

Why Every Fixed Income Investor Needs To Consider **Bitcoin** As Portfolio Insurance

What Credit Markets Are Telling Investors,
How To Understand Them, And How To Protect Yourself
From What's Coming.



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43.125

-22.10

0.66

50.366

51.125

22.36

32.25

62.224

43.125

15.512

-31.71

-20.25

18.125

-31.71

0.36

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Part 1

Over the last six months, I have had the pleasure of being a guest on the Rock Star Podcast three separate times (RockStarInnerCircle.com/podcast). This is a proud accomplishment for two reasons.

Firstly, I am proud to have been able to share my opinions on Bitcoin with Tom and Nick and the amazing audience. While Bitcoin is only just over twelve years old, since 1988 I have been searching for a solution to Fiat that Bitcoin offers. I am passionate about my discovery. Sometimes I am a little too passionate which can lead to alienation.

Accordingly, I am also proud that I did not fumble my first invite, and that led to a second and third invite on the show. I believe each episode got better, more in-depth, and free-flowing. That feeling helped me gain the confidence to propose an idea to Tom and Nick whereby I want to write a weekly blog to the Rockstar audience that links my experience in my thirty-odd year career in the credit markets with the beauty of Bitcoin.

Very simply, Bitcoin is the most important

financial innovation and technology that I have seen in my career. Initially, I loved the idea of Bitcoin due to its hard-capped supply limit of 21million coins. 21million, for the entire world population, investment community, and everyone looking for a Store of Value that was durable, potable, transferrable, divisible, fungible and SCARCE.

Perhaps I am a little geeky, since I am an engineer by training, but when I first saw the blockchain in action on tradeblock.com, together with transactions that were being processed and stored on the blockchain, I was hooked. I am visual. For me, seeing is believing (in the tech).

This weekly blog, in which I plan to submit ten to twelve installments, will not rehash the beauty of Bitcoin and its attributes. There are plenty of good books on that subject including *Magic Internet Money, A book about Bitcoin*, authored by Jesse Berger, a fellow Canadian with whom I shared the last Rockstar Podcast stage. The book is awesome. Jesse is a star, and I don't need to re-hash his eloquent production.

What I bring to the discussion is over thirty

years of risk management and survival in the credit markets.

I survived because I adapted. If I realized I had made a mistake, I exited (went flat) or even reversed a position (from long to short or vice versa).

In my opinion, credit markets are the most unforgiving of the capital stack. They are also the most ruthless. If you are right, you are paid a coupon and you get your principal returned.

If you are wrong, the interest coupon is in jeopardy, the price of the credit instrument starts to fall towards some sort of recovery value, and all sorts of contagion and correlation plays start to come into play. In short, I quickly learned to play probabilities. Expected value analysis. You can never be 100% certain.

I said on the last podcast that Credit Guys are pessimists. That is true because the return distribution tends to be asymmetric to the downside. A credit that is out-performing its risk profile (i.e. earnings, growth, cash flows are better than expected) will not increase its coupon and share that with the debtholders. Those benefits accrue to the equity. As a result, bond traders tend to ask, *“How much can I lose?”*

Equity traders and investors tend to be optimists. They love growth, believe trees grow to the moon, and are generally higher risk takers than bondies, everything else being equal. This is not surprising since their priority of claim ranks below that of credit (equity is worth zero, unless bonds are worth par). If you manage money professionally, equities are for capital gains, whereas bonds are for capital preservation.

Equity guys are expected to lose money on many positions provided their winners far outstrip the losers. Bond guys have a more difficult balancing act, since all bonds are capped to the upside, but their value can be cut in half an infinite number of times.

You need many more performing positions to offset those that underperform or default.

Credit is really misunderstood by most small investors. In fact, in my opinion, credit is also misunderstood by many professional investors and asset allocators as well. As one of Canada's first two sell-side High Yield (HY) bond traders (the esteemed David Gluskin of Goldman Sachs Canada being the other), I have lived many head-scratching moments on the trading desks on Bay Street and Wall Street.

I worked at RBC, Canada's largest bank, in 1988 when my job was to price C\$900MM of Mexican debt for swap into Brady Bonds. At this time, RBC was insolvent. So were all money center banks, hence the Brady Plan. RBC's book value of equity was less than the write-down that would be required, on a mark-to-market basis, on its LDC book. That was a scary discovery. Most, if not all financial analysts on the equity desks had not done this simple calculation because they didn't understand credit. They just felt, like most Canadians do, that the big six Canadian banks are too-big-to-fail. There is an implicit Canadian government backstop. That is true, but how would the government back-stop it? Print Fiat dollars out of thin air. Print, print, print...Solution Gold since bitcoin did not exist.

My experience with insolvent money centre banks in 1988 would be re-experienced in 2008/2009 when Libor rates and other counterparty risk measures shot through the roof PRIOR to equity markets smelling the rat. Again, in late 2007 equity markets rallied to new highs on Fed rate cuts when the short-term commercial paper markets and ABCP markets were shut. The banks knew there was credit contagion looming and they stopped funding each other, a classic warning signal. And then there was 2020. In 2020, the Fed did something totally new on the QE front, it started buying corporate credit. Do you think the Fed was buying corporate credit just to grease the lending

runway? Absolutely not. They were buying because hugely widening yield spreads would have meant banks were once again insolvent in 2020. Risky business that banking....good thing there is a government backstop. Print print print...Solution Bitcoin.

In 1995 I had a research article published in the Financial Analysts Journal titled *Quantifying Risk in the Corporate Bond Markets*. The article was cited by JPM in a study of Bank for International Settlements capital allocation guidelines for all commercial banks globally. When I say that commercial banks are regularly insolvent (on a mark-to-market basis) it is because of this study, which essentially quantifies risk for banks that are levered 25x to their equity cushions.

(Think government back-stops and Fiat implications. Think Bitcoin as the insurance.)

I worked as HY trader when we brought new C\$ HY debt to market for Rogers Communications Inc. At that point in its life, RCI was the largest HY borrower in the world. RCI issued more debt into the US HY market than any other company. Foolish Canadian institutional investors would not own the bonds because the bonds were junk, but they owned a subordinate claim....the equity, because the equity was in their benchmark. Well if the bonds are junk, the equity is "super-junk". More to come on this in future publications.

I worked at GMPIM, a hedge Fund in 2008/2009 in the depths of the credit crisis. My partner was Michael Wekerle (Dragons Den on TV). Wek is one of the most colourful and experienced equity traders in Canada. He knows risk. He quickly understood that there was no point in taking long positions in most equities until the credit markets behaved. We became a credit-focused Fund, and bought up hundreds of millions of dollars of distressed Canadian debt in companies like Nova Chemicals, Teck, Nortel, TD Bank Prefs in the US markets, and hedged by shorting the equity which traded mostly in

Canada.

This cross-border arbitrage was huge, and Canada equity accounts had very little idea why their equity was getting slashed "ruthlessly". I remember one trade that was 100% risk-free and thus presented an infinite return on capital. It involved Nova Chem short term debt, and put options. Our CIO, Jason Marks is a Harvard MBA. An extremely smart engineer who was a brilliant mathematician. But he believed in efficient markets and could not believe I had found a risk-free trade with huge absolute return potential. To his credit, when I showed him my trading blotter, and then asked, "*How much can I do?*" for risk limit considerations, his answer was beautiful. "*Do infinity*".

At GMPIM, we also embarked on the defining trade of my credit career. It was the restructured ABCP or MAV notes. We traded over C\$10billion of the notes, from a low price of 20cents on the dollar, right up to a full recovery value of 100 cents on the dollar. And it was all low risk, because we could hedge the leveraged super senior names with very targeted purchases of single-name default insurance. Wek was a risk management genius. He didn't need to be an equity trader to understand risk. Asymmetric trades define careers, and ABCP was the best asymmetric trade versus risk, I had seen up until that point in my career.

But Bitcoin is a better trade than ABCP, in my opinion. Bitcoin is the best asymmetric trade I have ever seen. And I want to explain why in forthcoming credit-focused publications.

I believe my trading experience is somewhat unique in Canada. I think the various cycles I have lived through give me hindsight to opine on why Bitcoin is such an important consideration for EVERY fixed income and credit portfolio. My goal is to share these thoughts with the readers of Rockstar. I hope that you will provide me with questions and feedback so that I can refine my pitch. Together, we can craft a document

that I would be comfortable presenting to any fixed-income investor, large or small, to explain why Bitcoin needs to be embraced as a kind of portfolio insurance.

Owning Bitcoin does not increase portfolio risk, it reduces it. You are actually taking MORE risk by not owning bitcoin, than you are if you have an allocation. It is imperative that all investors understand this, and I hope to lay out the arguments why, using the credit markets as the most obvious class that needs to embrace the “money of the internet”.

The plan is to start by explaining, in very general and simple terms, the credit markets. For administered rates set by the Central Bank authorities, to government bonds and rating agencies, to corporate loans and bonds from investment grade to High yield (higher risk), to structured products that were largely responsible for the Great financial crisis (GFC) of 2008 and 2009.

The GFC just transferred excess leverage in the financial system, to the balance sheet of the governments. Perhaps there was no choice but there is no question that in the ensuing decade, we had the chance to pay down the debts that we had pulled forward. We did not do that. Deficit spending increased, quantitative easing (QE) was employed whenever there was a hint of financial uncertainty, and now, in my opinion, it is too late. IT IS PURE MATHEMATICS.

The global response to the Covid pandemic has ensured that our kids' futures are doomed to eternal Fiat currency debasing. Again, simple math. Unfortunately, most people (and investors) are intimidated by math. They prefer

to rely on subjective opinions and comforting assurances from politicians and central authorities that it is okay to print more “money” out of thin air. I believe the credit markets will have a very different take and this could happen in short order. We need to be prepared, and we need to understand WHY. “Slowly, then suddenly” is a reality in credit markets.

In closing this introduction I want to state three truisms:

1. Bitcoin = math + code = truth. Never bet against open-source platforms.
2. Money has always been technology for making our work/energy/time today available for consumption tomorrow. Bitcoin is programmable monetary energy... A Store of Value (SoV), transferable on the world's most powerful computer network. Fiats are worthless, yet they have “subjective value” today. However, they are programmed to debase. Bond investors are really just a “derivative” to this reality. Choose your SoV wisely. Think physics and math and code.
3. Thank goodness that Satoshi had the foresight to design bitcoin in response to the last GFC in 2008/2009. We are headed in a dangerous direction and we are lucky to have this tool. I am not talking as a bond trader (a pessimist), I am talking as a realist. The bond markets are far larger, and far more susceptible to contagion, than are the equity markets. The credit markets are the dog that wags its tail -- equity markets-- and if credit markets are not happy, the equity markets are in for a world of hurt.

Part 2

In the first installment of this series, I detailed my history in financial markets together with some detail on why **Bitcoin is the best asymmetric trade I have seen in my 32yrs of trading. I stated that I believe EVERY fixed-income investor needs exposure to Bitcoin in order to reduce portfolio risk.** Obviously, this is a big claim. In order to back up my assertion, we need to be on a similar footing regarding our understanding of fixed income, and the various instruments that exist in the marketplace that allow for investors to take risk, manage risk (hedge), earn returns, and/or experience losses.

This is a deep subject. The “Bible” for fixed income investing is *The Handbook of Fixed Income Securities* by Frank Fabozzi. This “Handbook” is 1400 pages of green eye-shade reading. It was required reading for my CFA, and it was usually visible, in multiple editions and stages of dis-repair, on every trading desk that I have worked. I talked with Mr. Fabozzi once on the phone. I had submitted a research piece to his *Journal of Portfolio Management* publication.

I was proud that his journal responded and that he (the Editor) wanted to further consider my research paper but in doing so, would require that I agree not to have the piece published in any competing Journal.

My article had already been accepted for publication in the Financial Analysts Journal (FAJ) and I had gratefully accepted. I called Mr. Fabozzi to tell him about my situation and see if perhaps the research could be published in both spots. The conversation started nicely, until I informed him of the FAJ situation. At that point he got salty. *“You applied to MY Journal and the FAJ as well? Don’t you EVER submit another article to my Journal again!”*, and he hung up. That was the end of my conversation with the person whom I viewed as “The Man of fixed Income Research”.

My article was published in the FAJ in March 1995. It was titled *Quantifying Risk in the Corporate Bond Markets*. It was based on an exhaustive study of 23 years worth of data (18,000 data points) that I painfully accumulated at the McGill Library in Montreal. This was before

electronic data of corporate bond prices was available, and the data was compiled manually from a history of phonebook-like publications that McGill had kept as records.

The data and results were awesome, and unique. I was able to sell this data to the Royal Bank of Canada to help with their Capital allocation methodology for credit risk exposure. I had worked for RBC, and I was aware of all banks' need to better understand and price credit risk. As detailed in the introduction, when I started at RBC in 1988, it was insolvent due to bad loans (defaulted) made to Lesser Developed Countries (LDC). Price credit poorly, reap the dangerous consequences.

