} * QUAL) \\ & + \gamma_3\,(GroMinNetDerLev_{i,t} * QUAL) + \Sigma_s\, \delta_s\, controls_{i,t,s} \\ & + \text{time fixed effects} + \varepsilon_{i,t}.\end{aligned} \tag{2}$$

[19] We measure credit risk uncertainty using CDS spreads rather than bond yields or spreads, primarily because CDS spreads are a purer measure of credit risk (e.g., unlike bond yields, CDS spreads are not affected by the term structure of risk-free interest rates). A CDS spread reflects CDS sellers' current expectations of the likelihood that the referenced credit will be determined to default over the maturity of the CDS and also of the loss given default in that event (Rathgeber and Wang 2011). Additional reasons for our choice include prior research findings that CDS sellers have higher ability than bond investors to assess credit risk based on financial report information (Hu, Liu, and Zhu 2018) and that CDS typically are more liquid than the bonds issued by the referenced credit (Coudert and Gex 2010).

Equation (2) includes all three components of leverage that are comparable across IFRS and US GAAP dealers to capture the distinct information conveyed by these components. It includes a proxy for the transparency of dealers' disclosures under the 2013 requirements, *QUAL*, separately and interacted with $NetDerLev_{i,t}$ and $GroMinNetDerLev_{i,t}$. We describe the construction of *QUAL*, which increases with disclosure quality, in Section IV (briefly) and Appendix 5 (in detail).

H2 predicts that the coefficient β_2 on $NetDerLev_{i,t}$ is positive. H3 predicts that the coefficient γ_2 on $NetDerLev_{i,t}$ * *QUAL* is negative. In order to provide confidence that the results of the test of H3 are not attributable to *QUAL* systematically differing for IFRS versus US GAAP dealers, in specification analysis we also include the indicator *US GAAP* for dealers that report under US GAAP linearly and interacted with $NetDerLev_{i,t}$ and $GroMinNetDerLev_{i,t}$.

Following many banking studies (e.g., Ahmed, Kilic, and Lobo 2011), equation (2) controls for three variables: the natural logarithm of total assets (*Size*), net income divided by total assets (*ROA*), and non-performing loans divided by total assets (*NPL*). Following many CDS studies (e.g., Callen, Livnat, and Segal 2009), the equation includes fixed effects for the four main types of CDS documentation (or restructuring) clauses (ISDA 2014).[20] We include time fixed effects to ensure that our results are not attributable to variation in *CDS1y5y* arising from changing macroeconomic or financial market conditions (Das, Hanouna, and Sarin 2009) or to common time trends for *CDS1y5y* and *NetDerLev*.

We estimate equation (2) using OLS over the 2012−2017 years for which dealers provide disclosures of current gross and net derivatives fair values in compliance with the 2013 disclosure requirements. We calculate standard errors clustering observations by dealer (Petersen 2009). Given our small sample of 180 observations and the inclusion of nine or more explanatory variables and five time fixed effects, the addition of 46 dealer fixed effects simply

[20] The four types of documentation clauses ("doc clauses") in CDS contracts are XR (no restructuring), CR (old/full restructuring), MR (modified restructuring), and MM (modified-modified restructuring). The relative popularity of these types has varied over time.

absorbs too much sample variation, rendering the results discussed in Section V insignificant. To demonstrate whether and the extent to which observed variation in *CDS1y5y* is attributable to the numerator versus the denominator of this variable, we also estimate equation (2) with each of *CDS1y* and *CDS5y* as the dependent variable. The results using these alternative dependent variables also corroborate Neilson et al.'s (2020) findings regarding the association between derivatives leverage and the level of credit risk.

IV. DATA

Sample Selection

We identify dealers reporting under IFRS or US GAAP in two steps. First, we identify dealers from the "Primary Dealers" list from the New York Federal Reserve,[21] which includes the main US dealers, and from the "Primary Dealers" and "Members" lists from the Association for Financial Markets in Europe (AFME),[22] which include the main European dealers. We identify each dealer's ultimate owner (usually the top banking group or bank holding company) from Bureau van Dijk Bankfocus (hereafter, Bankfocus). We collect and analyze data for these ultimate owners, which for simplicity we continue to refer to as dealers. After excluding two dealers that report under Japanese GAAP (Daiwa Securities Group and Mizuho Financial Group), as well as BGC Holdings owing to its opaque structure and lack of data availability, 35 banking groups remain of which 26 (nine) report under IFRS (US GAAP).

Second, because the sample resulting from the first step yields unbalanced numbers of IFRS and US GAAP dealers, in part because the ultimate owners of many dealers operating in the US report under IFRS rather than under US GAAP, we identify additional US GAAP dealers from the 130 "Holding Companies with Assets Greater than $10 Billion" during the 2005Q1 to

[21] https://www.newyorkfed.org/markets/primarydealers (20 Sep 2017).

[22] These lists are available at https://www.afme.eu/en/divisions-and-committees/primary-deals-rates/ and https://www.afme.eu/Membership/Members-Derectory (20 Sep 2017). Adding the AFME's "Members" list to its "Primary Dealers" list adds four IFRS dealers (Bankia, Belfius, Lloyds, and Nordea). As these are somewhat to very important banking groups (e.g., Nordea is the largest bank in Scandinavia) and the AFME's selection criteria for primary dealers is rather opaque, we include these four additional dealers in our sample.

2017Q4 period from the National Information Center of the Federal Financial Institutions Examination Council (FFIEC).[23] We include these banks in the sample if their ratio of reported trading derivatives liabilities to reported trading derivative assets lies between 0.80 and 1.20 (indicating fairly well-matched trading derivatives books, consistent with dealing rather than with speculation or hedging), their ratio of reported trading derivative assets to total assets exceeds 0.5% (indicating a reasonable amount of dealing activity),[24] and their ultimate owner reports under US GAAP.[25] These criteria add 12 US GAAP dealers,[26] yielding a final sample of 47 dealers, of which 26 (21) report under IFRS (US GAAP).

Appendix 3 lists the sample dealers, whether they report under IFRS or US GAAP, and how we identify them. To provide a sense for the homogeneity of the sample dealers, Appendix 4 plots, for each dealer, the mean of gross derivatives liabilities divided by gross derivative assets (i.e., a matched-book measure) for 2012−2017 on the vertical axis against the mean of gross derivative assets divided by total assets (i.e., a derivatives activity measure) for the same period on the horizontal axis. The dealers all have reasonably to very well-matched books. As is invariably the case in studies examining banks' derivatives activity, the level of activity varies considerably across dealers.

Data Sources

We obtain financial report and CDS credit spread data for our global sample of dealers for the years 2012–2017 from multiple sources. For both IFRS and US GAAP dealers, we obtain financial statement data from Bankfocus. We hand collect all five derivatives assets and liabilities fair value variables required to be disclosed under the 2013 standard (i.e., gross, gross minus reported, reported, reported minus net, and net, as summarized in Figure 1 and with

[23] https://www.ffiec.gov/nicpubweb/nicweb/HCSGreaterThan10B.aspx (2 May 2018).

[24] We measure the first two criteria using data from the "Bank Regulatory - Bank Holding Companies" database of Wharton Research Data Services (WRDS).

[25] Five banks whose ultimate owners report under IFRS met the first two of these criteria.

[26] A 1.0% threshold for the second criterion would add eight rather than 12 US GAAP dealers.

sample disclosures in Appendix 1) from dealers' 2013−2017 financial reports, which we obtain from their websites.[27] Data coverage for 2013−2017 is very high with only three percent missing observations. Data coverage for 2012 is somewhat lower with 19 percent missing observations. While US GAAP dealers have disclosed gross derivatives assets fair values in bank regulatory reports since 1995, IFRS dealers did not have to disclose, and typically did not voluntarily disclose, net derivatives fair values prior to 2012.[28] We convert all unscaled data to millions of US dollars using current exchange rates from WRDS Federal Reserve Bank Reports.

We obtain daily data on one-year and five-year maturity CDS spreads for the years 2012–2017 from WRDS Markit.[29] We use end-of-year CDS spreads, but untabulated results using average spreads during the year are similar. For each of these maturities, we pick the one CDS spread for each dealer that has the most frequent combination of (1) tier group, (2) documentation clause (after 2014, we use ISDA's revised "doc clause" definition), and (3) currency. As WRDS Markit provides CDS spreads in decimal form, we multiply these spreads by 10,000 to convert them to basis points.

As described in detail in Appendix 5, we compile zero-one indicators for four dimensions of the transparency of dealers' disclosures under the 2013 standards: (1, findability) Is the information provided in its own subsection of the notes to the financial statements? (2,

[27] We obtain these data from dealers' annual financial reports or Form 10-K filings when they are available. When these filings are not available, we obtain the data from their Form 20-F filings. We could not obtain a report for Citizens Financial Group, Inc., in 2013, because it remained a subsidiary of RBS until 2014. We merged the data for Unionbancal in 2012–2013 and for MUFG Americas Holdings Corporation in 2014–2017 into a single time series under the name of the latter, because it is the bank holding company for MUFG Union Bank, N.A, which filed under the name "Unionbancal" through 2013.

[28] In an unsuccessful attempt to lengthen the pre-treatment period, we collected whatever derivatives assets and liabilities fair value information is available for IFRS dealers for the years 2008−2011, trying to construct the same five variables required to be disclosed under the 2013 requirements. This attempt yields 72 percent missing observations, consistent with the 2013 disclosure requirements providing substantial new information for IFRS dealers. The reasons why a minority of IFRS dealers provide more information than the rest about net derivatives fair values in the years prior to 2012 generally are unclear. One factor that we were able to observe in a few cases is country-specific regulation; for example, UBS recognized net derivatives fair values under Swiss accounting and gross fair values under IFRS.

[29] We are unable to obtain CDS spreads from WRDS Markit for seven dealers: Belfius Bank SA/NV, BOK Financial Corporation, Citizens Financial Group Inc., Comerica Incorporated, Cooperatieve Rabobank U.A., Jefferies Group LLC, and Regions Financial Corporation. In addition, these data are only partially available for Northern Trust Corporation and Lloyds Banking Group Plc.

readability) Is the information provided in a structured table or list? (3, ease of use) Is the information for derivatives assets and derivatives liabilities provided or summarized in a single line? (4, completeness) Are all five required variables disclosed for both derivatives assets and derivatives liabilities? We create an aggregate disclosure transparency index, *QUAL*, equal to the sum of these four indicator variables. Hence, *QUAL* takes values from 0 (least transparent) to 4 (most transparent).

V. EMPIRICAL ANALYSIS

Depictions of Differing Balance Sheet Presentations of Offsetting Derivatives by IFRS and US GAAP Dealers

The upper two panels of Figure 2 depict the sizeable differences in balance sheet presentation of derivatives (mostly gross) by IFRS dealers under IAS 32 versus (mostly net) by US GAAP dealers under FIN 39 (ASC 210-20-45) over the 2012-2017 sample period. The upper left panel depicts reported derivative assets fair values (*RepDerAss*) divided by gross derivatives assets fair values (*GroDerAss*), that is, the extent to which gross derivatives assets fair values are presented gross rather than net on the balance sheet. This ratio is approximately 65 percent for IFRS dealers, about twice the level of the ratio for US GAAP dealers, throughout the sample period.

Similarly, the upper right panel of Figure 2 depicts net derivative assets fair values (*NetDerAss*) divided by reported derivatives assets fair values (*RepDerAss*), that is, the extent to which the fair values of derivatives assets subject to enforceable MNAs are presented net rather than gross on the balance sheet. This ratio is about 85 percent for US GAAP dealers and about 15 percent for IFRS dealers.

