Rate Disparity Book

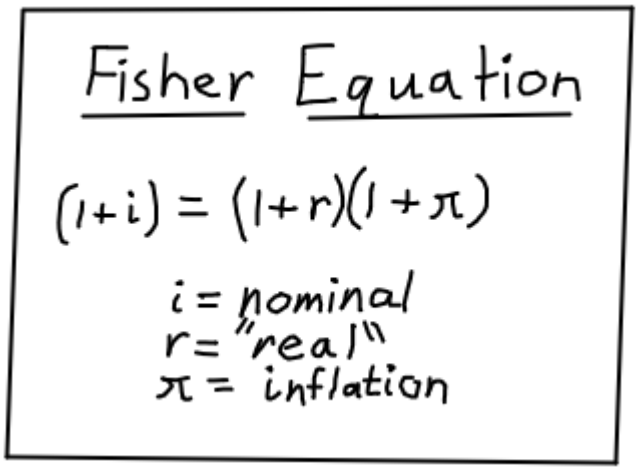
A technical yet informal exploration of novel interest rate ideas

Part Zero: How we all got interest rates backwards

Targeted vs Uniform Rate Increases

There are two ways one can go about "increasing interest rates". The first is a targeted approach, which involves going after specific problematic balance sheets and hitting them with rate increases on additional marginal borrowing, until they get their house in order, or they default and sell off their assets. The second approach is to uniformly increase interest rates. This involves mechanisms such as interest on reserves, and using the overnight rate, rather than looking at the long term health of assets. For political reasons, central banks use the second, ineffective approach. A uniform rate increase potentially ends up being a mere stock split: a continuous downward redenomination.

The fisher equation can be used to help analyze which ends up happening in a particular scenario, whether nominal rate increases lead to a regressive upward redistribution, or a unimpressive downward re-denomination. A simplistic reading of the fisher equation, would suggest that a plausible result is something in the middle: a partial increase in real returns, and a partial increase in inflation:



Much of the approach used by central banks today is done for historical and political reasons. There is a strong case that if we designed sovereign fiat monetary systems on a "whiteboard" from the ground up, we could come up with something a lot better. In the worst case, the conventional practice of nominal rate increases, according to a taylor styled rule, does little more than provide

pretext for an arbitrary and senseless financial disruptions to bond prices. I'll cover more on this throughout the book in discussions of duration and public balance sheets.

The case for a positive mechanical correlation between nominal rates and inflation

$$r \approx i - \pi$$
$$\pi \approx i - r$$
$$i \approx r + \pi$$

r - Real Rate of Interest
i - Nominal Interest Rate
π - Inflation Rate

There are three basic ways to order the terms in the fisher equation. We can solve for any one of the three variables, and reviewing each possible arrangement of terms can help us discuss various ideas about inflation and interest, and how they might be related. The fisher equation can be expressed exactly as a product or an equivalent sum of logarithms. Alternatively, it can be written approximately by simply adding and subtracting each variable representing a percentage rate of change, as shown here.

The way I like to remember the fisher equation, is as the definition of the "real rate". The term "real rate" is somewhat unfortunate, because it depends on creating a cpi inflation measure to serve as a reference frame. So there are many possible "real rates" depending on the basket of goods or metric you use to measure inflation. That's why I think the term "cpi adjusted rate" would be much better, or in the case of interest rates moving forward the "forecasted cpi adjusted interest rate". However, to stick with a very common convention, we will use the term "real rate".

After initially writing down the fisher equation as the definition of the real rate of interest, with the real rate on the left hand side, and the other two variables on the right, let's now solve for the nominal rate, and move it to the left hand side, with the other two terms, inflation and the real rate, added together on the right hand side. With the nominal rate isolated, we can clearly see the range of potential responses to nominal rate changes. When the nominal rate is increased, the sum on the right hand side is increased by an equal amount. This means that with a nominal rate increase, either inflation or the real rate must increase. Both could increase by a lesser amount, or, if one increases by *more* than the change to the left hand side, then the other will decrease. As we see, this is exactly the conventional story of the effect of rate hikes. A nominal rate increase is expected to achieve an even greater increase to the real rate of interest, which means inflation decreases as a result. This mathematical relationship is what we describe with the word "complements". It is just a way of saying that the real rate and inflation add up to the nominal rate, and an increase in one variable results in a decrease to the other variable, assuming the nominal rate is unchanged. If you recall from your high school geometry class, complementary angles add to 90 degrees. In this case, the real rate and inflation add up to the nominal rate of interest.

In this conventional view of interest rates, it is supposed that nominal rate hikes and cuts, lead to an even greater change to the real rate, and that inflation moves counter to this. In other words, the direction of causality of a rate hike is considered to be nominal++ to real++++ to inflation–. I am intentionally imitating a common notation used in programming languages called "post-increment" and "post-decrement" operators, because they are both a convenient shorthand and they are also "inline operators" which means the change to the variables happens after the statement executes, and not in the middle of evaluation.

I want to challenge the conventional story, and argue that a nominal increase in rates cannot reliably or automatically lead to higher real returns, especially not a real change larger than the nominal change, which is required to achieve deflation. To expect any nominal rate increase to change the real rate of asset performance, by an equal or greater amount, would suggest two likely explanations: either markets are gullible, always willing to trust the promise of higher real returns, or they are very strictly controlled by the central bank, so that they have no choice but to respond to the nominal rate setting with an even greater change to real rates. If the real rate change only matches the change to nominal rates, then no change to inflation will occur.

Why Amplified Transmission Into Real Rates Is Unlikely

Amplified transmission is the term I am choosing to refer to an even greater change to real rates, induced by a given nominal rate change, over the counterfactual scenario. From the fisher equation, amplified transmission is required for rate hikes to achieve deflation. Here is why this possibility is unlikely in both theory and practice.

First, I wish to acknowledge this can be difficult to observe because of mean reversion. Rates are typically raised when inflation is high. So if inflation falls after a rate hike, that requires careful analysis to determine if the hike was in fact the cause of that decline. Furthermore, an even higher standard is required to show, even if there is a causal relationship, that it is not a pavlovian response or placebo effect. A pavlovian response happens when a treatment triggers a system response, based on the system's ability to learn and adapt to recurring coordinated treatments. A placebo effect, while a similar idea, is when the expectation a treatment will work, biases the final outcome. These possibilities are important to consider, because if one of them is responsible, then there may be an observable causal relationship, in the direction we want, and yet, alternative measures are potentially responsible for the observed effect, or alternative treatments could easily achieve a similar or greater desired impact.

Thus, merely establishing a causal relationship between a treatment and response is not enough. Without determining the mechanical reasons why that treatment works, it is difficult for us to

understand when and how to apply it effectively. Meanwhile, economists often treat the interest rate setting as a universal medicine, applicable to any instance of inflation. While the dosage is debated, alternative prescriptions do not get a similar amount of consideration.

So as we were discussing, it should be pretty clear from the fisher equation's arithmetic, that the nominal rate tool, must work with some degree of mechanical disadvantage, or amplification, in order to have the intended effect. By that I mean that changes in the nominal rate setting must lead to an even larger response in the change to real rates, or the rate hike's "tough medicine" can backfire, and have a zero or inverse effect on inflation.