I have included a copy of the FAJ article in the appendix (see page 34). The report was cited by a research group at JPM, on the subject of pricing Credit risk and the Bank for International Settlements capital allocation guidelines. This research is important because it will formulate the basis of our conclusion on Credit Default Swaps (CDS) and **why I believe that Bitcoin should be considered as default insurance on a basket of sovereigns/Fiats.**

I will also take a stab on what the current market valuation of that basket and come up with one valuation methodology for Bitcoin. It will be a dynamic calculation, somewhat subjective; however, it will also be one of many rebuttals to the oft suggested claim by no-coiners that Bitcoin has no fundamental value.

This summary is fairly general, and does not dive into the subtleties of various fixed income structures or investments. The purpose is to get everyone on a similar footing so that I can propose a framework that will help future generations avoid the mistakes of the past.

“Those who don’t learn from history are doomed to repeat it.”

2.1 What are Fixed Income Instruments?

As the name implies, a fixed income instrument is a contractual obligation that agrees to pay a stream of **FIXED** payments from borrower to lender.

There is a payment obligation called the coupon in the case of a bond contract, or the spread in the case of a loan contract. There is also a term on the contract where the principal amount of the contract is completely repaid at maturity.

Accordingly, the value of the contract can change over the life of the term as reflected in the price, and the resulting internal rate of return (IRR) is termed the yield to maturity (YTM). This yield calculation is the basis of ALL return considerations when comparing the relative attractiveness of various fixed income instruments.

They are CONTRACTUAL but they are NOT GUARANTEED.

The payments (or loan spreads) are **FIXED**. This is important for a couple of reasons. Firstly, if the risk profile of the borrower changes, the payment stream does not change to reflect the changed risk profile. In other words, if the borrower becomes more risky, due to poor financial performance, the payments are too low for the risk, and the value/price of the contract will fall. Conversely, if the risk profile has improved, the payment stream is still fixed, and the value of the contract will rise.

Secondly, the fixed stream is contractual and binding. If the contract cannot be fulfilled by the borrower, a default of the contract occurs, and a settlement between borrower and lender needs to be consummated. This can be an in-court, or out-of-court settlement, and typically involves the transfer of ownership of the equity of the company, or an asset that was provided as security against the payment obligation.

Default is the over-riding risk in lending. The term credit risk and default risk are often used interchangeably but there are subtle differences

as will be described below.

For now, it is important to realize that lending is an asymmetric (to the downside) endeavour. If a borrower is doing well, the borrower does not increase the coupon or fixed payment on the obligation. That benefit accrues to the equity owners. In fact, if the risk profile has changed for the better, the borrower will likely pay down the obligation and refinance at a lower cost, which again benefits the equity. The lender can be out of luck since their more valuable contract is paid down, and they are not able to reap the attractive risk-adjusted returns (i.e. asymmetric).

On the other hand, if the risk profile of the borrower has deteriorated, it means that the fixed payments are likely too low to reward the lender for the true credit risk. Accordingly, the value of the contract will fall. The lender does not have to absorb any actual losses unless they sell the contract into the secondary market, or unless an event of default occurs. If the contract is eventually paid down by the borrower, and the lender has received all of its money back, any losses are avoided but the lender has earned a sub-par return on risk.

For these reasons, fixed-income lenders tend to be pessimists.

The asymmetric risk/return exposure leads them to ask, “*How much can I lose?*” rather than the popular refrain from equity investors: “*How much can I make?*”. Generally, lending portfolios need to be well diversified to offset the natural asymmetric returns when credit risk is involved.

Two final notes when considering equity versus fixed income investing. Firstly, in the event of default, **fixed income instruments have a priority of claim over the equity**. The fixed Income investor is entitled to 100% return of principal and accrued interest before the equity claim has value. There can be restructurings where there are creditor classes and equity

classes that agree on some residual value for the outstanding equity, but generally, the recovery on equity is small. For this reason, hedge funds can reduce the risk of losing money on their credit claims, by shorting subordinate claims in the capital structure of a company. Long the debt vs short a (delta) weighted amount of equity is a logical, risk-reducing position for exposure to a company experiencing financial hardship. Smart equity investors/analysts will take clues from the debt markets. Unfortunately, it is only a few who ever do.

Secondly, if the common equity pays a dividend, this dividend is NOT a FIXED income instrument. The dividend is NOT contractual, and the repayment of principal is not a consideration, thus there is no term and no contractually binding payment. Preferred shares notwithstanding, it is important to understand the difference between a contract, and a voluntary distribution of capital to equity stakeholders.

The **income trust** market in Canada was built on this false premise. Equity analysts would calculate the “dividend or distribution yield” on the equity instrument and compare it to the YTM of a corporate bond and proclaim the relative value of the instrument. Problem was, it was not contractual and did not incorporate the repayment of principal.

Furthermore, it ranked lower in the capital structure than a bond. Too many investors in income trusts were fooled by this narrative, not to mention the companies who were using valuable (potential) growth capital and maintenance capex on distributions. Far too many companies who embraced this structure in order to get a short-term pop in their enterprise value (EV) ended up destroying shareholder capital. Always understand the CONTRACT and its relative RANK in the capital stack of an enterprise.

Finally, notice that we have yet to express our

agreed-upon unit of account in our “contract”. I imagine everyone just assumed the contract was priced in dollars or some other Fiat denomination. There is no stipulation that the contract has to be priced in Fiat; however, almost all fixed income contracts are priced using a Fiat as a unit of account. There are problems with this as will be discussed in future sections. For the time being, keep an open mind that the contracts could also be priced in units of gold (ounces), or units of bitcoin (Sats), or in any other unit that is divisible, verifiable, and transferable.

2.2 Government borrowers, interest rate risk, and brewing Credit dangers

According to the Institute of International Finance, in 2018 total global debt was about US\$250T. Within that pool, the largest borrowers are Federal, State, Provincial and Municipal Governments. The publicly traded instruments, the Bonds, have varying terms to maturity. The fixed income obligations are issued in terms as short as 30 days (t-bills) up to lengths as long as 100yrs. Terms of longer than 30yrs are not common although a German State just issued a 100yr bond. Smart State treasurer. Long-term funding at ultra-low rates locks in funding costs and moves the price risk burden to the buyer. Interestingly, Janet Yellen mentioned today the **Fed is considering issuing 50yr bonds**. This is a smart move, for the issuer. As will be shown in subsequent sections below, the buyer is exposing themselves to huge price risk. Not just because of the inflation risk, but more because of the credit risk.

The term “long bonds” generically refers to 30yr bonds. The term “bonds” tends to apply to the ten-year term, and “notes” to the two-year and five-year terms.

There is NO difference in the structure of fixed income instruments with greater than one-year terms. They are contractual obligations that pay semi-annual interest coupons. There is

generally a very fluid secondary market in these securities with each instrument trading for a price that drives a YTM. If you were to chart a graph of the yields of the obligations relative to their maturities, you obtain a “yield curve”.

The shape of the yield curve is a subject of great economic analysis, and in an era when rates were not manipulated by Central Bank interference, the yield curve was useful in predicting recessions, inflation, and growth cycles. Today, in an era of quantitative easing (QE) and yield curve control (YCC), I believe the predictive power of the yield curve is vastly diminished. It is still an extremely important graph of government rates, and absolute cost of borrowing, but there is an elephant in the room.

Almost all government debt, from the same borrower ranks parri passu, that is to say, there is no priority of claim within the debt structure of governments because there is no subordination and no equity.

Government bonds are the most widely held fixed-income instrument.

Every insurance company, pension fund, and most large and small institutions own government bonds.

Federal government bonds of the USA have typically been called “risk-free” benchmarks. The yield curve of the USA sets the “risk-free rate” for all given terms. As we will see in the discussion on CDS, it is NO LONGER the case that Govies are risk-free, and opens some real dangers for investors as well as risk managers.

Historically, investors have primarily been concerned with interest rate risk on Govie bonds. Interest rate risk and inflation risk are synonymous. Both have been declining for my entire trading career. That is because over the last forty years, the general level of interest rates (YTM)s have declined globally, from a level in the early 1980s of 16% in the USA, to today’s rates of close to zero, or even negative in some

countries.

A negative-yielding bond is no longer an investment. In fact, if you buy a bond with a negative yield, and hold it until maturity, it will have cost you money, to store your “value” at a negative yield. At last count, there was close to US\$19T of negative-yielding debt globally. Most was “manipulated” government debt, due to QE by Central Banks, but there is negative-yielding corporate debt too.

Imagine having the luxury of being a corporation and issuing bonds where you got money back. Those CFOs should focus on that anomaly all day long!

Going forward, interest rate risk due to inflation will be one directional. Higher.

And due to bond math (explained in a following section), when interest rates rise, bond prices fall. But there is a brewing bigger risk than inflation for Govie bonds...Credit risk

Heretofore, credit risks of governments of developed G-20 nations have been de minimis. That is starting to change and CDS on sovereign debt will become a much larger consideration for ALL investors.

2.3 Credit Risk, and Default

Credit risk and default risk are sometimes used interchangeably, but there are important differences. The credit risk of a company can change due to systematic pressures; however, the idiosyncratic default risk remains unchanged.

Credit risk is the implicit risk of owning a credit obligation that has the risk of defaulting. When G-20 government balance sheets were in decent shape, and operating budgets were balanced, and accumulated deficits were reasonable, the implied risk of default by a government was almost zero. That is for two reasons. Firstly, their ability to tax to raise funds to pay their debts. Secondly, and more importantly, their ability to print Fiat money.

How could a Federal government default, if it could just print money to pay down its borrowings?

In the past that argument made sense, but eventually printing money will/has become a credit boogie man. For the purpose of setting a “risk-free rate” let’s continue to assume that benchmark is set by the Federal government.

In markets, credit risk is measured by calculating a “credit spread” for a given entity, relative to the risk-free government rate of the same maturity. Credit spreads are impacted by the relative credit riskiness of the borrower, the term to maturity of the obligation, and the liquidity of the obligation. We could get fancy and try and separate out the liquidity risk component but that is beyond the scope of this paper.

When credit-sensitive instruments trade on a spread basis, traders will typically quote a market on a bid/offer basis as “18 – 15” which means that the trader will buy paper at an 18bps discount to the risk-free benchmark, and sell paper at a 15bps discount. (There are 100bps in 1%). Since all bonds always trade for a price, the calculation of that 3bp market on a ten-year bond will typically translate to about a twenty-five-cent bid/offer price spread. On a thirty-year bond, because of bond math, that same spread market would translate to a larger bid/offer price spread of approximately seventy cents.

Notice that a higher spread on the bid side translates to a lower price (see section 2.6 on bond pricing. A higher spread (absolute rate) translates to a lower bond price, everything else being equal). So the bid price is lower than the offer. Traders may be wingnuts, but they are not fools.

18-15 sounds inverted until you do the bond math.

For very liquid securities you can execute tens of millions of dollars of trade on a very tight market. While equity markets have the semblance of

liquidity because they are transparent and trade on an exchange that is visible to the world, bond markets are actually far more liquid even though they trade over-the-counter (OTC).

Bond markets and rates are the grease of the financial plumbing system and for that reason central banks are very sensitive to how the liquidity is working.

Liquidity is reflected in the bid/offer spread as well as the size of trades that can be executed. When confidence wanes and fear rises, bid/offer spreads widen, and trade sizes diminish as market makers withdraw from providing their risk capital to grease the plumbing. What tends to happen is everybody is moving in the same direction. Generally, that direction is as sellers of risk or buyers of protection. Dealers will retreat from the market because they don't want to be left holding a bag of risk for which there are no buyers (in the context of the last trade) and they will just get buried.

Perhaps the most important component of the credit markets is the banking system. Confidence in the banking system is paramount. Accordingly, there are a few open market rates that measure the confidence in the system as well being the basis for floating-rate debt facilities. These rates are Libor and BA's. Libor is the London Interbank offered rate, and BA's is the banker's acceptance rate in Canada. Both rates represent the cost of funds between counterparties in the banking system and the rates at which a bank will borrow or lend funds in order to satisfy loan demand. When these rates rise meaningfully above the Fed's target for overnight lending (reflected in the TED spread (t-bill vs Eurodollar - for example)), it is an alarm that represents stresses in the system and that credit risk is rising and confidence is falling in the stability of the bank plumbing.

During the GFC, these funding rates were sounding the alarm bells when equity markets were hitting all-time highs because the Fed

was cutting rates. When in doubt, look to the financial markets to determine stresses, not to equity markets that can get a little irrational when the punch bowl is spiked. As stated previously, the turmoil in the GFC essentially transferred excess leverage in the financial system to the balance sheets of Governments. The can was kicked to the Govies. Printed money was the painkiller. Unfortunately, we are now addicted to the pain medicine.

