



Collateralized Loan Obligations: A Historical Analysis of a Modern Narrative

Author: Christian Mosdal Bretschneider, 71394

Program: MSc International Business and Politics

Type of Paper: Master's Thesis

Supervisor: Per H. Hansen

Date of Submission 16/09/2019

Pages: 64

STU: 145487

Table of Contents:

- 1. Introduction - Page 3**
- 2. Introduction to Securitization, CDOs, and CLOs - Page 5**
 - 2.1 Securitization & SIVs - Page 5**
 - 2.2 Collateralized Debt Obligations (CDOs) - Page 6**
 - 2.3 Mortgage Backed CDOs - Page 9**
 - 2.4 CDS Based CDOs - Page 11**
 - 2.5 Collateralized Loan Obligations (CLOs) - Page 12**
 - 2.6 Considerations & Exceptions - Page 14**
- 3. Literature Review - Page 14**
- 4. Methodology and Analytical Strategy - Page 19**
- 5. Theory - Page 20**
- 6. Benefits of CDOs and CLOs - Page 21**
- 7. Evolution and Supply Chains - Page 24**
 - 7.1 Historical Background - Page 24**
 - 7.2 The Evolution of Pre-Crisis CDOs - Page 26**
 - 7.3 Mortgage CDO Supply Chain - Page 29**
 - 7.4 The Evolution of CLOs - Page 3**
 - 7.5 CLO Supply Chain - Page 32**
- 8. Analysis I: The Narrative Itself - Page 33**
 - 8.1. Empirical Evidence for the Narrative - Page 33**
 - 8.2 Narrative Articulation - Page 37**
 - 8.3 Historical Level Analysis - Page 39**
 - 8.4 Narrative Level Analysis - Page 45**
- 9. Analysis II: Evaluating the Narrative - Page 48**
 - 9.1 Similarities Between Pre-Crisis CDOs and Modern CLOs - Page 49**
 - 9.2 Differences Between Pre-Crisis CDOs and Modern CLOs - Page 52**
 - 9.3 Market & Regulatory Changes Since the GFC - Page 55**
- 10. Conclusion - Page 60**
- 11. Discussion & Limitations - Page 61**

Abstract:

This paper investigates the current narratives surrounding collateralized loan obligations using a theoretical approach to narrative analysis directed by literature from Magnussen and Hansen. The first portion of the paper gives an introduction to the assets that are relevant for analysis of the narrative, such as various types of CDOs including CLOs and synthetic variations. Securitization and how it relates to these products is also discussed. The evolutions and supply chains that serve to create these assets are also included as they provide crucial context and components to be used in the analysis sections. The first analysis section utilizes the three levels of analysis to be used in understanding narratives as presented by Magnussen. The first isolates what the narrative surrounding CLOs actually consists of. In summary, there is currently a narrative that collateralized loan obligations are simply a rehash of pre crisis CDOs, and are therefore destined to end in the same turmoil. The historical level analysis takes a departure from Magnussen's method, as the narrative at hand in this paper is one which describes the future, rather than the past. Therefore the paper looks at the roots of the narrative instead and considers the role of CDOs played in the Global Financial Crisis. The final level of this analysis looks at what the narrative is *used* for, what is left unsaid, and what conclusions can be drawn from it. The second analysis contained within this paper evaluates the narrative to determine to what degree the narrative makes sense. The findings of this paper are that there are similarities between pre crisis CDOs and modern CLOs, but the narrative as purported by many of its commentators is often imprecise and plagued by a lack of a deeper understanding of structured finance. With this in mind, clear similarities between pre crisis CDOs and modern CLOs certainly do exist. Within this paper are two separate methodological approaches, as required by the two different styles and requirements of the two analysis sections. The first analysis using Magnussen's directives are constructivist in nature, while the second analysis that seeks to determine how credible the narrative is uses a realist approach.

Collateralized Loan Obligations: A Historical Analysis of a Modern Narrative

1. Introduction

Collateralized Debt Obligations (CDOs) are an asset-backed security created in order to tailor to the risk profiles of investors where the underlying asset can vary greatly from corporate debt, mortgages, to even movie revenues. (Griffin, 2010) In the case of CDOs, interest payments resulting from the underlying assets are then “tranching” in such a way that investors can invest in notes that match their particular risk preferences. Since their creation in 1987, where they were first used by banks to remove assets from their balance sheets (Dickinson.edu) their popularity grew immensely on the back of the American housing boom. (Deckant, 2011) However, the asset class suffered significant reputational damage during the Global Financial Crisis (GFC) and during post-crash analysis. Banks had packaged and sold mortgage loans into CDOs, funneling into a wide scale securitization machine of which the risks were not adequately understood. This resulted in significant blow-back when the subprime crisis hit and homeowners were not able to pay the interest payments on their homes, leading to widespread defaults, escalating up the tranches of CDOs. This in turn drove down the market for CDOs and liquidity in markets as a whole fell, to which CDOs had previously been considered beneficial. Following this chain of events, interest in CDOs - and particularly those containing household debt - decreased significantly. Post-crisis, these assets are once again gaining interest from investors to a non-insignificant degree. (Wharton, 2013)

The modern market for CDOs has seen significant growth in the last few years in the form of CLOs, a type of CDO where the underlying collateral is corporate debt in the form of loans or bonds. The fact that CLOs by nature of being CDOs, share the same overall structure as the infamous mortgage backed CDOs has naturally invited comparisons and warnings that they are

destined to result in financial turmoil as well. This thesis seeks to investigate the validity of this narrative, leading to the following research objectives:

“This thesis seeks to identify and analyze the narratives that have emerged regarding CLOs and to discuss and examine to what extent the narratives make sense.”

To clarify, the paper will first analyze the narrative itself using an approach borrowed from Magnussen before conducting an analysis of how credible this narrative is. In order to provide critical context and components to be used in the analysis sections, the developmental histories and supply chains of the relevant financial products will be also be laid out. While not the focus of this paper, the regulatory and business environments that these products exist in will also be considered.

As the market for CLOs continues to increase, understanding the risks involved will become increasingly complicated. Seeing as structured finance products played a central role in the last crisis, it would be even more of a shame to see them take center stage once again in the next financial crisis. On the other hand, CLOs have proven to be both resilient and profitable in the past. Much of the current narrative surrounding CLOs fails to acknowledge this, and it is therefore important to bring to light the benefits of this asset class in order to avoid misguided regulation based on a narrative that potentially draws heavily on false equivalencies between modern CLOs and pre crisis mortgage backed CDOs. Therefore the motivation for writing this thesis is to analyze CLOs as a threat to financial stability and in comparison to mortgage backed CDOs in order to gain clarity in regards to overall potential for good and harm towards society at large.

The paper will first introduce terms and definitions before moving onto a review of relevant literature and empirical material. Following this, theory and methodology sections will describe the analytical approach to be used in the coming analysis sections. A brief discussion of the benefits of these types of products is included before historical background is given, leading into

a section detailing the evolutions of the relevant assets as well as their supply chains. The first analysis section is focused on the narrative itself using Magnussen's three levels of analysis and concepts regarding sensemaking of financial crisis. The final analysis section seeks to draw conclusions regarding the validity of the narrative isolated in the previous analysis section. A conclusion containing the limitations of this paper and a discussion will end the paper.

2. Introduction to Securitization, CDOs, and CLOs

A common theme throughout this section, and indeed throughout literature written regarding these securities is highly inconsistent nomenclature. Therefore this section will not only define the terms, but also establish the terminology to be used in this paper as well as feature alternative terms where relevant, so as to avoid confusion when referencing or comparing to other writings. The terminology used to describe CDOs in the pre-crisis era is remarkably inconsistent. Often times, CDOs based on mortgage loans are grouped in with CDO derivatives and CDOs where the underlying collateral are CDSs. Therefore it is important that an attempt is made to unravel the "CXO" alphabet soup. Securitization as a broad concept and how it relates to these financial products will first be discussed, followed by sections detailing the relevant types of CDOs.

2.1 Securitization & SIVs

In defining securitization, we will look to "Defining Securitization" by Lipson, J.C which provides a precise definition that can be applied in understanding the assets that are relevant to this paper. Lipson describes securitization as containing three core elements: "1. Inputs, 2. A particular structure and 3. Outputs." The "inputs" are the underlying assets, such as loan payments in various forms, while the "outputs" are the claims on those payments, often in the form of bonds or coupon paying notes. (Lipson 2012, Page 1239) These are the securities themselves and the end result. The "structure" has to do with legal isolation between the two aforementioned components, typically by way of a special purpose vehicle (SPV.) Through this method, the credit risk of the securities can be separated from the entity originating them. That is

to say that an originator with a junk bond rating, could hypothetically create and issue a bond (a security) that is of investment grade. The benefits as argued by Lipson for securitization are efficiency, additional access to capital markets, and lastly for accounting and/or regulatory benefits. The other way of viewing securitization is the industrialization and optimization of the supply chain generating profits for the banks in the form of sales of these new products. In an attempt to move away from a process that involved scrutiny of individual assets being pooled together, the law of averages was relied upon, arguing that even if the structure did experience some defaults, the average asset within the wider structure would not - therefore the individual components did not need the same level of scrutiny. (Lanchester, 2009) Using these definitions, the CDOs to be described in the following sections can be described as the results of securitization. They are naturally not the only, first, or last securitization processes.

Crucial to the execution of CDOs, including CLOs are the separate legal entities that issue the liabilities against the collateral. The nomenclature varies significantly depending on the source, as well as the region and jurisdiction being discussed, but for the purposes of this paper, the terminology utilized by Gillian Tett will be employed, and they will be referred to as “Structured Investment Vehicles” (SIV). The purpose of the SIV is to create a separate legal entity from the collateral manager that is “default isolated.” That is to say that should the SIV issuing the notes to investors default, the collateral manager that manages the underlying pool of assets will only be affected by reputation and via any notes they have retained. Within the literature that will be addressed in the literature review, these vehicles have been addressed as “Special Purpose Vehicles” (SPVs), Special Purpose Entities (SPEs), and sometimes simply as the “Issuer,” a catchall term for this type of legal entity. The role of these SIVs will also become clearer during the discussions of the supply chains underlying these assets.

2.2 Collateralized Debt Obligations (CDOs)

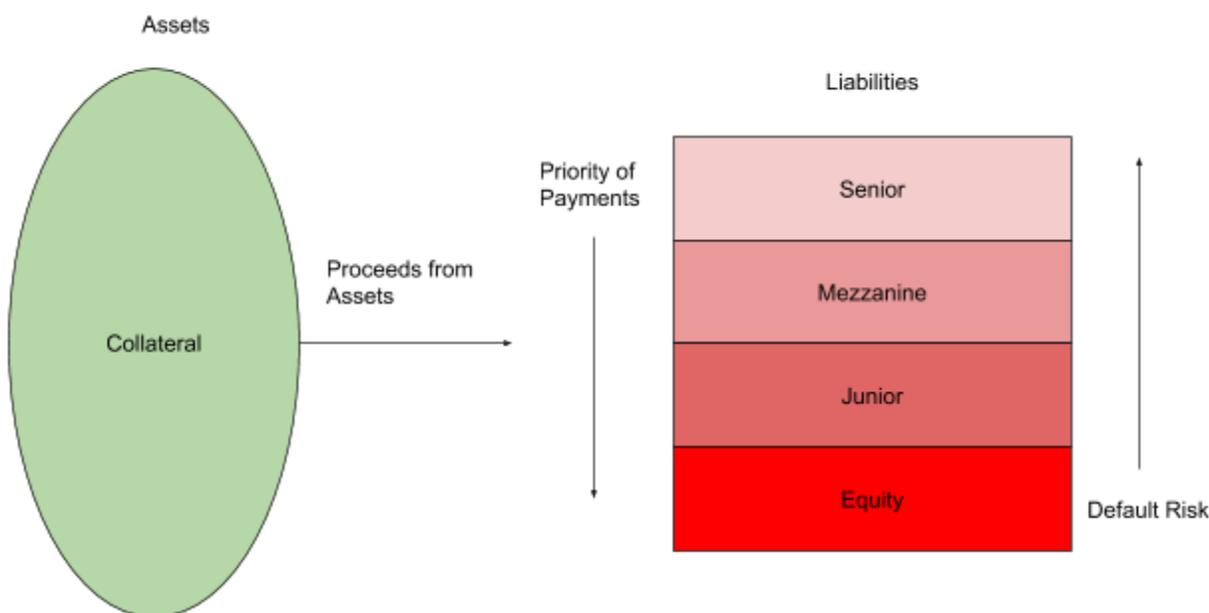
A CDO is an asset-backed security that can be comprised of various types of underlying debt assets. Famously, CDOs can be constructed from mortgages and other types of household and

private debts. However, other financial products can fill CDOs as well, such as corporate debt in the form of loans and bonds, or more esoteric products such as CDS contracts. In a sense, they are similar to mutual funds, except notes (essentially bonds) are issued by the SIV rather than shares in a mutual fund. An important difference here is that while shares in a mutual fund or ETF can typically be sold fairly easily, CDO notes are often considerably less liquid, and as a result CDO investors are more “locked” into their investments. What these different types of CDOs all have in common is that they can be understood as being two-sided, where one side of the CDO consists of the “collateral,” the underlying asset-generating revenue, and the “liabilities” side where the Collateral Manager has issued coupon paying notes. These notes are divided into tranches where investors can purchase notes in the tranche that best suits their risk and reward profile. This is true for all types of CDOs, including CLOs which are a type of CDO.

It is important to note that the revenue generating underlying assets are distributed through the tranches, and not “locked” into one tranche. Put simply, the rated tranches of notes are not necessarily filled with loans of a corresponding rating. Rather, it is the “default isolation” provided by the tranching system employed that allows higher tranches to receive higher ratings. The tranches can typically be understood as belonging to one of four groups. There is the “Senior” tranche, the least likely to fail, a group of “Mezzanine” tranches, which is slightly more likely to fail, but more profitable, followed by “Junior” tranches, which are even more likely to fail but offer higher returns. Lastly is the “Equity”, “First-loss” tranche, or the “Income Notes” tranche, depending on your nomenclature. The equity tranche absorbs the effects of the first defaults, should they occur. However, the equity tranche does not pay a fixed coupon like the other tranches. This is a critical distinction that is very often overlooked by popular sources. Instead of paying a predetermined coupon like the other tranches, this class of notes pays the *excess* cash flow. If ALL the other tranches have been paid, then the equity tranche will receive all the extra income - not only up to a certain coupon rate. That is to say that if 0 of the underlying assets have defaulted, the equity tranche note holders would stand to make unusually high returns. In effect, this makes the equity tranche the tranche with the highest possible return, but naturally also the first to be wiped out in the event of widespread defaults. (The Bond Market

Association) Note that all of these different notes are still issued by the same SIV. This information is visualized in a graphic below:

Figure 1:



In literature explaining CDOs, the tranches are almost always explained by example using 4 different tranches - 3 with a rating and fixed target return, and an equity tranche. In reality, many more tranches typically exist, and are often referred to as “Classes.” This will be demonstrated with prospectus excerpts in the following sections.

In attempting to conceptualize how a CDO of any sort functions, it can be helpful to think of it as a company with a semi fixed run time and a business plan that must be followed with a high degree of precision. The collateral obligations are the firm’s assets, while the notes are the liabilities. Similarly, all tranches other than the equity tranche can be thought of as debt issuances which are used to lever up the potential returns to the equity tranche. This also emphasizes the differences between the equity tranche and the “debt” tranches. All classes of notes above the equity tranche function much like regular debt investments, featuring a limited upside but with strong downside protection provided by the subordinate tranches. Conversely,

the equity tranche essentially has no down side protection, but offers considerably higher potential upside, much like purchasing typical equities.

2.3 Mortgage Backed CDOs

The type of CDO most often associated with the GFC are those built on the income streams from mortgages. These are considered “ABS CDOs” as they are built on real assets - mortgages and physical properties such as houses, apartments, ect. They are also sometimes referred to as “residential mortgage backed CDOs” (RMBS CDO) for this reason. When we say that this type of CDO is built on the income streams from mortgages, it is meant that the manager of the CDO has purchased the mortgages, and therefore receives the payments made towards paying off the mortgage.