Amplified transmission would make sense under at least two scenarios: if markets are highly gullible, such as is the case with ponzi schemes, or they are highly obedient and the central bank's toolkit is powerful and respected. Neither possibility is very convincing, if you look at how the financial system works at a basic level.

Seeing as nominal rate changes are only a surface level outward change, they alone cannot be expected to increase asset performance, and so any effect would only be possible when paired with "real measures", such as enforcing financial defaults or stricter collateral standards, or fiscal restrictions, like higher taxes or implementing more disciplined and focused public spending priorities. If such real measures are commonly coordinated with the nominal change, or further, necessary for nominal changes to work, then we have a strong case for a merely pavlovian mechanism: the parallel real measures are doing the heavy lifting, and the nominal rate changes only serve as a coordinating signal. This would be fine, except that the nominal changes do create certain imbalances: the one time loss of present value to outstanding securities like treasury bonds, and the ongoing nominal cost or increased income share to new purchasers of these securities.

If parallel real measures are doing most of the work, then these disruptions and imbalances are an unnecessary or excessive cost, especially when large and aggressive nominal rate changes are performed, as suggested by the "Taylor Rule".

In the absence of such parallel measures, the suggested mechanism for rate hikes to work seems to be little more than a psychological hack that leads markets to second guess themselves and "reset" their expectations.

An expectations reliant approach for fighting inflation, might be compared to home team basketball fans trying to distract a disciplined free throw shooter. Just like these fans, an effect working only through the expectations channel would have limited potency which is entirely in the hands of another party. The expectations approach to fighting inflation, is not much different from the attention seeking acts of desperation performed by sports fans on the sidelines.

While markets are fallible, and the "wisdom of the crowd" doesn't always win, treasury bond markets tend to be dominated by particularly well researched and risk averse institutional investors, so the gullibility ponzi scheme explanation for this mechanical advantage, is easily ruled out. On the other hand, central banks are expected to act very neutrally and face intense political scrutiny and limitations, so the obedience hypothesis is also fairly unconvincing. It is not markets that obey the fed, but rather the fed which faces intense political pressures and scrutiny. Over time, as inflation gets worse and worse(potentially from the very medicine we use to fight it), the frustration may upset political equilibriums enough, so that both the fed and the fiscal authorities can take more aggressive "real action". One might go so far as to say that the entire reason the fed embraces the nominal rate setting and promotes its potency is because it is typically too limited and scrutinized to enforce decisive "real measures", as described previously in terms of appraising financial collateral, and scrutinizing balance sheets.

Without fiscal coordination, it appears the most aggressive fed action is simply using duration to devalue outstanding treasury bonds, by indirectly increasing the yields of newly issued treasury bonds through changes to the short term overnight rate. In other words, we can only reduce bond holder's present purchasing power, by offering new bond buyers even more future purchasing power. Alternatively, central banks could choose to eliminate bonds entirely and simply convert them all to short term interest bearing reserve accounts. The current bank term funding program, kicked off in march of 2023, demonstrates how the fed's actions on bond pricing and duration can be contradictory or inconsistent, as they attempt to thread a needle with just the right amount of financial instability to scare markets, but not enough to break them.

Once we look beyond the fed's bond market disrupting "guess what I'm thinking" game of interest rate setting, there is a broader dynamic response based on the interaction on foreign exchange with the bond market. This response is often unpredictable or indeterminate for long periods of time, as it is mediated by markets and finance, relative to the entire domestic and foreign prospects of countries. This response plays a large role in determining the extent to which a nominal rate increase transitively leads to an increased real rate, but unlike other effects, it is a chaotic, market mediated, second order effect, whereas duration and targeting collateral appraisal are first order mechanical effects directly dictated by the practices of accounting, subject to the laws of balanced stock flow identities.

While it is plausible for nominal rate increases to increase real rates by some amount, the possibility of amplified transmission, is neither justified by theory nor clearly demonstrated in empirical work. While many papers have been published trying to measure the deflationary impact of rate hikes, the results are often inconsistent and leave room for questions.

One empirical paper you might want to evaluate, mentioned in the *recommended readings* section, is Romer and Romer: "A new measure of monetary policy shocks". The biggest question this paper raises for me, is that the effect of one of these interest rate "shocks", does not seem to be much shocking at all, as the response may require a lag of up to 2 years to have its intended effect. However, the most jarring claim I noticed from the paper, is that it optimistically reports a narrow confidence band for a shock's impact, even up to 4 years out. One would expect such a confidence band to increase greatly the more time which elapses from the initial change, as it becomes increasingly difficult to attribute the outcomes of that system, to the specific treatment, as the time from the change in the treatment variable increases. Either they are statistical wizards to see cause and effect clearly over a lag of four years, or the reported results represent some kind of very generous assumptions or dramatic simplification, and thus should be taken into consideration with a very healthy serving of salt. Regardless, even if we choose to reject these results and disagree with their conclusions, these efforts reflect a significant amount of academic labor and are representative more broadly of the consensus views of a significant body of credentialed academics. Contending with these claims in a satisfactory way requires much more than the comments I can make in this informal discussion, or my largely uncompensated and amature attempts at analytical exposition. Nevertheless, I would suggest that an accurate interpretation of the mechanical effects on accounting positions, is in my favor and calls into question these results. It was not clear to me at the least, how the paper's conclusions effectively accounted for the divergent uncertainty that arises in complex systems. Again, it appears the reported confidence bands for the response stayed optimistically tight even 4 years after the initial shock.

Another important consideration is that much of this empirical literature on rate hikes, starts with the assumption that they have some level of deflationary impact, and are thus focused on trying to measure this impact, rather than establish a direction of causality from a more neutral analytical perspective. If one is familiar with statistical methods of inquiry, your assumptions play a critical role in what kind of data you collect and how you evaluate it. In other words, the most informative test depends on where you expect the answer to be. If your theoretical model is too far off, it is very difficult to get useful information.

Measuring Nominal Transmission Into The Real Rate

When empirically evaluating the impact of rate changes, the approach is typically to try to measure the amount of deflation achieved. I think this framing is problematic, because the size of physical cash holdings is relatively small. If we want to measure and analyze the channels of monetary transmission effectively, we should be analyzing the impact of nominal rate changes on the real rate, rather than the impact on inflation.

If we reframe this question thus, then all of the sudden the different viewpoints on interest rates do not appear to be so irreconcilable after all. Both conventional monetary policy and various neofisher perspectives now agree on the direction of the impact of nominal rate changes, and merely disagree on the magnitude and sustainability of this change. When nominal rates are increased, even neofisher theorists would tend to expect some amount of real rate increase. While it is possible for this increase to be zero or negative, the benchmark to achieve deflation is much higher. By measuring the transmission from a nominal rate increase into the real rate, we are better able to analyze when it may be effective or not.

The Challenges and Limitations of Econometrics

While the econometric techniques employed by modern economists definitely have a high level of mathematical sophistication, there are at least two good reasons to question their ultimate effectiveness. First, what they are trying to achieve is incredibly difficult: evaluating a complex system involving many variables, especially with long delays and lags in the system, and secondly, economics is still very much steeped in a degree of "traditional hierarchical thinking".