State, provincial and municipal debt tends to come next of the credit ladder. Since none of the entities have equity in the capital structure, much of the implied credit protection in these entities flows from assumed Federal government backstops. These are certainly not guaranteed backstops, so there is some degree of free-market pricing, but generally, these markets are for high-grade borrowers and low-risk tolerance investors, many of whom assume "implied" Federal support.

Corporate risk is the final stop on the credit ladder. Banks are quasi-corporates and typically have low credit costs because they are assumed to have a government backstop, all else being equal. Most corporates do not have the luxury of a government backstop, although lately, airlines and carmakers have been granted some special status. But in the absence of government lobbying most corporations have an implied credit risk that will translate into a borrowing spread, or an absolute borrowing yield (that is not dependant on term) in the case of very risky credits, that reflects a return on risk dynamic.

High-grade corporates in the US market currently trade at an option-adjusted spread (OAS) to treasuries of 99bps according to BoAML.

High yield (HY) corporates trade at a yield of 4.33% and a OAS of 373bps. When I started trading HY 25yrs ago, the yield was actually "high". Generally, an over 10% YTM with spreads of 500bps and higher.

However, because of a 20-year “yield chase” and, more recently, the Fed interfering in the credit markets, these days HY looks pretty low yield to me.

My FAJ article shows a nice pictoral, of risk in the corporate markets. The dispersions of the credit spread distributions measures true risk. Notice, as the credit quality decreases the dispersion of the credit spread distributions increases. You can measure the standard deviations of these distributions to get a relative measure of credit risk as a function of the credit rating (see below). This is the basis of allocating capital for credit risk on a bank’s balance sheet.

2.4 Credit Metrics and Credit Rating Agencies

To help investors evaluate credit risk and thus price credit on new issue debt, there are rating agencies who perform the “art” of applying their knowledge and intellect to rating a given credit. Note that It is a subjective rating, that qualifies credit risk. The rating does NOT QUANTIFY risk.

The two largest rating agencies are S&P and Moody’s. In general, these entities get the relative levels of credit risk correct. In other words, they correctly differentiate a poor credit from a decent credit.

Notwithstanding their bungling of the credit evaluations of most structured products in the GFC, investors continue to look to them not only for advice, but also for investment guidelines as to what determines an “investment grade” credit versus a “non-investment grade” credit. Many pension fund guidelines are set using these subjective ratings, which can lead to lazy, and dangerous behaviour such as forced selling when a credit rating is breached.

For the life of me, I can not figure out how someone determines the investment merits of a credit instrument without considering the price (or contractual return) of that instrument!

However, somehow they have built a business around their “credit expertise”. It is quite disappointing and opens the door for some serious conflicts of interest since they are paid by the ISSUER in order to obtain a rating. (The unravelling of structured products in the GFC was precipitated by faulty credit opinions.)

I worked very briefly on a contract basis for DBRS, Canada’s largest rating agency. I heard a story amongst the analysts of a Japanese bank who came in for a rating because they wanted access to Canada’s commercial paper (CP) market, and a DBRS rating was a prerequisite for new issue. The Japanese manager, who upon being given his rating inquired, *“If I pay more money, do I get a higher rating?”* Sort of makes you think eh?

Rating scales are as follows: S&P / Moody’s highest rating to lowest rating: AAA/Aaa, AA/Aa, A/A, BBB/Baa, BB/Ba, CCC/Caa and D for default.

Within each category there are positive and negative fine tunings of opinion. Any credit rating of BB+/Ba+ or lower is deemed “non-investment grade”.

Again, no price is considered and thus I always say, if you give me that debt for free, I promise it would be “investment grade” to me.

This “Junk” debt is where big moves in price can occur. It is an exciting market that opens the door for some equity-like moves and equity-like returns. Remember though it is still a bond. It has prior claim to any equity of the same entity. If the bond price is distressed, the equity should be even more distressed. “Junk” bonds equal “super-junk equity”, all else being equal. In the introduction chapter, I detailed the absurdity of all the Canadian investment accounts who owned the equity of Rogers Communications, the largest HY borrower in the world (not just in Canada) yet they would not buy the bonds at any price because the bonds were junk.

Wow. Head scratching moments. Sell equity, buy the bonds, treat interest coupon like a dividend that is not being paid on the common, increase priority of claim, and reduce risk. It is a risk manager's absolute duty to reduce risk AND increase return! The typical response: "*Can't do it, Foss, I would have to report to my investment committee that I own a junk bond. Please don't call again*". For the love of our kids, we cannot let this type of foolish money management ideology to fester. Poor math skills are one thing, but adhering to subjective evaluations of credit risk is another. This danger will be further examined when we touch on Modern Monetary Theory (MMT) in section 2.8.

In the case of corporate debt, there are some well-defined metrics (see back page of FAJ article) which help to provide guidance.

Ebitda/interest coverage, total debt/Ebitda and EV/Ebitda are great starting points. Ebitda (earnings before interest taxes depreciation and amortization) is essentially pre-tax cash flow. Since interest is a pre-tax expense, the number of times operating cash flow covers the pro-forma interest obligation makes a lot of sense. In fact, it was this metric that my FAJ paper determined to be the most relevant in relating to a credit spread for a given issuer.

There are also subjective evaluations such as "business risk" and "staying power". Business risk can be defined as volatility of cash flows due to your product pricing power.

Cyclical businesses with commodity exposure such as miners, steel companies and chemical companies have a high degree of cash flow volatility and therefore, their maximum credit rating is restricted due to the business risk. Even if they had low debt leverage, they would likely be capped at a BBB rating level due to the uncertainty of their Ebitda. Staying power is reflected in the industry dominance of the entity. There is no rule that big companies last longer than small, yet there is certainly a rating

bias that reflects that belief.

The respective ratings for governments are also very, if not completely subjective. While total debt/GDP metrics are a good starting point for relative leverage, it ends there. In many cases, if you were to line up the operating cash flows of the government and its leverage statistics compared to a BB corporate, the corporate would look better.

The ability to tax, raise taxes and print money is paramount. Since it is arguable that we have reached the point of diminishing returns in taxation (raise tax rates but actual revenue decreases since more of the economy goes underground) then the ability to print is the only saving grace. That is until investors refuse to take freshly printed and debased Fiat as payment....This has happened in plenty of Fiat abusing jurisdictions...

2.5 Corporate Bonds, terms, covenants and subordination

Corporate debt obligations are structured in a myriad of terms, degrees of subordination, and restrictive covenants.

The term to maturity of corporate bonds tends to be a function of its credit rating. IG rated corporate credits can typically issue commercial paper (CP) with short terms to maturity. To do so they also need backup lines of credit with commercial banks, should the CP market seize up. These facilities tend to form part of the lending relationships that banks provide IG credits that include loan facilities and non-funded banking services such as treasury management, payroll, and fee-based services.

The banking relationship is key for liquidity at the corporate level. Any bank debt is the most senior claim in the lending stack. It is generally floating rate debt (it can be swapped to fixed) that uses a floating rate benchmark such as Libor or the "Prime" lending rate. A spread, which reflects the credit risk of the IG corporate

is attached. “Libor plus 1.5%” rate is a credit cost which “floats” with Libor. It will reprice every 30-90 days based on the Libor rate, but the spread will remain fixed, provided any covenants regarding credit metrics are not breached.

Loan facilities are repayable at any time. The corporate also usually pays an ongoing line of credit (LoC) fee, so that they can draw on the facility at any time. Pricing these LOCs is very important for a bank, since corporates will only drawdown their lines when enduring financial uncertainty.

When a company hits a rough patch, the first thing a smart CFO does is draws all their bank lines so that the bank cannot restrict access to the funding. It is a tough job for a loan officer and again reflects the asymmetric credit risk relationship.

Bank debt will include covenants such as negative pledge provisions that dictate that the corporation cannot issue any prior ranking debt. For this reason, most bank facilities are for shorter terms than public issue bonds. While the public bonds of IG corporates rank parri passu with the bank debt, they are for longer maturities and are usually fixed coupons. Banks have comfort when their credit decisions are buttressed by a market that is willing to lend to the same borrower for extended periods.

Typical IG corporate bonds are for five, ten and 30yr terms.

A big new issue for new public borrowers like Apple or Microsoft’s first issues, will include tranches in all three terms that appeal to buyers with different risk and maturity buckets.

These bonds will rank parri passu with bank debt, but could also include second lien tranches where priority of claim is subordinated. In a second lien issue, a larger spread is paid as compensation for the increased risk.

This happens when covenants such as total first

lien debt/Ebitda need to be respected.

Corporate bond terms can be as long as 100 years, but that is not common. In 1997, JC Penny issued a 100yr bond due in 2097. Its fixed coupon was 7.625%. The buyers would have been insurance companies that needed long-term assets to match long-term liabilities. In May 2020, JCP filed for bankruptcy. Hard to imagine that in 1997, lenders could claim they could price JCP credit risk with confidence over the next 100yrs, but they did. Many likely figured, it will be someone else’s problem. Play stupid games, win stupid prizes...

HY corporates are a bit of a different animal. HY credits cannot issue CP since the market is not open to them as CP buyers are looking for high quality, lower risk exposure.

Additionally, bank facilities are usually the most senior claim and have negative pledge provisions, but they will also limit the issuance of parri passu debt. For this reason, most HY corporate debt is subordinate to the bank debt.

Terms are limited to 10yr maturities, and the debt is non-callable for periods equal to one half the term so that lenders who have made smart risk-adjusted contracts don’t get these contracts called away in short order. This attribute somewhat levels the asymmetric lending field, but it is still hugely biased in favour of the borrower.

An example of a capital structure of an HY borrower could look something as follows. Bank debt equal to three turns of Ebitda. Public first lien debt equal to an additional one turn of Ebitda. Second lien debt of another two turns of Ebitda, Convertible debt of another one turn of Ebitda, and common equity with market cap equal to three times Ebida. The EV of this company is 10x Ebitda and it is 7 times leveraged. Credit-focused hedge funds salivate over this type of capital structure. The CDS market would be wild too. Plenty of ways

to hedge and wedge yourself. There is always a price for each tranche of the capital structure and it is a dynamic process.

Sharpen your credit pencils. P.S. the common equity is the whipping boy.

2.6 Bond Pricing and Contagion

Every bond that trades in the secondary markets started its life as a new issue (or a restructured obligation). It has a contractual term, and semi-annual interest coupon.

Generally, new issues are brought to market with a coupon which equals its YTM. In other words, a 4% YTM new issue, generally is brought at a price of par (100 cents on the dollar) with a contractual obligation to pay two semi-annual coupons of 2% each

After a new issue, there is usually a fairly liquid secondary market that develops for the issue. Future bond trades are impacted by supply and demand due to such considerations as a change in the general level of interest rates, a change in the actual or perceived credit quality of the issuer, or a change in overall market sentiment (risk appetite changes impacting all bond prices and implied bond spreads). A bond price is determined in an open market OTC transaction between a buyer and a seller. Accrued interest is not included in the price but is calculated after the trade and added to the settlement amount.

The price of a bond is impacted by the YTM that is implied in the transaction. If the YTM has increased due to credit risk or inflation expectations, the implied interest rate increase means that the price of the bond will trade lower. If the bond was issued at Par, then new trades will occur at a discount to Par. The opposite also applies.

Calculating a change in bond price using sensitivity analysis makes use of its first derivative (duration) and its second derivative (convexity) to determine a price change. For a given change

in interest rate, the price change in the bond is calculated as negative duration times the change in interest rate plus one half the convexity times the change in interest rate squared. If readers remember their physics formulas for distance, the change in price is like the change in distance, duration is like the velocity, and convexity is like acceleration. It is a Taylor series. (Math can be cool.)

At low-interest coupons, duration approaches the term to maturity. A ten-year bond would have an approximate 8yr duration for example. Ignoring convexity, this means that if rates change by 100bps, the price of the bond will change by 8%. Eight percent changes in bond prices can cost many people their year and their job. The rates can change because of a change in the general level of interest rates, or because of a widening spread. Imagine if a spread widens by 200bps on a ten-year bond. Down by 16%, everything else being equal. On a thirty-year (duration is 20-ish) a 200bps widening can cost close to 40points, ignoring convexity. Who said credit wasn't fun? Imagine if you had a strategic short in that bond. Until now, most of these "fun" credit moves were confined to the corporate bond markets. **But enter stage right, the new breed of sovereign risk...CREDIT.**

Contagion in the bond market is much more pronounced than in equities. For example, if provincial spreads are widening on Ontario bonds, most other Canadian provinces are widening in lockstep, and there is a trickle-down effect thru bank spreads, car paper spreads, high grade corporate spreads and even to junk spreads. This is true in the US market too with the impact of IG indices bleeding into the HY indices. If US HY is widening, there is a flow-through to the C\$HY market. The reverse is not generally true since most Canadian markets do not really register in the US and global playgrounds. Canada is smaller and less important than the State of California after all.