The below tables are taken from the Ambassador Structured Finance CDO and serve as references for the following paragraphs. It should be noted that the prospectus for this CDO allows scope for the purchase of other CDO notes as well. (Page 100)

Figure 2:

Class of Notes	Principal Amount/Initial Issued Amount as of Issue Date	Percentage of all Securities	Ratings (Moody's/S&P)	Weighted Average Life (1)	Stated Maturity
A-1	U.S.\$800,000,000	80.0%	"Aaa"/ "AAA"	6.2 years	July 2041
A-2	U.S.\$112,000,000	11.2%	"Aaa"/ "AAA"	6.7 years	July 2041
B	U.S.\$35,000,000	3.5%	"Aa2"/ "AA"	6.7 years	July 2041
C	U.S.\$26,000,000	2.6%	"A3"/ "A-"	6.7 years	July 2041
D	U.S.\$13,000,000	1.3%	"Baa2"/ "BBB"	6.7 years	July 2041
Income Notes	U.S.\$14,000,000	1.4%	Not applicable	Not applicable	July 2041

Figure 3:

Class	Principal Amount	Interest Rate	Stated Maturity
Class A-1 Notes	U.S.\$800,000,000	LIBOR plus 0.23%	Payment Date in July 2041
Class A-2 Notes	U.S.\$112,000,000	LIBOR plus 0.45%	Payment Date in July 2041
Class B Notes	U.S.\$35,000,000	LIBOR plus 0.55%	Payment Date in July 2041
Class C Notes	U.S.\$26,000,000	LIBOR plus 1.45%	Payment Date in July 2041
Class D Notes	U.S.\$13,000,000	LIBOR plus 3.00%	Payment Date in July 2041

Figure 2 shows a table of all the notes in the CDO, their principal amount, their share of the total value of securities, their minimum rating, average weighted life, and stated maturity. Average weighted life refers to the average time until each individual paydown on a debt is made. The final date for payments to be made is reflected by the Stated Maturity. In many cases and very often in the case of CLOs, this date is never reached, and payments are completed long before then. Figure 3 naturally excludes the Income Notes because they do not pay a set interest rate - they only benefit from the excess cash flow. In this case, the Class A-1 Notes pay an interest rate of 0.23%+London Interbank Offered Rate (LIBOR). This is described as a floating rate meaning that the rate paid on these notes is equal to the LIBOR rate *plus* the following rate. However, there is often a cap on the “float” meaning that negative LIBOR must be above 0 before being taken into the equation. Note that this vehicle was launched in 2006, where the average LIBOR was over 5%.

More complicated iterations of mortgage backed CDOs also exist in the form of squared and cubed versions (sometimes referred to as “CDO^N” where N represents the number of times it has been repackaged) of the product described above. To create a CDO squared, the proceeds from selling the notes to investors are used to purchase notes in already existing tranches of mortgage backed CDOs. The subtle yet highly important difference here is that in a CDO

squared, the income stream is generated from the coupon being paid on preexisting CDO notes, rather than directly from mortgages. CDO cubed adds another layer to this, where the income is then generated from the notes of a CDO squared, adding yet another level of securitization to the original mortgages. (Tett, 2009, Page 93) These “squaring” and “cubing” practices could be applied to other types of CDOs and not just those backed by mortgages, but those are less common. For a detailed overview of the supply chains used to create these products, please see Section 7.

2.4 CDS Based CDOs

CDS based CDOs are inherently different to asset backed CDOs in that the noteholders are paid to accept risk, rather than paid by revenue streams generated by an underlying set of assets that serve as collateral. Invented by Blythe Masters, Credit default swaps (CDSs) are a type of credit derivative that allows an investor to purchase “default insurance” on a third party. In short, the buyer pays premiums to the seller, and the seller pays out of a “default payment,” should the underlying entity default. In this way, the structure is very similar to an insurance plan and helps investors in credit assets to protect themselves against the failure of their counterparty to repay the principal on a bond or other debt asset.. However, CDS contracts can also be purchased by a party that does not own the underlying asset at the time of purchase. (Anthropelos, 2010)

In a synthetic CDO deal, as these types of deals are often called, the party that purchases the notes is given a set coupon in exchange for accepting the responsibility for paying up, should one of the firms covered in the deal default. In this way, these deals are very often a tool used to transfer risk away from the party that originated the loans. In literature describing these types of deals (Fool’s Gold, Gilliant Tett) their funding level is often a key component. Unlike asset backed CDOs, where all or nearly all of the notes need to be sold to investors in order to purchase a sufficient amount of collateral, synthetic CDOs do not need to be fully funded in order to be put into operation. This is because only a sufficient amount of notes to cover the *expected* level of defaults need to be sold. To clarify, if a synthetic CDO contains CDSs on 10

billion USD, it may only need to sell 1 billion USD of notes because it is assumed that no more than 10% of the involved CDS contracts will need to be paid down as the result of defaults. In effect this spreads the cost of insuring against defaults across multiple loans, essentially cheapening the process of purchasing insurance on a portfolio of debt assets. Famous examples of this type of deal include the BISTRO deal by JP Morgan and several comparable transactions by the Carlyle Group. (Gillian Tett, 2009)

2.5 Collateralized Loan Obligations (CLOs)

Conceptually, CLOs function in a similar manner to the mortgage backed CDOs discussed in Section 2.3. They differ in that the collateral used consists of corporate debts in the form of loans and often but not always, bonds. To properly understand CLOs, the sources of the underlying loans and bonds should also be considered. The loans most often purchased by CLOs are *senior secured loans*. (Natixis, Page 5) These are loans that are issued to corporations that are senior to its other debt (it will be paid off first) and it is secured by their assets - if the firm defaults, the lender will be compensated by liquidating the assets of the firm. These loans are typically syndicated by large institutional banks (known as the agent in any given transaction). This is due to the scale of the loans - no individual CLO manager would be interested in or even allowed by their prospectuses to purchase the entire outstanding loan. The total number of these loans on the market as a whole is relatively low, there simply are not that many firms that make use of broadly syndicated leveraged loans. The bonds purchased are typically not rated very highly and there is often a remit within the prospectus to purchase a certain level of unsecured bonds. A byproduct of this is significant “credit overlap” both between the individual CLOs under management by a single manager, and other CLO managers. Speaking to the lack of asset diversity in this space, there is often an overlap of 90% between CLOs under the same manager and 50% between managers. (Ares, Page 3) In other words, two CLOs under different management are likely to have as many as 50% of their assets in common.

The example below is taken from a prospectus for the “Black Diamond 2017-2” CLO.

Figure 4:

Class of Notes	Principal Amount	Notes ⁴		Moody's Ratings of at least ³	S&P Ratings of at least ³	Maturity Date
		Initial Stated Interest Rate	Stated Interest Rate			
A-1	€142,000,000	3 month EURIBOR + 0.86% ¹	6 month EURIBOR + 0.86% ²	Aaa(sf)	AAAsf	20 January 2032
A-2	\$55,800,000	3 month USD- LIBOR + 1.30% ¹	6 month USD- LIBOR + 1.30% ²	Aaa(sf)	AAAsf	20 January 2032
A-3	€30,000,000	1.22% ¹	1.22% ²	Aaa(sf)	AAAsf	20 January 2032
A-4	\$15,000,000	3.40% ¹	3.40% ²	Aaa(sf)	AAAsf	20 January 2032
B	€56,000,000	3 month EURIBOR + 1.40% ¹	6 month EURIBOR + 1.40% ²	Aa2(sf)	AAsf	20 January 2032
C	€30,900,000	3 month EURIBOR + 1.95% ¹	6 month EURIBOR + 1.95% ²	A2(sf)	Asf	20 January 2032
D	€23,000,000	3 month EURIBOR + 2.95% ¹	6 month EURIBOR + 2.95% ²	Baa2(sf)	BBBsf	20 January 2032
E	€18,000,000	3 month EURIBOR + 5.10% ¹	6 month EURIBOR + 5.10% ²	Ba2(sf)	BBsf	20 January 2032
F	€12,100,000	3 month EURIBOR + 6.90% ¹	6 month EURIBOR + 6.90% ²	B2(sf)	Bsf	20 January 2032
M-1 Subordinated Notes	€21,500,000	N/A	N/A	Not Rated	Not Rated	20 January 2032
M-2 Subordinated Notes	\$23,600,000	N/A	N/A	Not Rated	Not Rated	20 January 2032

While many of the “columns” in this table follow the same logic as in the previous example, there are two columns that provide the interest rates that these coupons will pay out, the “Initial Stated Interest Rate” and the “Stated Interest Rate.” The only difference here is whether the 3 month or the 6 month EURIBOR rates will be used in the calculation of interest payments. Which one of the two will be applied depends on the pay out frequency currently being applied by the collateral manager. These two frequencies can be “swapped” between by the collateral manager in an event known as a “Frequency Switch Event.” How these are triggered depends on the specific terms outlined in the prospectus, but there is typically a clause that allows the collateral manager to switch the entire payout structure to semi annual if a certain amount of the payments that they themselves are *receiving* from the loans are paid out semi annually.

2.6 Considerations & Exceptions

An important distinction to make when discussing CDO deals is between *balance sheet* and *arbitrage* CDOs. (Jobst, Page 11, 2002) Arbitrage CDOs are performed by investment banks that seek to exploit the delta between the costs of acquiring a collateral pool, and the value of those assets when they are placed inside of the CDO structure. Put simply, profit is derived from an arbitrage CDO because the tranche notes that investors purchase, pay less than the underlying collateral does. Thus an arbitrage CDO will be performed when this is possible. On the other hand, a balance sheet CDO deal serves a different purpose. In this scenario, the motivation is to remove loans from a bank's balance sheet, but not necessarily or specifically non performing loans. This is done in order to gain regulatory capital relief in relation to credit risk exposures. It is of course possible to also benefit from arbitrage in this case, it is however typically not the main purpose. Note: This applies to all of the aforementioned types of CDOs and this will be relevant to later discussions in this text regarding the evolution and supply chains of these assets.

While the above definitions of different types of CDOs are useful and correct in an academic or theoretical sense, in reality these "buckets" of different types of CDOs are less clear. Whether or not a CLO is allowed to invest in bonds as well as loans depends largely on *who* is creating the CLO or who is expected to buy the tranches. An example of this are the CLOs created in order to be compliant with the Volcker Rule and as a result were not allowed to invest in bonds. Conversely, a CDO that only invests in bonds is called a CBO. The evolution and supply chains of these assets will be covered in greater depth in Section 7.

3. Literature Review

In "Fool's Gold" Gillian Tett provides a detailed history of CDOs and credit derivatives as a whole from primarily the perspective of employees at JP Morgan starting from the 1990s. Tett

describes the “early days” of the popularization of CDOs at JP Morgan in the form of the BISTRO (Broad Index Synthetic Trust Offering) Bond and the marketing effort that backed it. The account follows the story lines of several key figures and can in a sense be seen as a case study of a group at JP Morgan specializing in this type of asset. Later on, the role of CDOs in the downturn of several firms that required bailouts are detailed. The crashes of Bear Stearns, Lehman Brothers, and AIG are all covered in detail, and the role of CDOs and other products related to their downturns are elucidated upon.

In contrast, Adam Tooze’s book, *Crashed: How a Decade of Financial Crises Changed the World* takes a more “institutional view” and does not focus on a specific firm or a specific asset class, though CDOs are still featured prominently. The work describes many of the processes that are critical to the existence and proliferation of CDOs in that Tooze specifically describes the supply chains established by big banks, investment funds, and the rating agencies to churn out CDOs filled with mortgages. Additionally, Tooze also describes the repo markets and their relationship with CDOs and the GFC. Of important note is that the timeline employed by Tooze calls back to the 1960s, while Tett is more focused on the 1990s and onwards. Taken in tandem, these two books provide material for beginning to map out some of the most critical pieces that allowed for the creation of toxic CDOs leading up to the GFC.

In contrast, Anna Katherine Barnett-Hart’s BA thesis from Harvard uses a dataset of ABS CDO to construct an argument that in the case of ABS CDOs, the write-downs certainly were the result of poor choices of collateral - ie bad lending. The roles of CDO underwriters and credit ratings agencies are also explored through a data driven approach using a collection 735 ABS CDOs to explore which market participants acted irresponsibly and in which ways. Barnett-Hart’s text also provides insight into the supply chains surrounding CDOs, and showcases how in some cases banks even used their own CDO tranches to created CDO squared deals.

Introduced by George Akerlof in “The Market for “Lemons”: Quality Uncertainty and the Market Mechanism” in 1970, the market for used automobiles is used to describe how information asymmetries can lead to a decrease in the average quality of goods sold. This is because buyers are willing to pay the average reasonable price for the product (taking into account both good and bad used cars) but only the seller knows whether the specific used car that they are selling is a “lemon” or not. As such, sellers will only be interested in selling when they hold a “lemon” and will otherwise leave the market. Using insurance as an example, Akerlof describes this state as one of adverse selection. (Akerlof, page 493)

Iain Hardie and Donald MacKenzie have produced a text titled “The Lemon-Squeezing Problem: Analytical and Computational Limitations in Collateralized Debt Obligation Evaluation” which discusses asymmetric returns and “computational intractability” specifically in the context of CDOs. It should be noted that the term “lemon-squeezing” is not meant to carry the implications that George Akerlof established. The text argues that the costs of adequately evaluating and properly understanding CDOs increased faster than the available returns. According to the arguments presented, this is the inevitable outcome of increasing securitization and appetite for profit. The two authors also draw attention to *Intex*, a software solution that they claim played a critical role in managing CDOs. (Hardie et al, Page 388) The software helps both the sellers and hypothetical buyers of such instruments to estimate their value based on inputs that can be modified to be in line with the user’s assumptions. Attention is drawn to the relatively low fees taken for CDO management as well as the time sensitivity and complexity of the analysis required for understanding CDOs by market participants at all levels. A concrete example is provided, wherein 3 stages of CDO evolution is provided; vanilla, squared, and cubed. The potential returns increase, but the difficulty of analysis far exceeds it, as measured by growth in the number of underlying mortgages. This can be seen most easily when comparing a vanilla MBS CDO to an MBS CDO cubed, where the return on a 100 million USD investment jumps from 240,000 USD to 1,300,000 USD, but the number of mortgages in the collateral increases from 4,507 to 19,600,000. (Page 392) The article concludes by stating that the “lemon squeezing” problem that they are describing, is one in which bankers will inevitably attempt to

squeeze as much revenue out of a fixed income stream as possible, often by way of adding complexity.

Inspired by the growing popularity of CLOs, “Model specification and collateralized debt obligation (mis)pricing” by Luo et al (2017) revisits the CDO crash of the GFC. This paper argues that CDOs were mispriced due to poor modelling potentially caused by misaligned incentives. (Page 1286) Specifically, Luo et al compare 2 different models of evaluating CDOs, the “no-frailty model” and the “dynamic frailty model,” over a dataset covering many CDOs, both ABS CDO, CLOs, and CDO squared. They conclude that at the time of the structuring of these CDO deals, the size of the AAA rated tranches would have either had to be significantly smaller or rated lower, had more advanced models been used. The trio of authors points to the “frailty” factor, a mathematical term that should be included in future CDO pricing. Beyond this paper, much has been written about CDO modelling and pricing.

“Mastering the Market Cycle: Getting the Odds on Your Side” by Howard Marks, renowned investor and founder of Oaktree, a publicly listed investment firm with over 120 billion USD in assets under management, offers a different perspective on the GFC than the other two books introduced in this section. The text is not meant as an overview or explanation of the GFC, and instead, as the name would suggest, focuses on cycles within financial markets such as the debt, credit, and real estate cycles. Marks unpacks how these cycles interact and trigger subsequent steps within the cycles. As is appropriate when discussing economic cycles, Marks does also discuss the GFC. After a brief retelling, the GFC is used both as an example of certain cycles, such as the debt and psychological cycle. The perspective brought by this text fundamentally differs from the other two as Marks approaches the GFC as an investor, someone who wishes to understand markets and how they function in order to profit. The other two authors, namely Tooze and Tett, focus significantly more on context, narratives, and essentially function as historians.