Depictions of the Real Effects of the 2013 Disclosure Requirements

The lower left panel of Figure 2 and Figure 3 depict real effects of the 2013 disclosure requirements. The lower left panel of Figure 2 depicts the difference between reported and net derivatives assets fair values (*RepDerAss-NetDerAss*) divided by the difference between gross

and reported derivatives assets fair values (*GroDerAss-RepDerAss*). This ratio is meaningful primarily for IFRS dealers, for which it captures the relative extents to which, in compliance with IAS 39's requirements, these dealers present the fair value of derivatives subject to conditional netting under MNAs gross on the balance sheet versus present the fair values of derivatives subject to unconditional netting net on the balance. This ratio increases sharply from 2012 to 2013 for IFRS dealers, and, after a small bump down in 2014, continues to trend up fairly strongly for these dealers through the end of the sample period in 2017. This immediate increase and subsequent upward trend are consistent with IFRS dealers more effectively covering derivatives under MNAs after the effective date of the 2013 disclosure requirements. For completeness, Figure 2 also depicts this ratio over time for US GAAP dealers. For these dealers, this ratio is close to zero in all sample years, as the numerator only includes the minimal amount of non-netted collateral.

Figure 3 depicts the sum of non-derivatives leverage (*NonDerLev*) and either gross derivatives leverage (*GroDerLev*) or net derivatives leverage (*NetDerLev*) for both IFRS and US GAAP dealers during our sample period; we add *NonDerLev* to the derivatives leverage variables to provide a sense for how the two sets of dealers' reported leverage are differentially affected by the required versus alternative presentations of derivatives fair values. For IFRS dealers, the summed leverage variables involving both gross and net derivatives leverage decrease sharply in 2013, and these variables continue to trend down more gradually over the remainder of the sample period. The decreases are larger for the sum involving gross derivatives leverage than for the one involving net derivatives leverage, so that gross minus net derivatives leverage (*GroMinNetDerLev*) decreases during the sample period. The immediate decreases and gradual downward trends in these ratios are consistent with IFRS dealers avoiding unnecessary gross derivatives usage and increasing the effectiveness of the coverage of their remaining gross derivatives under MNAs after the effective date of the 2013 disclosure requirements.

For US GAAP dealers, Figure 3 evidences a noticeable decrease in the summed leverage variable involving gross derivatives leverage in from 2012 to 2013. However, the trend for this sum for these dealers is only slightly downward over the entire sample period, while the trend for the sum involving net leverage is slightly upward over that period, so that gross minus net derivatives leverage (*GroMinNetDerLev*) decreases during the sample period, similar to the trend in this variable for IFRS dealers. Overall, however, the real effects of the 2013 disclosure requirements on the leverage variables are considerably milder for US GAAP dealers than for IFRS dealers, consistent with disclosures under these requirements conveying much less new information for US GAAP dealers.

Descriptive Statistics for the Model Variables in the Real Effects Analysis

Table 1 reports descriptive statistics for the equation (1) variables. Panel A of the table reports the mean and distributions of the variables for the full sample. Panel B reports the mean and median of the variables for the IFRS and US GAAP dealer subsamples, as well as *t*-tests of the differences in the means of the variables and two-sample Wilcoxon rank-sum tests of the differences of the distributions of the variables. For simplicity we focus the discussion on the means of the variables and the significance of the *t*-tests of differences in the means across the two sets of dealers.

Reflecting dealers' high leverage, the mean of *NonDerLev* is 18.74 in the full sample, and it is significantly higher at 21.88 for IFRS dealers versus 14.84 for US GAAP dealers. Reflecting dealers' extensive use of derivatives, the mean of *GroMinNetDerLev* is 4.37 in the full sample, and it is significantly higher at 4.92 for IFRS dealers versus 3.65 for US GAAP dealers. Reflecting dealers' extensive use of MNAs, compared to the the mean of *GroMinNetDerLev*, the mean of *NetDerLev* is much lower at only 0.30 in the full sample, and it is significantly higher at 0.34 for IFRS dealers versus 0.25 for US GAAP dealers. As discussed in the introduction, these differences reflect our expansion of the US GAAP dealer subsample to obtain more balanced numbers of IFRS and US GAAP dealers. Even with this

expansion, only 45 percent of the sample observations are for US GAAP dealers. Later in the paper, we conduct analyses using a restricted sample of New York Federal Reserve primary dealers and entropy balancing to help provide confidence that our results are not attributable to differences between the two sets of dealers.

Tests of the Real Effects of the 2013 Disclosure Requirements

Table 2 reports the tests of the two parts of H1, both of which are based on the estimation of equation (1). Panel A reports the tests using indicators for each post-treatment year, while Panel B reports the tests using a single indicator for the entire post-treatment period (i.e., a standard pre- versus post-treatment period difference-in-differences model).

Columns (1) and (2) of each panel report the results of the estimations of nested versions of equation (1) for the sample of IFRS dealers only. These columns test H1(IFRS), which posits that the 2013 disclosure requirements led IFRS dealers to reduce *NetDerLev* and *GroMinNetDerLev* below their pre-treatment levels. Specifically, columns (1) and (2) of Panel A [B] report the differences in *NetDerLev* and *GroMinNetDerLev*, respectively, for IFRS dealers from the benchmark pre-treatment year of 2012 to each post-treatment year from 2013 to 2017 [the entire post-treatment period].

Consistent with H1(IFRS), in column (1) of Panel A, *NetDerLev* decreases sharply and significantly for IFRS dealers from 2012 to 2013 ($p<5\%$). The coefficient of -0.186 indicates an economically significant reduction in *NetDerLev* of -43.21 percent from IFRS dealers' *NetDerLev* in 2012. In each subsequent post-treatment year from 2014 to 2017, *NetDerLev* remains similarly lower than in 2012, with the differences being at least weakly significant in all years except 2014. There is no perceptible trend in *NetDerLev* through 2016, although there is an appreciable further drop in 2017. The results in column (1) of Panel B are consistent with the results in Panel A.

Also consistent with H1(IFRS), in column (2) of Panel A, *GroMinNetDerLev* decreases sharply and highly significantly for IFRS dealers from 2012 to 2013 ($p<1\%$). The coefficient

of -4.294 indicates an economically significant reduction in *GroMinNetDerLev* of 52.80 percent from IFRS dealers' *GroMinNetDerLev* in 2012. In each subsequent post-treatment year from 2014 to 2017, *GroMinNetDerLev* remains highly significantly lower than in 2012. Moreover, there is a perceptible downward trend in *GroMinNetDerLev* through 2017, consistent with IFRS dealers further reducing their excess offsetting derivatives as their portfolios turn over. The results in column (2) of Panel B are consistent with those in Panel A.

Columns (3) and (4) of each panel report the results of the estimations of nested versions of equation (1) for the sample of US GAAP dealers only. We discuss these results as preface to our subsequent test of H1(DiD), which posits that the 2013 disclosure requirements led to smaller decreases in *NetDerLev* and *GroMinNetDerLev* below their pre-treatment levels for US GAAP dealers than for IFRS dealers. Specifically, columns (3) and (4) of Panel A [B] report the differences in *NetDerLev* and *GroMinNetDerLev*, respectively, for US GAAP dealers from the benchmark pre-treatment year of 2012 to each post-treatment year from 2013 to 2017 [the entire post-treatment period].

In column (3) of Panel A, *NetDerLev* decreases weakly significantly for US GAAP dealers from 2012 to 2013 ($p<10\%$), with the magnitude of the decrease being 20 percent of that for IFRS dealers reported in column (1). In each subsequent post-treatment year from 2014 to 2017, *NetDerLev* remains similarly lower than in 2012, with the differences being significant in 2015 and 2017 and insignificant in 2014 and 2016. The results in column (3) of Panel B are consistent with the results in Panel A.

In column (4) of Panel A, *GroMinNetDerLev* decreases weakly significantly for US GAAP dealers from 2012 to 2013 ($p<10\%$), with the magnitude of the decrease being 37 percent of that for IFRS dealers reported in column (2). As for IFRS dealers, there is a perceptible downward trend in *GroMinNetDerLev* through 2017, consistent with US GAAP dealers also further reducing their excess offsetting derivatives as their portfolios turn over, but the

magnitudes of the cumulative reductions remain much smaller than for IFRS dealers. The results in column (4) of Panel B are consistent with the results in Panel A.

Columns (5) and (6) of Panel A report the full equation (1) used to test H1(DiD). Specifically, columns (5) and (6) of the table report the differences in the differences in *NetDerLev* and *GroMinNetDerLev*, respectively, for US GAAP dealers versus IFRS dealers from the benchmark pre-treatment year of 2012 to each post-treatment year from 2013 to 2017. Note first that the coefficient on US GAAP is highly significantly negative in both columns, indicating that the average level of both dependent variables is lower for US GAAP dealers than for IFRS dealers.

Consistent with H1(DiD), in column (5) of Panel A, *NetDerLev* decreases weakly significantly less for US GAAP dealers than for IFRS dealers from 2012 to 2013 ($p<10\%$). In subsequent years, these differences are similar in magnitude but lose statistical significance, likely reflecting the development other sources of cross-sectional variation in the dependent variable. Reflecting this insignificance in four of the five post-treatment years, the difference-in-differences coefficient in column (5) of Panel B is insignificant.

Also consistent with H1(DiD), in column (6) of Panel A, *GroMinNetDerLev* decreases weakly significantly less for US GAAP dealers than for IFRS dealers from 2012 to both 2013 and 2014 ($p<10\%$). In subsequent years, these differences again are similar in magnitude but lose statistical significance. Reflecting this insignificance in three of the five post-treatment years, the difference-in-differences coefficient in column (6) of Panel B is insignificant.

In summary, the results reported in Table 1 are consistent with the 2013 disclosure requirements having sharp and strong economic consequences for IFRS dealers, which exhibit highly significant reductions in *GroMinNetDerLev* and *NetDerLev* in the year the requirements became effective, consistent with these dealers reducing their unnecessary offsetting gross derivatives and increasing the effectiveness of the coverage of their remaining gross derivatives under MNAs. The disclosure requirements also have directionally similar but lesser

consequences for US GAAP dealers, with the differences-in-differences in the effects for the two sets of dealers being weakly significant for *NetDerLev* in 2013 and for *GroMinNetDerLev* in both 2013 and 2014. Neither of these difference-in-differences are significant for the entire post-treatment period.

Descriptive Statistics for the Model Variables in the Credit Risk Uncertainty Analysis

Table 1, Panel A [Panel B] also reports descriptive statistics for the equation (2) variables in the full sample [IFRS and US GAAP dealer subsamples]. For the full sample reported in Panel A, the mean of *CDS1y5y* is 0.35, indicating that the one-year CDS spread (which has a mean of 36.59 basis points) is on average 35 percent of the five-year spread (which has a mean of 96.59 basis points), consistent with considerable credit risk uncertainty resolving over the interval from one to five years. The standard deviation is of *CDS1y5y* is 0.15, indicating considerable variation in credit risk uncertainty across the sample. For the IFRS and US GAAP dealer subsamples reported in Panel B, the *t* and two-sample Wilcoxon rank-sum tests are both insignificant for all three CDS spread variables.

In Panel A, the mean of *QUAL* is 2.94, indicating that dealers' disclosures typically satisfy about three of the four dimensions of the disclosure quality score for the 2013 requirements. The most commonly unprovided dimension of the disclosure quality score is the findability of the disclosures. The standard deviation of *QUAL* is 0.94, indicating reasonable spread in disclosure quality. In Panel B, the mean of *QUAL* is significantly higher for IFRS dealers (3.35) versus US GAAP dealers (2.429).

In Panel, A, the distributions of the control variables *Size*, *ROA*, and *NPL* are similar to those in other studies examining very large banks. The average (median) dealer-year observation holds total assets of $896 billion ($780 billion). In Panel B, IFRS dealers are significantly larger and less profitable and have significantly more non-performing loans than US GAAP dealers.