The border between “investment grade” and “non-investment grade” debt is a sweet spot for many credit market participants. The reality is that this inefficient and arbitrary designation, still sets the border for how many players can participate in the ownership of certain debt. The IG market is many times larger than the HY market. Thus the “crossover credit” space is a lively place. Improving credits from HY to IG are called “rising stars”. If a company is upgraded from HY, the universe of buyers increases substantially and it is certain that its credit spread will narrow meaningfully. The resulting price gain on the bonds is rewarding.

Conversely, “falling stars” have the reverse impact. And this is an area of grave concern. It was rumoured that one of the main reasons the Fed stepped into the credit markets to be able to buy HY debt in 2020, was due to the impending downgrades of four very large IG borrowers who are on the cusp of crossing over (to the dark side?). General Motors, Ford, AT&T and GE have cumulative debt that is larger than the entire HY market. Downgrades of any one of these names likely imply a downgrade of the others. The forced selling would rock the HY market, which would start a domino effect and a negative feedback loop that would reach to all credit and equity markets globally. Pretty scary stuff. Follow inefficient investment guidelines, win stupid prizes.

2.7 (Equity) Volatility and Credit Risk

The correlation between equity markets and credit markets is causal. Notwithstanding the debtholder’s priority of claim versus equity, there is a dynamic that overrides the idiosyncratic risk components of credit versus equity within a capital structure.

When you are long credit you are short volatility. Therefore, if equity vol starts to increase (a measure of increased risk) then credit spreads will also widen in lockstep, and

vice versa. Credit hedge funds who need to dampen their credit exposure will want to purchase more vol thereby exacerbating the increase in vol. It becomes a negative feedback loop, as wider spreads beget more vol buying begets more equity price movements (always to the downside). When Central Banks decide to intervene in the equity markets to stabilize prices and reduce vol, it is not because they care about equity holders, it is because they need to stop the negative feedback loop and its ultimate impact on widening spreads and the seizing of credit markets.

Remember, Credit is a dog. Its tail is the equity markets. Think of the levered HY credit example used in Section 2.5 above.

2.8 Credit Default Swaps (CDS)

CDS spreads and contracts are a relatively new financial engineering tool. They can be thought of as default insurance contracts where you can own the insurance and effectively be short the credit. Each CDS contract has a reference obligation that trades in a credit market so there is a natural link to the underlying name. If CDS spreads are widening on a name, bond spreads are widening too as arb players will play that basis trade.

CDS contracts start with a five-year term and roll down the curve. Every ninety days, a new contract is issued and the prior contract is 4 and $\frac{3}{4}$ years old and is now the off-the-run contract. Five-year contracts eventually become one-year contracts that also trade. When a credit becomes very distressed, many buyers of protection will focus on the shorter contracts in a practice that is referred to as “jump to default” protection.

The spread or premium is paid by the owner of the contract to the seller of the contract. These contracts are the components of various credit indices in the developed credit markets in New York and Europe. There can be, and usually is, much higher notional value of CDS contracts

amongst sophisticated institutional accounts, than the amount of debt outstanding on the company. The CDS contracts can thus drive the price of the bonds, not the other way around.

There is no limit to the notional value of CDS contracts outstanding on any name, but each contract has an offsetting buyer and seller. This opens the door for important counter-party risk considerations. Imagine if you owned CDS on Lehman Brothers in 2008 (a winning trade) but the counterparty was Bear Stearns? You may have to run out and purchase protection on Bear, thereby pouring gas on the credit contagion fire.

I believe it was Warren Buffet who said, CDS enables you to buy fire insurance on your neighbour's home and then you try and help him burn his house down. That is a little harsh, but it is not altogether untrue. The sellers of CDS can use hedging techniques where they use equity put options on the same name to manage their exposure. This is another reason that if CDS and credit spreads widen, the equity markets can get punched around like a toy clown. This dynamic is extremely important for corporate credit and it is a well-worn path. What is not so well worn, is CDS on sovereign credits. This is relatively new, and in my opinion, could be **the most dangerous component of sovereign debt going forward**.

Inflation risk considerations for sovereigns will become overwhelmed by credit concerns. Two years prior to the GFC, you could buy default insurance on Lehman Brothers for 9bps.

That meant you could insure 10MM of debt against default for a premium of 9k per year. Two years later that same contract was worth millions of dollars.

Are we headed down the same path with sovereigns, where an implosion in CDS is contagious and blows all MMTers out of the water?

Think of the potential for long-dated sovereign

bonds to get smoked if credit spreads widen by hundreds of basis points (see bond pricing section 2.6 above). This will cause many bond managers, and many economists indigestion. Most sovereign bond fund managers and economists are still focused on interest rate risk rather than the brewing credit focus.

And if CDS on the USA is widening, the CDS of Canada is bound to follow suit. This is how markets work in credit land. Hedge and wedge yourself.

Moreover, the level of sovereign CDS effectively sets a base spread for which all other credits will be bound. In other words, it is unlikely that the spreads of any financial institution will trade inside the CDS for the jurisdictional sovereign. Same all down the line. Therefore, a widening of sovereign CDS leads to a cascading effect down the credit spectrum. **CONTAGION, both inter-country and within a specific country.**

I am certain most MMTers have never traded credit. They also appear to be poor at math. This is a dangerous combination because in credit markets it starts as a slow drip, and then it becomes a flood. Slowly then suddenly....

Relying on an economics professor to opine that "Deficits are a Myth" is tantamount to a junior chef saying that the recipe is easy, no cooking experience necessary. It is the equivalent to managing credit risk using ONLY subjective rating agency opinions. No prices are considered! Remember, there is always a price, on both fronts.

It is also antithesis to open market participants who view real, un-manipulated hurdle rates for true risk, to be a market dynamic. The allocation of capital in an efficient and prudent manner is the basis of capitalism. Culling the herd/cleansing leads to sustainable business models without walking Zombie companies or countries. Manipulated credit and support can sustain Zombie companies and countries and

delays default, thereby diverting scarce capital from investment-worthy entities.

Copied below is a MMT quote by influential Bloomberg Editor -Joe Weisenthal. Joe is the same reporter who tweeted that there may be value in Hertz equity when the bonds were trading at 40% of Par and the company was in restructuring. He clearly has little experience in credit markets. This is the kind of blind commentary that leads to extremely dangerous beliefs. It is now about CREDIT RISK. In an expanding debt burden, Govie bonds do not mature, they need to roll over. When that confidence to roll ebbs, the marginal buyer cannot hold back the flood.

You can get your money back but that will require more printing, Fiat will debase faster, and eventually bondholders will realize they are holding a “circular logic” error.

On Jan 19, 2021, Joe W. wrote to a worldwide audience:

The MMT view is that government spending is always based on monetary financing. This is key. It doesn't matter whether deficits are high or low. It doesn't matter whether rates are 0% or 5%. It doesn't matter whether the Fed is buying bonds or shrinking the balance sheet. The MMT view is that a country like the U.S., which issues and spends its own currency, always finances spending the same way: by creating money. This is as true now as it was during the Clinton surplus years.

As such, conventional notions of spending sustainability (like the size of the deficit or debt-to-GDP) are useless. Instead, the main constraints on spending are political (will politicians allocate the money?) and real (are there enough real resources in the economy to absorb the spending?). If there is a shortage of real resources, we would expect to see inflation. Inflation is the indicator that spending is unsustainable, not some arbitrary ratio.

Total debt/GDP ratios are useless? Why pay

taxes then Mr. Weisenthal? Just print our way to prosperity. Remember the “circular error” message in Lotus 123 and excel? This is exactly what needs to be flashing in the bottom left of his brain. Perhaps he never tried to balance a budget or design a spreadsheet based on mathematics and code. He obviously prefers subjective analysis. However, his opinions carry weight. And danger.

In a debt/GDP spiral, the Fiat currency is the error term. That is pure mathematics. It is a spiral to which there is no mathematical escape. If you are holding a Fiat obligation, it is debasing as fast as the MMTers can “finance spending in the same way: by creating money”.

Creating money out of thin air. I wish I had a printing press in my basement to pay my mortgage the “same way”.

This chapter ends with five famous quotes:

1. *“Credit without default is like religion without Hell”* – Howard Marks
2. *“Communism only works until you run out of other people's money”* – Margaret Thatcher
3. *“Trust but verify”* – Ronald Reagan (Sounds like the Gipper was a Bitcoiner?!)
4. *“Capitalism is where risk is rewarded AND punished”* – Jeff Booth – The Price of Tomorrow
5. *“The best way to destroy capitalism is to debauch (debase) the currency”* – Vlad Lenin

Our “Minsky Moment” could be on the horizon. American economist Hyman Minsky theorized that a tipping point occurs where the debt-fuelled asset bubble collapses, and assets become difficult to sell at any price. A market collapse ensues. (hat-tip Jeff Booth – The Price of Tomorrow). That is a real risk that will begin to be reflected in the CDS of sovereigns.

Ed Yardeni, macro strategist at Yardeni Research, famously coined the term “Bond

Vigilantes". It was in reference to the free market bond investors keeping the Fed "honest" in its responsibility of minding inflationary pressures. Yardeni was recently on CNBC where he stated, "*The Fed tried to bury the bond vigilantes, but they are not dead. The Fed did not succeed.*"

It is my assertion that bond vigilantes will become sovereign CDS vigilantes.

Absolute interest rates can move higher because of inflationary concerns AND because of credit concerns. Credit concerns will overwhelm inflationary concerns, particularly if the deflationary impact of technological advances continues. However, technology does NOT solve credit risk in sovereigns/Fiats.

What technology does solve is Store of Value problems with Fiats....**BITCOIN**.

We will examine CREDIT risk contagion in the next installment. All owners of sovereign debt

need to be aware that credit (mark-to-market) losses can be very meaningful. A 100bps widening will knock 20% off the price of long bonds, as detailed in section 2.6. The Chinese PBOC owns US\$1T in US Treasury debt. All pension Funds, life insurance companies, mutual funds and individual investors need to understand the realities of credit exposure versus "manipulated" interest rate exposure.

We will also calculate a "Fulcrum Index", essentially a dynamic calculation of the price of credit insurance multiplied by the funded and unfunded liabilities of a basket of sovereign credits. The Fulcrum Index can also be thought of as a proxy for the value of the **hardest money/asset ever created**. BITCOIN.

Study math people. Or end up playing stupid games and winning stupid prizes.

Part 3

In the first installment of this series, I reviewed my history in the credit markets, to provide context for the planned series.

The intent of the second installment was to lay the groundwork for our “**Fulcrum Index**”, an index that calculates the cumulative value of CDS Insurance on a basket of G-20 Sovereign nations multiplied by their respective funded and unfunded obligations. This dynamic calculation could form the basis of a current valuation for bitcoin (the anti-Fiat).

The second installment was dry, detailed and academic.

Hopefully, there was some interesting stuff. At the end of the day though, math is typically not a strong subject for most. And, as for Bond Math, most people would rather chew glass. Too bad.

Bond and credit markets make the capitalist world function.

However, when we socialize losses, and reward the risk-takers with government-funded bailouts, the self-correcting mechanism of capitalism – creative destruction – is jeopardized.

I asked my wife to read the second installment. When she was halfway through reading she stopped and said, “*Two things. First, I never knew Fabozzi (Editor of the Journal of Portfolio Management) gave you crap for submitting your article to two Journals at the same time. And second, you are a turbo-geek.*” With that as valuable feedback, I apologize if I geeked out on bond markets and bond math. I hope I didn’t bore too many readers. This stuff is important and our leaders and kids need to understand the implications of credit, how to properly price credit and ultimately the COST of crony-capitalism. The penalty for mispricing credit needs to be write-downs, not continual bailouts.

In this installment, I will expand on our base footing, and take a first cut at the Fulcrum Index calculation. I will also talk about other bitcoin valuation methodologies.

The culmination of this installment, therefore, details why I believe **Bitcoin is the best asymmetric trade I have seen in my 32yrs of trading, and why I believe EVERY fixed-income investor needs exposure to Bitcoin in**

order to reduce portfolio risk.

3.1 The 2008/2009 GFC – My experience and Fears, TARP

In the summer of 2007, the credit markets were starting to exhibit typical stresses in the system indicating that the “plumbing” wasn’t working properly. Equity markets were largely unaware of the true nature of the problems except that they were being flung around as credit hedges reached for protection in the CDS and equity volatility markets. It was a time of preliminary contagion. The beginning of the Global Financial Crisis (GFC).