The Dissenting Statement presented by Hennessey et. al. as part of the Financial Crisis Inquiry Commission will be leveraged to understand less dominant narratives regarding the GFC. The three authors argue that while American housing may have contributed to creating a bubble that popped, it was far from the only factor. Cheap capital from emerging economies and oil producers had flooded America and Europe, pushing the price of borrowing down, and therefore decreasing the borrowing costs of making risky investments. These capital inflows paired with what they describe as a potential change in preferences on the part of investors as well as the Federal Reserve not increasing interest rates from 2002 to 2006 are the chief culprits pointed to by Hennessey et. al. It is argued that the mortgage and housing bubbles (which they view as two separate but interlinked components) is an extension of the wider credit bubble, rather than the primary component driving up leverage. Lack of risk retention resulting from the originate to distribute model leading to the build up of a toxic mortgage bubble while the housing bubble could have been caused by land restrictions, psychology, and population growth. Criticisms of American regulators are also dampened by demonstrations that credit bubbles and crashes had occurred in European countries with more stringent regulations than the USA, and even in those who were not necessarily practitioners of the same styles of securitization or large buyers of American securitized mortgage products.

In order to develop an understanding of collateralized debt obligations as well as collateralized loan obligations, several industry white papers will be employed. The 2004 “CDO Primer” from the Bond Market Association serves as an introduction to CDOs in general and distinguishes some of the different types. Concepts such as coverage tests, certain risks, and valuation and also covered. “CLO Structures: An Evolution” released by Deloitte, concisely explains CLOs, their internal structures, and how they are set up. Prospectuses from various offerings of CDOs and their variants will be also be used both to verify the information provided in the aforementioned industry white papers. Among these are following prospectuses:

- Black Diamond CLO 2017-2
- Accunia European CLO II B.V.

- Ares XXXI CLO
- Ambassador Structured Finance CDO
- Attentus CDO I

4. Methodology and Analytical Strategy

The premise of this thesis itself requires a methodological blend in that two often opposing views of the world must be adopted in analyzing different components of the paper. In discussing narratives and their relationship to performativity, a constructivist lens must be applied. This is necessary due to the manner in which narratives can affect how current and past events are perceived and therefore affect future decisions. Narratives themselves are also a social construction, they are not empirical observations of the world, though they may draw upon facts and real events. This is the case both for narratives surrounding the GFC and the role played by CDOs, as well as those seeking to predict the future of CLOs. These narratives are also performative in that actors believing them, are likely to behave in certain ways in response.

On the other hand, in attempting to describe the role of CDOs in the GFC and the potential for CLOs to act as a trigger for the next crisis, a realist approach will be strived for. By this, it is meant that conclusions will be reached by way of empirical observation where possible, and not rely simply on interpretations of retellings of past events and descriptions of current events and structures. Herein lies a dichotomy, in that this paper recognizes the role of narratives in shaping outcomes and that narratives themselves are constructed, and are not merely observations of the world. However, this attempt to shift into a realist perspective will inevitably be colored by the approaches and conclusions drawn in the previous section. Analyzing the narrative will, by its very nature, draw attention to certain aspects or concepts which will inadvertently direct the course of the realist analysis of the validity of the narrative.

5. Theory

The driving theoretical approach to the analysis of this narrative first requires a framework, or definition to guide it. The Cambridge Dictionary definition of a narrative is a “a story or a description of a series of events” or “a particular way of explaining or understanding events.” While these definitions can be useful in analyzing narratives that seek to make sense of the past, they fall short when attempting to understand the multiple contexts that narratives exist in, how they are formed, and how they can be used.. They also do not highlight the performative effects of narratives. As such, we must look elsewhere for a definition of narratives that can be operationalized towards an analytical purpose. The theoretical approach to be used in analyzing the narrative surrounding CLOs will be based on the approach introduced by Anne Magnussen in “Fortællingsanalyse for Historikere.” The text provides an analysis of the narratives that solidify the social and ethnic identity of the state of Texas using texts from the 1920s to establish how the past (primarily the 1820s) was described, facts and events from the 1820s up to the 1920s, and considerations of how the dominant narrative was *used*. Magnussen describes three levels of analysis: The text level, the historical level, and the narrative level.

The text level is the level at which sources describing the narrative are analyzed. In the Magnussen text, this is school textbooks that describe the history of the state. However, using this approach, any text or source that seeks to establish a narrative could be analyzed here. During the historical level of analysis, the events and facts that the previous level builds off of are analyzed. This is where the narrative laid out in the previous level is critically analyzed - what events or facts is it built off of? Lastly, the narrative level seeks to understand how this narrative is used. In the example provided, a narrative of Texas as a state that was “domesticated” by white colonizers braving the wild frontier is analyzed and can be assumed to have been used to shape the future identity of the state by rooting it in understandings of the past. Magnussen also emphasizes the importance of what is left unsaid and the intentions of those wielding power. In the case of the story of Texas, ethnic minorities such as Mexicans are often ignored, while those in power emphasize the role of those figures sharing their own skin color.

In “Making Sense of Financial Crisis and Scandal: A Danish Bank Failure in the First Era of Finance Capitalism,” Hansen underlines the importance of narratives and the sensemaking process that follows a financial crisis. He does this by describing the rise and fall of the Landmandsbanken in the early 1920s. He argues that during and following these crises, people attempt to assign meaning to events in order to develop an understanding of the sources of the problems. They also seek to identify the people who should be blamed, thus constructing the narrative that explains the chain of events leading to downfalls. The text illustrates how differing narratives competed to explain how Scandinavia’s largest bank suddenly collapsed. Hansen argues that over time one narrative will become the dominant narrative, paving the way for a societal response and creating a path for society to move forward. The text uses the case of Landmandsbanken to illustrate the importance of having a broader and contextual perspective about financial crises. In other words, it is important to identify the different economical, political and societal narratives that came into play before, during and after a crisis occurred. The author also demonstrates the importance of crowd-behaviour, group think, or put simply, narratives that are constructed in order to make sense of any dramatic events such as crises, but most importantly in order to prevent them from reoccurring. The cultural aspect of these events and the role of dominant narratives should be more thoroughly analysed as they shape how societies will respond to future events of this magnitude and thus avoid repeating history as we did with the Great Financial Crisis of 2008, parallel event to the Great Depression described by the author.

6. Benefits of CDOs and CLOs

While the purpose of this thesis is primarily to evaluate the validity of a narrative that espouses the harms that have been wrought and may be wrought by CDOs, the potential benefits of these instruments and the reasons for their original creation should also be considered, both as an explanatory factor in their evolution, and to maintain a balanced view of them.

By virtue of investing in corporate loans and ultimately purchasing more than half of all leveraged loans (Guggenheim) access to credit markets for firms is enhanced through the use of CLOs. The argument against CLOs often cites decreasing lending standards without taking into consideration the manner in which access to credit can allow firms to grow without sacrificing control in the manner that issuing equity does. The utility of credit for growth stage companies can be seen in cases such as Netflix and Tesla, which have each taken loans or issued bonds. Likewise, mortgaged backed CDOs increase the ability of everyday people to purchase homes. Naturally, if these instruments were to make a meaningful comeback in the future, the risks would have to be adequately managed through the application of lessons learned from the GFC.

For banks, a variety of benefits exist for creating these credit derivatives. In some cases, banks can use structured finance products to decrease the amount of regulatory capital that must be kept on their balance sheets. In this way, banks are freer to make investments in the real economy that can drive growth. Whether or not this is in the interest of society at large is of course another question. Although it was not the case in the lead up to the GFC, structured finance instruments should have the ability to shift the concentration of risk away from globally systemic banks and towards less critical players in the financial sector.

From the perspective of investors, these instruments offer the chance to invest in “pre diversified” portfolios, in theory. As opposed to investing in a variety of corporate bonds, or mortgage backed securities, CDOs allow investors to purchase notes that are already exposed to a diversified portfolio. For investors hoping to make safe investments, the higher tranches, are given an extra padding of safety as they are protected by the lower tranches. This is particularly true of CLOs in which the highest rated tranches have never defaulted in Europe and only 0.3% of all CLOs issued since 1994 have defaulted. (Guggenheim, 2019) Lastly, the ability to invest in a CDO allows investors to very specifically select notes corresponding to their risk appetite. In this sense, they are very powerful risk management tools.

Information asymmetries can arise in CDO transactions, but are even more likely to do so in the sale of individual assets. This causes illiquidity - after all why would the bank want to sell anything other than their “lemons?” When a pool of these individual assets is tranced and sold off, concerns regarding information asymmetries are reduced through credit enhancement and the spreading of capital over more assets. If each of the involved parties had perfect information, there would be significantly less interest in purchasing collateralized assets. In this way a paradox arises, in the sense that complete and perfect information would eliminate the ability to profit off of these structures. (Jobst, Page 19, 2002) As perfect information will never exist in secondary markets for credit, structured credit products increase liquidity in the market for credit by way of decreasing the *significance* of asymmetrical information.

In the current state of the private equity market, many of the loans taken to perform leveraged buyouts are eventually sold into CLO collateral portfolios. (Natixis, 2017, Page 5) The existence of CLOs helps to facilitate the LBO process, and as a result benefits the private equity industry. Whether or not PE is a net benefit to society is a separate question. Innovations within the field of credit derivatives also provide benefits to pension funds, and other investment vehicles that have set targets for returns. These products offer a set coupon rate and can therefore suit the needs of institutions, particularly in times of turbulence in equity markets.

Though it does not appear to be taking place in today’s markets to any significant degree, there is a potential link between microfinance and structured credit products. CDOs in the form of “MiCDOs” where the underlying collateral pool is composed of microloans can help to commercialize microfinance and provide credit to underserved markets. (Byström, 2008) Byström also provides what he describes as a hypothetical but realistic example where a MiCDO references 50 MFIs (microfinance institutions) spread evenly across 5 Asian countries. He argues that this would provide diversification of economic and currency risks and cites that historically, microfinance loans have had relatively low default rates, even when paired with very high interest rates. In addition to the benefits that are consistent across all types of CDOs, the equity tranche, which receives the excess cash flows, can function as a type of proxy for directly

investing in the equity portions of these small, and newly founded ventures. This is naturally in addition to the potential to generate growth in underbanked regions.

7. Evolution and Supply Chains

Understanding the evolutions of and the supply chains enabling the creation of these assets serves the goals of this paper in several ways. A deeper understanding of the supply chains supporting these assets will assist in evaluating how grounded in reality the narrative is by deepening the level of comparisons that can be made between CDOs of the pre crisis era and modern day CLOs. Similarly, understanding the evolutions of CDOs (including CLOs) is useful in that it provides critical context and understanding of the “timelines” at play. Pre-crisis CDOs (including both asset backed and synthetic) will be covered first, before modern CLOs will be discussed. It can be helpful to imagine the supply chains to be introduced in the following pages as fleshed out versions of the Lipson’s securitization framework - both supply chains start with an asset and churn out a financial security to be sold to investors.

7.1 Historical Background

While not the central component to this thesis, commentary on the political environment at the time of the creation of CDOs and the current political climate are pertinent in understanding the narratives at hand. During the 1980s when CDOs were first created, neoliberalism was ultimately the driving political force in the US and the UK, leading to deregulation and freer markets that allowed for financial innovation to occur. On each their side of the Atlantic, Thatcher and Reagan argued for free market economies and the free movement of capital. Securitization increased as citizen’s mortgages and ordinary debts were made into financial products, a symptom of the overall financialization of the economy and the growing importance of the financial sector.

In September of 1986 the US Federal Reserve and the Bank of England came to an agreement and the first Basel Accord was established, requiring banks to carry 8% of their total loan exposure in cash. (Tooze, 2018, Page 84) As can be expected of the banking world, discussions

regarding what exactly this meant quickly followed suit. Naturally, if the bank has to carry 8% of its risk exposure, they would prefer to make the riskiest loans possible in order to get the most out of their cash holdings and generate the best returns. To counteract this, risk weights were introduced by the Basel committee, stating that the holdings of short term national debt of OECD members and mortgages and mortgage linked securities did not come with high reserve capital requirements. One of the primary oversights of the first Basel Accord was the allowance for banks to hold many of their investments in SIVs, as per the interpretations of national regulators. In 2004 Basel II brought with it its own set of challenges, requiring banks to reconcile their off balance sheet assets with their own balance sheets, while allowing the banks to implement their own risk-weighting practices. (Tooze, 2018, Page 85) The second Basel installment also placed greater weight on the ratings issued by credit rating agencies by way of stressing the values of transparency and self regulation. The logic was that investors would not subject themselves to unreasonable risks and would therefore impose discipline. While the 8% capital requirement remained in name, the banks were in effect able to maintain larger balance sheets under this regulatory regime, and mortgages and mortgage linked securities were given an even lower risk-weighting.

The Basel accords also notably relied on “home country rules” and as a result, banks from countries with loose regulation were able to do business in American and European markets while operating under the regulations of their home countries. In this way, the City of London and New York could not be held accountable for the actions of European banks operating in their jurisdictions. That is to say that a European bank operating in America and holding loans in America, would not need to hold capital against those loans *in* America, if they did so in their home countries. (Tooze, Page 87, 2018) A last minute push on the part of regulators limited the short term reduction in capitalization to 15% before 2011 on a per bank basis. This was however only enforced upon American banks, and began to create a considerable gap in leverage ratios between American and European banks. Some American banks had begun to shift management roles away from New York to London. Americans wanted New York to remain as the capital of

global finance and as a result, a deregulatory race to the bottom ensued between London and New York.

7.2 The Evolution of Pre-Crisis CDOs

While the title of this section and the core topic has to do with the evolution of CDOs, other instruments and derivatives as well as financial institutions will featured heavily as they are intrinsically linked to the development of CDOs. The mortgage-backed security (MBS) was first issued in 1968 (McConnell et al, Page 173, 2010) and is an asset backed security where the underlying collateral is a mortgage or group of mortgages. Within this category exists a garden variety of variations such as subprime, which are junk rated, or Alt-A which consists of borrowers that are likely to pay off their loan but are atypical in some manner in that the loan may have been used to purchase a second home, or the documentation could be lacking. It is important to understand the difference between MBSs and mortgage backed CDOs in order to grapple with the narrative that is being analyzed in this thesis. An MBS is any security where the underlying asset generating interest or principal payments are mortgages. While both are Asset Backed Securities (ABS) and credit derivatives, and there is certainly conceptual overlap between MBSs and mortgage backed CDOs, mortgage backed CDOs differentiate themselves from traditional MBSs in that they feature multiple tranches and an internal waterfall of payments that dictates who is paid first. MBSs can be described as a predecessor to the mortgage backed CDOs of the pre-crisis era, and these CDOs can even be described as MBSs, but the terms typically bear different implications and different structures. While MBSs were profitable they brought with them the need for significant resources to be invested in the distribution of these products. Lacking diversification, investors wanted to analyze the individual mortgages carefully. (Tett, Page 52, 2009)

CDOs were first issued in 1987, but first gained popularity in the mid 1990s. (Dickinson.edu) Investors were willing to pay extra for the convenience of being able to invest in an asset that was diverse in nature when compared to asset backed securities relying on only one cash flow.