Table 3 reports Pearson correlations of the variables for the full sample. We discuss the more notable correlations. *NonDerLev* is significantly positively correlated with *CDS1y5y*, as well as with both its numerator *CDS1y* and denominator *CDS5y*, consistent with this variable capturing both credit risk uncertainty and credit risk. *NetDerLev* is significantly positively correlated with both *CDS1y* (0.29) and *CDS5y* (0.17), consistent with *NetDerLev* capturing credit risk. While the correlation of *NetDerLev* with *CDS1y* is 73% larger than its correlation with *CDS5y*, consistent with *NetDerLev* capturing credit risk uncertainty, unexpectedly *NetDerLev* is insignificantly positively correlated with *CDS1y5y*. As we shall see, as expected this association is highly significantly positive in the multiple regressions used to test H2 and H3. In contrast, *GroMinNetDerLev* is significantly negatively correlated with *CDS1y5y*; the opposite and hard-to-interpret sign of this correlation reflects the fact that the correlation of *GroMinNetDerLev* with *CDS1y* (0.13) is about half its correlation with *CDS5y* (0.24). Hence, consistent with prior discussion, *GroMinNetDerLev* captures credit risk but appears to be noise with respect to (or at least hard to interpret as a measure of) credit risk uncertainty.

The three CDS spread variables are all significantly positively correlated. The three leverage variables also are all significantly positively correlated.

Not surprisingly, *ROA* is significantly negatively correlated with *CDS1y5y* and both its numerator *CDS1y* and denominator *CDS5y*, indicating that *ROA* inversely captures both credit risk uncertainty and credit risk. *NPL* is significantly positively correlated with both *CDS1y* and *CDS5y*, but insignificantly correlated with *CDS1y5y*, indicating that *NPL* primarily captures credit risk. *Size* is significantly negatively correlated with both *CDS1y* and *CDS1y5y*, and weakly significantly negatively correlated with *CDS5y*, consistent with *Size* inversely capturing both credit risk uncertainty and credit risk, but the former more strongly than the latter.

The correlation of *QUAL* with *CDS5y* is weakly significantly negative, consistent with it inversely capturing credit risk to a limited extent, but the correlations of *QUAL* with the other two CDS spread variables are insignificant. *QUAL* is significantly positively correlated with

NonDerLev and *NetDerLev*, consistent with more leveraged dealers provide lower quality disclosures under the 2013 requirements. However, *QUAL* is insignificantly associated with *GroMinNetDerLev*. *QUAL* is significantly negatively correlated with *US GAAP*, indicating that US GAAP dealers provide lower quality disclosures than IFRS dealers. *QUAL* is significantly positively correlated with *Size*, indicating that larger dealers provide higher quality disclosures.

Tests of the Association of Net Derivatives Leverage with Credit Risk Uncertainty

The first column of Table 4, Panel A reports the OLS estimation of equation (2) and our main tests of hypotheses H2 and H3. Equation (2) regresses *CDS1y5y* on *NonDerLev*, *NetDerLev*, and *GroMinNetDerLev*, on *QUAL* linearly and interacted with *NetDerLev* and *GroMinNetDerLev*, and on the control variables.

We first discuss the coefficients on the non-test variables and control variables. Similar to their Pearson correlations with *CDS1y5y* reported in Table 3, the coefficient on *NonDerLev* is weakly significantly positive, and the coefficient on *GroMinNetDerLev* is weakly significantly negative. The coefficients on *QUAL* and its interaction with *GroMinNetDerLev* are insignificant. Similar to its correlation with *CDS1y5y* reported in Table 3, the coefficient on *ROA* is weakly significantly negative. The coefficient on *NPL* is insignificant, however, despite its significant positive correlation with *CDS1y5y* reported in Table 3.

Consistent with H2 that credit risk uncertainty rises with net derivatives leverage, the coefficient on *NetDerLev* is strongly significantly positive (0.585, $p < 1\%$). Consistent with H3 that disclosure quality attenuates the positive association of credit risk uncertainty with net derivatives leverage, the coefficient on *NetDerLev*QUAL* is strongly significantly negative (-0.152, $p < 1\%$).

For completeness and to corroborate Neilson et al.'s (2020) findings that the derivatives leverage is associated with the level of credit risk, columns (2) and (3) of Table 4 report the estimation of equation (2) replacing the dependent variable with its numerator *CDS1y* and denominator *CDS5y*, respectively. Most notably, the coefficients on both *NetDerLev* and

*NetDerLev*QUAL* are considerably larger in absolute value and more significant in column (2) than in column (3), consistent with these variables capturing credit risk uncertainty that resolves over the medium term.

Because IFRS dealers on average provide higher quality disclosures under the 2013 requirements than US GAAP dealers, it is possible that the support for H3 that we document in Table 4, Panel A is attributable to differences between the two sets of dealers. To address this possibility, column (1) of Table 4, Panel B reports the estimation of an expansion of equation (2) that includes the indicator variable *US GAAP* linearly and interacted with *NetDerLev* and *GroMinNetDerLev*. Compared to the results reported in Panel A, the inclusion of these variables slightly increases the absolute magnitude and significance of the coefficients involved in the tests of H2 and H3, providing confidence that this possibility does not explain our results.

The idea that *NetDerLev* captures the extent to which the positions covered by MNAs do *not* offset, thus rendering this variable a satisfactory proxy for the incompleteness and imperfections of the right of setoff provided by these agreements, underlies H2 and H3. Consistent with this idea, we expect the increasing effect of *NetDerLev* on credit risk uncertainty to strengthen as *NetDerLev* increases relative to *GroMinNetDerLev*. The inclusion of *GroMinNetDerLev* in our main tests of H2 and H3 reported in Table 4, Panel A should control for this effect, but in a fashion that suppresses rather than reveals the effect.

To provide evidence as to whether this effect exists, Table 4, Panel C reports a modified version of the model reported in column (1) of Table 4, Panel A that includes *NetGroRank*, the rank of the ratio of *NetDerLev* to *GroMinNetDerLev* scaled from zero to one, linearly and interacted with *NetDerLev*. To avoid multicollinearity between the *NetGroRank* variables and the *GroMinNetDerLev* variables (by construction), we eliminate the latter variables from the model. Column (1) [(2)] of Panel C reports the results without [with] the control variables. In column (1), the coefficient on *NetDerLev* remains significantly positive and the coefficient on *NetDerLev*NetGroRank* is also weakly significantly positive, providing some evidence that

this effect exists. However, the addition of the control variables in the model reported in column (2) renders the coefficient on *NetDerLev* only weakly significantly positive and the coefficient on *NetDerLev*NetGroRank* insignificantly positive. This likely reflects multicollinearity between *NetDerLev* and *NetDerLev*NetGroRank* (by construction) as well as among these variables and the control variables.

Supplemental Analyses Mitigating Differences between the IFRS and US GAAP Dealer Subsamples

As discussed in Section IV, to increase the number of US GAAP dealers to a level close to the number of IFRS dealers, we included US GAAP banks that are not on the list of primary dealers of the New York Federal Reserve Bank (NYFed) but that have with sufficiently large trading derivative assets and sufficiently well-matched derivative assets and liabilities. Not surprisingly, these additional US GAAP dealers typically are smaller and have smaller derivatives exposures than, and exhibit various other differences from the IFRS dealers. In this section, we conduct two analyses to mitigate these differences: (1) we restrict the sample to ten IFRS dealers and nine US GAAP dealers that are on the NYFed's list of primary dealers (see Appendix 3 for these dealers), and (2) following considerable recent accounting research, we use entropy balancing to reweight the observations for the control subsample of US GAAP dealers to match the first and second moments of three variables that capture key dealer features —*Size*, trading derivative assets, and the ratio of derivative liabilities to derivatives assets— with those in the treatment subsample of IFRS dealer observations.[30]

Similar to Table 1, Panel B for the full sample, the first three columns of Table 5 report the means of the variables in equations (1) and (2) separately for the subsamples of IFRS and US GAAP primary dealers on the NYFed list, as well as *t*-tests of the differences in these means.

[30] We estimate the entropy balancing weights using the Stata package ebalance. See Hainmueller (2012) for general discussion of entropy balancing. See Shipman et al. (2017), Chapman, Miller, and White (2019), McMullin and Schonberger (2020), Kleymenova and Tomy (2020), and Francis and Wang (2021) for recent uses of entropy balancing in accounting research.

The significant differences between the IFRS and US GAAP dealer subsamples in Table 1, Panel A are substantially mitigated for most variables, eliminated for *NetDerLev*, and reversed for *GroMinNetDerLev*. The only variable for which the difference becomes larger and more significant is *QUAL*. Hence, the fairly severe restriction of the sample to NYFed primary dealers makes the IFRS and US GAAP dealer subsamples appreciably more similar.

The fourth through sixth columns of Table 5 report the means of the variables in equations (1) and (2) separately for the entropy balanced subsamples of IFRS and (weighted) US GAAP dealers, as well as *t*-tests of the differences in these means. The significant differences between the IFRS and US GAAP dealer subsamples in Table 1, Panel A are again substantially mitigated for most variables. The only variable for which the difference becomes larger and more significant is *CDS1y5y*, which becomes significantly negative. Hence, entropy balancing makes the IFRS and US GAAP dealer subsamples appreciably more similar.

Similar to Table 2, Panel B, Table 6 reports the real effects analysis using a nested version of equation (1) that reflects a standard differences-in-differences approach; the post-treatment year-by-year analysis using the full equation (1) yields similar inferences. Columns (1) and (2) [(3) and (4)] indicate that *NetDerLev* and *GroMinNetDerLev*, respectively, decrease significantly from the pre-treatment to the post-treatment period for IFRS [US GAAP] dealers, with the magnitude of both decreases being about 30 percent lower for the US GAAP dealers. Columns (5) and (6) indicate that the difference-in-differences between the two sets of dealers are insignificant, however.

Similar to column (1) of Table 4, Panel A, Table 7 reports the credit risk uncertainty analysis estimating equation (2) using both the NYFed primary dealers sample in column (1) and entropy balancing in column (2). The significant positive coefficient on *NetDerLev* and significant negative coefficient on *NetDerLev*QUAL* for the NYFed sample reported in column (1) are both consistent with the corresponding coefficients in the full analysis reported in column (1) of Table 4, Panel A. Similarly, the weakly significant positive coefficients on

NetDerLev and *NetDerLev*QUAL* in the entropy balancing analysis reported in column (2) are consistent with the corresponding coefficients in the full sample analysis.

Overall, these supplemental analyses provide the same directional inferences as the full sample analyses, although statistical significance is lost in the difference-in-differences in the real effects analysis using the NYFed sample and the results in the credit risk uncertainty using the entropy balancing approach are only weakly significant.

VI. SUMMARY AND CONCLUSION

In this paper, we empirically examine the real effects and usefulness for assessing credit risk uncertainty of derivative dealing banks' financial report disclosures of the gross, reported, and net fair values of their offsetting derivatives that are presented net on the balance sheet or are presented gross but are subject to enforceable bilateral master netting agreements (MNAs). IFRS and US GAAP jointly require these disclosures as of 2013. Dealers extensively use MNAs to mitigate counterparty risks on derivatives with their frequent derivatives counterparties. MNAs cover large numbers of derivatives whose fair values, but not necessarily transferred risks, largely offset. MNAs typically are specified under International Swaps and Derivatives Association agreements in which the covered positions are closed out and net settled only in the event of a default by either party on any covered position. In this event, MNAs grant substantively all control rights to the non-defaulting party to close out the covered positions, subject only to the commercial reasonableness of that party's exercise of those rights in accordance with industry practice. These features of MNAs and related frictions yield uncertainty about the extent, timing, and fairness of any future net settlement, and thus about the credit risk of the dealers engaging in these agreements.

We first hypothesize and provide evidence that the 2013 disclosure requirements have real effects on IFRS dealers for which the disclosures convey new information, but lesser effects on US GAAP dealers for which the disclosures only increase the visibility of the information.