The non-bank asset-backed commercial paper (ABCP) market in Canada had seized after the CDPQ (C\$160B in assets at the time), the pension arm of the Province of Quebec, had refused to “roll” their short term paper.

Concerns on sub-prime mortgage exposure within the financial system were rampant and CDPQ was one of the first major players to pull the emergency brake. They had C\$16B exposure, or 10% of their assets in ABCP, a financially engineered alchemy. The paper quickly went no bid and a total of C\$32B in leveraged super senior assets fell ten points on no trade. (It would ultimately trade down in price almost 80%)

Two Bear Stearns hedge Funds were rumoured to be in big trouble due to subprime exposure, and Lehman Brothers was in a precarious spot in the funding markets. Market participants at the time will no doubt remember the famous “Jim Cramer Rant”, when on a sunny afternoon in early August 2007, Cramer lost his patience and called out the Fed and Ben Bernanke for being clueless to the stresses.

“THEY know NOTHING!”

Watch the video here: <https://www.cnbc.com/video/2017/08/03/watch-the-full-rant-cramers-they-know-nothing.html>

There is a lot in here. Note the outset, “As goes Bear Stearns (Bear Stock at \$109/hr), so goes the Dow.” “In the fixed income markets, we have Armageddon”. And, at the end, “they could save us with a rate cut”.

Well, the Fed did cut rates and equities rallied to all-time highs in October 2007 as credit guys who were purchasing various forms of protection reversed course and covered, thus pushing up stocks. Remember, credit is a dog, and equity markets are its tail. Equities can get whipped around with reckless abandon because the credit markets are much larger and credit has priority of claim over the equity.

However, reality soon returned. Bear Stearns stock traded down to \$2/share in March of 2008 when it was acquired by JPM. Subprime mortgage exposure was the culprit in the collapse of many structured products and in September 2008, Lehman Brothers (LB) was allowed to fail.

My fear was that the system truly was on the brink of collapse. I was not the only one. In January through March 2009, it got really ugly. I rode the train every morning in the new year of 2009 wondering if “it was over”. Our Fund was hedged and wedged but we had counterparty risk exposure in the markets.

It was a blessing that our investors had agreed to a lockup period and could not redeem their investments. Our performance was actually very good, however, sometimes that is a curse because investors are apt to “sell their winners”.

We calculated and managed our risk exposure on a minute-by-minute basis but things were moving around so fast. There was true FEAR in the markets. Any stabilization was only a pause before confidence and prices took another leg lower. We added to our hedges as the market tanked. This is an unfortunate result of “delta” hedging. I won’t even start with the “gamma” component. Suffice to say it becomes circular. Contagion builds on itself.

My fund owned credit obligations in many of the largest North American banks. We were typically long the credit instruments and short the equity, a term that is referred to as “capital structure arbitrage”. There were relative value anomalies all through the markets. For instance, why was I able to buy TD Bank Pref shares in the US market at 40 cents on the dollar when equivalent debt in the Canadian market was trading at 90 cents? Answer: Because Citibank prefs were trading at 25 cents on the dollar.

It is all relative. Americans assumed that TD was baked if Citi was baked.

TD had zero sub-prime exposure. No one cared. Long only accounts could sell TD prefs, and buy Citi prefs, take-out 15 points...where is Canada again?

You may ask why the C\$ prefs of TD bank “held in” at such a high price relative to the US\$ prefs. The simple answer, Canadian accounts and retail investors assumed that TD bank was “too-big-to-fail” and that at 90 cents the return was juicy. More importantly, they were unaware of where the US\$ prefs were trading as the two markets had little cross-over. To say it was a scary time in the markets with definite pricing inefficiencies is an understatement.

Liquidity is best defined as the ability to sell in a bear market. By that definition, liquidity was non-existent. Some securities would fall 25% on one trade. Who would sell something down 25%? If funds are being redeemed and investors want cash, the fund needs to sell regardless of the price. For that reason, many funds “gated” themselves, meaning redemptions were unilaterally stopped. There was panic and blood in the streets. Just when you thought things couldn’t get worse, they invariably did.

It was called CONTAGION. The system was broken and there was a de facto vote of no confidence.

People didn’t sell what they wanted to, they sold

what they could. **Selling begets selling.**

3.2 True leverage in Banks.

The bankruptcy of LB was a true awakening for all market players.

An institution that was deemed by some as “too-big-to-fail” was not rescued by the Government. The cascading credit crisis became even more real as people who had assets custodied at LB as well as players who had purchased CDS protection from LB were suddenly exposed to risks as a major counterparty failed.

LB’s downfall was that it had been the largest player in the mortgage-backed securities (MBS) business and it had a residual portfolio of MBS risk which it was not able to “lay off” on other risk players. This MBS risk had a notional value of US\$85Billion. This was equal to FOUR times its book value of equity. Financial market players are very leveraged and equity cushions are surprisingly low relative to the true risks.

It is for this reason that I often say; **“Banks are regularly insolvent on a mark to market basis”**. My experience in 1988 was being repeated again in 2009.

Commercial banks are typically 25x levered on their lending books.

That is to say, for every hundred dollars in loans, they have \$4 of equity and \$96 of deposits and subordinated debt. How then do they maintain such high credit ratings? The implied government backstops. This is a huge danger. However, these backstops do NOT ensure that a levered institution can continue to “fund itself”. When confidence ebbs, depositors run for the exits, and a “bank run” generally ensures that a weak bank needs to run to the arms of a strong suitor. But what if all potential suitors are themselves dealing with a crisis in confidence?

The GFC just transferred leverage from the financial system onto the balance sheets of sovereign nations. The Troubled Asset Relief

Program (TARP) was the beginning of financial acronyms that facilitated this risk transfer. And then in 2020, with the Covid crisis in full swing, more acronyms and the **high likelihood that many financial institutions would again be insolvent**. But the Fed ran into the market again. This time with the same old QE programs, but also new programs that would purchase corporate credit and even HY bonds.

As stated in section 2.6, the reason that the Fed decided to endorse a credit facility to purchase HY bonds was due to four credits who were (and still are) on the cusp of becoming “fallen Angels”. CONTAGION comes at you in many ways in a crisis of confidence, and this selling pressure would have overwhelmed the HY markets, led to further increases in equity volatility. It was a game of whack-a-mole.

3.3 Administered Rates, Inflation, Government bonds and Sovereign CDS - The NEW paradigm

Quantitative Easing QE by central banks (CBs) tends to focus on the “administered” level of interest rates (some call it manipulation), and the shape of the yield curve, using targeted Treasury bond purchases sometimes called “yield Curve Control” or YCC. Under these extreme conditions, it is difficult to get an open market rate for a quasi “risk-free hurdle rate”.

Moreover, due to CB interference, true inflation risks can be compressed as well as true CREDIT risks. For this reason, we implore market participants to follow the CDS rates on sovereign governments for a much better indication of the true risks that are brewing in the system. One glaring example in my mind is the following:

USA (AA+ rated by S&P) 5yr CDS = 14bps

Canada (AAA) = 36bps....(trades like a single-A

Portugal (BBB) = 40bps....(ECB support!)

Even though Canada has the highest credit rating of the three, the market is telling us

otherwise. Do the Canadian politicians and local MMTers have any idea? No way. There is truth in markets. Do not follow subjective credit opinions blindly.

Falsey rated “AAA” credit tranches were a major cause of the unravelling of structured credit products in the GFC. Forced selling due to downgrades of previously “over-rated” structures and their respective credit tranches was contagious. When one structure collapsed others followed.

Selling begets selling.

For a complete list of CDS by nation see here: <http://www.worldgovernmentbonds.com/sovereign-cds/>

3.4 What is Fiat and the problems with a Fiat Obligation.

The term Fiat is Latin for “let it be done”. In other words, trust the decree of the central banks.

“Fiat money is a government-issued currency that isn’t backed by a commodity such as gold. Fiat money gives central banks greater control over the economy because they can control how much money is printed. Most modern paper currencies are fiat currencies” -- Wikipedia

In the GFC of 2008/09, there was a huge amount of debt that was written down, but there was also a huge amount that was bailed out and transferred to Govie books and thus are now Govie obligations.

According to the Institute for International Finance, in 2017, Total global debt / global GDP was 3.3X. Global GDP (then US\$67Trillion) has grown a little in the last three years, but Global debt has grown much faster. I now estimate that the debt/GDP ratio is over 4X. At this ratio, a dangerous mathematical certainty emerges. If we assume the average coupon on the debt is 3% (likely low), then the global economy needs to grow at a rate of 12% just to keep the tax base in line with the organically growing (the coupon

obligation) debt balance. This does not include the increased deficits that are contemplated for battling the recessionary impacts of the covid crisis.

In a debt/GDP spiral, the Fiat currency becomes the error term. Printing more Fiat is the only solution that balances the growth in the numerator relative to the denominator. When more Fiat is printed, the value of the outstanding Fiat is debased. It is circular. Error terms imply an impurity in the formula.

Therefore, when you lend a government money at time zero, you are highly likely to get your money back at time X; however, the value of that money will be debased. That is a mathematical certainty. Assuming there is no contagion that leads to a default, the debt contract has been satisfied. But who is the fool? Moreover, with interest rates at historic lows, the contractual returns on the obligations will certainly not keep pace with the Consumer Price Index (CPI) let alone true inflation as measured by other less manipulated baskets like the Chapwood Index. And notice we have not even mentioned the return that would be required for a fair reward due to the CREDIT risk.

While a default by a G-20 sovereign in the short term is still a lowish probability event, investors still need to be rewarded for the RISK of **potential default**. That is not currently happening in the environment of manipulated yield curves.

There are over 180 Fiat currencies, and over 100 will likely fail before a G-20 country does. However, CDS rates are likely to continue to widen. Contagion and the domino effect are real risks. Remember the GFC. Investors need to be rewarded for the increased systematic credit risk, as well as idiosyncratic credit risk. How? **Own Bitcoin as a hedge to CDS widening in sovereigns.**

"Fiats always return to their intrinsic value."

Zero." – Voltaire.

3.5 Bitcoin is default Insurance on a basket of Sovereigns/Fiats, The Fulcrum Index

I believe that bitcoin is anti-Fiat. As such, it can be thought of as default insurance on a basket of sovereigns/Fiats. This concept has a value that is fairly easily computed and it will be a dynamic calculation since the input variables are continuously changing.

Let's use the USA as a sample calculation. The Federal government has over US\$25Trillion in outstanding debt. According to Jeffry Gundlach, it also has US\$157T of unfunded liabilities in Medicare and Medicaid obligations. These are not contractual obligations, however, anyone who is counting on a semblance of healthcare from the government is counting on this aid and needs to protect themselves should the safety net collapse. So for the USA, the total of funded and unfunded obligations is US\$180T.

USA 5yr CDS at 14bps multiplied by the total obligations is US\$250B.

If CDS widens to 35bps in the 5yr (to match Canada), the value increases to US\$630B. This calculation uses a fixed 5yr term. The outstanding weighted-average obligation is longer than 5yrs due to Medicare and Medicaid, consequently, we have decided to use a term of 15yrs for the USA. There is no 15yr CDS market, but we can calculate the implied spread using a tenor calculation. The implied 15yr CDS spread for the USA is 45bps. In other words, just using the USA as ONE component in the G-20 basket, we have a valuation of US\$180T * 45bps = US\$810Billion.

I am currently constructing the Fulcrum Index with the help of Shaun Cumby. He is an experienced CDS trader who successfully hedged some very large naked long credit positions for a major Canadian bank PRIOR to

the GFC. Shaun is a wizard at CDS, tenor calcs and modelling.

Our first cut calculation of the **current Fulcrum Index is between US\$2Trillion and US\$3Trillion** for the risk basket. Note that the USA is between one quarter and one-third of that amount.

If we assume that the US\$2-3Trillion is a valid benchmark for the value of bitcoin, divide that range by 18.6mm coins and we obtain a **value of between US\$108k and US\$160k per bitcoin**. Again, this is a dynamic calculation, somewhat subjective, but a very valid benchmark using other clearly observed CDS markets and disclosures. Also, since there is no counterparty risk with Bitcoin, there is further validation in the calculation. If you are a Fixed income investor with the above-mentioned Fiat risk exposure to contractual sovereign obligations, **bitcoin can be viewed as cheap portfolio insurance**.

Together with the asymmetric return profile of Bitcoin detailed in section 3.6, the traditional 60/40 equity/bond portfolio can be meaningfully enhanced with an added exposure to bitcoin. Expected portfolio returns are increased while actual portfolio risk is decreased. Furthermore, with YTMs in credit products at historical lows, pension funds with prescribed rates of return that are calculated using more generous return assumptions for fixed income, will have large difficulty hitting their return assumptions. Many pension funds will have to examine their funded “status” more closely.