The first synthetic CDO was issued in 1997 by JP Morgan and Swiss Bank Corporation (Gibson, Page 2, 2004) in the form of BISTRO, a JP Morgan proprietary term. The underlying collateral in these instruments were CDSs, so that the resulting “insurance” payments were funnelled through the structure, and the lowest tranches absorbed the first costs arising from defaults. (Tett, Page 53, 2009) What made this deal so clever was not only the idea of using CDSs as the collateral in a CDO type structure, but rather the choice of which CDS contracts to include. The team at JP Morgan working on this product had selected 307 firms that JP Morgan was exposed to and created CDSs on these assets that would be bundled together. The notes of the synthetic CDO were then sold from an SIV which sold only \$700 million worth of notes, against the almost \$10 billion dollar total value of the deal. They argued that the chances of defaults were so low that the amount raised would be enough and the rating agencies eventually agreed. As a result, JP Morgan had essentially “insured” itself. This came with regulatory as well as bottom line benefits. In order to be Basel compliant, banks had to hold 8% of their capital in reserve in order to offset the fallout from loan defaults. (Lanchester, 2009) Outsourcing the risk of default on the loans issued by JP Morgan by way of BISTRO, meant that the loans were essentially risk free - at least in their own eyes, thus freeing up capital to originate more loans. Following the success of BISTRO, deals of this type began to gain popularity and JP Morgan helped other banks in Europe and in Japan to execute similar deals. (Tett, 2009)

However, regulators and especially those in Europe did not fully agree that the execution of BISTRO type deals should allow for regulatory capital benefits, especially when underfunded. (Afterall, only 1% of the notes of the original BISTRO were sold to outside investors). As a result, the banks had to find additional buyers of the notes, now dubbed “super senior.” To accomplish this, JP Morgan and other banks managed to persuade AIG, among other insurers, to provide insurance against defaults. However, regulators had decided to hand the banks a gift, and agreed that they only needed to hold 20% of the 8% (1.6%) of the typically prescribed regulatory capital in the case of super senior risk that had been rated AAA and had presumably been demonstrated to be “truly negligible.” Naturally, the required ratings and assurances towards regulators were made, and bankers had managed to skirt around the Basel rules by way of

complex financial structuring. Some even flippantly joked that BISTRO really stood for “Bank for International Settlement Total Rip Off.” (Tett, 2009, Page 63)

2003 saw increased popularity in mortgage backed CDOs as low interest rates and the services offered by Freddie Mac, Fannie Mae, and other mortgage lending firms, enticed consumers. Consumer spending increased heavily due to spending on homes and a feedback loop developed. Borrowers were more eager than ever to borrow, and lenders were incentivised to do so through the structured finance instruments that allowed them to ramp up lending. This pulled lending standards down and 30-year adjustable rate mortgages featuring teaser rates sometimes starting at low rates during the first few years before spiking saw an increase in demand as they were attractive collateral for CDOs. Lenders compromised on their due diligence regarding the credit risk of borrowers and were all too happy to collect securitization fees from banks. (Dickinson) It can be said that there was a somewhat symbiotic relationship between mortgage backed CDOs and GSEs as they formed a perfect link in the financial supply chain.

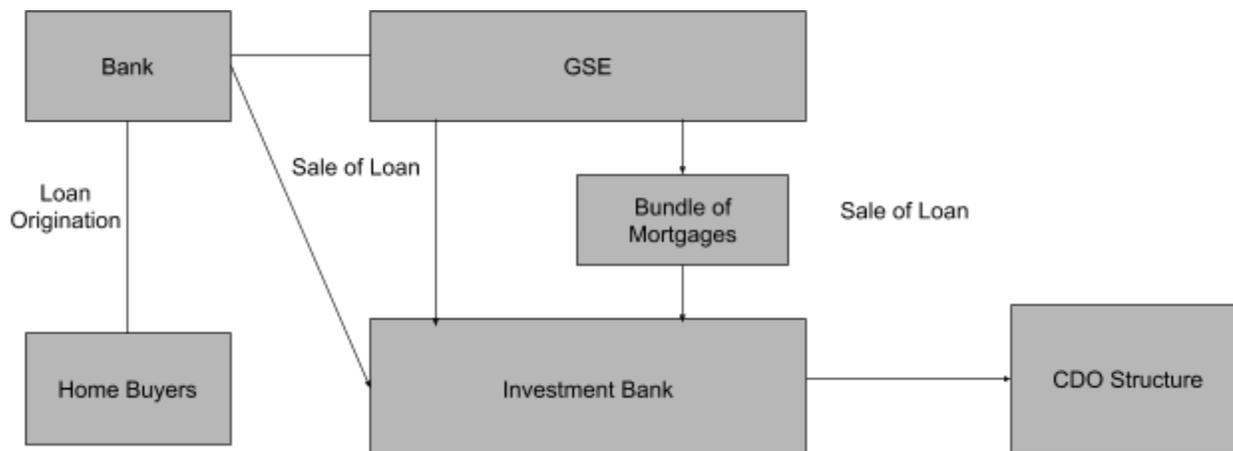
Government Sponsored Entities (GSEs) involved in the mortgage market were highly relevant to the development of CDOs and the GFC as a whole. Fannie Mae (Officially called “Federal National Mortgage Association” or “FNMA.”) was founded on the back of the New Deal in 1938 and operate within the “secondary” market for mortgages. Their purpose is to purchase mortgages, repackage them through a securitization process, and then resell them as MBSs. The purpose of this is to increase liquidity in the market for mortgage loans and ultimately to increase home ownership. Fannie Mae and Freddie Mac are competitors, and employ what is essentially the same business model, for the most part only differing in their sourcing of mortgages. Fannie Mae often purchased mortgages from commercial banks, while Freddie Mac tends to purchase mortgages from thrift banks which often have greater liquidity to make mortgage loans. These two institutions serve to benefit American banks in two primary ways: 1) Banks receive a fee for originating the mortgage loans and 2) this frees up liquidity for banks to perform more lending. As GSEs, Fannie Mae and Freddie Mac are not directly backed by the US government, and are only *implicitly* backed. However, both institutions received tax payer sponsored bailouts in the

midst of the GFC. (Tooze, 2018, Page 46) Their roles in the history of mortgage backed CDOs was one of augmentation, and helped to popularize the asset by way of providing the underlying assets generating cash flows.

The above allowed for the execution and sale of more mortgage backed CDO deals and as these deals became more widespread, so did the innovations surrounding them. Bankers began to create increasingly complicated and expansive mortgage backed CDO deals by way of squared and cubed varieties, which purchased tranches in pre existing CDOs. The evolution of CDOs in the pre crisis era can be seen as following two separate but interrelated tracks: the synthetic and asset backed track. The two styles of CDOs “leap frogged” off of each other in expanding the practice of structuring deals in this style.

7.3 Mortgage CDO Supply Chain

While the previous portion of this section discussed the evolution of both asset backed and synthetic CDOs before the GFC, we will solely focus on the supply chains of the asset backed (mortgage) CDOs in this section. The supply chains for synthetic CDOs vary considerably more than those of asset backed CDOs. The choice of which CDSs contracts to include, who the note buyers are, and how the deal is structured, varies significantly from deal to deal. These components make it considerably harder to compose a diagram that accurately reflects the majority of synthetic CDO supply chains.

Figure 5:

In the graphic above, a future home owner is interested in purchasing a home, but needs a mortgage loan in order to do so. The prospective homeowner contacts their bank in order to get this mortgage loan, which is then issued. At this point, the bank originating the loan typically either sells the loan onto a government sponsored entity such as Fannie Mae, or directly to an investment bank. If the bank sells it to a GSE, the mortgage will often be bundled with other mortgages before being sold onto an investment bank. Of course, if the bank has the volume to do so, it can bundle these mortgages itself. After purchasing the mortgages, the investment bank then creates the CDO structure and allows investors to purchase notes receiving coupons, and the delta between what they pay and what they receive is flushed to the equity note holders. The supply chain pictured above is often described as “originate to distribute.” This refers to the motivation for originating mortgage loans, which was often simply to sell them to a third party wishing to place them into a securitized product, such as a CDO. (The Bond Market Association)

Excluded from the above graphic are the liabilities side of the resulting CDO, which are included in Figure 1.

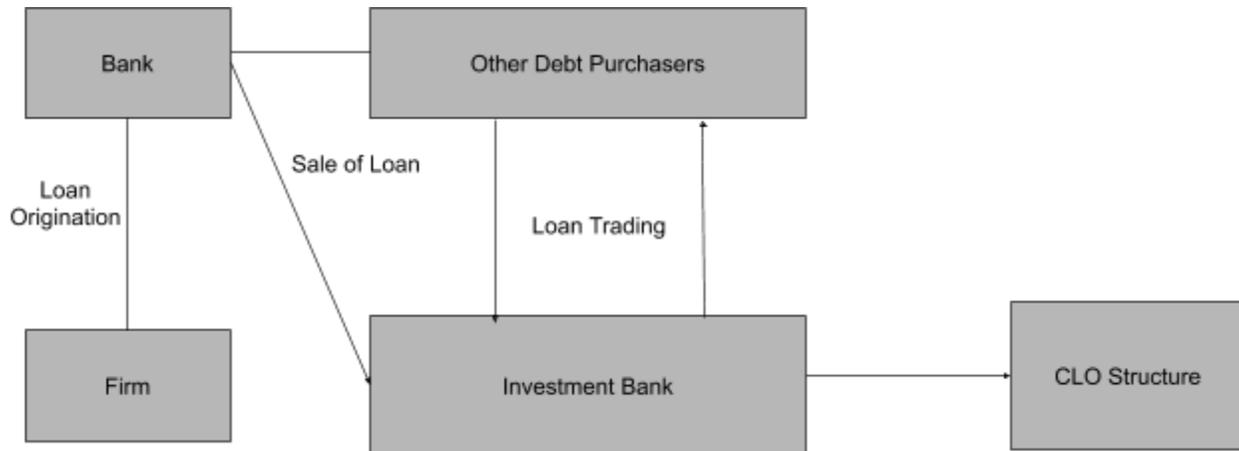
7.4 The Evolution of CLOs

Much like the MBS CDOs discussed above, CLOs are an asset that have undergone non linear innovations, often varying by region. However, the current popularity of CLOs can partly be attributed to decreased viability of collateralized bond obligations (CBOs) in the early 2000s. (Creditflux) CBOs are another type of CDO where the collateral is constructed of bonds, often unsecured. In the context of loans and bonds, unsecured refers to a debt that is not backed by an asset, ie there is no collateral posted. If the borrower defaults, the lender is likely to experience very limited recovery. This hit CBOs hard in the early 2000s where this type of bond faced even lower than expected recovery rates. As a result, credit rating agencies required far larger equity tranches that were not guaranteed a return to be subordinated to the higher tranches, thus rendering this type of deal inefficient.

The market adjusted in response, and began to create CLOs consisting largely of senior secured loans - loans that were both secured by collateral and senior to other debt, meaning that it would be paid before other debts. CLOs are also often described by their “vintage” and whether they are European or American. The two most common designations are “CLO 1.0” and “CLO 2.0” referring to their pre and post crisis counterparts respectively. There are a variety of compliance “tests” that govern CLOs concerning interest and par coverages and the levels required to be passing have increased in the vintage transition and the requirements are generally higher in European issues. The line between CLOs and CBOs today is slightly blurred, and it appears that many CLOs are actually actively investing in bonds as well as loans. A third breed of CLOs has also been seen. The term is not as widely adopted as CLO 1.0 or 2.0, but CLOs described as CLO 3.0 refer to those built in order to be compliant with the Volcker Rule and avoid investing in bonds entirely. While it may seem strange to refer to a financial product by its “vintage,” the appropriation of the term makes sense when considering that CLOs have “improved” over time, and the size of CLO deals has increased over time. (Pinebridge)

7.5 CLO Supply Chain

Figure 5:



In the above supply chain, a firm contacts an investment bank to create a loan or a bond issue for them. In the case of the loans, the originating bank funds the loans before allowing other parties into the deal. These parties, if interested in the offering, purchase slices of the total debt amount. The bank performing this service on behalf of the firm is typically referred to as the agent bank, and serves as the “syndicator” of the loan. It should be noted that the above sources for collateral, describe the *primary* offerings of such a loan or bond. That is to say, the first time that it is available for purchase, similar to an initial public offering in the case of equities. CLO managers can also source these assets in the secondary market, after they have been purchased from a primary offering by another fund, CLO manager, or institution. This is indicated by the lines representing loan trading in the diagram above.

Each of these loans or bonds has its own set of rules known as “debt covenants.” Debt covenants are agreements in place between borrowers and their creditors. These typically dictate the terms of the loan or bond such as what happens in the event of a default and may limit certain actions on the part of the borrower. Examples of stipulations that may appear in the documentation of a loan or a bond are whether the creditor has the rights to first-lien or not, and prescriptions for certain financial ratios that should not be exceeded. Some of these ratios may include interest coverage (the firm must earn a certain multiple of their interest payments),

certain profitability or revenue ratios, or ratios related to the solvency of the firm or repayment life of the loan.

As can be seen above, many similarities exist to the supply chain for CDOs presented in the previous section. However the main difference here is that multiple CLOs each own a *piece of each underlying* asset, where in mortgage backed CDOs, a mortgage is usually only owned by one CDO manager. Currently, some of the largest suppliers of CLO notes are Blackstone (GSO), Carlyle Group, and Credit Suisse Asset Management. (Creditflux, 2018) It should be noted that many of the collateral managers either have their PE practices under the same management, or have relationships with PE firms. Examples of this are KKR, Carlyle, and Apollo.

8. Analysis I: The Narrative Itself

This analysis will utilize the the levels of analysis described and demonstrated by Magnussen in order to understand the current narrative surrounding CLOs. The first “level” will be the text level, where the empirical evidence for the existence of this narrative is presented in a literature review style. Following this, analysis will be conducted on a historical basis, using sources examining the GFC. Lastly, the narrative level will be analyzed and questions regarding what the narrative is *used* for and what is left unsaid will be answered. In this portion, perspectives from Hansen regarding narratives and sensemaking will also be brought in. To accomplish this, the methodological approach in this section will be constructivist to accomodate for the performative properties of narratives and indeed how they came to be.

8.1. Empirical Evidence for the Existence of the Narrative

Arguments comparing current year CLOs to mortgage backed CDOs and subprime lending in general leading up to the GFC have made appearances in financial media as well as mainstream media services. It should be noted that this narrative is primarily prevalent in the news media, rather than academia, at least as of the writing of this paper. This can perhaps be attributed to the lag caused by the need for peer approval in publishing academic papers as opposed to comparable ease at which news articles can be published online.

In a Bloomberg article from Dec 2018 (Metcalf et.al.) attention is drawn to the fact that 2018 was the year with the highest issuance of CLOs (excluding re-issues) with a total of 125 billion USD of value being invested in CLOs throughout the year. The article also expresses a concern that the rise in corporate debt could be attributed to CLOs and the fact that they may have made it easier for companies to issue debt, by way of providing more buyers. A very brief case study of a CLO issuance is also provided, shedding light on the number of participants taking a cut along each step of the way, as well as providing numbers on the totals earned during each phase of CLOs during 2018. The article segways into describing exactly how much debt is in play through these vehicles and cites the fact that many of the loans contained in these CLOs are “cov-lite” meaning that the covenants governing the bonds or loans are not as rigorous as they could or perhaps should be. Attention is also brought to the fact that many firms are likely to be piling up several *types* of debt and that earnings adjustments can inaccurately reflect a firm's ability to pay back loans. Claims that the market for CLOs has looked less “rosy” at the close of 2018 are made as well as a description of potential disaster scenario, wherein much of the debt collateralized in CLOs receives a downgrade, sparking a sell off by CLO managers.

Also from Q4 of 2018, in a New York Times article Matt Phillips directly compares and arguably even blurs the lines between modern CLOs and the mortgage backed CDOs of the pre-crisis era. The claim is made that the same “assembly line” that went “haywire” a decade ago is now being reactivated. While he notes that it will not necessarily result in the same fallout as it did in 2008, and that a different set of borrowers are involved, lending standards are slipping in much the same manner. It should be noted that the article also provides a definition of CLOs that stands in stark contrast to the one provided by industry white papers. According to this New York Times article, CLOs can “combine multiple repayment streams — thousands of monthly credit card, auto loan or mortgage payments, for example — and funnel them to investors.” This is despite clarifying earlier in the article that CLOs differentiate themselves from the CDOs of 10-15 years ago because they are filled with corporate debt.