Using a difference-in-differences approach that distinguishes each post-treatment year, as expected we find that IFRS dealers' gross minus net derivatives leverage and net derivatives leverage decrease sharply and significantly from 2012 to 2013, the year the disclosure requirements became effective. These effects continue to grow for gross minus net derivatives leverage in future post-treatment years. These results are consistent with the disclosure requirements leading IFRS dealers to reduce their unnecessary offsetting gross derivatives and to cover their remaining gross derivatives more effectively under MNAs. The disclosure requirements have directionally similar but, as expected, substantially weaker effects for US GAAP dealers. The difference-in-differences for IFRS and US GAAP dealers are weakly significant for gross minus net derivatives leverage in 2013 and 2014 and for net derivatives leverage in 2013.

We then examine CDS sellers' use of dealers' required financial report disclosures. We hypothesize and find that dealers' net derivatives leverage is positively associated with the slope of their credit default swap (CDS) credit spread curves, consistent with net derivatives leverage proxying for credit risk uncertainty arising from the incomplete and imperfect right of setoff provided by MNAs. We further find that this effect is stronger when net derivatives leverage is higher relative to gross minus net derivatives leverage, consistent with less effective offsetting of gross derivatives,[31] and that it is primarily attributable to one-year maturity CDS spreads rising with net derivatives leverage, consistent with this leverage capturing credit risk uncertainty rather than the level of credit risk. We find that this effect is substantially attenuated for dealers that provide more transparent disclosures about their derivatives under the 2013 disclosure requirements, consistent with these disclosures reducing CDS writers' perception of dealers' credit risk uncertainty. In contrast, we find that dealers' gross minus net derivatives

[31] We thank the anonymous reviewer for suggesting this analysis.

leverage is insignificantly associated with the slope of their credit spread curves, consistent with CDS sellers viewing this variable as mostly noise with respect to credit risk uncertainty.

We emphasize two limitation of our empirical analysis. First, it is limited by the relatively few dealer-year observations. Second, as a result of our efforts to obtain similar numbers of IFRS and US GAAP dealers in the full sample, the sample IFRS dealers are larger, more leveraged, and hold more derivatives than the US GAAP dealers. While we can do nothing about the first limitation, we address the second limitation by conducting supplemental analyses on a restricted sample of New York Federal Reserve primary dealers and by using entropy balancing to reweight the observations for control subsample of US GAAP dealers to match the key dealer features in that subsample and the treatment subsample of IFRS dealer observations. We obtain directionally identical but somewhat weaker results in both supplemental analyses as in the primary analyses using the full sample.

Notwithstanding these caveats, our study contributes to the large banking and mandatory disclosure literatures first by providing descriptive evidence that the 2013 disclosure requirements led IFRS and US GAAP dealers to reduce their unnecessary offsetting gross derivatives and IFRS dealers to increase the effectiveness of their coverage of derivatives under MNAs, real effects of mandatory disclosure. These effects seem likely to reduce individual dealers' overall risk, although it is possible that the former effect involves some reduction of economic hedging. They also seem likely to reduce systemic risk, by reducing the possibility for counterparty risk externalities to develop.

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FIGURE 1
Disclosures under the 2013 Requirements, with a Numerical Example Indicating Differences between IFRS and US GAAP

Panel A: Required disclosures

	(a)	(b)	(c)	(d)	(e)
	Fully gross amounts	**Amounts netted under applicable balance sheet presentation requirements**	**Amounts presented on balance sheet**	**Amounts not netted on balance sheet despite coverage under enforceable MNAs**	**Fully net amounts**
IFRS and US GAAP	*same*		*different*		*same*
IFRS		Unconditional right of setoff only		Conditional right of set off and non-netted financial collateral	
US GAAP		Unconditional and conditional right of setoff		Non-netted financial collateral	

Panel B: Numerical example with visualization of gross assets, netting of assets, and net assets under IFRS and US GAAP

IFRS					
Assets	100	(10)	90	(30)	60
Liabilities	40	(10)	30	(30)	0
US GAAP					
Assets	100	(40)	60	-	60
Liabilities	40	(40)	0	-	0

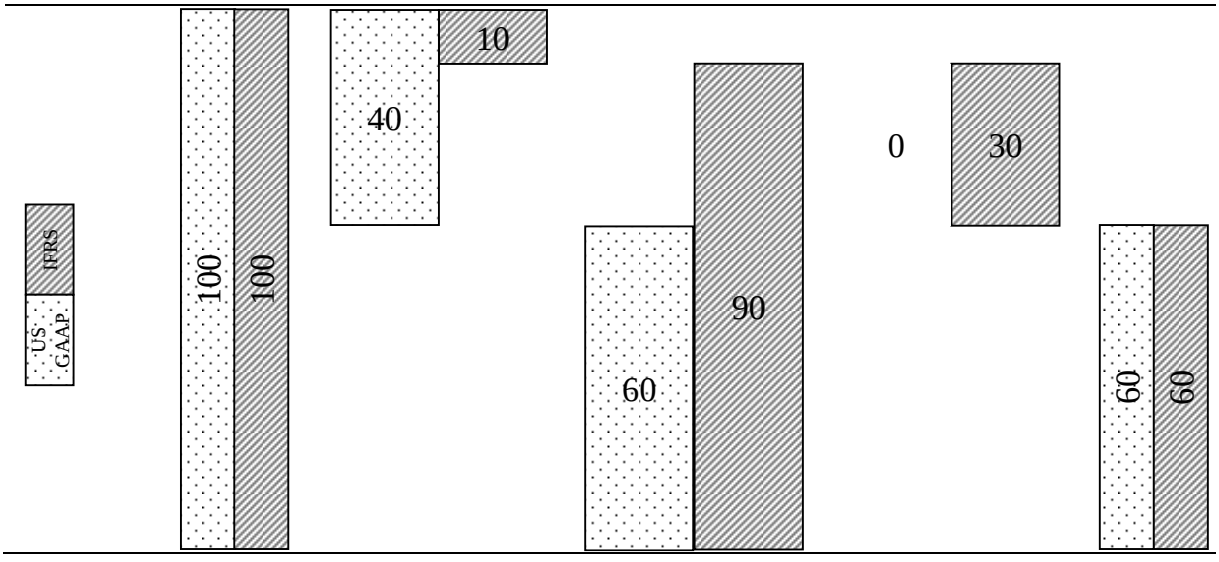
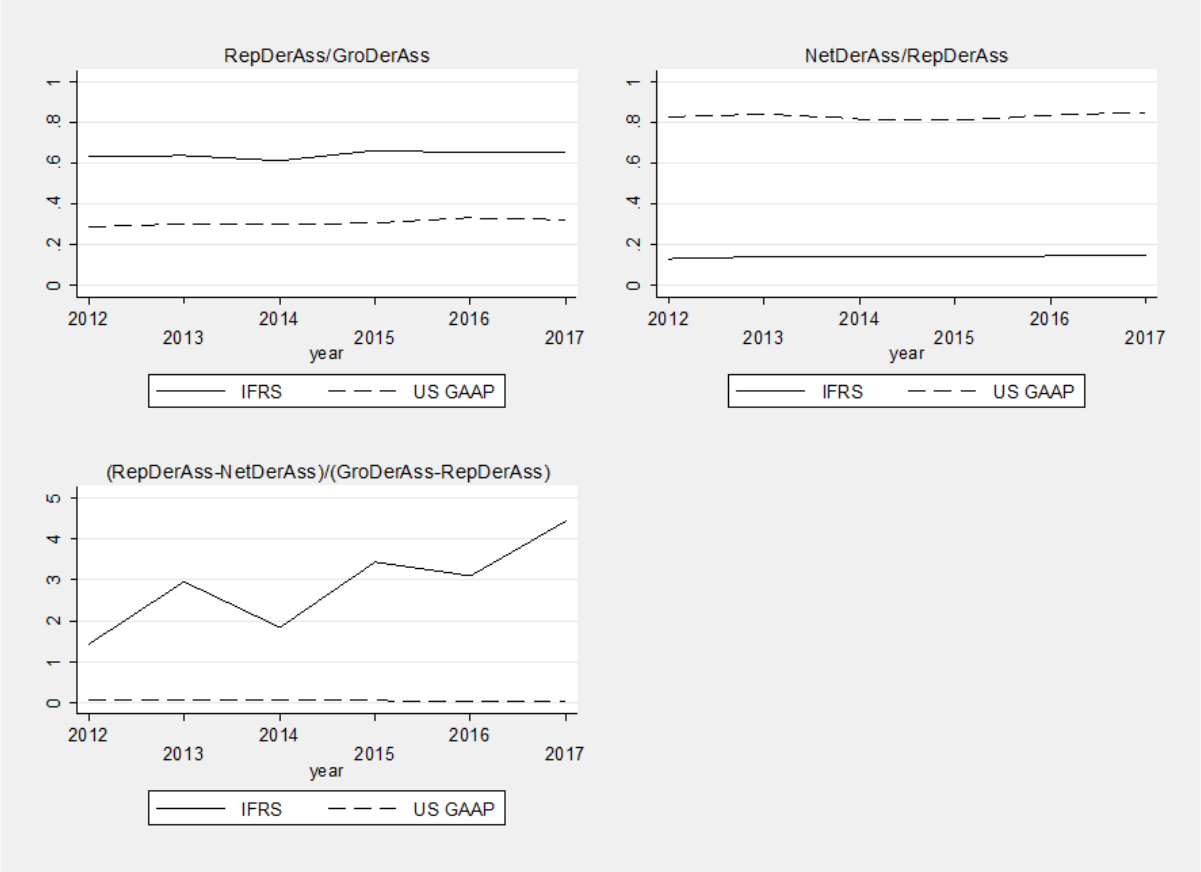


FIGURE 1 (Continued)

Notes: Panel A of this figure summarizes the 2013 disclosure requirements, and Panel B illustrates the required disclosures under IFRS and US GAAP for a numerical example with a given set of positions. The required information for financial assets and liabilities that are presented net on the balance sheet or are covered by enforceable MNAs depicted in Panel A includes: (a) the fully gross amounts (e.g., fair values for derivatives) of financial assets and financial liabilities before any netting, (b) the amounts netted under the applicable balance sheet presentation requirements (i.e., IFRS or US GAAP), (c) the amounts presented on the balance sheet, (d) the amounts not netted on the balance sheet despite coverage of the financial assets and liabilities under enforceable MNAs, including non-netted financial collateral, and (e) the fully net amounts. The numerical example in Panel B includes derivative assets and liabilities with fair values of 100 and 40, respectively; 10 of both of these fair values is attributable to a transaction with a clearinghouse for which the reporting firm has the unconditional right of offset, and 30 of both of these fair values is covered by an enforceable MNA for which the firm has the conditional (on default) right of offset.

Our derivatives variables relate to the required disclosures in Panel A and numerical example in Panel B as follows: *GroDerAss* (the numerator of *GroDerLev*) is item (a) for assets, i.e., 100 for both IFRS and US GAAP dealers; *RepDerAss* (the numerator of *RepDerLev*) is item (c) for assets, i.e., 90 for IFRS dealers and 60 for US GAAP dealers; and *NetDerAss* (the numerator of *NetDerLev*) is item (e) for assets, i.e., 60 for both IFRS and US GAAP dealers.