3.6 Other Bitcoin Valuation Methodologies

Our Fulcrum index is one of many calculations that should be performed in order to evaluate potential price outcomes for bitcoin. I will advance two others: i) bitcoin versus the market cap of physical gold, and ii) bitcoin as a proportion of total global financial assets including real estate.

The market cap of physical gold is US\$10T. If

we divide that amount by 21mm coins the result is US\$475k per coin.

According to the Institute for International Finance, total global financial assets in 2017 including real estate was US\$900T. If bitcoin were to capture 5% of that market, \$45T/21mm is \$2.14mm per coin. At 10% market share, it is over \$4mm per coin.

These are huge numbers. Also, they show the asymmetric return possibilities of the bitcoin price curve. The likelihood is certainly low, but it is not zero. In reality, the probability/price distribution is a continuous distribution bounded at zero with a very long tail to the right.

3.7 Investing in bitcoin. Probability analysis and expected value

Expected value analysis has always been a key calculation in my risk management toolbox.

Let's do a simple analysis using the numbers calculated in sections 3.5 and 3.6. We will formulate a simple distribution that has only five outcomes. Bitcoin worth zero, bitcoin worth \$135k/coin, worth \$475k/coin, worth \$2.1mm/coin and worth \$4mm/coin. For example purposes, we assign arbitrary probabilities to each outcome to reflect a subjective distribution as follows: price of zero with 75% probability, 135k (mid-point of Fulcrum Index range) with 15% probability, \$475k with 7% probability, \$2.1mm with 2% probability and \$4mm with 1% probability. **The expected value outcome of this example is \$136k per coin.**

Given recent trading levels on bitcoin, if you believed this to be your base case expected value calculation, you would be buying with both hands. For the record, my base case is substantially higher than this. But you must “Do your own research” (DYOR). Always DYOR!

Bitcoin is currently trading under US\$40k/coin. It sure looks cheap to my expected value distribution; however, there is no certainty I am

right. And this is not financial advice to run out and buy bitcoin. I am presenting a valuation methodology that has served me well in my 32yr career. I have been called a kook many times. I am fine with that. If the facts change, my investing decisions and valuation models change.

Others will argue that bitcoin is too volatile. I quote Bill Miller, “*Volatility is the price of return*”.

No Vol, no return.

And finally, given its asymmetric return distribution I believe “*It is more risky to have zero exposure to bitcoin than it is to have a 5% portfolio weight. If you are not long bitcoin, you are irresponsibly short*”.

Don't overthink this. Lower your time preference. Bitcoin is the purest form of monetary energy and is portfolio insurance for all fixed-income investors. In my opinion, it is cheap on most rational expected value outcomes. You can never be 100% certain. The only thing that is a

certainty is Fiat debasing in a debt spiral. **Hedge the global Fiat Ponzi.**

In a debt/GDP spiral, the Fiat currency is the error term. All Fiats are melting ice cubes. The rate of decay is relative, but all Fiats melt. It is only math.

I believe there is a real chance that bitcoin becomes the reserve asset of the world. The tipping point (or Fulcrum point) for that event is when bitcoin is adopted as a global unit of account for the trade of energy products. When oil, natural gas and electricity are priced in bitcoin, bitcoin will supplant the USD as world reserve currency/asset. This will be the topic for the next and final installment.

For now, I leave you with the following picture from the New York Times in December 1921, and Henry Ford calling for “*An energy currency that would stop wars*”. Makes you think.

Bitcoin = math + code = truth

Part 4

In the first three installments of this series, I reviewed my history in the credit markets and introduced the “**Fulcrum Index**”, an index that calculates the cumulative value of CDS Insurance on a basket of G-20 Sovereign nations multiplied by their respective funded and unfunded obligations. This dynamic calculation forms the basis of a current valuation for bitcoin — the anti-Fiat. This methodology determined that a fair value for bitcoin is between US\$110k/coin and US\$160k/coin, TODAY.

At a current trading level of approximately US\$40k/coin, the Fulcrum Index would indicate that bitcoin is cheap to fair value. As such, given that every fixed income portfolio is exposed to sovereign default risk, it would make sense for every fixed-income investor to own bitcoin as portfolio insurance. As sovereign CDS spreads widen — reflecting increased default risk — the intrinsic value of bitcoin will increase and this will be the dynamic that allows the Fulcrum index to continually revalue bitcoin.

Moreover, on an expected value basis, bitcoin is also cheap. And, with each day that the bitcoin

network survives and gets stronger, the left-hand side (tail) of the probability distribution continues to decrease while the right-hand side asymmetry is maintained.

Accordingly, I state for a final time: **Bitcoin is the best asymmetric trade I have seen in my 32yrs of trading, and I believe EVERY (fixed income) investor needs exposure to bitcoin.** Having zero exposure to bitcoin is riskier than having a 5% portfolio weight.

4.1 – Feedback from Prior Installments

I have received some valuable feedback from readers. I thank you for the kind words as well as the questions.

I paraphrase the main question as follows; *“If countries can just print, they can never default, so why would CDS spreads widen?”* I provide two examples below.

Firstly, the same thing was said about Lehman Brothers having an implied backstop by the US government and that it would never fail. The GFC showed us otherwise, and the CDS spread of 9bps (US\$9k per annum to ensure US\$10mm

of debt) that LB protection was offered at in 2006 turned out to be a very valuable insurance policy. The CDS of other financial players also widened in lockstep as CONTAGION spread through the markets, and while other players survived (no event of default occurred), the CDS protection was still a valuable policy that could have been sold to crystallize the value of the protection. The same dynamic will apply to the correlations of sovereign CDS spreads.

The bankruptcy of LB was a true awakening for all market players. An institution that was deemed by some as “too-big-to-fail” was not rescued by the Government. The cascading credit crisis became even more real as people who had assets custodied at LB as well as players who had purchased CDS protection from LB were suddenly exposed to risks as a major counterparty failed. CONTAGION.

Secondly, sovereign credits do default even though they can print money. Remember the LDC crisis in 1988. Or Venezuela in 2020 where Fiat is shovelled to the curb as garbage. It becomes a crisis of confidence and existing holders of government debt do not ROLL their obligations and instead demand cash. They can “print” the cash, but if it is shovelled to the curb, we would all agree that it is a de facto default.

4.2 – An example of CDS Contagion

In previous installments I laid out the leverage in the financial system, and why the unwinding of this leverage is what ultimately leads to crises exploding. The following example is particularly timely since we have just experienced a similar event in the Gamestop (GME) affair.

GME caused leverage to unwind which cascaded through the equity markets and was reflected in increased equity vol (and associated pressure on credit spreads). It happened as follows. Up to 15 major hedge funds were all rumoured to be in trouble as their first-month results were horrible. They were down between 10% and

40% to start the 2021 year. Cumulatively, they controlled about US\$100B in assets, however, they also employ leverage, sometimes as high as ten times levered.

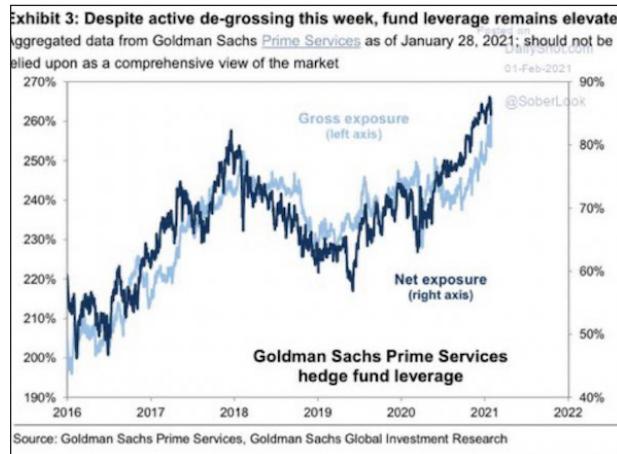
I quote from the Bear Traps Report, Jan 23, 2021, “*Our 21 Lehman Systemic Indicators are screaming higher. The inmates are running the asylum...when the margin clerk comes walking by your desk it is a VERY unpleasant experience. You don't just sell your losers, you MUST sell your winners. Nearly ‘everything must go’ to raise precious cash. Here lie the problems with central bankers. Academics are often clueless about systemic risk, even when it is right under their noses. The history books are filled with these lessons.*”

Consider a hedgie that uses ten times leverage and sells protection on a basket of sovereign credits “to collect that free premium” and generate a high leverage-aided ROI. The hedgie has been a consistent seller, even as spreads have widened. The market runs to the hedgie for more protection, they sell more. Then the margin clerk walks buy and suddenly the only seller of protection needs to reverse course to raise cash. They are now also a buyer, in a market where there are only buyers, spreads explode.

In the following exhibit, the title says it all: “*Despite active de-grossing, fund leverage remains elevated*”. This is what happens in an era of low rates. Costs of borrow are low, leverage is used to chase yield and make yield-producing assets attractive on a leverage-adjusted basis. “High yield” bonds have NEVER been lower yield (moved under 4% for the first time in history). See Appendix I for discussion on this absurdity for anyone who owns an HY Mutual Fund.

What does all this leverage do? It increases the risk of the inevitable unwind being extremely painful while ensuring that the unwind fuels the CONTAGION. A default does not have to occur in order for a CDS contract to make money. The widening of spreads will cause the

owner of the contract to incur a mark-to-market gain, and conversely, the seller of the contract to incur a mark-to-market loss. Spreads will widen to reflect an increase in the potential for default. And, there will be a correlation between widening sovereign spreads as systemic risks absorb the leverage unwind.



Roger Lowenstein's bestseller *When Genius Failed, The Rise and Fall of Long-term Capital Management*, is a must-read for all risk managers and market historians. LTCM was a huge hedge fund that employed two Nobel prize-winning economists and a team of elite traders. Their pocket strategy was essentially to sell volatility and enhance returns using leverage. When Wall Street banks needed to purchase options (buy volatility) they went to LTCM. LTCM sold, when vol widened they sold more, as the street needed more protection, they sold more...

At one point they remark, “*Markets are broken. Vol is at 99% confidence intervals, according to our models*”. Problem was, their models were based on SEVEN years of historical data. Wow. Nobel prize winners eh? Seven years of data!!! What a farce. Yet the “Bank of volatility”, almost brought down the street. LTCM was bailed out in 1997, and the party soon continued. Socializing losses has enduring consequences as the can was once again kicked down the road.

Risk happens fast.

4.3 – Concluding Remarks

Bitcoin is the purest form of monetary energy and is portfolio insurance for all fixed-income investors. In my opinion, it is cheap on most rational expected value outcomes. You can never be 100% certain. The only thing that is a certainty is Fiat debasing in a debt spiral. Hedge the global Fiat Ponzi.

In a debt/GDP spiral, the Fiat currency is the error term. All Fiats are melting ice cubes. The rate of decay is relative, but all Fiats melt. It is only math.

I believe there is a real chance that bitcoin becomes the reserve asset of the world. The tipping point for that event is when bitcoin is adopted as a global unit of account for the trade of energy products. When oil, natural gas and electricity are priced in bitcoin, bitcoin will supplant the USD as world reserve currency/asset. The following picture is from the New York Tribune in December 1921, and Henry Ford calling for “*An energy currency that would stop wars*”.



I believe it is logical for countries who are selling their valuable energy resources in return for worthless Fiat money to move from the Fiat-based US dollar as a reserve asset, to bitcoin. Digital energy stored on the world's largest and most secure computer network, in return for energy that has been stored as fossil

fuels, or hydropower, or solar power. It is a natural evolution built upon the first law of thermodynamics – Conservation of Energy.

“Bitcoin mining will be the most profitable use of energy in human history, that does not need to be located close to human settlement. Once the mining is built, the human settlement will follow”
– Ross Stevens.

Cheap energy has always resulted in human flourishing via increased productivity. Many bitcoin critics argue that bitcoin wastes energy. I contend that bitcoin consumes energy waste. From flare gas projects to wasted energy resources that are too far from the human settlement (you can only efficiently transport electricity about 500 miles), bitcoin mining can actually be used to stabilize the electricity grid as a system that is built for overcapacity (peak loads) can be more efficiently employed with miners that bridge the power gap.

Bitcoin mining increases the revenue and risk/return prospects for new energy projects. The Canadian energy patch would benefit greatly from these new revenue sources. Capital can be allocated more effectively. Entire communities and provinces can benefit. Trickle-down effects such as ASIC chip manufacturers returning

to North American soil due to the increased demand for miners can also be put into the playbook.

“Money is technology for making our work/time/energy expended today, available for consumption tomorrow” – hat-tip Ross Stevens (I added my own twist).

By that definition, bitcoin is the purest form of money and Store of Value (SoV) that mankind has invented. Choose your SoV wisely. Bitcoin equals math plus code. The code is open-source. *“Don’t mess with open-source software, you will lose every time”* — Jack Mallers.