What it took for the scientific revolution, in physics and astronomy, to break through the barriers of traditional authority is truly impressive. Early physicists and astronomers such as Galileo were sometimes even imprisoned or convicted for their ideas. While the dissent and contention in economics comes nowhere close to this level of stakes or legal persecution, there are some parallels. There is a lot of prestige in the field of economics, and rather than coming across as the renegades fighting to overturn centuries of ignorance with new ideas, mainstream economists, much like their theory of value, are focused on marginal or incremental gains. Whether you consider this incremental traditional approach to be a good idea, depends a lot on how you view the history of economic theory, and the level of confidence you have in the existing mainstream status quo. There is a strong case that the historical record of the economics profession is not great, and that the ideas that end up winning have usually been outsider alternative viewpoints.

In some respects, the economic world we live in today is a very new one, based on the constant changes to law and politics, which shape the design of the financial system. A critical example is how commodity standards like gold were repeatedly adopted and abandoned in financial history. When the chicken farmer and agricultural economist George Warren encouraged FDR to suspend the gold standard, prominent economists of the day railed against it as heresy. In many ways modern economics is still playing a game of catch up, trying to figure out what this chicken farmer saw that the rest of the world didn't.

Today, other than the austrian school, and a few outliers like fans of German Post Keynesian economist Wolfgang Stützel, fiat currency is accepted as the new "gold standard", the best tool for public finance. And we have a new "Warren" who is telling us once again to try something radical.

Just like George Warren was a unconventional or even heretical outsider in the world of finance and economics, Warren Mosler is equally unconventional, demonstrating as much passion and creativity for engineering cars and catamarans, as he has for promoting unconventional interest rate policies and new economic ideas.

Perhaps this is just what is needed to take on the conventional thinking. Econometricians may need to stop assuming that hikes have some level of deflationary impact, and focus on establishing whether this casual relationship is actually robust or driven by other variables and causes as well as mean reversion. Additionally, we should genuinely consider other alternatives for inflation control, like pursuing deflation through restrictive fiscal measures or disciplined collateral appraisals. Frequently, empirical studies will run into what is called the "Price Puzzle", where the hike appears to increase inflation, until some specific more advanced technique is used. Maybe this is more than just Milton Friedman's thermostat being so effective it inverts the apparent causality.

Regardless, empirical work on such macro relationships is incredibly difficult, both because these are historical outcomes subject to unique, ever changing circumstances, and because markets themselves are essentially amalgamated intelligences and forecasting machines, often leading to strange loops of causality and feedback, as the market tries to predict what the market is thinking. Although it is possible for aggregated large scale variables to be dominated by simple relationships, such as how periodic oceanic levels are dominated by tides caused by the moon's motion relative to the earth, there is no such simple and conclusive link between interest rates and inflation.

To summarize the ideas we've discussed, let's review the three possible responses to a nominal rate change. The real rate change could be equal to the nominal rate change, which means no change to inflation would occur. The real rate change could be deficient, less than the nominal rate change, which would mean that inflation increased. Or we could get an amplified real rate change, which I have chosen to designate an "amplified transmission" of the nominal signal.

Some authors suggest that the long and short run response to interest rates could be different(John Cochrane has explored this idea on his blog), that in the short run rate hikes reduce inflation, but in the long run they could increase it. In my viewpoint, I don't see long vs short run as being the decisive factor, but rather counterfactuals. Counterfactuals are easier to prove over the long run, but they can have immediate and dramatic effects in the short run as well. So I would not particularly expect this to be long run/short run distinction, so much as a noisy relationship with many confounding

variables. There is admittedly, one short run/long run distinction, which appears plausible at first glance, and that is related to asset duration, rather than the demand effects of interest rate changes.

By my assessment, the potential for a short run deflationary impact of rate hikes is not the demand suppression of borrowers, but rather the equity reduction of asset holders based on duration. But I even question this, as not all assets have the same duration, ie the same price response to interest rate changes. So I would expect duration to affect relative wealth and financial gains more than overall demand. Duration can certainly create financial instability.

These empirical issues are challenging questions for any researcher or statistician, and additionally outside my core mathematical competencies. I have put a lot of work into studying system dynamics and computer science, but not statistics, so I will defer to others to analyze that more thoroughly. What I wish to discuss now is an important dynamic behind prices in financial markets, including FX and bonds.

While I think such statistical and empirical work is incredibly important, it is very difficult and potentially has a short shelf-life. The "Lucas Critique", suggests some possible reasons why previous empirical studies may not be applicable to future scenarios, but I think there are other reasons as well. Regardless, let's go back to discussing the relevant accounting *mechanics* rather than the complex, unpredictable, and often seemingly contradictory market *dynamics*.

The Mathematics of Price Discovery: Relative Value Paths

Conventional financial theory of interest rates focuses on two key ideas: cash flows and time discounting. For most financial analysis, these are very useful concepts, but for analysis of the interaction of foreign exchange(which I will refer as FX subsequently) and bond markets, this toolkit falls short.

For one thing, discussing "cash flows", completely sidesteps the issue of what the money unit is and how that might change over time, and this is exactly the issue which drives FX and sovereign bond markets. FX and bond markets are inherently connected, especially in a post gold standard world. In such a financial system, bonds issued by a currency issuing country are often called "risk free assets", because if the country controls the unit of account, they can always make payments.

In order to effectively analyze FX exposed sovereign bonds, I would suggest that it is helpful to think of their price dynamics more like equities or commodities. These assets are subject to constant relative price discovery and subjective value uncertainty, compared to conventional bonds which are priced on an explict coupon and the default risk. FX exposed sovereign currency- issuing bonds or

the bonds issued by the large players in a currency union, cannot be effectively priced and analyzed the same as conventional bonds. Both equity and commodities trade with a large degree of short term uncertainty, whereas conventional bonds primarily are driven by long term uncertainties. In the case of equity this typically comes from the uncertainty of future profits, both in terms of costs and sales levels. But for fiat bonds the uncertainty of their payout is driven by the dynamics of inflation. Compared to fiat issuer bonds, corporate issued bonds are viewed essentially a binary instrument: either the issuer defaults, or they do not. But when the issuer of a bond directly controls the unit of account used, the range of "real outcomes" possible tends to be much more continuous.

One way that cash flow analysis falls short in discussing these particular asset markets, is that cash flow analysis uses future outcomes and prices to try to describe what is called *present value*. I wish to point out only that the present is typically more certain and concretely determined than the future, so in this case, this analytical approach seems backwards. At the very least it often leads to very circular reasoning and heated debate of contentious philosophical questions.

For example, with accelerating inflation, a line of thinking might go like this: because the value of a currency fell over the last year, we expect it to fall over the next year as well. Then if we take next years price, and work backwards to get the present value, the price today should be even lower, unless we raise interest rates.

I am not going to go so far as to say this is the actual logic employed by any noteworthy economist or market commentator. This is only an example of how these issues often lead to apparent circular arguments and indeterminate questions. If economic analysis ever sounds like I just described, it is likely something was lost in translation, because the cash flow view becomes very complex when you try to use it on itself.

Instead, I would suggest there is an alternative mathematically and financially sound way to frame this analysis, closely related to common techniques in mathematical financial modeling, such as markov chains and random walks. I call this framing *relative value paths*. Over time, the value of one asset moves against another, as markets negotiate control of resources, mediate conflict, and realize consequences. Virtually any possible path of any two assets relative to each other is possible, in some possible world or timeline.