In a New York Times opinion piece released March 18th, 2019, where William D. Cohan, a former investment banker makes the claim that markets are in a comparable state to “a decade or so ago.” Like the previous article, this one also invites direct comparisons between the CDOs of the past and modern CLOs. Cohan points to the fact that investors are chasing yields without demanding adequate premiums in line with the risks being taken while bankers continue to move the resulting structures off of their balance sheets. Emphasis is also put on Jerome Powell’s claim that should corporate bankruptcies accelerate, CLO investors would be the hardest hit. That is to say that, everyday people would bear the consequences as they trickle down through their private banks and pension funds. The article cites Randal Quarles, an employee at the Fed charged with overseeing Wall Street, stating that he is pleased that large and systemically important banks are selling CLOs off to investors instead of holding onto them themselves. However, warnings regarding potential “backdoors” are also given as well as one specific example wherein hedge funds are able to purchase a firm’s debt while simultaneously purchasing credit default swaps, ie. insurance on their debt. The fund would then hypothetically force the firm into default before collecting on their insurance. This would then have a knock on effect towards investors in collateralized loan obligations and is exemplified by Windstream, a telecoms company in Arkansas that was forced into bankruptcy protection by a hedge fund employing this very strategy.

In an opinion piece written by former banker and author, Satyajit Das in a Bloomberg Opinion article, titled “The Bomb that Blew Up in 2008? We’re Planting Another One” claims are made that markets have convinced themselves that CLOs are far safer than the CDOs of the prior decade. After stating the size of the CLO market (700 billion USD, with approximately 100 billion new issues annually), the author describes the risks inherent in CLOs such as many of the loans being cov-lite, and the exposure of even the most senior tranches to potential mark-to-market writedowns. Das continues throughout the article to develop nuance, noting that Japanese banks have been significant purchasers of CLO tranches, explaining the higher concentration of risks found in CLOs which consist of relatively few loans, as opposed to more diversified mortgage CDOs, and the danger of margin calls as well as credit rating triggers.

According to Das, CLOs purchase “50-60 percent of all leveraged loans” and problems within the CLO market could lead to widespread issues in credit markets as CLOs serve to funnel credit into the leverage loan market much in the same way that mortgage backed CDOs pushed credit into the housing markets. A potential feedback loop is described, wherein a downturn would make it difficult for banks to sell their underwritten loans, leading to a tightening of the credit market as a whole that would eventually spill into the real economy. The article was posted as recently as early March 2019.

The above review of articles sounding the alarm regarding CLOs is by no means complete. Among others, the following news services have also published articles with similar takes, which are referenced in the bibliography of this paper:

- CNBC
- The Wall Street Journal
- InvestmentNews
- Several blog posts on Medium.com
- Reuters

Janet Yellen has made several pertinent statements regarding corporate lending and collateralized loan obligations in late 2018 and early 2019. In October 2018 Janet Yellen warned against the current deregulatory approach and drew attention to weakening lending standards in the “\$1.3tn market for leveraged loans.” Debt covenant standards have deteriorated and banks have been engaging in lobbying attempts to “water down reforms that were put in place at the start of the decade.” Yellen also draws attention to the possibility of the rising corporate debt worsening the next potential downturn as well as the “softer-touch” regulators appointed by Donald Trump. Specifically, the size at which banks are subjected to extra scrutiny has increased, setting some small lenders free of certain rules. According to Yellen, the framework established following the GFC is being undermined as a whole as regulators do not have access to “macroprudential tools” that could be used to control risk taking. These tools could be in the form of forcing banks to build up a “countercyclical capital buffer,” a tool that she would like to

“hear more about.” Additionally, she cites President Trump’s attacks Federal Reserve interest rate hikes as an attempt to undermine the institution in the public eye and hamper its ability to do good for the US and global economy. (Sam Fleming, Financial Times, 2018)

These comments were underscored during a panel discussion at the American Economics Association/ Allied Social Science Association during a panel discussion at the start of 2019. Yellen stated that as leverage has increased significantly in the American non-financial sector, the next recession would force them to “fire workers and cut back on investment spending.” This paired with the fact that lender protections and the correlated expected recovery rates following defaults are decreasing is naturally concerning. Expected recovery rates on first-lien defaults has fallen to 61%, down from the historic average of 77% according to Moody’s. Janet Yellen does however point out that the leverage that helped sparked the GFC is not currently present in this market to the same degree and that much of the risk associated with corporate debt lies outside of the banking system when compared to the CDO market leading up to the GFC. (Wiltermuth et. al. with Reuters, 2019) Whether or not these comments ignited the narrative can be debated, however they certainly have helped to add validity and draw attention to it.

Of important note is the relative lack of academic articles reflecting these opinions. This can perhaps be attributed to several issues, but the simplest explanation is that peer reviewed research takes considerably longer to publish than news articles.. This is afterall a relatively recent narrative, judging by the publication dates.

8.2 Narrative Articulation

In its simplest form, the narrative is that CLOs are themselves dangerous and share many similarities with CDOs of the past and as a result will result in the same financial turmoil. The narrative has clear roots in the sensemaking process that took place after the GFC. Following the GFC, much of the blame for the crisis was laid at the feet of CDOs, and this serves as a building block in the narrative regarding CLOs. In this sense, the narrative of CLOs that is being

discussed now can be seen as an extension of the conclusions that were made about this asset class following the last financial crisis.

As evidenced by the literature review, authors en masse cite the toxicity of CDOs as contributing to the GFC, while others take it as a given fact that CDOs fueled the GFC in order to create a derivative analysis of a tertiary component. Within mainstream media services, when explanations for the GFC are given beyond describing it as a “housing market crash,” CDOs are almost always mentioned. The following publications have published articles blaming the GFC on CDOs.

- NPR
- The New York Times
- Reuters
- Forbes

The list is non exhaustive. Given this fact and the damage caused by the GFC, it is understandable that reporters will preemptively categorize CLOs alongside CDOs. It is a relatively simple narrative that is both digestible and plausible, particularly in a mainstream context. While by no means the primary source, the role that Hollywood has played in developing the mainstream understanding of the GFC, should not be ignored. Films like “The Big Short” lay the blame for the crisis directly at the feet of CDOs and credit rating agencies, without providing very much detail about the products themselves. A 2011 movie titled “Margin Call” which shows a banking crisis from the boardroom perspective also shows mortgage backed assets as toxic positions that the bank needs to exit as quickly as possible, regardless of reputational and relationship damages. The film also makes allusions to the Gaussian Copula formula used to estimate default correlations in MBS CDO collateral.

8.3 Historical Level Analysis

In this section, a departure from the strategy laid out by Magnussen must be taken. In her text, Magnussen is considering a narrative that seeks to describe the past, while in this context we are looking at a narrative that describes what will happen in the future, based on claims made about what took place in the past. As such, instead of analyzing the topic of the narrative directly on a historical level, which would be impossible because the narrative is one which describes the future, the roots of the narrative will be analyzed. As the narrative regarding CDOs rests on a telling of the GFC that was in large part caused by CDOs, this is what will be considered during the historical level analysis. To consider this perspective, the focus will be on some of the largest collapses seen during the GFC and to what degree CDOs were involved.

During the lead up to the GFC, there was significant financial innovation in creating new types of CDOs and varying the collateral used. This chain of evolution can be understood by considering the creation of CDO squared and cubed, as well as the BISTRO bond created by JP Morgan, all of which were more complicated than their predecessors. As demonstrated by MacKenzie and Hardie, the returns did not sufficiently match the increased resources needed to evaluate them. The crash of Lehman Brothers, both a symptom of and an exacerbating factor in the GFC, exemplifies this phenomenon. The firm had grossly overestimated the value of their CDO portfolio, and in some cases their actual value was close to 1/30th of their market values. (John Carney, 2010) The mistakes made at Lehman Brothers in relation to CDOs can largely be attributed to their “Product Control Group” which was responsible for checking the asset valuations reported by the various desks in the company. However, due to the sheer volume and complexity of the tasks, they often simply used the models provided by the traders and did not perform sufficient due diligence. This is very much in line with the theory put forth by MacKenzie and Hardie (2014) that banks were simply not able (or willing) to properly evaluate the risks and values of their mortgage backed portfolios. The takeaway here is that while CDOs were a cornerstone of Lehman Brothers’ fall, the core of the problem was not CDOs themselves, but rather the failure on the part of financiers to properly understand the risks and adequately

pricing their assets. This is also echoed in the work done by Luo et al (2018) wherein they found that their weaker model was closer to what the models at the time concluded. This underscores the likelihood that even the CDOs at Lehman Brothers that were subject to external review were also mispriced.

An enabling factor for both the growth and mismanagement of the mortgage backed CDO market was the role played by rating agencies. Many of the tranches that received rating downgrades during and in the lead up to the GFC were actually initially giving the highest possible credit ratings, putting them on par with treasury bills and other credit instruments of the highest quality. Credit rating agencies were directly incentivized to ignore the risks as their profits were reaching record levels. (Barnett-Hart, Page 3, 2009) Of the three largest credit rating agencies, the two most involved were Moody's and Standard & Poors. (Barnett-Hart, Page 18, 2009) With the adoption of CDOs, rating agencies also became "consumers" in the sense that when rating tranches of CDOs, they built their work on top of previous ratings, sometimes even work from other rating agencies. The methodologies employed by these agencies also produced remarkably inconsistent results - indicating a lack of true understanding of credit worthiness and default correlation in this sector. This was made worse by the second round of Basel negotiations, which had elevated the level of reliance upon accurate and reliable credit ratings. (Barnett-Hart, Page 20, 2009) The rating agencies were of course not solely responsible, as other market participants failed to question their ratings to a significant enough degree. And of those who did, some managed to place bets against CDOs, rather than to enact changes on the market.

With regards to estimating the correlation between defaults for mortgage backed CDOs, the Gaussian Copula, first published by David X. Li, was utilized. Gillian Tett provides an excellent analogy to default correlations on page 64 of Fool's Gold, where a comparison is made to fruit and the chances of rot forming. If all the apples are stored separately, an average rate of default might be observed. But what happens when they are stored together, rubbing up against each other? Can rot spread from apple to apple, and if so, why, when, and how fast? Needless to say, the apples represent loans in this case, and the example illustrates that default rates most likely

are not independent of each other when in the same space or environment. This relationship is what the Gaussian Copula formula attempts to capture. Residential mortgages and corporate loans do not exist in vacuums, defaults in one sector of the economy will likely affect others, and mortgage defaults are likely correlated in that the causes of default are unlikely to only affect one household. The underlying idea behind the Gaussian Copula is to create a relationship between two different distributions. While the mathematics and execution of this concept are beyond the scope of this thesis, the purpose of the exercise is comprehensible. If there is no correlation between Set A of mortgages and Set B, then the chance of defaults occurring within the same period in both sets, is simply the rate of default for Set A multiplied by the rate of default for Set B. However, if there is a correlation between the two sets, as there most certainly is in reality as the mortgages within the two sets exists within the same overarching economy, then the distributions of defaults between the two must be “combined” to get an understanding of the chances for defaults within the same period. The effects of varying correlation rates on aggregate default rates are elaborated upon and illustrated in MacKenzie et al, 2013. This formula or mathematical methodology was at the heart of much of the CDO mispricing.

Paired with ABS CDOs in the lead up to the GFC was the other side of the coin, CDSs. In theory, CDSs have the ability to shift default risk through the payment of premiums away from those who cannot bear them, and towards those who can. This can result in CDS “daisy chains” wherein the opacity of the market is greatly increased and it becomes extremely difficult for CDS protection buyers to measure their counterparty risk. (Persson, 2008, Page 24-25) This can happen because firms selling CDS protection are very often also CDS protection purchasers. In this way, if A purchased protection from B, but B purchased CDS protection from C, the ability of A to benefit from their CDS protection depends upon the ability of B to be able to pay out the default fee and the ability of C to be able to payout default fee to B, should simultaneous defaults occur in a widespread manner. As such, even an investor or regulator eager to understand counterparty risk in the CDS market would have a very difficult time doing so. As CDSs were a relatively new financial innovation at the time, many transactions involving them were sold over

the counter and there exists limited data. (Persson, 2014, Page 11) As will be shown in the following paragraphs, CDSs played a central role in triggering the GFC.

Shortly after the collapse of Lehman Brothers, AIG was the next to run into troubles as the result of their Financial Products division which had helped insure debt in deals such as JP Morgan's BISTRO as well as mortgage linked deals. As a result, the global insurer had an exposure of \$55 billion to subprime mortgages. (Tooze, Page 150, 2018) This was actually a relatively small portion of their total loan portfolio and had therefore not warranted enough concern to insulate themselves or to get rid of them. On the BISTRO related deals, there were 125 CDS contracts that alone could trigger payments of \$11.5 billion, more than they had earned in the previous decade combined. While the company may have been able to survive this regardless of the scale of the losses, rapid downgrades in mortgage backed markets triggered margin calls in the tens of billions towards AIG as the insurer lost its AAA credit rating. Making matters worse, AIG was unable to sell their own mortgage linked assets in order to generate cash to match the margin calls. As a result, the firm required a bailout of 180 billion USD. The chief party issuing margin calls against AIG was Goldman Sachs who had been large purchasers of CDS contracts from AIG, betting against the housing market. In this sense, the considerable amount of CDS contracts that had built up on the back of CDOs and other mortgage backed securities ending up contributing to their undoing, and spreading the crisis wider. CDSs, the very instrument that helped to popularize the CDO structure played a very direct role in turning them into a financial liability.

Important to the role of CDOs during the lead up to the GFC was also their use in repo markets. Repo agreements, short for "repurchase agreements" are transactions wherein the the seller agrees at the time to repurchase the security back at a later date and at a higher price. The duration of these contracts are often very short term and frequently only overnight. Essentially, repo deals can be understood as short term loans where the security traded is really being used as collateral. Currently, treasury bills are the most common collateral used in repo deals, but in the lead up to the GFC, CDOs were a common sight in these deals. As the scale of money under

management has increased over the last 3-4 decades, so has demand in the repo market, even from non-financial institutions and firms. (Gorton et al, 2010) As a whole, the repo market differs from interbank lending, reflected in rates such as EURIBOR and LIBOR, in that those are the rates for unsecured loans, whereas repo by definition is secured.

It was specifically this relationship that helped to transfer the perils of the mortgage markets into the rest of the economy during the crisis. (Gorton et al, 2010) Repo haircuts (the cost of performing repo deals) increased as concerns over the market increased and the value of the collateral used in repo agreements (CDOs) was dropping rapidly. This in effect led to widespread insolvency throughout the American banking sector. Gorton and Metrick frame this as a “run in the repo market.” (Gorton et al, 2010, Page 28) This is most apparent in the case of the collapse of Bear Stearns. The most profitable division at Bear Stearns was its fixed income department, which profited off of mortgage securitization. (Stanford Law, 2008, Page 280) The brokerage received a lot of its funding through short term borrowing - primarily via the repo markets. Naturally, the collateral that was needed for the \$50-70 billion USD was largely posted in the form of mortgage linked securities. (Stanford Law, Page 281) While only a few hedge funds noticed at first, the wider troubles in the housing market meant that it was increasingly difficult and expensive for Bear Stearns to achieve the short term borrowing that it needed in order to continue to operate. Eventually, news of this spread and more funds cut ties with Bear Stearns, and some sought replacement counterparties to credit derivative contracts previously held by Bear. The departure of a large client, Renaissance Technologies, was the final nail in the coffin and Bear was eventually forced into a government sponsored acquisition by JP Morgan for the value of less than the building they had worked in. (Tett, Page 221, 2009)

At this historical level of analysis, it can clearly be seen that both asset backed and synthetic CDOs played a central role in the crisis. But they did not cause this crisis purely by virtue of being a “bad idea” or inherently toxic. There certainly existed multiple secondary factors fueling the fire. Poor risk management practices in the cases of AIG and Lehman Brothers speak to a wider and more underlying issue in banking - the difficulty of accurately determining and

understanding risk. In the case of Bear Stearns, inherently weak business practices in regards to their funding structure allowed for the devaluation of CDOs to have such a devastating effect on their firm. Furthermore, CDSs which had been invented alongside synthetic CDOs, seem to bear little of the blame in modern interpretations of the crisis, despite playing an active role in causing it. The failure of the rating agencies involved in the business of CDOs also played a central role, but much like the other market participants, they were simply unable or unwilling to issue ratings that accurately reflected the risk levels present in these assets. The recurring theme in these components is the difficulty in modeling the risks of CDOs. If so many participants, each wielding significant resources failed to do this, the question of whether or not these assets should continue to be produced should be raised. While the term “too big to fail” is often used to describe the financial sector, Gillian Tett proposes the use of the term “too *interconnected* to ignore.” (Tett, 2009, Page 255) This term is an apt description of the state of financial markets leading up to the global financial crisis. (And perhaps still is today). As demonstrated in some of the above examples, it was often the dealings with or reliance on other parties and institutions that landed those who would need bailouts in hot water.