RISK HAPPENS FAST. BITCOIN IS THE HEDGE

Thanks for reading and thanks to Tom and Nick and the Rock Star team for teaching me the ropes.

Sincerely,

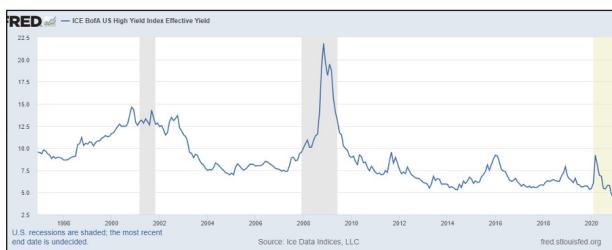
Greg Foss

Reach me on Twitter at @fossgregfoss – concerned but Optimistic Canadian

Appendix

If you own an HY Mutual Fund at the current Sub 4% YTM, be aware of the downside risk

The following is a graph of the BOAML HY Index since 1998. This spans my entire trading career. In fact, I was trading credit for ten years prior to the start of the index. Take a minute to look at the graph and align the spikes in yields to various events in the global financial markets. (The grey shaded areas denote economic recessions.) Note the typical economic cycle and how it is reflected in the graph of yields.



Three events jump out at me. Firstly, the GFC where yields on the index jumped to over 20%. This was in the spring of 2009, where I remarked earlier that I was going to the trading desk each

day wondering if the financial world was ever going to recover. Note the recovery (reduction in yields) from 2009 to 2015 where QE and Fed accommodation drove a compression (of spreads and) yields. Secondly, the hiccup in 2016, where there was a taper tantrum, and concerns over the solvency of Middle-European countries. Thirdly, the COVID spike in 2020 and subsequent recovery to where yields are now at 4%YTM.

The current YTM in HY guarantees that owners of HY Mutual Funds will have a negative annualized real return over a five-year holding period. As usual, It is only MATH.

Defaults in credit are an EXPECTED loss. If you can perfectly predict expected losses, then you can perfectly price credit to ensure a proper return on risk. The problem is you cannot perfectly predict expected losses and thus UNEXPECTED losses need to be priced into the return assumption.

Default rates in HY are expected to exceed 4% going forward, as the lingering effects of the latest recession work their way through the

credit cycle. Recovery rates (in the event of default) are typically in the area of 40%, thus a 4% default rate with a 40% recovery rate implies a loss of 2.4%. In the past, default rates have soared past 10%, implying a loss of 6%, but let's use a default rate of 4% for now. The MATH is still ugly.

The 4% YTM on HY minus expected losses of 2.4% leaves an expected return of 1.6%. Subtract a management expense ratio (MER) of 40bps for your typical HY mutual fund and you are left with an expected return of 1.2% in nominal terms. Subtract inflation and you are left with a negative expected REAL return in HY bonds.

This is before we account for UNEXPECTED losses, and the return required to compensate investors for this reality. Accordingly, the expected return on HY is the worst that I have ever seen in my career. Anybody who owns an HY mutual fund needs to take note: You are not earning an appropriate return on your

risk. Remember, when the perception of risk is low, the actual risk is high. Conversely, when the perception of risk is high (reflected in high yields), the actual risk is reduced.

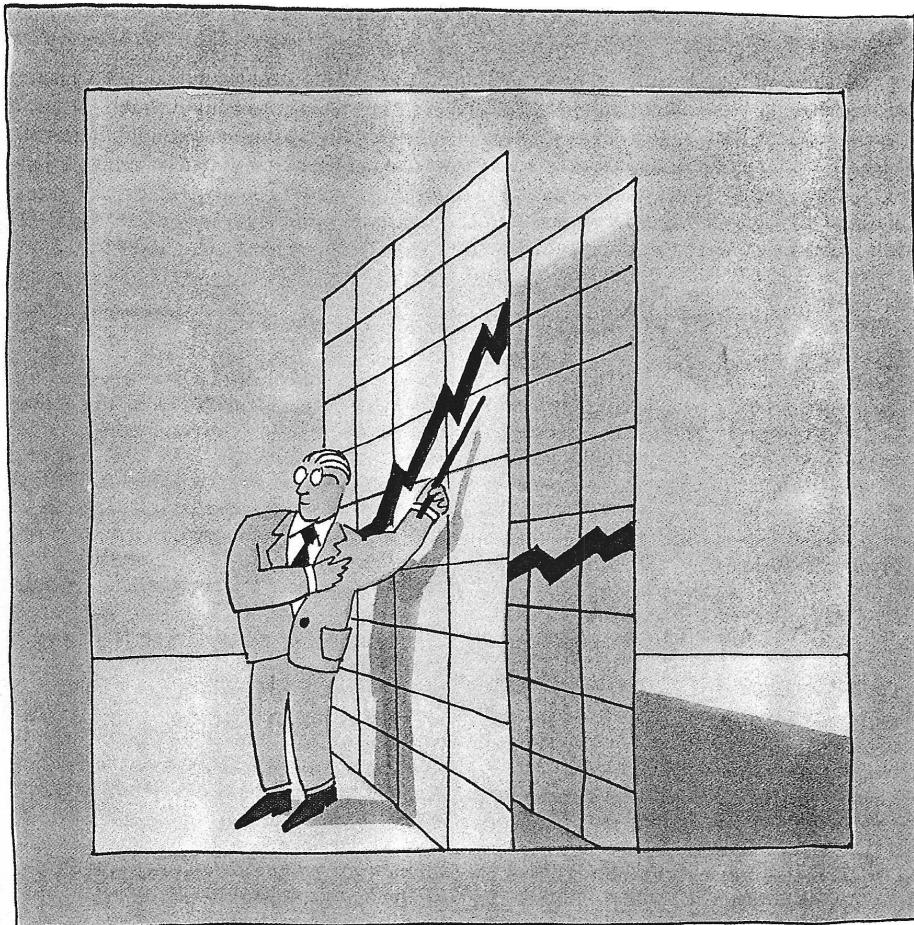
In summary, the HY market is heading for a major reckoning. The graph shows that the credit cycle is predictable and natural. This will lead to CONTAGION in other markets including widening spreads in high-grade credit and sovereign CDS spreads. Also, volatility in equity markets will invariably be impacted. Remember, credit is a dog. The equity markets are the tail that gets whipsawed like a ragdoll.

The process becomes circular. Increased spreads lead to increased vol. When you are long credit, you are short vol, and to reverse that exposure, you need to buy vol (protection). The spikes always return as CONTAGION and correlation kick in.

Proceed accordingly. Risk happens fast.

Financial Analysts Journal

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Predictability Bias in the U.S. Equity Market

Lex C. Huberts and Russell J. Fuller

Quantifying Risk in the Corporate Bond Markets

Gregory W. Foss

Global Fixed-Income Investments: The Persistence Effect

Martin L. Leibowitz, Stanley Kogelman and Lawrence N. Bader

Trading Costs and the Trading Systems for Nasdaq Stocks

Meeta Kothare and Paul A. Laux

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Quantifying Risk in the Corporate Bond Markets

Gregory W. Foss

Under certain circumstances, yield spread volatility and total return volatility on corporate bonds are directly related. Consequently, risk in the corporate bond market can be measured by examining yield spread volatility as a function of the credit rating. The EBITDA interest coverage ratio is highly correlated to the market's relative risk levels as a function of the credit rating. Accordingly, market prices are directly influenced by changes in this ratio. Because the EBITDA interest coverage ratio incorporates both business risk and financial risk into one measure, credit analysts and bond investors who wish to identify value in the corporate bond market should strive to forecast trends in this dynamic ratio.

When credit-rating agencies evaluate the credit quality of a given debtor or debt issue, the market accepts their ratings as a *qualified* opinion on the likelihood of receiving timely payments of principal and interest in accordance with the terms of the obligation. In essence, credit ratings segment the credit-quality spectrum into universally accepted and well-defined categories, and thus, credit-rating agencies provide a valuable service to the financial marketplace.

Credit ratings, however, do not *quantify* risk. In other words, one cannot state that a BBB-rated issue is X times as risky as an AA-rated issue, all else being equal.¹ One can only state that the likelihood of default on a BBB-rated security is greater than the likelihood of default on an AA-rated security. The same restriction applies to all relative comparisons between the credit ratings that span the credit-quality spectrum.

This article details a methodology for quantifying relative risk in the corporate bond market. The analysis involved calculating the historical volatility of corporate bond yield spreads as a function of the credit rating and then quantifying the relative results. Accordingly, one can state, for example, that a population of BBB-rated corporate issues is 2.13 times as risky as a population of AA-rated corporate issues, everything else being equal. Furthermore, comparative results can be calculated across the whole credit-quality spectrum.

Gregory W. Foss is a high-yield corporate bond trader at Midland Walwyn Capital Inc. in Toronto.

The EBITDA interest coverage ratio was found to be highly correlated to the market's assessment of risk across all rating categories.² The EBITDA interest coverage ratio is a dynamic ratio that incorporates the effects of both business risk and financial risk.³ Accordingly, it is a key component of the market's pricing mechanism. Using this ratio, an investor will be able to focus on an issuer's most important financial trends when making discretionary investments in the corporate bond market.

COMPONENTS OF THE YIELD SPREAD

The incremental yield spread on a corporate bond compensates investors for the incremental risks of holding default-prone debt rather than risk-free Treasury bonds. Specifically, the yield spread on any corporate bond (excluding all embedded options) comprises

- the expected default loss on a diversified portfolio of equally risky bonds;
- a credit risk premium required to compensate risk-averse investors; and
- a liquidity risk premium required to compensate risk-averse investors.

Default Risk and Credit Risk

The terms "default risk" and "credit risk" are often used interchangeably; however, they are not one and the same. Default risk is defined as the risk that the issuer of a fixed-income security will be unable to make timely payments of interest or principal. This risk, diversified over a portfolio of equally rated securities, leads to an expected de-

fault loss. Many of the initial studies on risks and returns in the U.S. corporate bond market focused on historical default rates and losses. Although these studies provide valuable insight, default rates and default losses, in isolation, are not paramount.

Credit risk is defined as the risk that the perceived credit quality of an issuer will change, although default is not necessarily a certain event. Increased credit risk is reflected in a widening of the yield spread. Credit risk and default risk are correlated because credit deterioration is almost always a precursor to eventual default; even in the most drastic cases, however, until default actually occurs, the potential for recovery or stabilization cannot be totally discounted.

Liquidity Risk

A liquid market is characterized by the ability to sell an asset in a timely and cost-effective manner. The quintessential liquid market exhibits narrow bid-ask spreads in all market environments. Therefore, liquidity risk can be defined quite simply as the ability to sell into a bear market.

YIELD SPREAD VOLATILITY

Risk is defined as the standard deviation of possible outcomes. The standard deviation is a measure of the dispersion of possibilities. Volatility and standard deviation are essentially synonymous (in mathematical terms the standard deviation is defined as the square root of the volatility). Risk in the corporate bond market can be defined as the volatility of total returns. Our interest was in isolating the effects of return volatility in the absence of effects from movements in the general level of interest rates. Consequently, we focused on yield spread volatility as opposed to price volatility in order to remove the effect of fluctuations in the U.S. government yield curve.

For small changes in yield spreads (i.e., ignoring convexity), the volatility of total returns is directly related to yield spread volatility. Corporate bond prices will move with changes in the yield spread as a function of the duration of the instrument. To quantify risk in these terms, we measured the volatility of yield spreads on a diversified portfolio of similarly rated corporate bonds. Although we cannot state that the weighted average durations of the various portfolios are exactly the same, if we use the portfolio volatilities on two instruments with the same duration, then the total return volatility of each instrument will be directly

proportional to the observed yield spread volatility.

The yield spread is assumed to incorporate, in one measurable quantity, the incremental return the market requires to compensate a bondholder for the *cumulative* incremental risks at any given time. No attempt was made to differentiate the individual components of the yield spread, because we are only interested in measuring the "all-in" risks inherent in investing in corporate debt.⁴ Because the magnitudes of the perceived risk components will vary over time, the volatility of the yield spread over an extended period of time is important.

No two corporations are exposed to exactly the same opportunities or exactly the same risks. Therefore, even if two entities have the same credit rating, one can only assume that they are of approximately the same credit quality. In fact, given that credit ratings can lag the market at least as often as they lead it, credit ratings only segment the credit-quality spectrum into groups of entities of similar risk.