In other words, we do not want to simply assume acceleration of price trends or even continuation of past trends. The state of perfect knowledge for markets is to know nothing in equal weights: any future direction is equally likely.

Admittedly, there are reasons why currency and fx may not be able to achieve this state of omniscient ignorance, where you know everything about the present but nothing about the future.

For one thing, a lot of people use currencies, and there are many long term contracts both public knowledge and private information. So there is very good reason to think that these asset prices may lag and 'swing' or oscillate, much more than other asset markets.

But we should not make the mistake that lag or overshoot implies an inherent bias to continue the current trend, or the threat of destabilizing acceleration.

The first order mechanics are simple, even if the higher order dynamics are complex

Whenever the real rate change is less than the nominal rate increase, inflation is increased as well, by the simple arithmetic of the fisher equation.

Rate hikes are conducted by nominally increasing interest rates through various central banking tools. The effect can be difficult to assess as it requires knowing what would have happened without the rate hikes, or had the rate hikes been different over a long time frame. But in all cases the following is true:

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Whenever the increase to real rates, is less than the associated
nominal rate increase, inflation must increase as well, by the
arithmetic of the fisher equation.
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Even determining which has occurred is difficult, because we care about what are called "counterfactuals", and not simply the absolute change after the nominal adjustment. This issue of counterfactuals is discussed in the section on empirical challenges in more detail. Basically, there are potentially long and variable time lags between the initial change, and the system response, and determining which has occurred reliably requires either a time machine or sufficient statistical power to emulate one.

I think that most economists would agree that raising the nominal rate alone is not what generates disinflation, but rather that the accompanying financial defaults, as well as other possible market dynamics, play an important role. I would like to suggest, however, the possibility that the variables are independent: What if it is possible for banks, including central banks, to increase the real rate directly, without relying on the nominal rate of interest?

How this might work is by trying to directly target the standards for financial collateral, how banks appraise assets which they keep on their balance sheet or lend against. Banks can always ask their corporate and business users for margin calls and more collateral, without increasing the nominal

rate of interest they charge for borrowing. In this way banks might seek to manage the rate of defaults, and real rate, and inflation more directly. One potential issue with this proposal, is that central banks typically defer to the financial system and markets, in order to determine the relative pricing of assets. So to effect disinflation in this way, would appear to violate the premise of neutrality under which central banks operate.

I do not know the extent to which conventional economists have considered this possibility, of trying to enforce pricing discipline directly at the level of asset appraisal, or whether they simply dismiss it as it appears to violate the premise of market independence and neutrality under which central banks operate.

But if we think back to commodity currencies like the gold standard, this is in essence what central banks and governments did. Operating on a commodity standard is a form of "price fixing" for that specific commodity. Not to mention the burden and costs of both storing and managing the commodity, and the downsides of removing that commodity from circulation for reserves.

This is a topic I address more thoroughly in the section of the book on the history and controversy of "Modern Monetary Theory", as it relates specifically to the notion of buffer stock policies, which are especially important to the MMT conception of how fiat currencies work. In that section I reveal how buffer stocks are still a commodity standard, but a diversified one, with the goal that the storage costs and resource sequestration of commodity reserves performs an important function in complementing the private sector, rather than competing with it. Even so, there are limits and potential downsides to such policies. Regardless, I would instead ask us to consider the possibility that the fisher equation suggests a mechanical connection between nominal rates and inflation, that is, they are directly correlated, and higher nominal rates lead to higher inflation, other things being equal(specifically, the rate of defaults or standards for financial collateral)

The hard limitation on the the potential for nominal rate increases to increase real rates(a "ponzi mechanic", if you will) is the national debt of a currency issuer, or the debts of member countries in the case of currency unions. A national debt which is too large creates inflation, and rate increases increase the national debt. (See unpleasant monetarist arithmetic, although the authors still use the phrase 'tightening' for nominal rate increases)

From the fisher equation alone, it would appear that increasing the nominal rate would increase the real rate, or it would increase inflation. It is possible, if not likely, that both would happen. For example, suppose you increase nominal rates by 10%. This could potentially lead to a 5% increase in the real rate of return, and a 5% increase in inflation. For a nominal rate increase to in fact, reduce inflation, the real rate must increase by *more* than the amount of the nominal increase. One might describe this as the nominal rate establishing a "benchmark" for the real rate. The higher the

benchmark of the nominal rate setting, the higher the real rate must be to achieve zero inflation or deflation. We could also say that the nominal rate setting separates the performance of financial assets, from the performance of the currency itself.

I think this "rate differential" framing, that the nominal rate is used to create a differential between money's unit of account measurement and its store of value performance, is a good compromise between the conventional view of interest rates, and alternative viewpoints, such as described here, which suggest positive correlations between the nominal rate of interest and inflation. By separating the rate on financial assets from the performance of the currency, using a nominal rate setting, we can potentially smooth over financial disruption, continuously devaluing a currency relative to financial assets, rather than dealing with a sporadic and unpredictable price changes. In this case, rates would be increased to reduce the volatility of inflation, rather than achieve disinflation. The disinflation is then achieved as interest rates are lowered, once the volatility subsides.

The conventional explanation is that the real rate of return is accelerating, through the mechanism of equilibrium. So if you have excess inflation, and thus a low real rate, fewer people will want to hold your assets, leading to even more inflation. If you have low inflation, and a high real rate, more people will want to hold that currency.

What this "accelerating inflation" explanation ignores, is that many different financial assets experience drawdowns and price corrections, and then stabilize after the total valuation of that asset is reduced to a more conservative level. When the market generates inflation, it is not only due to "price stickiness" or "expectations", but the market is in fact telling us something about the value of currency and/or that currency's related national debt valuation. You cannot simply raise rates arbitrarily high to create a more valuable currency, because the real return will increase the valuation of the currency and related debts, making it more difficult to "defend" that higher valuation. Essentially, the market needs to naturally "bottom out", and find the floor of the price for the currency and national debt, without an attempted fiddling with the "real rate" too early. If you try to stabilize the real rate before the market has a chance to properly correct prices, this can end up backfiring, increasing inflation rather than reducing it.

A currency which experiences inflation, results in a lower total valuation for the currency and national debt, making it easier to "defend" this lower valuation. This same logic of accelerating real rates, would apply to all asset price changes, not just currency and debt. If the price of gold starts to drop, then people may be less willing to hold gold, unless they expect a reversal. At a certain point, if the price declines enough, it may be considered a bargain buy.

Discussing this issue alongside the issue of the valuation of the national debt, helps to clarify which effect may be possible or likely: an acceleration of price trend, or a bargain buy and reversal of that

trend.

The real issue is who absorbs the impact of inflation: bond holders, cash holders, or contract holders. In this case, workers are contract holders. Interest rate policy shifts who this burden falls on.

Rate Hiking Dynamics: Commodity Money vs Fiat

Rate hiking with a commodity currency, such as a gold standard, would not necessarily be done with the intent of achieving an economy wide "deflation" alone, but rather for two potentially similar reasons: to allow the rate bearing instrument issuer to better monopolize their reserve commodity, or to allow them to borrow more in real terms at the higher rate.

Rate increases under a commodity standard are not the most direct approach to effect a change in money's price level. And there is a sense in which rate changes cannot effect any change to money's price. This is because the value of the the currency is already fixed to the commodity. So by definition there is no inflation or deflation in terms of that commodity as a price index.