In addition to the more specific cases described in the preceding paragraphs, more general observations can be drawn from the Dissenting Opinions portion of the FCIC and Howard Marks’ views on economic cycles. The authors of the Dissenting Opinion propose an alternative to “derivatives and CDOs caused the financial crisis,” and go on to describe a more nuanced view of the GFC. (Page 426) The parties securitizing mortgages lowered their standards which in turn allowed mortgage originators to issue increasingly lower quality mortgages. These trends were not met with sufficient push back from credit rating agencies or investors. The popping of the bubble was exacerbated and spread through the financial system through the use of associated credit derivatives. This of course on the back of the wider credit bubble fueled by foreign capital. It is however made clear that an increase in the level of capital available does not necessarily lead to more irresponsible lending. Instead it is emphasized that something, unclear from their perspective, has affected a change to the state of the world and caused investors to accept higher risks for lower returns. This is a compliment to the hypothesis put forward by other

works cited within this thesis, namely the idea that there was a mismatch between risk, complexity and the returns offered in exchange. With this in mind, fuel source for many of the credit derivatives was provided by the originate to distribute model of issuing mortgages. While Howard Marks emphasizes the importance of cycles, he ultimately concludes that the GFC was a crisis caused by and originated from within the financial sector. He purposefully highlights the disconnect between risk creation and risk bearing accepted by the financial sector to highlight this. (Marks, 2018, Location 1958)

8.4 Narrative Level Analysis

At the narrative level we return to the present day in order to investigate how the narrative is used, what is left unsaid or put into focus and which conclusions can be derived from the narrative. The natural conclusion to be reached from many of the articles covered in Section 8.1 are that regulators need to intervene quickly, or CLO production must be curbed in some other way, or else we will see a repeat of the GFC. After all, if the assets really are so similar, are they not destined to end in similar results? There is an element of fear present in many of the retellings of the growth in the CLO market, serving as a call to action for something to be done about this. In this way, the narrative can be seen as a tool to justify the further regulation of bankers.

The lines between mortgage backed CDOs and modern CLOs are often obfuscated by way of stretching the definitions of these assets. This can be seen in one of the articles, (Matt Phillips, 2018) where what can be used as collateral in the two types of financial products are made to appear more similar than they really are. “A financial assembly line that went haywire a decade ago and contributed to an economic crisis is gearing up again on Wall Street.” (New York Times, 2018), is a line from one of the articles that illustrates this perfectly. The statement on its own, and even with in context of the article does not have a strong basis in reality. The “assembly line” referred to here is undoubtedly the originate to distribute model created in order to facilitate the creation of more mortgage backed CDOs. However, CLOs, by definition, do not employ this

supply chain as demonstrated in Section 7. CLOs source collateral in the form of corporate debts, which is generated in an entirely different manner. But by way of invoking the past, the author of the article seeks to frame CLOs as almost the same thing as pre crisis CDOs.

Crucially, the narrative is also selective in what is left out. In much of the telling regarding modern CLOs, they are framed as a new asset or a new *flavor* of CDO. But neither of these are the case. CLOs existed before and during the GFC, and actually performed very well during the crisis compared to mortgage backed CDOs. (Guggenheim, 2019) By framing CLOs as a rehashing of pre crisis CDOs, the authors make the association between modern CLOs and GFC era MBS CDO meltdowns on the behalf of the reader. Crucially, this reduces the level of critical thinking needed in order to deduce a narrative - the narrative is simply that the Wall Streeters are making the same mistakes as “last time.” Similarly, by framing CLOs as a new creation, a narrative in which bankers and Wall Streeters refuse to learn from the past, and are solely focused on profit arises. This also streamlines the narrative and bypasses nuances in what is otherwise a fairly complicated retelling of how CLOs fared during the crisis and have evolved since.

There is also a consistent element of describing CLOs as an asset or activity that is solely beneficial to the already rich or those who participate in their creation and management. This can be seen in the Bloomberg article bombastically titled “Wall Street’s Billionaire Machine, Where Almost Everyone Gets Rich,” (Metcalf et al, 2018) and use of the word “party” by the New York Times to describe these activities. In this way, the authors seek to frame this as a tale of the wealthy jeopardizing the welfare of the economy as a whole in order to pursue their own interests. This framing of bankers can be seen in much mainstream representation of bankers as a whole. Popular movies (The Big Short, Margin Call, Wall Street: Money Never Sleeps are prime examples) and books (The Bonfire of the Vanities, and even American Psycho) also feed into this common understanding of banker’s motivations. What is left unsaid in this context is the potential benefits of CLOs for pension and insurance funds, which ultimately benefit those outside of the ultra wealthy elite. The advantages of the CLO structure such as fixed incomes on

notes and the elimination of funding risk (investors cannot simply redeem their notes any point) can certainly be useful to institutions who need to reach a set threshold of returns and wish to place their capital with outside active managers. This is particularly relevant today, in a largely negative interest rate environment. With this in mind, CLOs can be framed as a method for hopeful pensioners to achieve positive returns.

The conclusions that can be reached by those buying into this narrative are that more regulation is needed and that banking activities in this sector should be curved. In this way it can be seen that the creation of this narrative is a symptom of a struggle for power and control between those operating and investing in CLOs, and those who wish to pave the way for increased financial regulation in order to avoid future turmoil. This can be seen in the ongoing debate regarding retention rates for CLO managers. Retention rates refer to how many of the notes the collateral manager itself must purchase. The logic of course being that by forcing collateral managers to have “skin in the game,” they will behave more conservatively. But the effects of higher retention rates for collateral managers are multifaceted. Naturally, they will have more at risk if they are retaining a higher portion of their notes, but this also means that they will be able to launch fewer CLOs. This is an important detail because most CLO management firms have several under management at any given time. By managing more CLOs, they are able to achieve greater economies of scale by leveraging their fixed costs. If a manager wants to launch a new CLO, it does not need to hire an entirely new team of credit analysts to select the assets to construct the underlying collateral portfolio because they can simply replicate the asset selection of their other CLOs. In this case, CLO managers and the LSTA (Loan Syndication and Trading Association, which is the industry body governing syndicate loan practices in the US), were successful in suing the SEC and Federal Reserve in order to remove these risk retention rules specifically for CLO managers. (Reuters, 2018)

All of these aspects of the overall narrative are made possible by the sensemaking process that originally followed the GFC and can be understood by applying the lens utilized by Hansen in “Making Sense of Financial Crisis and Scandal: A Danish Bank Failure in the First Era of

Finance Capitalism.” Regular citizens with limited experience and understanding of how the global financial system functions needed an explanation that was both digestible as well as easy to communicate and understand. This was especially true in the face of bailouts for banks that they saw as responsible and the apparent lack of accountability on the part of the financiers themselves. In attempting to explain the GFC, there are two overarching competing narratives seeking to provide explanations. The first is a framing of the crisis as the result of the greed of consumers spending irresponsibly, purchasing homes and properties that they could not possibly afford to pay for. This perspective is critical of consumers, arguing that they should have known better than to accept mortgage deals that they could not service the debt on in the long term, letting themselves be fooled by teaser rates. The alternative narrative instead pivots the assignment of blame to the bankers that had sold these mortgages and the assets that they had created. Both of these narratives paint one group of actors as the irresponsible party, but it was the one giving bankers the lion’s share of the blame that became the dominant narrative. Whether or not this is logical, it makes sense that it won out in the competition for narrative validity. It is this explanation of the GFC that is being used, or *built* upon in much of the current dialectic regarding CLOs. Had the alternative narrative framing consumers as the party at fault in the GFC won out, the narrative being analyzed in this thesis would be considerably more difficult for its perpetrators to frame, as they would have to first revisit the past in explaining it.

9. Analysis II: Evaluating the Narrative

In this section, the paper takes on a realist approach and moves away from the constructivist view of the world. By this we mean that the methodological approach in this section dictates that our theories and ideas about the objects, entities, and events that we observe do not directly affect them. This section will conduct a comparison of modern CLOs to the CDOs of the pre crisis era to determine what characteristics they share, and whether the direct comparison between the two that is often made is appropriate. Following this a discussion of how modern CLOs differ from GFC era MBS CDOs will be conducted across two different sections, one focusing on the environment and regulatory frameworks that they operate within, and the other focused on the assets themselves.

9.1 Similarities Between Pre-Crisis CDOs and Modern CLOs

The previous financial crisis inarguably originated in the United States but had consequences for the global economy due to the level of interconnectedness present in the global economy. Part of this was due to the nature of how the products were distributed. While the CDOs that were highly relevant during the GFC were by and large created in the United States, they were sold to investors around the world. This is one of the components that allowed for the downturn in the CDO market to have a global impact. The state of affairs in the modern CLO market is not incomparable and in the event of a wide spread defaults, one should expect global effects. Investors from all over the world are also buying CLO notes, particularly Japanese investors. (Bloomberg, 2019)

A common theme in all sorts of CDOs whether backed by corporate debt of one type or another, or mortgage backed is the difficulty in predicting default correlations. In the case of CLOs, defaults can be related in a similar manner as they were with MBS CDOs. If a large producer goes out of business and defaults, their customers and suppliers will be affected as well, causing a chain reaction. While this thesis will not seek to engage in speculation, default correlations for loans in CLOs may potentially be even higher than mortgages used to create CDOs. Drawing inspiration from Akerlof, an argument can be constructed that the nature of credit derivatives such as CDOs (therein including CLOs) are susceptible to adverse selection. In both the case of pre crisis CDOs and modern CLOs, the originator of the collateral is almost always a bank moving the assets of balance sheet, either to their own SIV, or to a third party collateral manager. In both cases (mortgage backed CDOs and CLOs), there is the chance for adverse selection to arise. This can be understood through the lens of the “lemon-squeezing” problem introduced by Akerlof and discussed in the literature review section of this thesis. Hypothetically, in both cases, the bulge bracket banks originating the loans could choose to maintain the assets that appear to be strong, and only distribute the “lemons.”

In the lead up to the GFC, lending standards in the mortgage market decreased significantly in order to facilitate the origination of more loans to be placed into the CDO “machine.” If one adopts the view presented by the narrative analyzed in the previous section, similar trends can easily be observed in the current CLO supply chain. Possibly because of the demand for such loans created by CLOs, the lending standards within the market for leveraged loans are decreasing. Loans to already indebted corporations are slipping in their documentation quality, and “cov-lite,” meaning that lenders are less protected by the debt covenant, and second lien debt, meaning that the lender is not the first to be paid in the event of a default, are becoming more prevalent. The parallels between this trend and the falling lending standards leading up to the GFC are clear. As the demand for vehicles to place capital in remains high or even increases, the underlying collateral used will at some point begin to deteriorate.

As seen in Section 8.3, there were a multitude of other financial products and activities that helped to create the crisis. These were the CDS contracts betting against mortgage backed CDOs and the use of these CDOs in the repo markets. Comparable products are available in today’s market, namely, *Loan credit default swaps (LCDS)* and *Single-name total rate of return swaps (TRS)* are two common loan derivatives, meaning that they would hypothetically be dependent on the underlying loans in CLOs, rather than the CLOs as a whole, or single tranches of a CLO. (S&P)

While certain components of the financial sector have changed since the GFC, moral hazard still exists, and potentially exists to an even greater degree than during the lead up to the GFC. Given that they were bailed out during the last crisis, it stands to reason that bulge bracket banks would also expect to be the next time around. The rating agency, Moody’s even takes this into account when issuing ratings to clearing houses. (Bloomberg) In the creation of mortgage backed CDOs the incentives for rating agencies were also misaligned. The dynamic between rating agencies and their customers, CDO managers including CLO managers in this case, have not changed for the better. In the same vein as how the credit rating agencies became consumers of their own ratings during the previous crisis, this remains true. These agencies are employed both to rate the

individual loans and bonds being purchased by CLOs, as well as to rate the tranches of the CLO itself. As pointed out by Howard Marks (Location 2911), at the time when many MBS CDOs were issued leading up to the crisis, the vast majority received triple A ratings on their most senior tranches. He points out that this seems strange, given that there were only four American companies in total which possessed such a high rating on their debt. Fast forward to today, and the story is not dissimilar. CLOs very rarely print without a triple A rated senior tranche and the number of American firms with AAA rated debt has fallen to just two. One question that remains a mystery from the perspective of this author, is why in an era of negative interest rates, do the highest rated tranches of CLOs often pay around 1% yield? As indicated by Thomas Hale in the Financial Times (2019), this seems highly unusual given that other triple A rated debts such as sovereign debts are yielding negatively. While this could simply be due to the “stigma premium” as suggested by the author, it certainly does not put to rest concerns regarding ratings shopping on the part of CLO managers.

Quoted in the Financial Times (2007), Anthony Bolton, a veteran of structured finance products, argues that these products are based on models based on a set of assumptions. Under normal circumstances these assumptions might hold, but as financial crises throughout the centuries have shown, assumptions do not hold over time, and need to be updated, and often only done so after a crash has occurred. When comparing the documentation of pre crisis CDOs to modern CLOs, the underlying metrics and rules set out within them are not dissimilar. Direct comparisons between subprime MBS CDOs and modern CLOs are difficult due to the lack of recent printed subprime MBS CDOs. But when comparing crisis era CLOs to modern CLOs, there have been changes to the levels needed to be reached in order to be compliant, but it is the same metrics being used. (Deloitte) For example, the requirements regarding overcollateralization and interest coverage have become more stringent, but the measurement methodology is unchanged. The same can be said for many other metrics such as weighted average spread and life tests. In summary, the underlying assumptions that these metrics are sufficient in reducing risk when operating CDOs of all types are still in operation. More obvious parallels such as the tranching system seeking to create credit enhancement for more senior notes

naturally also exist and build on the same idea that by having a default “buffer,” the senior tranches will be safer.

On the topic of risk retention rules, even if they are to be introduced on a permanent basis, it is unclear from the perspective of this author what effect they will have in practice. In theory, risk retention rules should ensure that CLO operators act responsibly as their own capital is at risk. But as highlighted by the previously referenced Deloitte (2018, Page 2) white paper, CLO managers can seek financing to deal with this regulatory challenge. Should a CLO manager seek financing by issuing debt or engaging in a repo agreement in order to retain a certain percentage of their own notes, the question of whether or not these regulations actually lead to increased financial stability must be asked. If CLO managers are indeed capable of largely skirting risk retention rules by way of outside financing, the goals of risk retention are bypassed, and indeed backfire to a certain degree by serving to spread risk, potentially back into the heart of the financial system.

9.2 Differences Between Pre-Crisis CDOs and Modern CLOs

During the lead up to the GFC, there was significant financial innovation in creating new types of CDOs and in the collateral used. This chain of evolution can be understood by considering the creation of CDO squared and cubed, as well as the BISTRO bond created by JP Morgan (Gilliant Tett, 2009, Page 51) all of which were far more complicated than their predecessors. As demonstrated by MacKenzie and Hardie, the returns did not sufficiently match the increased resources needed to evaluate them. However, this “arms race” of financial innovation does not appear to have entered the modern CLO market to a significant degree as of the writing of this paper. CLOs that are being issued today are not significantly more complicated or esoteric than those issued 10 or more years ago. With this in mind, there is still a lemon squeezing problem, as the term is used by MacKenzie and Hardie (Mackenzie et al, 2014). Bankers managing structured finance products, mortgage backed CDOs or CLOs in principal have a finite amount of debt instruments to squeeze income from. It is only natural then, as we have seen in the past,

that more complicated products will eventually be derived from the underlying products in search of greater profits. However, as of the writing of this paper, “CLO Squared” or Cubed products have not been introduced, at least publically. This gives CLOs several advantages in terms of avoiding meltdown. As the same structure has been in place for so long, significant expertise in managing and modelling the risks present in CLOs have been developed. Modelling in this context does not refer to the metrics mentioned in the previous subsection discussing rules outlined in CDO documents, but rather the risk management modelling methods employed. While risks certainly still do exist, this indicates that CLO operators will not run into the considerable asymmetries between resources needed for evaluation and the returns offered faced by mortgage backed CDO managers described by Hardie and MacKenzie.