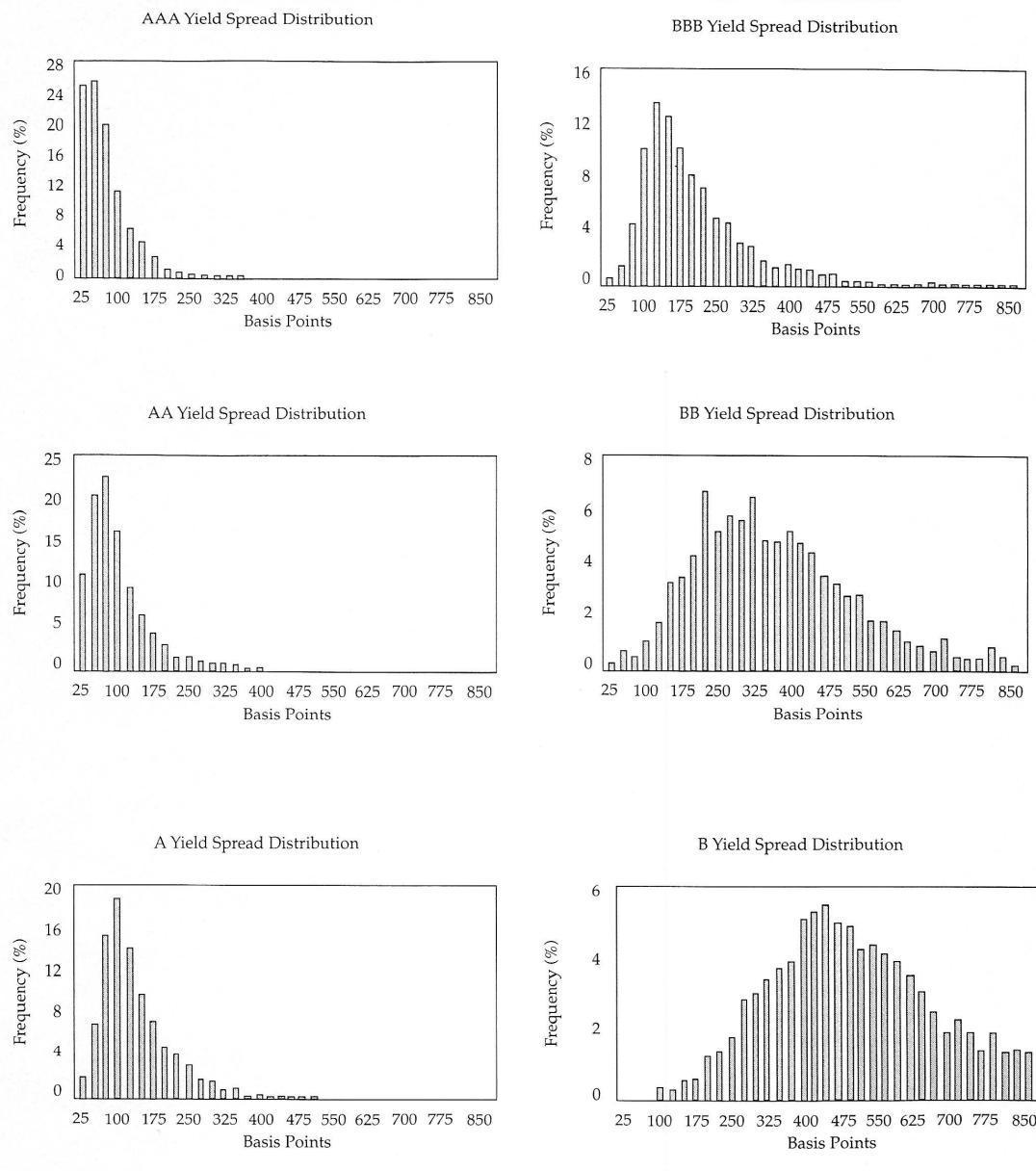
The market's view of this reality is expressed in the historical yield spread distributions shown in Figure 1. A comparison of the six panels of Figure 1 makes obvious the fact that the market's evaluation of all-in risk shows significant variance for each rating.

Methodology

Because secondary trading of corporate bonds occurs primarily over the counter rather than via a centralized exchange, no centralized data source on these trades exists. Consequently, we compiled our base data from historical issues of Moody's *Bond Record*, which is published monthly. Beginning with the October 1971 publication, the data were collected in three-month intervals up to and including January 1994. The quotes were restricted to U.S.-dollar-denominated debt issued primarily by U.S. corporations. The total population included approximately 18,000 quotes from more than 750 individual corporations that have issued debt in the U.S. market and whose issues fall within the parameters defined below.

In each periodic sample, no more than three quotes from one individual issuer were allowed. Maturities were restricted to ten years at most. Because the purpose of the study was to calculate yield spreads that incorporate only default expectations, credit risk, and liquidity risk, the sampling focused on noncallable issues. The sample excluded issues whose yields were significant-

Figure 1. Yield Spread Distributions for Six Credit Rating Categories



ly influenced by embedded options and sinking funds. To form the segmented distributions, yield spreads were calculated and sorted by credit rating.

Results

The frequency distributions shown in Figure 1 represent yield spread observations from AAA-

through B-rated issues. Note that as credit quality decreases, the volatility (dispersion) of the respective yield spreads increases. This visual representation of yield spread risk incorporates expected default losses, credit risk, and liquidity risk of an efficient market over time.

By measuring the standard deviations of the various yield spread distributions, risk can be quantified as a function of the credit rating. Furthermore, it is possible to quantify relative levels of risk between the various credit-quality ratings. The results are shown in Table 1.

Table 1. Risk Multiples by Credit Rating Category

Credit Rating	Standard Deviation (bps)	Times-AAA Risk	Times-AA Risk
AAA	51	1.0	—
AA	62	1.21	1.0
A	87	1.71	1.40
BBB	132	2.59	2.13
BB	217	4.25	3.50
B	297	7.11	4.79

TIMES RISK MULTIPLES

The times-AAA risk and times-AA risk multiples in Table 1 show the relationship between the standard deviations of the AAA- and AA-rated distributions and the standard deviations of the respective lower rated distributions. These multiples are a way of relating the risk of one credit rating to that of another. Specifically, using our definition of risk, A-rated debt, for example, is 1.71 times as risky as AAA-rated debt, B-rated debt is 4.79 times as risky as AA-rated debt, and B-rated debt is 2.75 times as risky as BBB-rated debt. This calculation can be applied on any relative basis.⁵

In addition to quantifying the risk relationships between the various credit ratings, these results can be compared with a number of traditional financial ratios that are typically used to assess credit quality. Although, in isolation, the financial ratios focus predominantly on the measurement of *financial risk*, a time series analysis also incorporates an element of *business risk*. Thus, a standard ratio reflects a complete assessment of credit quality.

Accordingly, if a ratio that is well correlated to the times risk multiples reported in Table 1 is isolated, one may hypothesize that the market places emphasis on the results of this calculation. Therefore, if a corporate bond shows strength in

the deemed components of the ratio but the market has yet to properly reflect this fact in pricing the instrument, an investment in that bond may produce superior returns.

Rating agencies frequently calculate a number of standard ratios to evaluate credit quality. *S&P CreditStats* has published median ratios by rating categories for a number of key financial ratios. Results for industrial companies during the five-year period from 1988 to 1992 are included in the appendix. These ratios are statistical composites and are not intended to be used as absolute benchmarks, because they are based on historical rather than projected performance. Credit ratings are forward looking, considering historical performance less important than future prospects. Nevertheless, historical results help identify interesting correlations.

CASH FLOW ADEQUACY

Cash flow analysis is crucial in all ratings decisions. A ratio that is particularly useful in examining cash flow adequacy is pretax funds flow interest coverage, otherwise known as EBITDA interest coverage. Because interest is a pretax expense, calculating a pretax coverage ratio makes sense. EBITDA, as a proxy for pretax cash flow, incorporates into one ratio a consideration of business risk and financial risk.

The *S&P CreditStats* median levels of the EBITDA coverage ratios, as shown in Appendix 1, are reproduced in Table 2. The second line of Table 2 presents an index calculated by dividing the individual ratios observed for each rating by the median for an AA-rated credit. The impetus is to try to create a fundamental risk index based on the AA-rated credit. AAA-rated results were not used as the base because the small number of AAA-rated companies reduces the significance of the results.⁶ The times risk multiples determined from the yield spread distributions are reproduced in the third line of Table 2.

The results are consistent across the credit spectrum. The results for the lower rated credits are particularly significant and tend to back the intuition that cash flow is paramount. Certainly, a case can be made that the market reflects this relationship, because no other ratio indexes were found to exhibit such consistent results in relation to the risk calculated from the yield spread distributions.

Granted, the index uses median ratios and *CreditStats* reports significant variance within each category. Without further investigation, it is im-

Table 2. Median Levels of EBITDA Interest Coverage Ratios by Credit Rating Category

Ratio	AAA	AA	A	BBB	BB	B
EBITDA interest coverage median industrial ratio	20.09	9.89	6.70	4.38	2.75	2.15
EBITDA times risk multiple	—	1.0	1.48	2.26	3.60	4.60
Yield spread distribution times AA risk multiple	—	1.0	1.40	2.13	3.50	4.79

possible to state any statistical significance with respect to the results. Nevertheless, the importance the market places on cash flow adequacy can be defended on an intuitive basis, as well as on a (albeit preliminary) quantitative basis. After all, pretax cash flow is what pays the contractual obligations on the debt instruments.

CONCLUSION

An analysis of yield spread volatility as a function of credit rating produces quantifiable relationships between credit ratings and risk. The results can be

used to isolate financial ratios that the market perceives to be foremost in the evaluation of credit quality and investment risk.

The EBITDA interest coverage ratio is identified as being a valuable market bellwether. Because this ratio incorporates both financial risk and business risk into one measure, any components that favorably affect this ratio should have a positive impact on the value of the investment, regardless of whether the rating agencies react by actually increasing the credit rating. Therefore, much as equity analysts strive to forecast earnings per share results, credit analysts who wish to identify value in the corporate bond market should concentrate on the EBITDA interest coverage ratio.

Quantifying the risk relationship between the credit ratings also has other important applications. For example, corporate banks could use the results to allocate capital to corporate loan portfolios. Because many corporate banks use shadow bond ratings for their internal credit systems, a relatively straightforward application would allocate capital as a function of risk relationships and credit ratings, everything else being equal. This methodology incorporates economic risk and presents a superior alternative to using the capital guidelines of the Bank for International Settlements as an internal risk-management system.⁷

APPENDIX

Key Industrial Financial Ratios, S&P Five-Year (1988–92) Medians, by Credit-Rating Category

Ratio	AAA	AA	A	BBB	BB	B
Pretax interest coverage (X) ^a	17.05	8.18	4.54	2.74	1.66	0.96
EBITDA interest coverage (X) ^b	20.09	9.89	6.70	4.38	2.75	2.15
Funds from operations/total debt (percent) ^c	127.1	65.9	38.6	27.6	16.4	11.2
Operating income/sales (percent) ^d	22.3	17.0	15.5	13.2	12.8	12.7
Long-term debt/capitalization (percent) ^e	11.8	22.6	34.0	42.6	59.5	62.4
Total debt/capitalization (percent) ^f	23.4	30.7	39.7	48.2	66.2	68.5

Note: Financial ratios are adjusted to exclude nonrecurring gains or losses and to capitalize operating leases.

^a $\frac{\text{Pretax income from continuing operations}}{\text{Interest expense}}$
Gross interest

^b $\frac{\text{Pretax income from continuing operations}}{\text{Depreciation + Amortization + Interest expense}}$
Gross interest

^c $\frac{\text{Net income from continuing operations}}{\text{Depreciation + Amortization + Deferred taxes}} \times 100$
Total

^d $\frac{\text{Sales} - \text{Cost of goods mfd. (before depreciation and amortization), selling, general and administrative, and R&D costs}}{\text{Sales}} \times 100$

^e $\frac{\text{Long-term debt including capitalized leases}}{\text{Long-term debt + Equity}} \times 100$

^f $\frac{\text{Long-term debt} + \text{Current maturities, + All short-term borrowings}}{\text{Total debt + Equity}} \times 100$

Source: S&P CreditStats, October 27, 1993.

FOOTNOTES

1. Although credit-rating agencies have distinct rating scales and definitions, the generic rating scale used throughout this article is AAA, AA, A, BBB, BB, B. This scale mirrors the scales of the major rating agencies and covers the range in credit quality from gilt-edged to highly speculative.
2. EBITDA stands for earnings from continuing operations before interest, taxes, depreciation, and amortization.
3. Business risk is also referred to as operating risk because it represents an entity's underlying risk in the absence of financing. Business risk effectively limits the maximum rating level to which a borrower can aspire.
4. "All-in" risk is an abbreviated term for all-inclusive, or comprehensive, risk.
5. Note that these results apply only to the relationships between populations of equivalently rated issues. Comparing specific issues within each population on the same basis can yield vastly different results.
6. Specifically, S&P states that the removal of IBM and Emerson Electric from the AAA-rated category significantly changed the median results for this group.
7. The BIS guidelines were imposed on the banks by regulators to protect against credit risk exposure. The guidelines impose a flat capital requirement rate irrespective of the credit quality of the loan.