This is a case where it becomes important to distinguish between different definitions and indices of inflation. If we use another measure like CPI to assess inflation, then inflation is entirely a matter of the relative price of the commodity compared to other items.

The most direct approach to change "money" purchasing power under a commodity standard, is simply to adjust the rate of conversion between the money unit or unit of account, and the commodity. Historically this has been known as "seignorage", when the ratio of the commodity to the accounting unit is decreased.

Commodity Currencies still use "Fiat" tokens

Even under a commodity currency standard, for most transactions and uses, people will still favor paper or digital tokens that represent claims to the commodity, rather than the commodity itself. These claims may be described as "fiat", as they are valuable based on the word of the issuer. The fact that they are fixed to a specific item with promised on demand redemption, makes these commodity tokens a clear example of debt, or even more specifically, a bearer deposit. It does not, however, change that these tokens are valued based on the word or promise of the issuer.

So even under a commodity currency the stock of instruments in circulation and saved, is not limited to the physical stock of the commodity. If this relation becomes questioned, if it is believed that too

many commodity instruments have been issued relative to the underlying stock, then the market can experience rapid deflation, as participants seek to acquire the commodity to cover their debts.

This may be compared to a run on a bank, but it is even more dramatic, in that it occurs across the entire system. It is a "run on money". This can have the effect of inducing rapid deflation, or a change of the commodity's price relative to other commodities. So while a commodity currency is price stable in terms of that commodity, it can be more difficult and costly to stabilize its relative price against other commodities.

Fiat Currencies are still "Backed" by commodity debts

While a fiat currency is commonly described as being "unbacked", this is an inaccurate label. It is more accurate to say they lack on demand redemption at a fixed conversion rate. Fiat currencies are involved in a system of taxation, debt, and property, and can be used to pay taxes, settle legally binding claims such as torts, and purchase commodities on the open market.

If a commodity token issuer fails to redeem their token for the underlying commodity, they go into default. But a similar process of conversion exists for "unbacked fiat", only it happens at the point of taxation, or tax default, and not at a deposit window. To secure money to pay taxes, you provide some good, service or commodity, and the commodities you own may be subject to forfeit if you fail to pay. So instead of redeeming the tokens for commodities at a bank teller window, a fiat currency allows you to avoid forfeiting commodities, goods, and other property to the tax man, when he comes knocking. While the process may be very different, and the timing very different as well, it has the same effect: the value of something informational or representative, is "backed" by real things in the economy. There are specific points where the conversion between the paper and real item takes place.

A fiat currency simply changes the timing and location of where the exchange between paper and real wealth happens. Furthermore, it is better diversified across the market portfolio of available goods and services. A tax authority can repossess homes, land, vehicles, paintings, garnish wages, and more, whereas a gold token issuer must hold gold in reserves.

For this reason, the value of a fiat token is essentially what you must do to earn it, to pay your taxes, or someone else's taxes indirectly through the market process.

Multi-Commodity Fixed Currencies Are Possible But Annoying

If you want to use a basket of commodities to measure inflation, then you could simply use the same basket as reserves, assuming they are not perishable. Multi-commodity standards are not a new idea, but it appears they fail to catch on, because the price is typically fixed to each item in the basket, rather than the complete basket itself. A direct(one-to-one mathematically) multi-commodity currency reserve system would require a deposit of all commodities in equal proportion, or similarly withdrawals would involve receiving the full basket of commodities. Otherwise the relative prices between the basket's items must be fixed or accurately tracked to market conditions, which essentially requires the multi-commodity instrument issuer to either monopolize all the items in the basket, or competently trade them without excessive net losses.

To achieve the latter, a multi-commodity currency issuer could simply operate as a "market maker", for each of the items in the basket. However, this requires them to run an effective trading operation so that they don't take continual losses. While there are algorithmic ways to operate as a market maker with minimal risk, this increases operational complexity and requires a higher standard of competency, which is essentially an annoyance and cost for a bureaucratic institution.

Even if all the members of a bureaucracy have a high level of competency as individuals, it is a different matter for the organization to operate effectively at that level. So it is often best to reduce complexity where-ever possible, even if something is completely possible in concept.

Whether for this or another reason, it appears that an effective multi-commodity currency has never been achieved. It is much simpler to use the non-perishable commodity with the largest share of the global wealth portfolio: gold.

A commodity currency always has zero commodity inflation in the same commodity index

So as we were discussing, a commodity currency always has zero inflation when measured against that same commodity as a commodity index. While this may appear obvious, despite being a mouthful to say, it is important for us to point this out to help distinguish between two important definitions of inflation. One definition of inflation was when the stock of the commodity money changed. To my assessment this has only ever been a widely accepted use for commodity currencies, as it does not make sense for fiat currencies or other assets not linked to a specific scarce commodity. Once we began using currencies that were not commodity based, then we used commodity indexes instead as a basis of measurement, rather than simply the quantity of a money good available.

One reason to use a commodity index is that it can include perishables and consumer goods, while it is difficult to use perishables as a reserve to defend currency prices. Also, as economic agents shift their patterns of consumption, commodities indices can be adjusted to better reflect the commodities that the economy uses.

Only consumed commodities have intrinsic value

The irony is, that if a good cannot be consumed, it literally has no use. This is true because try as we might, all useful things experience depreciation as they are used. This is a basic observation about technology. All tech is degraded with use, and may also lose relevance over time, which can lead its price to decrease. While gold may be considered the closest thing to a non-consumable, there is still a cost to recover it from applications like electronics or machinery, and an increasing recovery and storage cost over time can be accounted for as depreciation. But it is not enough for an item like gold to be potentially consumable, it must actually need to be consumed either in the present and future, for it to have intrinsic value. If most of the world's gold is not consumed in costly to recover applications, then it does not have intrinsic value either, due to the practical reality of useful items degrading and losing relevance as discussed. All tools depreciate.

So in this case, the value of non-perishable and unconsumed commodities like gold is extrinsic, and to be frank, unnecessary. We would get along well enough without assigning any extrinsic value to gold.

On the aggregate, a great deal of value is essentially lost by expending it on these kind of aesthetic extrinsically valuable items. So even though gold may be consumed, it is mostly not.

It is only the easiest thing to monopolize, or in other words, to tax. So it is a contradiction to say you hate taxes but love the idea of gold based money. Because that is one of the most important reasons why gold is valuable: it is the easiest thing to tax.

Commodity Currencies can have relative price inflation in another commodity index

So we just discussed how gold is an extrinsically valuable commodity tax credit. It is primarily valuable because it is easy to tax and has historically been used for that purpose. Its application for ornamentation, can be related to the fact that ornamentation is an overt display of wealth, indicating that someone has paid their taxes, ie that the rest of society has not disputed their claims to wealth. Overt displays of wealth could be considered a challenge and signalling mechanism in this way, directly related to the fundamental principle of taxation as a social concept. Such displays would be

punished if they had not paid their taxes, in other words, put in the work necessary to establish social consensus or support for their claims to wealth.

But aside from the definition of inflation as a change in the commodity stock, which doesn't even matter if it's monopolized anyway, there can be relative appreciation or depreciation of commodity money in terms of a distinct index or basket of other commodities.

And I think one can conclude that the rate of interest may affect this in a "pro-cyclical" way.