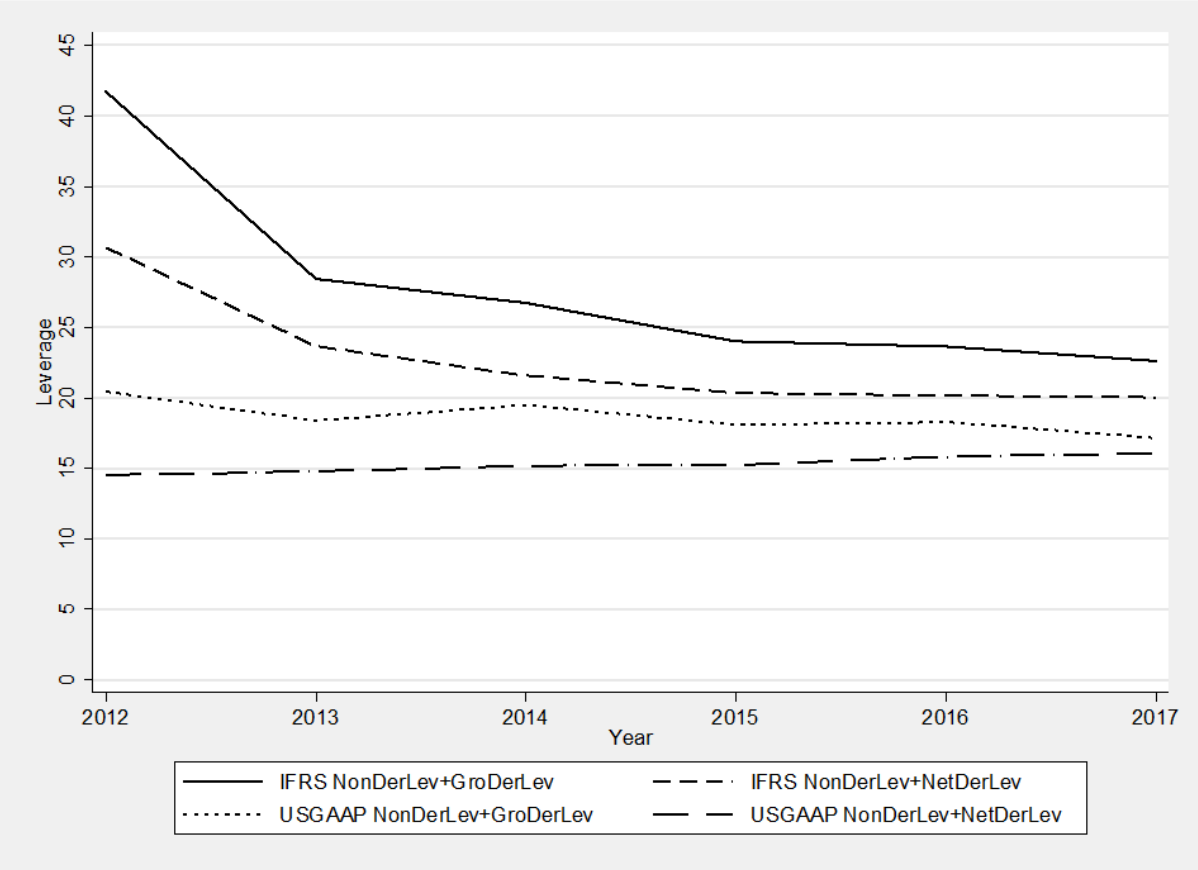
FIGURE 2
Annual Means of Ratios Indicating Balance Sheet Netting and Use of Enforceable MNAs, Distinguishing IFRS and US GAAP Dealers



Notes: This figure depicts the annual means of three ratios that indicate the extent of balance sheet netting or the use of enforceable MNAs, separately for the subsamples of 26 IFRS dealers and 21 US GAAP dealers, for the years 2012-2017 that dealers provide information under the 2013 standards.

- The upper left panel depicts reported derivative assets fair values (*RepDerAss*) divided by gross derivatives assets fair value (*GroDerAss*), i.e., the extent to which gross derivatives assets fair values are presented gross rather than net on the balance sheet.
- The upper right panel depicts net derivative assets fair values (*NetDerAss*) divided by reported derivatives assets fair value (*RepDerAss*), i.e., the extent to which the fair values of derivatives assets subject to enforceable MNAs are presented net rather than gross on the balance sheet.
- The lower left panel depicts the difference between the reported and net derivatives assets fair values (*RepDerAss-NetDerAss*) divided by the difference between gross and reported derivatives assets fair values (*GroDerAss-RepDerAss*). For IFRS dealers only, this ratio captures the extent to which they offset the fair values of derivatives on the balance sheet versus not; the numerator rises with the extent to which IFRS dealers use MNAs but do not offset the fair values of the covered derivatives, while the denominator falls to the extent that they offset the fair values of derivatives subject to unconditional netting. For US GAAP dealers, the numerator only includes non-netted collateral and so is close to zero, rendering the ratio largely uninformative.

FIGURE 3
Annual Means of Non-Derivatives Leverage Plus Net or Gross Derivatives Leverage, Distinguishing IFRS and US GAAP Dealers



Notes: This figure depicts the annual means of non-derivatives leverage (*NonDerLev*) plus either net derivatives leverage (*NetDerLev*) or gross derivatives leverage (*GroDerLev*), separately for the subsamples of 26 IFRS dealers and 21 US GAAP dealers, for the years 2012-2017 that dealers provide information under the 2013 standards.

TABLE 1
Summary Statistics
Full Sample and IFRS and US GAAP Subsamples

Panel A: Variable summary statistics for full sample

	count	mean	p50	sd	p5	p25	p75	p95
CDS Spread variables (dependent variables in equation (2))								
CDS1y	202	36.590	23.875	49.893	8.678	15.624	38.509	102.214
CDS5y	217	96.947	78.429	65.223	33.433	57.239	118.828	218.888
CDS1y5y	202	0.349	0.338	0.148	0.138	0.256	0.416	0.594
Leverage variables (dependent variables in equation (1) and/or main regressors in equation (2))								
NonDerLev	278	18.738	16.926	8.892	10.177	13.659	22.400	29.569
NetDerLev	261	0.302	0.268	0.241	0.041	0.129	0.391	0.769
GroMinNetDerLev	252	4.365	2.486	4.885	0.039	0.798	6.450	14.372
Interactive variables (in equations (1) or (2))								
QUAL	282	2.936	3.000	0.933	1.000	2.000	4.000	4.000
USGAAP	282	0.447	0.000	0.498	0.000	0.000	1.000	1.000
Control variables (in equation (2))								
Size	282	13.230	13.567	1.136	11.145	12.410	14.168	14.681
ROA	282	0.005	0.006	0.005	-0.002	0.002	0.008	0.012
NPL	282	0.014	0.008	0.019	0.001	0.004	0.016	0.065
Total assets (in USD billions)	282	896.45	780.04	734.13	69.19	245.16	1,422.97	2,374.99

TABLE 1 (Continued)

Panel B: Variable means and medians, with tests of differences, for IFRS and US GAAP subsamples

	IFRS			US GAAP			Difference in means	Two-sample Wilcoxon rank-sum test
	count	mean	p50	count	mean	p50	(*t*-statistic)	*Z*-statistic
CDS Spread variables (dependent variables in equation (2))								
CDS1y	120	41.127	22.676	82	29.951	25.890	11.175 *(1.57)*	0.225
CDS5y	132	101.457	78.832	85	89.943	77.342	11.514 *(1.27)*	0.870
CDS1y5y	120	0.358	0.351	82	0.337	0.312	0.021 *(0.99)*	1.265
Leverage variables (dependent variables in equation (1) and/or main regressors in equation (2))								
NonDerLev	154	21.879	20.624	124	14.837	13.708	7.043*** *(7.13)*	9.339***
NetDerLev	145	0.342	0.284	116	0.253	0.203	0.088*** *(2.99)*	3.746***
GroMinNetDerLev	142	4.921	3.332	110	3.649	0.628	1.272** *(2.06)*	5.433***
Interactive variables (in equations (1) or (2))								
QUAL	156	3.346	3.000	126	2.429	2.000	0.918*** *(9.40)*	7.965***
Control variables (in equation (2))								
Size	156	13.747	13.698	126	12.590	12.401	1.158*** *(9.86)*	7.364***
ROA	156	0.003	0.003	126	0.008	0.008	-0.005*** *(-7.68)*	-9.283***
NPL	154	0.021	0.013	114	0.005	0.005	0.016*** *(7.51)*	8.982***
Total assets (in USD millions)	156	1113.59	889.46	126	627.61	242.99	485.98*** *(5.84)*	7.364***

Notes: Panel A of this table reports the summary statistics for the variables in equations (1) and/or (2) for the full sample. Panel B reports the means and medians of these variables for the IFRS and US GAAP dealer subsamples of the full sample, with t tests of the differences of the variable means across the subsamples and Wilcoxon rank-sum tests for differences of the variable distributions across the subsamples. All variables are defined in Appendix 2.

TABLE 2
Tests of Decreases in Gross Minus Net Derivatives Leverage and Net Derivatives Leverage for IFRS and US GAAP Dealers From Pre versus Post the 2013 Disclosure Requirements

Panel A: Difference-in-differences estimation distinguishing each post-treatment year from 2012

		IFRS Dealers		US GAAP Dealers		Difference-in-differences	
	Predicted coefficient	(1) NetDerLev	(2) GroMinNetDerLev	(3) NetDerLev	(4) GroMinNetDerLev	(5) NetDerLev	(6) GroMinNetDerLev
YEAR13	- (H1:IFRS)	-0.186**	-4.294***	-0.0366*	-1.593*	-0.186**	-4.294***
		(0.039)	(0.001)	(0.075)	(0.053)	(0.034)	(0.000)
YEAR14	- (H1:IFRS)	-0.141	-3.885***	-0.00623	-0.890	-0.141	-3.885***
		(0.163)	(0.007)	(0.834)	(0.261)	(0.155)	(0.005)
YEAR15	- (H1:IFRS)	-0.184*	-5.416***	-0.0732**	-2.375*	-0.184*	-5.416***
		(0.090)	(0.001)	(0.047)	(0.085)	(0.083)	(0.001)
YEAR16	- (H1:IFRS)	-0.192*	-5.531***	-0.0532	-2.824**	-0.192*	-5.531***
		(0.083)	(0.001)	(0.331)	(0.046)	(0.076)	(0.001)
YEAR17	- (H1:IFRS)	-0.275**	-6.556***	-0.112***	-3.616**	-0.275**	-6.556***
		(0.017)	(0.000)	(0.002)	(0.037)	(0.013)	(0.000)
USGAAP						-0.235***	-3.173**
						(0.008)	(0.037)
YEAR13_USGAAP	+ (H1:DiD)					0.149*	2.701*
						(0.093)	(0.053)
YEAR14_USGAAP	+ (H1:DiD)					0.135	2.995*
						(0.192)	(0.055)
YEAR15_USGAAP	+ (H1:DiD)					0.111	3.042
						(0.314)	(0.125)
YEAR16_USGAAP	+ (H1:DiD)					0.139	2.707
						(0.246)	(0.178)
YEAR17_USGAAP	+ (H1:DiD)					0.163	2.940
						(0.149)	(0.198)
N		145	142	116	110	261	252
SE clustering		By dealer	By dealer	By dealer	By dealer	By dealer	By dealer
Firm FE		Yes	Yes	Yes	Yes	Yes	Yes
Intercept		Yes	Yes	Yes	Yes	Yes	Yes
Adjust. R sq.		0.447	0.733	0.850	0.818	0.618	0.780

TABLE 2 (continued)

Panel B: Difference-in-differences estimation distinguishing entire post-treatment period from 2012

POST	- (H1:IFRS)	-0.196*	-5.137***	-0.0556*	-2.240*	-0.196**	-5.137***
		(0.054)	(0.001)	(0.071)	(0.056)	(0.047)	(0.000)
USGAAP						-0.236***	-3.189**
						(0.007)	(0.032)
POST_USGAAP	+ (H1:DiD)					0.140	2.896
						(0.168)	(0.101)
N		145	142	116	110	261	252
SE clustering		By dealer	By dealer	By dealer	By dealer	By dealer	By dealer
Firm FE		Yes	Yes	Yes	Yes	Yes	Yes
Intercept		Yes	Yes	Yes	Yes	Yes	Yes
Adjust. R sq.		0.433	0.695	0.832	0.794	0.603	0.749