Arguments have been made in some of the literature featured in Section 3.1 that when compared to mortgage backed CDOs, CLOs have a greater concentration of risk due to the lower count of underlying assets in the collateral portfolio. The reasoning is that as a CLO collateral portfolio typically consists of 100-300 leveraged loans (Deloitte, 2018), and the number of mortgages in a mortgage backed CDO can range from the mid five figures into the millions. (Hardie et. al. 2014, page 392) However, the supposed diversification of risk that mortgage backed CDOs possessed was largely irrelevant as the *correlation* between the mortgages that constituted the collateral pool was higher than expected.

Another important distinction to be made between mortgage backed CDOs and CLOs is that CLOs are very often *actively* managed. This means that a collateral manager has the ability to sell the assets within their collateral pool and repurchase “new” ones. That is to say that if a credit analyst responsible for a specific firm’s bond in their portfolio begins to question the firm’s ability to repay the principal, the bond or loan can be traded, and the cash reinvested. An analysis of the importance of this has been carried out by Fabozzi et. al. published by the Danish National Bank in 2010. The findings of the research were that the more “actively traded” CLOs were, the more likely they were to sell off pieces of their portfolio, often managing to sell them at higher prices and avoiding downgrades of their collateral. This is illustrated on page 36 of

their report. It should be noted that RMBS CDOs also did have a reinvestment period, but this was primarily used for reinvesting the capital received through paydowns, rather than actively trading assets. Individual mortgages, and even groups of mortgages were not liquid enough to accomplish this style of active trading. While the above concerns the collateral involved in CLOs, the underlying assets, markets for the resulting notes representing the obligations of CLOs are also traded, leading to a more realistic indication of their market value. While it is difficult to say what the impact of this will be in the event of a downturn, one can observe the consequences of a lack of a reliable market price for RMBS CDOs in the lead up to the GFC.

As demand for CLO notes increases, the ability of CLO managers to dictate the terms of these deals will increase. In recent years, CLO managers have been able to more regularly include components in their prospectuses that are highly advantageous from their perspective. These include provisions such as par flushes, which allow par gains gained from trading to be “flushed” down to the equity tranche. (ClearStructure, 2018) In other words, if the managers of the CLO trade their assets so that the overall value of the structure increases, some of it can be sold off and the proceeds paid to the equity note holders as an additional bonus to any interest payments. In terms of judging what this opportunity for managers means in terms of the risk profile of CLOs, there are two primary considerations. From one perspective, this can increase the “attention to detail” applied when making debt purchases in order to pick assets that may appreciate. On the other hand, this can certainly incentivise risky behavior on the part of traders employed at CLO funds. With the potential to build par to be used in a par flush, a trader may buy an asset trading well below par with the hope or belief that it will trade at a higher price at a later date and can be resold. Traders working with CLOs are however restricted in terms of what assets they can purchase. Managers cannot employ distressed debt investment strategies as they are often restricted from buying assets that are trading under a certain level. But when trading debt assets that are issued at or around 100, and very rarely trade much above that, but can in theory go all the way down to a value reflecting their expected recovery rate, there is clearly room for more downside in terms of par gain and loss than there is upside.

As shown in earlier sections, much of the difficulty in managing mortgage backed CDOs in the lead up to the GFC arose from the task of accurately modeling the associated risks. While CLOs can and are modelled using statistical models and software, CLOs have the clear edge in being able to almost instantaneously see the market values of their portfolios, as the underlying bonds and loans are actively traded - though not necessarily with a particularly high degree of liquidity. A MBS CDO operator in 2006 could not simply log onto his Bloomberg console and see the market opinion of his mortgage portfolio. This thesis does not seek to make the argument that markets will always or automatically assign an accurate value on these securities, but it is certainly a useful data point for those managing these vehicles.

Also on the note of accurately pricing and valuing the credit used in CLOs is the importance of the syndication process when issuing these loans. As shown in Section 7, for a syndicated loan to be introduced to the market, an investment bank must first undertake the task of underwriting and structuring the deal. Likewise, an agent must agree to the terms and agree to manage the administrative aspects. After these parties have committed, the buyers of portions of the syndicated loan must each, at least to some degree, conduct their own analysis of the resulting security and consider the credit worthiness of the firm taking on the debt. In this way, both the depth of analysis and *number* of analyses performed per asset in a CLO compared to a RMBS CDO is significantly higher. In the case of a mortgage going into an RMBS CDO, it is likely that only a single loan officer or branch office of a bank conducted any meaningful analysis of the asset. In the same vein as in the above paragraph, this argument is not made to suggest that markets cannot be wrong, but rather to stress that the amount of participants that would need to be wrong, is remarkably higher in the case of the assets involved in the CLO industry.

9.3 Market & Regulatory Changes Since the GFC

In addition to comparing the types of CDOs that were popular leading up to the crisis with modern CLOs, the regulatory frameworks that they operate(d) within should also be considered.

If the argument is that CLOs are in a position to trigger another financial crisis by virtue of having similar characteristics to pre crisis CDOs, the state of the system that they exist within and act on has to be taken into account and compared. Since the GFC, several regulatory changes have been implemented, resulting in critical changes to the financial business environment.

The 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act, introduced significant new regulation and government bodies tasked with monitoring the financial system with the goal of preventing future financial collapses. The legislation limited the ability of banks to invest their depositors money and prohibited them from investing in “covered funds.” In terms of expanding government monitoring capabilities of the financial sector, an office under the SEC was established to monitor credit rating agencies, and another office was created to monitor large insurance companies. Following Dodd-Frank, hedge funds were also required to register with the SEC and provide data on their practices. The Consumer Financial Protection Bureau was established in order to protect everyday consumers of financial products and they are responsible for monitoring credit card, banking, and mortgage services aimed towards individuals. Derivatives have also received attention in this regulatory package. Dodd-Frank imposed that many of the riskiest derivatives have to be traded at clearing houses and new specific rules were introduced for many types of derivatives. Whether or not Dodd-Frank will be relevant in the future is yet to be determined. 2018 roll-backs of some of its regulation and attacks from President Donald J. Trump indicate that it may see considerable weakening in the coming years. The other piece of significant legislation since the GFC is Basel III which was introduced in 2010 after work had started on it following the GFC and is an extension of Basel II. Basel III focuses on three primary pillars. The first concerns requirements regarding capital and capital quality, risk management, and the total leverage of banks. The second and third pillars seek to enforce stronger risk management practices and market discipline. It was also the Dodd-Frank act that introduced risk retention rules which took effect in late 2016. (Deloitte, 2018) As previously discussed, these rules have been a topic of significant debate within the industry and between regulators.

In general terms, when comparing the current economy to the pre crisis economy, one of the starkest differences is *where* the leverage in the economy is. Broadly speaking, leverage has shifted away from households and to businesses. This has resulted in more capital sitting in leveraged loans and junk bonds. The state of bulge bracket banks is also different today than in 2008. Structurally, banks have become safer following the GFC in that their capital buffers have increased significantly. According to Bloomberg (2018) many banks in 2007 had about 2% of “cushion” for every \$100 of assets. In late 2018, this ratio was closer to 7:100, signalling a significant increase in the amount of losses that large banks could withstand in the event of a downturn. The regulatory initiatives that have helped to increase these ratios have also had effects on the growth of large banks, as reflected in the lower Assets-to-GDP ratios seen in large American banks. This indicates a lower concentration of risk within the banking sector when compared to the lead up to the GFC.

Funding sources for banks have also changed. This was a critical source of weaknesses during the GFC, as seen in the case of Bear Stearns which was overly reliant on repurchase agreements sourced from repo markets. Trading liabilities (as a source of funding, wherein settlements on trades are delayed in order to meet funding requirements) and other short term forms of debt have also decreased, further speaking to the argument that big banks would be significantly more resilient, should a downturn be triggered by CLOs. As showcased by the retelling of the Bear Stearns meltdown, one of the primary causes of their bust was their use of MBS CDOs as collateral in repo deals used to reach short term funding requirements. Whether or not this should be blamed on the assets themselves, or the management of the firm can be debated ad infinitum, but either way, it should be noted that CLOs are not even accepted by the ECB as collateral in repo agreements as of the writing of this article. (Thomas Hale, 2019) This further separates modern CLOs from what can be considered close to the heart of the financial sector.

Interest rates were brought down to near zero or even to negative rates by some central banks as a response to the GFC, and rates have stayed at these levels in many cases. The reason for the cut in interest rates was to ease lending to encourage businesses to make investments, stimulating the

economy in order to move passed the crisis as quickly as possible. Naturally, it can be difficult to predict exactly what affects something like this may have in the event of a down turn, but it is mentioned here because it is a fundamental difference in the state of the economy when comparing 2008 to 2019. As of the writing of this paper, U.S. Federal Reserve Interest rates are in the range of 2.25% to 2.5%, while the ECB is currently setting rates at 0.25% for marginal lending and -0.40% for deposits. ECB interest rates spanned from 3.25% in July of 2007, down to 0.25% in mid 2009, and eventually to 0% in the wake of the Eurozone crisis. For the ECB, this indicates that there may be less room to push interest rates down, should a recession begin tomorrow - taking negative rates even lower would be a step further into uncharted territory.

On the topic of low interest rates established by central banks which naturally also affect the rates paid on debt by corporations, the interpretation of the MBS CDO meltdown that culminated in the GFC presented by MacKenzie et al should be revisited. The root of the argument presented is that the marginal benefit of each asset added to the portfolio did not scale in accordance to depth of analysis needed. This line of thinking can be transposed to CLOs which consist of a smaller portfolio by number of assets, but significantly more complicated ones. If the total interest paid by the assets in a collateral portfolio decreases due to them being “floating rate” over an interbank rate such as LIBOR or EURIBOR, CLOs are also exposed to experiencing asymmetries between the costs required to analyze the risks associated with the collateral and what the collateral *pays*. It should also be considered that an extended period of low interest rates may have served to push corporate leverage up, increasing the risk of default, should rates be brought back up.

One of the primary regulatory changes relating to CDOs, including CLOs, is the Volcker Rule. One of the cornerstones of the rule is intended to prevent banks from participating in speculative investments using their client’s cash. This includes placing money with private equity, hedge funds, or other types of “covered funds.” As CLOs are considered “covered funds” if they include a bond bucket, US banks are strictly not allowed to purchase their notes. Clearly, the inability of banks to purchase non Volcker Rule compliant CLO notes has material consequences

both for the profitability of the asset class, and for the systemic risks it poses. A smaller pool of potential buyers inevitably leads to decreased demand, and likely decreased liquidity. This is perhaps also part of the reason why the most senior rated notes of CLOs pay such a significant premium over similarly rated assets. From the perspective of the author of this paper, keeping banks from holding CLO notes would suggest a decentralization, or spreading of risk, away from systemically important banks, and towards smaller investment, pension, and private funds. Should it hold up to industry pressure, the Volcker Rule will play a pivotal role in deciding the severity of an economic downturn.

2017 saw the introduction of EU regulation target resecuritization. The regulation defines resecuritization as “securitisation where at least one of the underlying exposures is a securitisation position.” (Article 2, REGULATION (EU) 2017/2402) Within the context of CDOs, this refers to squared and cubed versions of CDOs, where the collateral obligations themselves are securities, ie notes issued by an already existing CDO. As of the effective date of this regulation, the creation of squared CDOs was banned. An important caveat does exist here, in that if a resecuritization is unitranched, it is permitted. (Article 8, REGULATION (EU) 2017/2402). In the United States, resecuritization regulation has also taken effect. As of 2014, the United States requires asset level disclosures to investors, regardless of whether it is the first level of securitization or a resecuritization. In theory, this allows purchasers of CDO notes to more easily conduct their own due diligence on investments that they are indirectly participating in. (Asset-Backed Securities Disclosure and Registration, SEC)

10. Conclusion

Modern narratives describing CLOs often color them as a new financial innovation that poses significant risks to the financial system and economy as a whole. These tellings rely on conclusions drawn during and after the GFC and build on a streamlined understanding of the GFC that sees CDOs as the primary trigger of the crisis. The historical level analysis showed that while CDOs played a central role in many of the collapses that occurred at the time, there were often compounding factors at play, which are seldom discussed in relation to how critical a role they played. The narrative is operationalized as a tool to advocate for increased regulation and ignores facts that would contradict it, such as how CLOs navigated the past crisis successfully.

The second analysis which sought to determine to what extent the narrative makes sense found that while certain points are valid, there exists impactful differences between pre crisis CDOs and modern CLOs that should not be discounted. At their cores, pre crisis CDOs and CLOs share similar structures and comparable underlying assumptions regarding the virtues of credit enhancement and collateral diversification. While the supply chains for pre crisis CDOs and modern CLOs contain different ingredients and different actors, in reality both asset types have a factory line underlying them which serves up debt assets to be included in these products. Additionally, elements of both types of lemon squeezing discussed in this paper exist continue to exist in the CLOs being printed today in much the same style they did pre-2008.

The fact that CLOs today are actively managed and participate in secondary trading separate them markedly from MBS based CDOs. CLO managers are forced (and enabled) to actively manage their portfolios and trade out of bad positions and have access to almost live evaluations of the net asset values of their portfolios. This lessens the importance of risk modelling attempts that failed so horribly in 2007-08. Perhaps most importantly, CLOs have not undergone the financial “innovation” seen with pre-crisis era CDOs such as squaring and cubing. This is largely due to regulation following the crisis as well as the stigma currently associated with such

products. This reduces complexity and the ability of the originators to repackage the more difficult parts of the CDO (including CLO) capital stack.

While they two differ on many metrics, ultimately the most important considerations are the environments and regulatory frameworks that they operate within. In the current state of the world, leverage has to a degree shifted away from consumers and onto the balance sheets of corporations, which in itself is evidenced by the growth of the CLO market. Regulatory changes have been applied to these structured finance products that seek to enforce discipline on CLO operators via risk retention rules and to funnel systemic risk away from the heart of the financial system. Risk retention rules in theory will help to ensure responsible behavior as well as the number of CLOs that will be produced. The pure scale of CLO production will likely also be curved by limitations to the pool of potential buyers, via the Volcker Rule.

To answer the question of how much sense the narrative at hand makes, the answer must be that it certainly does contain valid points, but within mainstream media, it is often formulated in a manner which lacks nuance to a dangerous degree and fails to take into account significant differences in how the assets at hand are operated. Not only does it fail to highlight differences in how they are made or operated, but the arguments are often agonistic to changes to the environment and perhaps even have a tendency to overlook more probable drawbacks of CLOs in order to focus on their relation to CDOs before the crisis. As such, the narrative should be given credence, while discounting the components which do not hold up to scrutiny. With this said, it is not the aim of this paper to argue that these journalists should not write pieces warning against what they see as risky behaviors within the financial sector. Criticisms of the financial sector are a part of maintaining healthy financial markets.

11. Discussion & Limitations

The long term effect of negative interest rates on CLOs and the wider economy as a whole should also be considered. Have years of quantitative easing and low to negative interest rates

allowed for corporate borrowers to become overly indebted, partly facilitated by the ability and willingness of CLOs to purchase said debt? The scope of this question, eg. attempting to precisely correlate rising corporate leverage with CLOs is beyond the scope of this paper and therefore is instead mentioned here as an example of potential future research. In the same category, is the question of why CLOs despite being purchased by Asian investors, are so predominantly produced in Europe and the United States. Is this because only American and European firms are sufficiently indebted to warrant the creation of these vehicles? While regulations impacting this asset class were discussed, it was largely within the context of considering the overall environments that they operate within. A deeper analysis of the laws passed following the GFC and their specific ramifications for structured finance products such as the ones discussed within this paper would also have borne fruit. However, to accomplish this sufficiently, a very specific skill set and understanding of financial engineering from the perspective of bankers is required.