When you borrow a commodity money at interest, you issue more of that commodity, and thereby increase the amount in future circulation

So this is the critical point we must discuss. When you borrow a commodity money at interest, you are not merely promising that you will repay a debt, but essentially are promising that the amount of that commodity in circulation will increase. This promise can be fulfilled either by literally increasing the stock of the commodity available, relatively by decreasing savings in the commodity, or virtually by increasing alternative savings vehicles denominated in the commodity. The final and easiest way to increase availability of a commodity to fulfill interest payment commitments is simply to decrease its relative value and price. Regardless of which of these paths is chosen to fulfill interest commitments, the financial availability of the commodity must increase. This is true locally if not globally at the level of the larger macro economy.

If you are a small borrower your promise can be fulfilled at a small scale very locally only: you can repay more gold in the future fairly easily by acquiring it elsewhere. But for a large borrower, the rate they promise is a promise to increase the global supply, and thereby "inflate" that commodity, if we use the commodity stock definition of inflation.

If you borrowed all the gold in the world at a 5% interest rate, then you are essentially promise that next year there will be at least 5% more available gold, whether through mining, or perhaps you had uncommitted gold reserves, which you will make available in the future if other gold holders agree to give you their gold. This serves to help you establish or preserve a monopoly over gold.

There are two reasons to borrow a commodity money at interest: fx or increasing reserves

There are two reasons why a (tax) authority might want to borrow commodity money at interest. The first simple reason is to spend into the foreign sector. But for that rate to be sustainable, they must ultimately be able to extract more value from the foreign sector than the rate they promise to pay

when they borrow. Like all borrowing, this works because not all economic transactions are zero sum: often there are opportunities to save costs or increase wealth through coordination and trade.

The second reason is domestic: to essentially monopolize reserves to push the price up higher, allowing you to spend more in relative terms using a smaller amount of the commodity.

But even this can backfire if you are too aggressive, as you must cover the higher interest you owe to instrument holders. For that reason it is most effective when it is not the only tool you rely on to monopolize the commodity reserves.

To monopolize reserves means you own effectively infinite gold

So long as you have more than you would possibly want to spend you have infinite. By pushing the price of an extrinsically valuable commodity higher and higher, a monopolist of that commodity can emulate a true fiat currency, where spending is only limited by things offered for sale in that currency. Whereas a fiat currency might tolerate some inflation when it expands real spending, a monopolist of a commodity currency will generally do the opposite: pursue deflation, to expand their spending. So this would make it seem like the commodity monopolist enjoys a stronger financial position, as they might retain an overwhelming share of the commodity in reserves, and keep pushing its price higher and higher, making those reserves even more valuable.

But this can be just as precarious, if not more so, as it depends on manipulating the price of the commodity upwards, especially through tax and spend policies. As discussed, using interest to buy more reserves is only a short term tool, as eventually commodity reserves purchased with interest, must be paid back with interest, or the instrument issuer defaults.

Manipulating the price of the commodity money, is the true reason why you would want to rate hike on a commodity standard *even though* you are promising that there will be more of that commodity in the future through interest payments. You borrow to help suck up commodity so you can control its price over time.

If this were your only tool for retaining a gold monopoly, eventually it would fail, but if it complements other tools like taxation or simply direct pillaging, an elevated interest rate can help you retain a monopoly over a commodity based currency.

The Ponzi Race: the rush to monopolize reserves

So this leads us to the ponzi race. While you may be offering unsustainable returns on gold, you do not have to sustain it infinitely. You only have to outlast the other borrowers, and you can buy off their real assets in a firesale and then use it to make weapons against them.

This is the truth of rate hiking even under a gold standard, it has an inflationary bias through the promise of future gold income, but it is conducted alongside your perpetual campaign to monopolize all the gold, and you only offer high interest in the margins, to force people into debt, to loot both your creditors and your debtors. It is not a sustainable thing.

So even under a strict fixed commodity standard, there is an implication of either inflation(as an increase in the commodity stock), default, or an economic drain through higher taxes, when elevated interest rates are pursued. The word inflation connotes something getting bigger, like inflating a balloon. But it depends on how we think of the boundary created by the barrier of the balloon. Are we making the inside of the balloon bigger, or the outside of the balloon smaller?

Preventing inflation in a commodity currency requires maintaining scarcity

So when discussing inflation, we really need to get our perspective straight. If we make everyone richer or better off, then previously scarce items will have much less relative value. So as something is losing relative value, if we treated that thing as a currency, then that thing would have inflation.

So if we tried to treat wheat as a currency, or energy, or houses, then we would have to keep that thing scarce, limit it, and try to keep the outside of the balloon, the real world, really small. This is a problem, if you are able to make the commodity less necessary or more avaiable through innovation or logistics, then it loses value, and doesn't work as a commodity money very well. This leads to one of the paradoxes of commodity currencies: it should be perceived as useful or valuable, but if you use something intrinsically valuable, it will have costs and negative consequences for society, as that thing is kept artificially scarce to stabilize prices. So objects with primarily extrinsic value, like gold, tend to be used.

It is not not necessarily desirable if the valuation of a virtual commodity money keeps increasing, or increases too rapidly

Other than physical commodities like gold, it is possible to build a similar commodity currency system based on virtual commodities. Note that this *does not* have to be digital. It could be trading cards, or beanie babies, or anything else that can have an artifically limited controlled supply(stock or inventory). The most widely promoted virtual commodity system today is perhaps bitcoin or other cryptocurrencies in general. There are many potential uses and applications of these systems, the

most notable being gambling and market speculation and various scams: rug pulls, ponzi schemes, mlms, etc. A secondary possible use of virtual commodities or cryptocurrencies, is micropayments and a low cost, globally accessible payment systems.

This second application might be compared to using cowrie shells as coins, and for this I want you to consider a unique possibility. Imagine if we had a cash system, where the large bills were issued by one entity, like government fiat, but the small tokens and coins were managed by another entity. Instead of having competing money payment systems control localities or certain groups of people, they could be divided by the value of the tokens or denominations.

Suppose that a grocery store gave out small change with chuck-e-cheese or bus tokens, or your barber gave you lottery tickets as change for breaking a $100 bill. In the limit, "change" can be considered simply a set of small purchases added to the top of an order so that it fits a fixed payment amount.

While this is definitely worse in terms of usability than our current system, in my opinion it is the strongest case for an actually beneficial system of virtual commodities. The ambiguity in virtual commodities arises because they are not necessarily a direct debt of the issuer(though you may choose to account for them as such), but they still need to be controlled and managed by this issuer, or issuing process.

To my assessment, the only way that a virtual commodity would keep increasing as a share of the global wealth portfolio, is if some tax like debt system made it have some power or influence within the financial system, as we previously discussed how taxes mean that fiat currency is still "backed" by commodities and other real wealth, by avoiding forfeiting them to the taxman. Rather than redemption on demand to receive a reserve commodity, tax credits serve as a buffer allow you to retain your owned commodities and other real assets, when the taxman comes knocking.

With far too much emphasis on the valuation and speculation aspect of virtual commodities, rather than reasonable applications like flexible, privacy repsecting payments within alternative spaces, whether digital or physical, it will continue to be difficult for these commodities to find a useful niche. And I am genuinely afraid that if they do succeed in the way many supporters imagine, as a wholesale replacement to fiat money, that that would only be through an instigation of similar barriers and burdens to our current system of taxes and financial regulations, but without the social proctections and accountability and transparency that we currently enjoy, even if it is imperfect.