Notes: Panel A of this table reports estimations of equation (1), which distinguishes each post-treatment year in 2013-2017 from the pre-treatment year 2012. Columns (1) and (2) of this table report the estimations of a nested version of equation (1) that only includes the year indicators as explanatory variables on the observations for IFRS dealers only. These columns provide the differences in net derivatives leverage (*NetDerLev*, column 1) and net minus gross derivatives leverage (*GroMinNetDerLev*, column 2) for the sample IFRS dealers. Columns (3) and (4) report the estimations of the same nested equation for the observations for US GAAP dealers only. Columns (5) and (6) report the estimation of the full equation (1) and provide the difference-in-differences results for the observations for both sets of dealers. The columns of Panel B report analogous tests using a single indicator for the entire post-treatment period (i.e., standard difference-in-differences models). All variables are defined in Appendix 2. Statistically significant differences and difference-in-differences are indicated by *, **, and *** for $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

TABLE 3
Pearson Correlations

	CDS1y	CDS5y	CDS1y5y	NonDerLev	NetDerLev	GroMinNetDerLev	QUAL	USGAAP	Size	ROA	NPL
CDS1y	1.000										
CDS5y	0.814***	1.000									
CDS1y5y	0.688***	0.355***	1.000								
NonDerLev	0.536***	0.277***	0.183***	1.000							
NetDerLev	0.291***	0.168**	0.054	0.558***	1.000						
GroMinNetDerLev	0.128*	0.236***	-0.146**	0.308***	0.671***	1.000					
QUAL	-0.048	-0.134*	-0.001	0.357***	0.127**	-0.092	1.000				
USGAAP	-0.110	-0.086	-0.069	-0.394***	-0.182***	-0.129**	-0.490***	1.000			
Size	-0.145**	-0.133*	-0.142**	0.281***	0.371***	0.498***	0.343***	-0.508***	1.000		
ROA	-0.478***	-0.363***	-0.170**	-0.460***	-0.353***	-0.396***	-0.098	0.417***	-0.271***	1.000	
NPL	0.326***	0.382***	0.115	0.100	-0.052	-0.062	0.072	-0.418***	0.156**	-0.392***	1.000
N	*282*										

Notes: This table reports the Pearson correlations for the variables in equation (2). All variables are defined in Appendix 2. Statistically significant correlations are indicated by *, **, and *** for $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

TABLE 4
Leverage Components, Disclosure Quality, and Credit Risk Uncertainty

Panel A: Primary Results

	Predicted coefficient	(1) CDS1y5y	(2) CDS1y	(3) CDS5y
NonDerLev		0.0043*	2.428**	0.896
		(0.076)	(0.023)	(0.163)
NetDerLev	+ (H2)	0.585***	197.300**	131.500*
		(0.006)	(0.019)	(0.090)
GroMinNetDerLev		-0.016*	-4.046	-0.386
		(0.051)	(0.109)	(0.903)
QUAL		0.014	4.054	10.440*
		(0.372)	(0.513)	(0.073)
NetDerLev*QUAL	- (H3)	-0.152***	-51.139**	-39.240*
		(0.005)	(0.018)	(0.059)
GroMinNetDerLev*QUAL		0.002	0.561	0.089
		(0.422)	(0.417)	(0.920)
Size		0.008	-6.765	-9.645
		(0.623)	(0.214)	(0.108)
ROA		-5.808*	-2969.700***	-3633.400***
		(0.061)	(0.010)	(0.000)
NPL		0.462	521.100*	832.300***
		(0.521)	(0.068)	(0.007)
N		180	180	190
SE Clustering		By dealer	By dealer	By dealer
Fixed effects				
Documentation (restructuring) clause		Yes	Yes	Yes
Year		Yes	Yes	Yes
Intercept		Yes	Yes	Yes
Adjust. R sq.		0.416	0.593	0.530

TABLE 4 (Continued)

Panel B: Controlling Interactively for US GAAP

	Predicted coefficient	(1) CDS1y5y	(2) CDS1y	(3) CDS5y
NonDerLev		0.00310	2.256**	1.013
		(0.182)	(0.028)	(0.154)
NetDerLev	+ (H2)	1.068***	306.6**	71.24
		(0.004)	(0.026)	(0.685)
GroMinNetDerLev		-0.0374***	-5.621	3.811
		(0.003)	(0.165)	(0.617)
QUAL		0.0176	10.33	9.927
		(0.258)	(0.122)	(0.173)
NetDerLev*QUAL	- (H3)	-0.275***	-78.07**	-24.56
		(0.003)	(0.020)	(0.586)
GroMinNetDerLev*QUAL		0.00703**	0.932	-0.849
		(0.015)	(0.342)	(0.655)
USGAAP		-0.0424	22.38*	2.929
		(0.235)	(0.071)	(0.840)
NetDerLev*USGAAP		-0.344*	-102.6	49.04
		(0.096)	(0.181)	(0.678)
GroMinNetDerLev*USGAAP		0.0152**	1.868	-3.307
		(0.050)	(0.483)	(0.487)
Size		0.00541	-6.123	-9.310
		(0.723)	(0.235)	(0.119)
ROA		-6.566*	-2930.7**	-3440.8***
		(0.057)	(0.012)	(0.001)
NPL		0.134	531.300*	888.3***
		(0.857)	(0.070)	(0.006)
N		180	180	190
SE Clustering		By dealer	By dealer	By dealer
Fixed effects				
Documentation (restructuring) clause		Yes	Yes	Yes
Year		Yes	Yes	Yes
Intercept		Yes	Yes	Yes
Adjust. R sq.		0.444	0.602	0.529

TABLE 4 (Continued)

Panel C: Controlling Interactively for the Rank of NetDerLev/GroMinNetDerLev

	Predicted coefficient	(1) CDS1y5y	(2) CDS1y5y
NonDerLev		0.006**	0.005*
		(0.049)	(0.069)
NetDerLev	+(H2)	0.291**	0.206*
		(0.033)	(0.075)
NetGroRank		0.0363	-0.014
		(0.596)	(0.822)
NetDerLev*NetGroRank		0.387*	0.252
		(0.083)	(0.268)
QUAL		0.012	0.012
		(0.497)	(0.479)
NetDerLev*QUAL	-(H3)	-0.161***	-0.104**
		(0.009)	(0.047)
Size			0.002
			(0.908)
ROA			-4.544
			(0.142)
NPL			0.781
			(0.305)
N		185	180
SE Clustering		By dealer	By dealer
Fixed effects			
Documentation (restructuring) clause		Yes	Yes
Year		Yes	Yes
Intercept		Yes	Yes
Adjust. R sq.		0.276	0.396

Notes: Panel A of this table reports OLS estimations of equation (2) with dependent variable *CDS1y5y*, *CDS1y* (the numerator of *CDS1y5y*), and *CDS5y* (the denominator of *CDS1y5y*) in columns (1)-(3), respectively. Panel B reports OLS estimations of expansions of the models in Panel A that include the indicator variable *US GAAP* linearly and interacted with *NetDerLev* and *GroMinNetDerLev*. Panel C reports OLS estimations of OLS estimations of models similar to that in column (1) of Panel A but that exclude *GroMinNetDerLev* and instead include the ratio of *NetDerLev* to *GroMinNetDerLev*, denoted *NetGroRank*, linearly and interacted with *NetDerLev*. The model in column (1) of Panel C also excludes the three control variables. All models include fixed effects for the CDS documentation clause and year, and calculate standard errors clustering observations by dealer. All variables are defined in Appendix 2. Statistically significant coefficients are indicated by *, **, and *** for $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

TABLE 5
Summary Statistics
IFRS and US GAAP Subsamples of New York Federal Reserve Primary Dealer and Entropy Balanced Samples

	NYFed Primary Dealer Sample			Entropy Balanced Sample		
	IFRS	*US GAAP*	Difference in means	*IFRS*	*US GAAP*	Difference in means
	Mean (count)	Mean (count)	*(t-statistic)*	Mean (count)	Mean (count)	*(t-statistic)*
CDS Spread variables (dependent variables in equation (2))						
CDS1y	27.634 (46)	26.252 (48)	1.382 *(0.40)*	37.946 (115)	42.980 (77)	-5.034 *(-0.43)*
CDS5y	77.246 (53)	80.232 (48)	-2.986 *(-0.46)*	95.601 (125)	124.994 (78)	-29.393 *(-1.30)*
CDS1y5y	0.358 (46)	0.333 (48)	0.025 *(0.95)*	0.353 (115)	0.582 (77)	-0.228** *(-2.02)*
Leverage variables (dependent variables in equation (1) and/or main regressors in equation (2))						
NonDerLev	20.522 (60)	15.267 (53)	5.256*** (6.48)	21.994 (148)	22.194 (118)	-0.200 *(-0.04)*
NetDerLev	0.383 (60)	0.413 (47)	-0.030 (-0.66)	0.340 (143)	0.422 (110)	-0.083 *(-0.97)*
GroMinNetDerLev	6.374 (57)	8.189 (47)	-1.815* (-1.68)	4.921 (142)	6.431 (110)	-1.510 *(-1.14)*
Interactive variables (in equations (1) or (2))						
QUAL	3.600 (60)	2.111 (54)	1.489*** *(11.25)*	3.358 (148)	3.207 (119)	0.151 *(0.21)*
Control variables (in equation (2))						
Size	14.035 (60)	13.612 (54)	0.424** *(2.43)*	13.747 (148)	17.092 (119)	-3.346 *(-0.99)*
ROA	0.004 (60)	0.006 (54)	-0.002** *(-2.51)*	0.003 (148)	0.007 (119)	-0.004* *(-1.86)*
NPL	0.009 (60)	0.005 (42)	0.004*** *(2.70)*	0.020 (147)	0.007 (108)	0.013*** *(4.68)*
Total assets (in USD billions)	1,431.93 (60)	1,242.99 (54)	188.94 *(1.32)*	1,118.94 (148)	1,355.22 (119)	-236.29 *(-0.87)*

Notes: This table reports the means of the variables in equations (1) and/or (2) for the IFRS and US GAAP dealer subsamples of the NYFed primary dealer sample in the first two columns and of the entropy balanced sample in the fourth and fifth columns. t tests of the differences of the variable means across each of the two pairs of subsamples are reported in the third and sixth columns. NYFed primary dealers are listed in Appendix 3. In the entropy balance sample, the first and second moments of *Size*, trading derivative assets, and the ratio of derivative liabilities to derivative assets for the US GAAP dealer control observations are matched to those of the IFRS dealer treatment observations. All variables are defined in Appendix 2.