There is also an argument that thinking of the next crisis, or the potential for a new crisis, in terms of the last crisis is misguided. Adair Turner, former chair of the UK Financial Services Authority from 2008 to 2013, argues that thinking about the next crisis in terms of the last crisis, and assuming that it will be driven by similar factors, is like generals planning for the last war. He asks why economic growth has become debt dependent, and points to the fact that the low interest rates seen since the last crisis have allowed firms to take on huge debts. This has left firms in emerging markets very exposed to changes in dollar interest rates, despite these low interest rates not having led to significant growth in Western markets over the past decade since the crisis. (Financial Times, 2018) As the article implies, there are new and divergent sources of risk in the current day economy which imply that the next crisis cannot be prepared for by focusing on what went wrong the last time around. He does however mention the improvements seen in bank capitalization rates since the GFC, as mentioned by many commentators. This thesis is guilty of applying the lens that Adair Turner warns against, but this is the framework, or starting point that must be adopted in order to engage with the current narrative seeking to describe CLOs. This of course has knock on consequences seen in the second analysis as the

parameters that CLOs are evaluated on are naturally colored by those that affected pre-crisis CDOs.

In writing a thesis about potential drawbacks to financial products there is a significant element of inaccessibility. Operators of these assets are not incentivised to open their doors and explain the risk factors. But finding literature describing the benefits of CLOs and emphasizing how responsibly they are managed is not a difficult task. This information is however often published by those with incentives to do so. On the other hand, literature outside of mainstream media explaining the potential downsides of CLOs is scarce relative to the size of CLO issuance and their relationship to the asset type that was arguably at the heart of the previous crisis. While there certainly does exist academic literature on CLOs, the volume of it is limited and perhaps is the case due to the necessary “lag” created by the peer review process needed to publish research.

Paired with this inaccessibility is the difficulty of knowing *where* to look for potential risk factors indogenous to the system that they operate within. During the GFC, the use of mortgage backed CDOs in repo agreements proved to be a multiplying factor in the damage caused by CDOs. From the perspective of this author, the fact that specifically this relationship played a significant role in the collapse of Bear Stearns would not have been easily observable by an outside researcher. In the same vein, it should be acknowledged that if CLOs are indeed the cause of the next financial crisis, it is unlikely to be pre identified within a research paper written by someone outside of the financial sector.

As discussed in Section 2, the nomenclature used in structured finance is remarkably inconsistent. In conducting research on these products this presents multiple challenges. One of which is when attempting to categorize deals to understand when certain types were popular, and how they have evolved. It can at times be extremely difficult to understand which deals are similar because certain groups may have wished to “differentiate” their product by calling it something other than the terms used by their competitors. An example of this is the synthetic

CLOs offered by the Carlyle Group. From the perspective of an outside researcher, these deals do not appear to be very different, but the use of the term “synthetic CLO” rather than “synthetic CDO” obfuscates this. Understanding the nuanced differences between these types of deals requires significant time (and access to) the prospectuses describing the terms of the deal, as well as a considerable and nuanced understanding of structured finance products.

Sources:

- Bloomberg.com*, Bloomberg,
www.bloomberg.com/news/articles/2019-02-28/clo-market-s-japanese-whale-faces-increased-regulatory-scrutiny.
- Akerlof, George A. “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism.” *The Quarterly Journal of Economics*, vol. 84, no. 3, 1970, p. 488., doi:10.2307/1879431.
- Anthropelos, Michail. “A Short Introduction to Credit Default Swaps.” 2012,
www.researchgate.net/publication/265067074_A_Short_Introduction_to_Credit_Default_Swaps.
- Buchanan, Bonnie G. “What History Informs Us About Securitization.” *Securitization and the Global Economy*, 2016, pp. 49–76., doi:10.1057/978-1-137-34287-4_2.
- Buchanan, Bonnie G. “The Way We Live Now: Financialization and Securitization.” *Research in International Business and Finance*, vol. 39, 2017, pp. 663–677., doi:10.1016/j.ribaf.2015.11.019.
- Byström, Hans N.e. “The Microfinance Collateralized Debt Obligation: A Modern Robin Hood?” *World Development*, vol. 36, no. 11, 2008, pp. 2109–2126., doi:10.1016/j.worlddev.2007.11.012.
- Carney, John. “Lehman Brothers Was Dramatically Over Valuing Its CDOs.” *Business Insider*, Business Insider, 17 Mar. 2010,
www.businessinsider.com/lehman-brothers-was-dramatically-over-valuing-its-cdos-2010-3?r=US&IR=T.
- “CDO Primer.” *The Bond Market Association*,
www.quantcandy.com/blog/wp-content/uploads/2008/01/cdo-primer.pdf.
- Chappatta, Brian. “You Know It’s a CLO Peak When Mom and Pop Show Up.” *Bloomberg.com*, Bloomberg, 10 July 2018,
www.bloomberg.com/opinion/articles/2018-07-10/clos-have-hit-a-peak-when-mom-and-pop-show-up.

“CLO 2.0 Mechanism, Modelling and Management.” *Natixis.com*, Natixis,
www.nam.natixis.com/Content/Documents/Publications/Research/paper/Taux/NAM_TR_CLO2_0_juin2017_v5.pdf.

“CLO Structures: An Evolution.” *Deloitte.com*, Deloitte,
www2.deloitte.com/content/dam/Deloitte/uk/Documents/financial-services/deloitte-uk-fs-banking-clo-structures.pdf.

“Clear Insights - What Is Par Flush?” ClearStructure, 7 Sept. 2018,
clearstructure.com/clearinsights-what-is-par-flush-clos/.

Cordell, Larry, et al. “Collateral Damage: Sizing and Assessing the Subprime CDO Crisis.” *SSRN Electronic Journal*, 2011, doi:10.2139/ssrn.1907299.

Davidson, Adam. “How Wall Street Made The Mortgage Crisis Worse.” *NPR*, NPR, 27 Aug. 2010,
www.npr.org/sections/money/2010/08/26/129454550/inside-the-sausage-factory-how-wall-street-made-the-financial-crisis-worse?t=1559515455792.

DECKANT, NEAL. “CRITICISMS OF COLLATERALIZED DEBT OBLIGATIONS IN THE WAKE OF THE GOLDMAN SACHS SCANDAL.” 2011,
www.bu.edu/rbfl/files/2013/09/CriticismsofCollateralizedDebtObligations.pdf.

Eder, Steve, and Mathew Goldstein. “Analysis: Crisis Panel Targets Goldman as AIG Skates By.” *Reuters*, Thomson Reuters, 2 July 2010,
www.reuters.com/article/us-financial-commission/analysis-crisis-panel-targets-goldman-a-s-aig-skates-by-idUSTRE6613ZK20100702.

Fabozzi, Frank J., et al. “Active Loan Trading.” *SSRN Electronic Journal*, 19 June 2018,
doi:10.2139/ssrn.2997057.

Fleming, Sam. “Janet Yellen Sounds Alarm over Plunging Loan Standards.” *Financial Times*, Financial Times, 25 Oct. 2018,
www.ft.com/content/04352e76-d792-11e8-a854-33d6f82e62f8.

Gibson, Michael S. “Understanding the Risk of Synthetic CDOs.” *SSRN Electronic Journal*, 2004, doi:10.2139/ssrn.596442.

- Girón, Alicia, and Alma Chapoy. “Securitization and Financialization.” *Journal of Post Keynesian Economics*, vol. 35, no. 2, 2012, pp. 171–186., doi:10.2753/pke0160-3477350201.
- Global FocusNorth America. “CDOs Are Back: Will They Lead to Another Financial Crisis?” *Knowledge@Wharton*, Wharton, 10 Apr. 2013, knowledge.wharton.upenn.edu/article/cdos-are-back-will-they-lead-to-another-financial-crisis/.
- Gorton, Gary, and Andrew Metrick. “Securitized Banking and the Run on Repo.” 2009, doi:10.3386/w15223.
- Gorton, Gary, et al. “The Run on Repo and the Feds Response.” 2018, doi:10.3386/w24866.
- Hale, Thomas. “The Corner of the Bond Market That Won’t Go Negative.” *FT Alphaville*, 19 Aug. 2019, ftalphaville.ft.com/2019/08/19/1566219948000/The-corner-of-the-bond-market-that-won-t-go-negative/.
- Hardie, Iain, and Donald Mackenzie. “The Lemon-Squeezing Problem: Analytical and Computational Limitations in Collateralized Debt Obligation Evaluation.” *Competition & Change*, vol. 18, no. 5, 2014, pp. 383–401., doi:10.1179/1024529414z.00000000067.
- Haunss, Kristen. “CLO Risk Retention Now Just a Memory as Final Appeal Deadline Passes.” *Reuters*, Thomson Reuters, 11 May 2018, www.reuters.com/article/us-clos-supremecourt/clo-risk-retention-now-just-a-memory-as-final-appeal-deadline-passes-idUSKBN1IC21S.
- Haunss, Kristen. “CLO Market Cheers End of Risk-Retention Rules.” *Reuters*, Thomson Reuters, 13 Feb. 2018, www.reuters.com/article/us-marketreaction-clodecision/clo-market-cheers-end-of-risk-retention-rules-idUSKCN1FX29C.
- “History of Collateralized Debt Obligation.” *History of Collateralized Debt Obligation - Dickinson College Wiki*, wiki.dickinson.edu/index.php/History_of_collateralized_debt_obligation.

Husson, Tim, et al. "Collateralized Loan Obligations, Warehousing, and Banc of America's Undisclosed Losses." www.slcg.com/pdf/workingpapers/CLOs, Warehousing and Banc of America's Undisclosed Losses.pdf.

"Investing in CLOs ." [Http://Aresmgmt.com](http://Aresmgmt.com), 2019, aresmgmt.com/media/526684/Ares_Investing-in-CLOs-White-Paper_RETAIL_1H-2019.pdf.

Jabłecki, Juliusz. "Rise And Fall Of Synthetic Cdo Market: Lessons Learned." *International Journal of Theoretical and Applied Finance*, vol. 20, no. 08, 2017, p. 1750052., doi:10.1142/s0219024917500522.

Jarrow, Robert A. "The Role of ABS, CDS and CDOs in the Credit Crisis and the Economy." [www.russellsage.org/sites/all/files/Rethinking-Finance/Jarrow ABS CDS CDO 2.pdf](http://www.russellsage.org/sites/all/files/Rethinking-Finance/Jarrow_ABS_CDS_CDO_2.pdf).

Jobst, Andreas A. "Collateralised Loan Obligations (CLOs) - A Primer." *SSRN Electronic Journal*, 2003, doi:10.2139/ssrn.370640.

Kollmorgen, Laila, and Steven Oh. "An Introduction to Collateralized Loan Obligations." *An Introduction to Collateralized Loan Obligations | PineBridge Investments*, PineBridge, 8 Aug. 2017, www.pinebridge.com/insights/investing/2017/08/clo-beyond-the-complexity.

Lanchester, John, and John Lanchester. "Outsmarted." *The New Yorker*, The New Yorker, 18 June 2017, www.newyorker.com/magazine/2009/06/01/outsmarted.

Lipson, Jonathan C. "Re: Defining Securitization – Article by Jonathan C. Lipson." *Southern California Law Review*, July 2012, southerncalifornialawreview.com/2012/07/10/re-defining-securitization-article-by-jonathan-c-lipson/.

Loumioti, Maria, and Florin P. Vasvari. "Portfolio Performance Manipulation in Collateralized Loan Obligations." *SSRN Electronic Journal*, 2016, doi:10.2139/ssrn.2803704.

Luo, Dan, et al. "Model Specification and Collateralized Debt Obligation (Mis)Pricing." *Journal of Futures Markets*, vol. 38, no. 11, 2018, pp. 1284–1312., doi:10.1002/fut.21932.

- Mackenzie, Donald, and Taylor Spears. “‘The Formula That Killed Wall Street’: The Gaussian Copula and Modelling Practices in Investment Banking.” *Social Studies of Science*, vol. 44, no. 3, 2014, pp. 393–417., doi:10.1177/0306312713517157.
- Magnussen , Anne. “FORTÆLLINGSANALYSE FOR HISTORIKERE.” *Temp. Tidsskrift for Historie*, vol. 17, 2018, pp. 5–26.
- “MARCH 2008: THE FALL OF BEAR STEARNS.” *Law.stanford.edu*, Stanford Law, fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_chapter15.pdf.
- Marie Ishmael, Stacy, and Steve Johnson. “Fidelity Veteran Warns about CDO Risk.” *Financial Times*, Financial Times, 3 July 2007, www.ft.com/content/3a7a8578-298c-11dc-a530-000b5df10621.
- Marks, Howard. *Mastering the Market Cycle: Getting the Odds on Your Side*. Nicholas Brealey Publishing, 2018
- McConnell, John J., and Stephen A. Buser. “The Origins and Evolution of the Market for Mortgage-Backed Securities.” *SSRN Electronic Journal*, 2011, doi:10.2139/ssrn.1840723.
- Metcalf, Tom, et al. “Wall Street’s Billionaire Machine, Where Almost Everyone Gets Rich.” *Bloomberg.com*, Bloomberg, 20 Dec. 2018, www.bloomberg.com/graphics/2018-collateralized-loan-obligations/.
- Morgenson, Gretchen, and Louise Story. “Banks Bundled Bad Debt, Bet Against It and Won.” *The New York Times*, The New York Times, 24 Dec. 2009, www.nytimes.com/2009/12/24/business/24trading.html.
- Onaran, Yalman. “Can We Survive the Next Financial Crisis?” *Bloomberg.com*, Bloomberg, 10 Sept. 2018, www.bloomberg.com/graphics/2018-lehman-anniversary/.
- SECURITIES AND EXCHANGE COMMISSION 17 CFR.Parts 229, 230, 232, 239, 240, 243, and 249.
- Persson, Henrik K. “The Role Played by the Credit Default Swap in the Economic Boom and the Financial Crisis of 2008.” 28 Dec. 2016.
- REGULATION (EU) 2017/2402 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2017.

- Salmon, Felix. "Recipe for Disaster: The Formula That Killed Wall Street." *Wired*, Conde Nast, 17 Oct. 2018, www.wired.com/2009/02/wp-quant/.
- "Understanding Collateralized Loan Obligations (CLOs)." *Collateralized Loan Obligations (CLO) Overview* | *Guggenheim Investments*, www.guggenheiminvestments.com/perspectives/portfolio-strategy/collateralized-loan-obligations-clo.
- Valladares, Mayra Rodriguez. "Rating Agencies Sound Alarm About Leveraged Loans And CLOs." *Forbes*, Forbes Magazine, 18 Dec. 2018, www.forbes.com/sites/mayrarodriguezvalladares/2018/12/18/rating-agencies-sound-alarm-about-leveraged-loans-and-clos/#40fba2db4d6d.
- Wallison, Peter J, and Charles W Calomiris. "The Last Trillion-Dollar Commitment: The Destruction of Fannie Mae and Freddie Mac." *The Journal of Structured Finance*, vol. 15, no. 1, 2009, pp. 71–80., doi:10.3905/jsf.2009.15.1.071.
- "What Types of Asset Are Used as Collateral in the Repo Market?" 6. *What Types of Asset Are Used as Collateral in the Repo Market?*, ICMA Group, www.icmagroup.org/index.php/Regulatory-Policy-and-Market-Practice/repo-and-collateral-markets/icma-ercc-publications/frequently-asked-questions-on-repo/6-what-types-of-asset-are-used-as-collateral-in-the-repo-market/.
- Whittall, Christopher, and Mike Bird. "In a Blast From a Financial Crisis Past, Synthetic CDOs Are Back." *The Wall Street Journal*, Dow Jones & Company, 28 Aug. 2017, www.wsj.com/articles/in-a-blast-from-a-financial-crisis-past-synthetic-cdos-are-back-1503912601.
- Wiltermuth, Joy, and Kristen Haunss. "Yellen Warns of Corporate Distress, Economic Fallout." *Reuters*, Thomson Reuters, 27 Feb. 2019, www.reuters.com/article/us-yellen-distressed/yellen-warns-of-corporate-distress-economic-fallout-idUSKCN1QG2CZ.