So as eager as the bitcoiners may be to make their virtual commodities an appreciating asset, they can only sustain aggressive growth if they embrace some sort of taxing, rent seeking, or create other market barriers. It would be worse if this managed to insert itself into some actually critical

economic or financial function, and I don't see that going well. If you fill a balloon with a little bit of air, and then manage to suck away the atmosphere, the balloon will grow in size. I don't see continued appreciation of virtual commodities as an indication that they have succeeded, done good in the world, or fulfilled a public purpose.

Marginal Borrowing Curves: the Ponzi Cliff

Thus, rate increases under a fixed unit of account can be thought of simply as a changing marginal borrowing cost. In an idealized model of borrowing, eventually no one will be able or willing to lend more in real terms, or accept a net unreciprocated spending position from an instrument issuer. This point, where the interest rate of marginal real borrowing reaches infinity, we can call the "credit limit in real terms".

What is unusual about borrowing under a commodity standard, is that there may be good reasons to distinguish between gross and net borrowing positions, as it allows you to more effectively control the commodities price, as well as manage its flows over time.

Swing Buyers and sellers: Money is Always a monopoly

While it may appear that fiat money is a monopoly, but commodity currencies defy centralization, it is often the case that one way or another, even commodity money ends up being controlled by an important "swing trader", (similar to how a swing voter decides an election), or in other cases an overt monopoly.

The change from commodity money to fiat, may initially appear to be a simple substitution. Instead of using a strictly defined physical object for final settlement, we simply use limited issue tokens instead. Why can't the process of issuing fiat, not simply be an abstraction from the process of mining a physical commodity like gold?

The Credit Limit In Real Terms

At the credit limit, offering higher rates does not give you more purchasing power at the time of borrowing, it only increases the profits of your lenders and the costs you pay for financing. If we use an interest rate to measure the cost of borrowing or an unreciprocated net real spending position, then in an idealized model this marginal cost will eventually be infinite. However, with a flexible fiat currency, this credit limit actually happens much earlier, because the potential for inflation limits real purchasing power.

The higher the rate, the more people will accept your instrument, to a point. But once you pass that point borrowing is only a greater external transfer of wealth. You are not able to buy more goods and services at the time of borrowing, you only pay more in interest.

But this dynamic does not apply in the same way currency or equity issuers, who cannot face default or repossession, only a loss of support and losing the ability to buy more, as their share price falls to zero. But the critical tipping point is not when their share price falls, but rather when their total valuation decreases despite issuing more shares. Once issuing more currency or shares results in a decreased valuation for the aggregate of all currency or shares issued, that is when you have hit the "credit limit in real terms".

When a conventional borrower reaches their credit limit, they have something to lose. But a currency or equity issuer merely has the price of their shares or currency fall, faster than they can issue more. Eventually currency or share price can fall to zero, and the entity ceases financial existence.

Most Experts Agree Rate Hikes are Deflationary, But Are They Wrong?

First, We Must Learn About Banking

Listening to Perry Mehrling talk about the history of central banking is enthralling. He is obviously passionate and knowledgeable, an expert on our institutional structures and their history. But if the conventional view of interest rates is wrong, how and why did so many experts, including Mehrling, miss this? It is certainly not for a lack of intelligence, study, nor simply for the sake of conformity with traditional viewpoints. Many economists such as Mehrling challenge traditional narratives on many topics and ideas, and yet still support the consensus that rate hikes are more likely deflationary than not. Through an accomplished career as an academic and educator, Mehrling has demonstrated himself both knowledgeable and an expert communicator, as well as willing to challenge conventional mainstream ideas when he finds them wrong or misleading. There are countless other experts like Mehrling. The idea that nominal rate hikes are a deflationary tool, represents an overwhelming majority opinion, not only among mainstream economists, but it also appears to be the majority opinion among heterodox economists as well, who might otherwise argue against mainstream economic theory.

Just as a note for context, compared to other academic disciplines, the level of contending viewpoints in economics is very high, and I would suggest that while mainstream conventional theory represents a very dominant plurality(the most common opinion less than 50%), it falls short

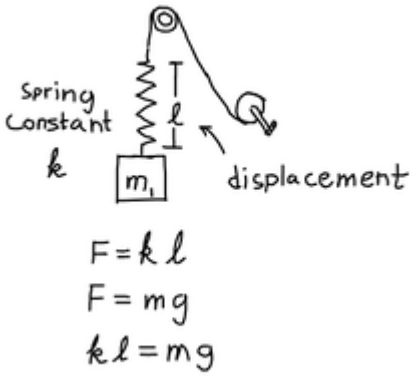
of a majority among credentialed experts. I don't have hard data on this, and would be open to correction, but one historical example of contending perspectives is the cambridge capital controversy, which led to the "post-keynesian" school. But the conventional view of rate hiking has an unusually high support, both among many different schools of thought, and those of different political sentiments. So for us to contend with that opinion, we must make a strong argument, and furthermore attempt to describe how so many experts could get this point wrong. I do not consider it a comment on someone's merits or credentials to make a mistake on this matter, simply because it appears there are very good reasons for this belief, even though I am a dissenter to this common viewpoint. While many might be willing to entertain the idea that nominal rate hiking isn't a very effective or reliable tool for reducing inflation, there are very few who go so far as to argue the exact opposite, that nominal rate increases not only fail to reduce inflation, that they reliably increase it, especially if we compare this to a more direct approach of "price discipline".

There are a few reasons why I want to discuss, and would encourage you to learn about, Mehrling's viewpoint of the economy. First of all, Mehrling is a credible academic and excellent at communicating his ideas. He does this in a way that is both helpful to novices and illuminating to seasoned experts. Secondly, Mehrling challenges many conventional framings of finance and economics. Moreover, I find that his ideas are substantially correct and can serve as an invaluable foundation for our discussion. Finally, Mehrling's viewpoint on interest rate hikes appears to be a "soft agreement" with the conventional idea. To my knowledge, Mehrling has not commented extensively on what is known as "neofisherism". From the lectures of his I have watched and his writing that I have read, it appears he largely agrees with the viewpoint that rate hiking, will tend to be deflationary in most circumstances.

In his work, Mehrling discusses a concept of the "four prices of money". These four prices include par clearing, interest rates, foreign exchange, and commodity prices or the price level(CPI). The ability to view the same system from many different perspectives and viewpoints, is a critical tool for thinking effectively about the economy. In mathematics it is common to change number or coordinate systems to try to make a problem easier to solve, or to approach it from a different angle, and this is important in economics as well, not only at a mathematical level, but also at a conceptual and political level. Some such "framings" may be mutually compatible, while some may at least appear to at least to represent some form of intellectual or political opposition. In other cases, alternative framings may directly contradict each other.

A Physical Analogy to Explain "The Interest Rate Error"

Speaking informally, I think the primary reason why most experts, both mainstream and heterodox, get the macro impact of interest rates backwards, is because the effects of raising rates on one party, and the effect of a universal market wide rate change, are exactly opposite.



To use a physics analogy, if you look at a simple spring system, there are a few ways that one might raise or lower a mass on a spring, attached to a rope, hanging from a pulley, as shown here. One way would be to use a spring with a higher spring constant. This would in fact raise the mass. Another way to increase the tension on the spring would be to increase the mass, or to increase the force of gravity.