TABLE 6
Tests of Decreases in Gross Minus Net Derivatives Leverage and Net Derivatives Leverage for New York Federal Reserve IFRS and US GAAP Primary Dealers from Pre versus Post the 2013 Disclosure Requirements

		IFRS Dealers		US GAAP Dealers		Difference in Differences	
	Predicted coefficient	(1) NetDerLev	(2) GroMinNetDerLev	(3) NetDerLev	(4) GroMinNetDerLev	(5) NetDerLev	(6) GroMinNetDerLev
POST	- (H1:IFRS)	-0.193*	-6.893**	-0.136***	-4.774**	-0.193*	-6.893***
		(0.085)	(0.010)	(0.005)	(0.044)	(0.065)	(0.004)
USGAAP						-0.197**	-3.901
						(0.035)	(0.114)
POST_USGAAP	+ (H1:DiD)					0.0576	2.119
						(0.584)	(0.461)
N		60	57	47	47	107	104
SE clustering		By dealer	By dealer	By dealer	By dealer	By dealer	By dealer
Firm FE		Yes	Yes	Yes	Yes	Yes	Yes
Intercept		Yes	Yes	Yes	Yes	Yes	Yes
Adjust. R sq.		0.609	0.731	0.721	0.606	0.641	0.682

Notes: This table reports estimations of nested versions of equation (1) that include the single indicator *POST* for the entire post-treatment period (i.e., standard difference-in-differences models) for the NYFed primary dealer sample. Columns (1) and (2) of this table report the estimations of a nested version of equation (1) that only includes *POST* for the IFRS dealer subsample of the NYFED sample. These columns provide the difference in net derivatives leverage (*NetDerLev*, column 1) and net minus gross derivatives leverage (*GroMinNetDerLev*, column 2) for these IFRS dealers from the pre- to the post-treatment period. Columns (3) and (4) report the estimations of the same two equations for the US GAAP dealer subsample of the NYFed sample. Columns (5) and (6) report the estimation of models that include USGAAP and POST*USGAAP which provide the difference-in-differences for the two sets of dealers in the NYFed sample. All variables are defined in Appendix 2. Statistically significant differences and difference-in-differences are indicated by *, **, and *** for $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

TABLE 7
Leverage Components, Disclosure Quality, and Credit Risk Uncertainty
New York Federal Reserve Primary Dealers Sample and Entropy Balancing

		New York Fed Primary Dealers	Entropy Balancing
	Predicted coefficient	(1) CDS1y5y	(2) CDS1y5y
NonDerLev		0.00342	0.00296
		(0.503)	(0.124)
NetDerLev	+(H2)	0.540**	0.760**
		(0.019)	(0.013)
GroMinNetDerLev		-0.00842	-0.0109
		(0.247)	(0.280)
QUAL		0.0706**	0.0438
		(0.015)	(0.374)
NetDerLev_QUAL	-(H3)	-0.171**	-0.198**
		(0.029)	(0.020)
GroMinNetDerLev_QUAL		0.000483	0.00132
		(0.833)	(0.712)
Size		0.0592**	0.00339
		(0.019)	(0.912)
ROA		-8.912**	-8.443***
		(0.021)	(0.005)
NPL		-4.380**	0.797
		(0.012)	(0.216)
N		87	180
SE Clustering		By dealer	By dealer
Fixed effects			
Documentation (restructuring) clause		Yes	Yes
Year		Yes	Yes
Intercept		Yes	Yes
Adjust. R sq.		0.489	0.450

Notes: This table reports OLS estimations of equation (2) with dependent variable *CDS1y5y* on the NYFed primary dealer sample in column (1) and the entropy balanced sample in which to the first and second moments of *Size*, trading derivative assets, and the ratio of derivatives liabilities to derivatives assets in the control subsample of US GAAP dealer observations are matched to those of the treatment subsample of IFRS dealer observations. All models include fixed effects for the CDS documentation clause and year, and calculate standard errors clustering observations by dealer. All variables are defined in Appendix 2. Statistically significant coefficients are indicated by *, **, and *** for $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

APPENDIX 1

Sample Disclosures for IFRS and US GAAP Dealers from 2013 Annual Reports

IFRS Dealer Example: UBS Group AG

Note 26 Offsetting financial assets and financial liabilities (continued)

The table below provides a summary of financial assets subject to offsetting, enforceable master netting arrangements and similar agreements, as well as financial collateral received to mitigate credit exposures for these financial assets. The gross financial assets of the Group that are subject to offsetting, enforceable netting arrangements and similar agreements are reconciled to the net amounts presented within the associated balance sheet line, after giving effect to financial liabilities with the same counterparties that have been offset on the balance sheet and other financial assets not subject to an enforceable netting arrangement or similar agreement. Further, related amounts for financial liabilities and collateral received that are not offset on the balance sheet are shown to arrive at financial assets after consideration of netting potential.

Financial assets subject to offsetting, enforceable master netting arrangements and similar agreements

31.12.13

	Assets subject to netting arrangements			Netting potential not recognized in the balance sheet[3]			add to both item a and d	
	item a	item b	Assets recognized on the balance sheet, net	item d	item d	item e	Assets not subject to enforceable netting arrangements and other out-of-scope items	item c
CHF billion	Gross assets before balance sheet netting	Balance sheet netting with gross liabilities[2]		Financial liabilities	Collateral received	Assets after consideration of netting potential		Total assets recognized on the balance sheet
Cash collateral on securities borrowed	26.5	0.0	26.5	(1.2)	(25.2)	0.2	1.0	27.5
Reverse repurchase agreements	111.5	(25.4)	86.1	(5.4)	(80.7)	0.0	5.5	91.6
Positive replacement values	240.7	(7.2)	233.5	(185.0)	(35.1)	13.4	12.3	245.8
Cash collateral receivables on derivative instruments[1]	223.8	(200.2)	23.5	(14.2)	(1.1)	8.2	4.5	28.0
Financial assets designated at fair value	3.9	0.0	3.9	0.0	(3.9)	0.1	3.4	7.4
Total assets	606.4	(232.9)	373.5	(205.8)	(145.9)	21.8	26.7	400.3

31.12.12

	Assets subject to netting arrangements			Netting potential not recognized in the balance sheet[3]				
CHF billion	Gross assets before balance sheet netting	Balance sheet netting with gross liabilities[2]	**Assets recognized on the balance sheet, net**	Financial liabilities	Collateral received	Assets after consideration of netting potential	**Assets not subject to enforceable netting arrangements and other out-of-scope items**	**Total assets recognized on the balance sheet**
Cash collateral on securities borrowed	37.4	0.0	**37.4**	(2.7)	(34.4)	0.3	**0.0**	**37.4**
Reverse repurchase agreements	154.5	(34.8)	**119.7**	(9.6)	(110.1)	0.0	**11.2**	**130.9**
Positive replacement values	416.8	(14.6)	**402.1**	(327.3)	(57.3)	17.5	**16.8**	**419.0**
Cash collateral receivables on derivative instruments[1]	351.8	(331.8)	**20.1**	(17.4)	0.0	2.7	**10.2**	**30.4**
Financial assets designated at fair value	4.6	0.0	**4.6**	0.0	(4.5)	0.1	**4.5**	**9.1**
Total assets	**965.1**	**(381.2)**	**583.9**	**(357.1)**	**(206.3)**	**20.6**	**42.8**	**626.8**

1 The amount of Cash collateral receivables on derivative instruments recognized on the balance sheet, net, includes certain OTC derivatives which are in substance net settled on a daily basis under IAS 32 and ETD derivatives which are economically settled on a daily basis. In addition, this balance includes OTC and ETD cash collateral balances which correspond with the cash portion of collateral pledged, reflected on the Negative replacement values line in the table presented on the following page. 2 The logic of the table results in amounts presented in the "Balance sheet netting with gross liabilities" column corresponding directly to the amounts presented in the "Balance sheet netting with gross assets" column in the liabilities table presented on the following page. 3 For the purpose of this disclosure, the amounts of financial instruments and cash collateral not set off in the balance sheet have been capped by relevant netting agreement so as not to exceed the Net amount of financial assets presented on the balance sheet, i.e., over-collateralization, where it exists, is not reflected in the table.

US GAAP Dealer Example: JPMorgan Chase & Co

The following table presents, as of December 31, 2013 and 2012, the gross and net derivative receivables by contract and settlement type. Derivative receivables have been netted on the Consolidated Balance Sheets against derivative payables to the same counterparty with respect to derivative contracts for which the Firm has obtained an appropriate legal opinion with respect to the master netting agreement. Where such a legal opinion has not been either sought or obtained, the receivables are not eligible under U.S. GAAP for netting against related derivative payables on the Consolidated Balance Sheets, and are shown separately in the table below.

	2013			2012		
December 31, (in millions)	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables
U.S. GAAP nettable derivative receivables						
Interest rate contracts:						
Over-the-counter ("OTC")[a]	**$ 486,449**	**$ (466,493)**	**$ 19,956**	$ 794,282	$ (771,449)	$ 22,833
OTC-cleared	**362,426**	**(362,404)**	**22**	491,947	(491,678)	269
Exchange traded[b]	**–**	**–**	**–**	–	–	–
Total interest rate contracts	**848,875**	**(828,897)**	**19,978**	1,286,229	(1,263,127)	23,102
Credit contracts:						
OTC	**66,269**	**(65,725)**	**544**	90,744	(90,104)	640
OTC-cleared	**16,841**	**(16,279)**	**562**	8,471	(8,471)	–
Total credit contracts	**83,110**	**(82,004)**	**1,106**	99,215	(98,575)	640
Foreign exchange contracts:						
OTC[a]	**148,953**	**(136,763)**	**12,190**	141,053	(133,088)	7,965
OTC-cleared	**46**	**(46)**	**–**	23	(23)	–
Exchange traded[b]	**–**	**–**	**–**	–	–	–
Total foreign exchange contracts	**148,999**	**(136,809)**	**12,190**	141,076	(133,111)	7,965
Equity contracts:						
OTC[a]	**31,870**	**(29,289)**	**2,581**	26,025	(24,645)	1,380
OTC-cleared	**–**	**–**	**–**	–	–	–
Exchange traded[b]	**17,732**	**(11,415)**	**6,317**	12,841	(8,768)	4,073
Total equity contracts	**49,602**	**(40,704)**	**8,898**	38,866	(33,413)	5,453
Commodity contracts:						
OTC[a]	**21,619**	**(15,082)**	**6,537**	26,850	(20,729)	6,121
OTC-cleared	**–**	**–**	**–**	–	–	–
Exchange traded[b]	**12,528**	**(11,212)**	**1,316**	15,108	(12,407)	2,701
Total commodity contracts	**34,147**	**(26,294)**	**7,853**	41,958	(33,136)	8,822
Derivative receivables with appropriate legal opinion	**$ 1,164,733**	item b **$ (1,114,708)** [c]	**$ 50,025**	$ 1,607,344	$ (1,561,362) [c]	$ 45,982
Derivative receivables where an appropriate legal opinion has not been either sought or obtained	**15,734**		**15,734**	29,001		29,001
Total derivative receivables recognized on the Consolidated Balance Sheets	item a **$ 1,180,467**		item c **$ 65,759**	$ 1,636,345		$ 74,983

(a) The prior period amounts have been revised. This revision had no impact on the Firm's Consolidated Balance Sheets or its results of operations.
(b) Exchange traded derivative amounts that relate to futures contracts are settled daily.
(c) Included netted cash collateral payables of $63.9 billion and $79.2 billion at December 31, 2013, and December 31, 2012, respectively.

Derivative receivable collateral

	2013			2012		
December 31, (in millions)	Net derivative receivables	Collateral not nettable on the Consolidated balance sheets	Net exposure	Net derivative receivables	Collateral not nettable on the Consolidated balance sheets	Net exposure
Derivative receivables with appropriate legal opinions	**$ 50,025**	**$ (12,414)** [a]	**$ 37,611**	$ 45,982	$ (11,350) [a]	$ 34,632

item d

JPMorgan Chase also includes similar tables for derivatives payables and derivatives collateral payables.

APPENDIX 2
Definitions of Variables

Variable	Description	Source
Derivatives		
GroDerAss (GroDerLiab)	Fully gross fair value of derivative assets (liabilities) before any netting	Post-2013 disclosure requirements Hand collected (see Figure 1)
GroMinRepDerAss (GroMinRepDerLiab)	Fair value of derivative assets (liabilities) netted on the balance sheet in accordance with applicable balance sheet presentation requirements	
RepDerAss (RepDerLiab) Post-2013 disclosure requirements	Fair value of derivative assets (liabilities) reported on the balance sheet	
RepMinNetDerAss (RepMinNetDerLiab)	Fair value of derivative assets (liabilities) subject to enforceable MNAs but not netted on the balance sheet, including financial collateral	
NetDerAss (NetDerLiab)	Fully net fair value of derivative assets (liabilities)	
Leverage measures and components		
TAss	Total assets minus intangibles (data52500)	Bankfocus following Blankespoor et al. (2013) Hand collected and Bankfocus
TCE	Shareholders equity (also book value) minus intangibles minus preferred equity (data63300 - data52500 - data62100)	
NonDerLev	(TAss – RepDerAss)/TCE	
NetDerLev	(NetDerAss)/TCE	
GroDerLev	(GroDerAss)/TCE	
GroMinNetDerLev	(GroDerAss-NetDerAss)/TCE	
GroMinRepDerLev	(GroDerAss-RepDerAss)/TCE	
RepMinNetDerLev	(RepDerAss-NetDerAss)/TCE	
Risk variables		
CDS1y	1year CDS Spread in basis points (as Markit includes more than just one spread, we select the spread which is most frequently available per id based on three criteria: (1) tier group, (2) docclause definition, and (3) currency)	WRDS Markit
CDS5y	5year CDS Spread in basis points (as Markit includes more than just one spread, we select the spread which is most frequently available per id based on three criteria: (1) tier group, (2) docclause definition, and (3) currency)	WRDS Markit
CDS1y5y	Ambiguity about credit risk calculated by the ratio of 1year CDS spreads to 5year CDS spreads	WRDS Markit following Duffie and Lando (2001) and Kim et al. (2013)

Control variables		
Size	Bank size calculated as the natural logarithm of total assets	Handcollected and Bankfocus following Blankespoor et al. (2013)
ROA	Return on assets calculated as net income divided by total assets (data94300/TA)	Bankfocus following Ahmed et al. (2011) and Blankespoor et al. (2013)
NPL	Non-performing loans calculated as total impaired/non-performing loans divided by total assets (data80380/TA)	Bankfocus following Ahmed et al. (2011)
Interactive variables		
QUAL	Index capturing the quality of disclosures following the 2013 amendment. Values range from 0 to 4 with 0 being the lowest "quality and readability" of the related offsetting information and 4 being the highest (see Appendix 5).	Hand collection
US GAAP	An indicator variable that equals one if the dealer reports under US GAAP and zero otherwise	Hand collection
Docclause	Fixed effects for the four types of restructuring clauses (called 'doc clauses') in CDS contracts following ISDA (2014): XR (no restructuring), CR (old/full restructuring), MR (modified restructuring), and MM (modified-modified restructuring).	WRDS Markit following Callen et al. (2009)

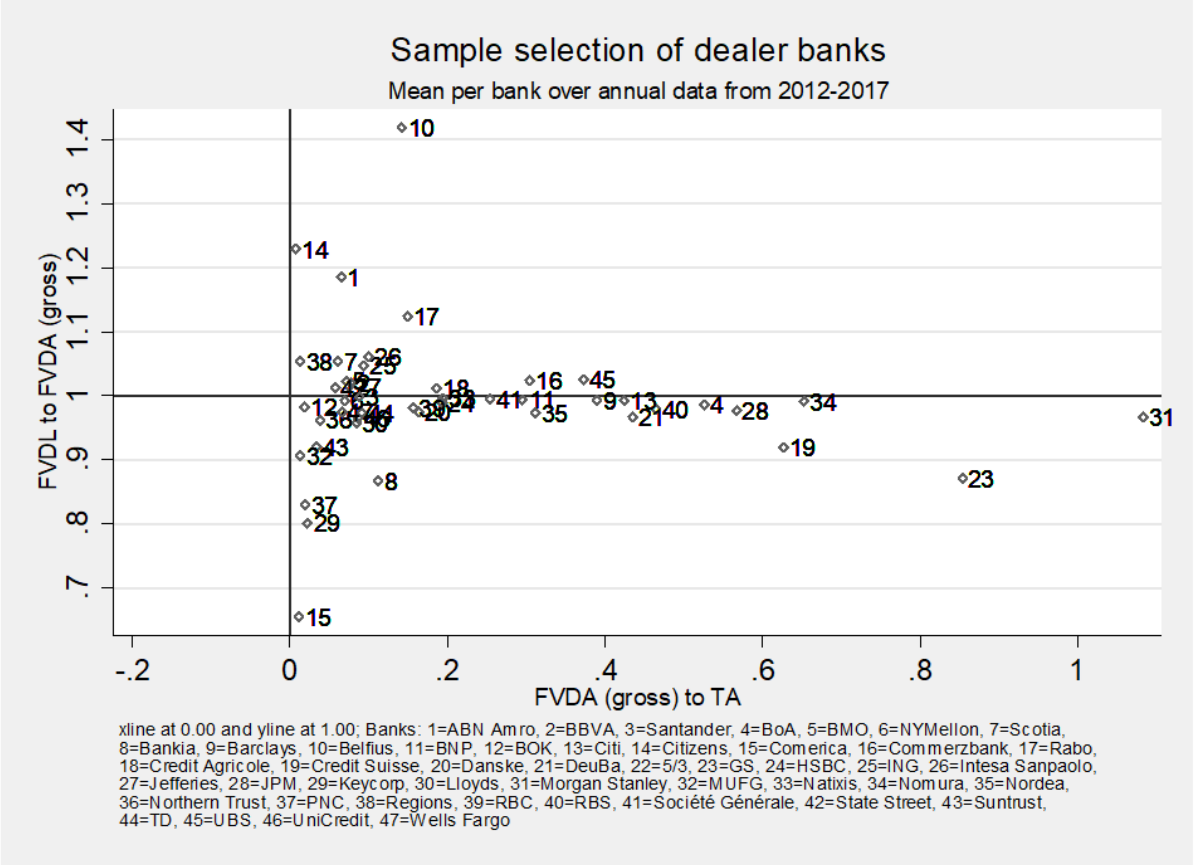
APPENDIX 3
List of Dealers

#	Ultimate owner	Accounting	Source
1	ABN AMRO Group N.V.	IFRS	AFME
2	Banco Bilbao Vizcaya Argentaria SA-BBVA	IFRS	AFME/ FFIEC
3	Banco Santander SA	IFRS	AFME
4	Bank of America Corporation	USGAAP	NYFED/ FFIEC
5	Bank of Montreal-Banque de Montreal	IFRS	NYFED
6	Bank of New York Mellon Corporation	USGAAP	FFIEC AFME (Members)
7	Bank of Nova Scotia (The) - SCOTIABANK	IFRS	AFME/ NYFED
8	Bankia, SA	IFRS	AFME (Members)
9	Barclays Plc	IFRS	AFME/ NYFED/ FFIEC
10	Belfius Banque SA/NV-Belfius Bank SA/NV (in October 2011, when Dexia Belgium Bank separated from Dexia)	IFRS	AFME (Members)
11	BNP Paribas	IFRS	AFME/ NYFED/ FFIEC
12	BOK Financial Corporation	USGAAP	FFIEC
13	Citigroup Inc	USGAAP	AFME/ NYFED/ FFIEC
14	Citizens Financial Group Inc.	USGAAP	FFIEC
15	Comerica Incorporated	USGAAP	FFIEC
16	Commerzbank AG	IFRS	AFME
17	Cooperatieve Rabobank U.A.	IFRS	AFME
18	Crédit Agricole S.A.	IFRS	AFME
19	Credit Suisse Group AG	USGAAP	AFME/ NYFED
20	Danske Bank A/S	IFRS	AFME
21	Deutsche Bank AG	IFRS	AFME/ NYFED/ FFIEC
22	Fifth Third Bancorp	USGAAP	FFIEC
23	Goldman Sachs Group, Inc	USGAAP	AFME/ NYFED/ FFIEC
24	HSBC Holdings Plc	IFRS	AFME/ NYFED/ FFIEC
25	ING Groep NV	IFRS	AFME
26	Intesa Sanpaolo	IFRS	AFME
27	Jefferies Group LLC	USGAAP	AFME/ NYFED
28	JPMorgan Chase & Co	USGAAP	AFME/ NYFED/ FFIEC
29	KeyCorp	USGAAP	FFIEC
30	Lloyds Banking Group Plc	IFRS	AFME (Members)
31	Morgan Stanley	USGAAP	AFME/ NYFED/ FFIEC

32	MUFG Americas Holdings Corporation	USGAAP	FFIEC
33	Natixis SA	IFRS	AFME
34	Nomura Holdings Inc	USGAAP	AFME/ NYFED
35	Nordea Bank AB (publ)	IFRS	AFME (Members)
36	Northern Trust Corporation	USGAAP	FFIEC
37	PNC Financial Services Group Inc	USGAAP	FFIEC
38	Regions Financial Corporation	USGAAP	FFIEC
39	Royal Bank of Canada	IFRS	AFME (Members)/ NYFED
40	Royal Bank of Scotland Group Plc (The)	IFRS	AFME/ NYFED/ FFIEC
41	Société Générale SA	IFRS	AFME
42	State Street Corporation	USGAAP	FFIEC
43	SunTrust Banks, Inc.	USGAAP	FFIEC
44	Toronto Dominion Bank	IFRS	NYFED
45	UBS Group AG	IFRS	AFME/ NYFED
46	UniCredit SpA	IFRS	AFME
47	Wells Fargo & Company	USGAAP	NYFED/ FFIEC

Notes: This table lists the 47 sample dealers, whether they report under IFRS or US GAAP, and the source from which we identified them. We identified each dealer (a subsidiary, legal entity, or holding company related to the ultimate owner that we analyze empirically) from one of three sources: (1) the Association for Financial Markets in Europe's lists of "Primary Dealers" and "Members" (AFME); (2) the New York Federal Reserve's list of "Primary Dealers" (NYFED); and (3) the Federal Financial Institutions Examination Council's list of "Holding Companies with Assets Greater than $10 Billion", requiring that their ratio of trading derivatives liabilities to trading derivative assets is between 0.80 and 1.20 (indicating that their trading derivatives books are fairly close to matched, consistent with dealing rather than speculation or hedging), the ratio of their trading derivative assets to their total assets exceeds 0.5% (indicating that they do a reasonable amount of dealing), and their ultimate owner reports under US GAAP (FFIEC).

APPENDIX 4
Dealer Heterogeneity



Notes: This figure plots, for each of the 47 sample dealers during 2012–2017, the mean of gross derivative liabilities fair value (*GroDerLiab*) divided by gross derivative assets fair value (*GroDerAss*), a measure of the matching of their derivatives books, on the vertical axis against the mean ratio of *GroDerAss* to total assets, a measure of derivatives activity, on the horizontal activity.

APPENDIX 5
Disclosure Quality Index

This appendix explains how we developed *QUAL*, the index of the transparency of dealers' disclosures under the 2013 requirements that we use in testing H3. *QUAL* is based on our evaluation of four dimensions of the disclosures in each dealer's 2017 financial report, because the way in which these disclosures are provided is highly sticky for a given dealer in its 2013–2017 financial reports. We selected these dimensions as capturing the range of the informativeness and readability of dealers' disclosures from our reading of all of the disclosures in their 2013–2017 financial reports in the process of hand collecting the reported fair value amounts. We frame each of these dimensions as a yes/no question, coding a more transparent disclosure (yes) as one and less transparent disclosure (no) as zero. The table below reports the number of dealers, in total and IFRS versus US GAAP, providing disclosure that satisfy each dimension.

	Dimension/Question	***Coding (# of dealers)***	
		0 (No)	***1 (Yes)***
1	Is the information mentioned as its own subsection in the table of contents of the notes to the financial statements? (I.e., is the information easily findable?)	Full: 26 IFRS: 9 US GAAP: 17	Full: 21 IFRS: 17 US GAAP: 4
2	Is the information provided in structured list or table? (I.e., is the information presented in an easily readable/scannable fashion?)	Full: 8 IFRS: 1 US GAAP: 7	Full: 39 IFRS: 25 US GAAP: 14
3	Is the information for derivatives provided or summarized in a single line? (I.e., does the information require pre-processing by the user?)	Full: 10 IFRS: 5 US GAAP: 5	Full: 37 IFRS: 21 US GAAP: 16
4	Are all five disclosures specified in the 2013 disclosure requirements provided for both financial assets and financial liabilities? (I.e., does it provide all required information?)	Full: 6 IFRS: 2 US GAAP: 4	Full: 41 IFRS: 24 US GAAP: 17

QUAL is the sum of our coding of the four dimensions/questions, and thus takes a value from 0 (lowest transparency) to 4 (highest transparency).