This simple system demonstrates that it is not true that all the possible ways one might increase tension in the system will move the spring's mass in the same direction. If we increase the mass on the rope, or increase the force of gravity, the spring will lower. This same idea applies to interest rates and the price level. Not all approaches to increasing rates will have the same effect, especially depending on the other fiscal or monetary measures we pursue at the same time.

Let's imagine for a moment that our mass-spring-pulley-rope system represents the price level in the economy. There are a couple ways we could map this system, to the economic system. I would argue that the best representation, is to compare the mass going up to an increase in the price level. What can we do to bring the mass back down and anchor it again(hint hint)?

There are a few things we might try. One would be to swap out the spring with another spring with a different spring constant. You could even imagine a special device which could dynamically change the constant using a radio remote control device. A higher rate of interest in this analogy is like a higher spring constant. While existing equity is potentially devalued once, with a rate increase, the ongoing effect tends to pull the price level higher.

A simpler setup would be to simply adjust the rope. This is comparable to using interest on reserves. The claim that a higher rate lowers inflation, is analogous to observing our spring system, and asserting that increasing tension in the system, will necessarily lower the mass, no matter how we go about it. In a sense, financial commentary often sounds like rate hikes are increasing the force of financial gravity. But in some cases, they might simply be moving the base of the spring, which will temporarily increase tension, by pulling the mass higher, rather than lowering it. To an observer standing on the mass, it would feel like gravity was increasing, so they might be confused into thinking this was pulling them downward, if they had no stable external reference to gauge relative motion.

Similarly, because our financial experience is from that of an individual, and applying a higher rate to individuals is more taxing, we think that higher rates across the economy as a whole will similarly pull the price level downward.

While it may be possible to lower the price over a period of elevated nominal rates, the nominal rates do not help with this process, and in fact make it more difficult in the long run. At best you may be able to temporarily decrease the financial volatility associated with inflation, by adjusting the exchange rate between present and future money, and temporarily reducing the purchasing power of those holding future money, such as treasury bonds and other contracts.

The Banking Perspective

As anyone versed in finance can tell you, central banks, as a "banker's bank", raise interest rates to discipline the financial sector and contract the economy. There's at least one problem with this story, it makes a specific fundamental error about balance sheet positions and how they work with public money systems.

Fiat money: What is it?

A philosophy of money and taxes

Money is inherently public. Two people may decide to use a good to settle trade, but that alone does not make something money, to be money specifically requires public recognition and acceptance. Public recognition leads to both network effects, which amplify small advantages over a large scale system, as well as a greater relevance of political dynamics, where one part of the system affects all the other parts.

Public activities have pros and cons. When a large group of diverse interests is involved, it is easy to impose external costs and hard to act in unison toward a shared goal or establish boundaries. It is so difficult to establish boundaries in large groups of people, that humanity has literally spent thousands of years fighting, then talking, fighting then talking, etc. It is an endless cycle. That's how hard it is to set boundaries in large groups. There is no property without creating some kind of publicly enforced boundary condition on acceptable behavior. Large groups of people are good at imposing external costs, but otherwise very poor at acting in unison towards a specific goal. This is because there are inherently very different interests and even thought processes at play. But as soon as you say "something is bad, let's punish that behavior" that is very easy for a large group to do. This kind of thinking can catch on quickly like wildfire, which is why politics like fascism is so

dangerous... Once a large group of people starts disliking something or someone, or some subgroup of people, it is very hard to limit, direct or control.

If everyone who walked by your house dropped a tiny piece of litter on your lawn, it would quickly become a complete mess, and it would take exponentially more work to hold everyone accountable. Once the behavior of a group starts deteriorating, it can quickly become very dangerous, harmful, and out of control. This is behind everything from nimbyism, to racism, to fascism, as well as some slightly less extreme, only sometimes negative behaviors, like youths or economists for that matter trying to act cool so they aren't mocked by the peers. Bullying, like many externalities, is something relatively cheap to produce but expensive to consume, which tends to amplify or increase, within larger and larger groups of people.

Boundaries are very important for a functional society in large groups, so we channel this behavior of creating external costs, into taxation. If we didn't tax each other, we could very well be doing all sorts of worse behaviors: straight up vandalism, extortion, general mob behavior. This is a very common pattern in historically tumultuous times. Hopefully, we can change things for the better while avoiding such indiscriminate mob vandalism, although sometimes this can be a positive cathartic and uniting experience, like the dismantling of the berlin wall.

Taxation is humans acting out what we describe when we say "lobsters in a bucket". If someone gets too much stuff, or too far ahead, or too powerful, we inherently want to put them in their place. "If you're gonna have all that stuff you're gonna have to pay." Taxation channels this negative attitude into something actually productive: want to stand out from the crowd? We'll allow it, provided you are either successful enough or do something else to garner public recognition and praise. That's part of the role that money plays: a voting mechanism for popularity, which can be abstracted through exchange of goods and services. Money does a bit more than this too, but this is at least one of the things which it does.

So that is why we have taxation. Because we all have this incredibly powerful and ruthless mob instinct, and we really need some boundaries. Taxation satisfies both of these. It allows people establish boundaries and property claims, by paying an explicit tax, and it also allows us to act out this instinct, which can sometimes be good and helpful for society, but can also easily go way too far overboard.

What is often neglected in this discussion, is that property claims themselves are more than a tax, they are full exclusion. It is not that you require some toll or fee to tread on a domain, it is that you give a lone individual, against the mob of everyone else's interests and desires and needs, the power to exclude all those other people. What could possibly justify one person, no matter how small their domain or claim, the power to exclude everyone else from using a resource? Well, I don't have a good

answer for that, besides repeating what I just said: we need boundaries to get along. Things don't seem to work all that great without them.

The tax implications of capital gains

This is where we get things wrong: passive financial returns, as a benefit arising solely from claims in the property system, are a negative tax. If a return arises from the superior management of property based resource claims, then it may be fully justified. But if it is passive, ie automatic regardless of the quality of resource management, then it is problematic. In short, financial returns can only be uniform and in equilibrium if the behavior and effectiveness of property owners is uniformly good, when in fact freedom and independence allow us to realize our unique differences. If there is an equilibrium or uniformity to rates, it is because of filtering or selection which suppresses natural diversity of preferences in economic performance.

This relates to banking and finance in a very simple and direct way: Banks operate payment systems by issuing and lending out money through debt, and using that money/debt to allow people to settle payments. When the behavior of these institutions becomes too uniform: only borrowing and lending for the same class of asset, such as cookie cutter HOA managed suburban homes, then costs increase, and fragility compounds.

When a bank charges its users, or another bank, a higher rate of interest, that tends to be contractionary. The users will not want to borrow from the bank if they need to pay more interest, or lose their assets.

It may not be obvious, but most of the lending and borrowing banks do is with other banks in order to operate the payment system. This is true at least in terms of frequency of borrowing lending operations, but there is also an argument that this is also true in terms of scale, as a bank is just a money creator which does this by accounting for collateral in a standard way.

So that's all well and good, but then how did we get interest rates backwards? Well, that happened by reversing the relationship between user and issuer. It's all a matter of perspectives and which side of the balance sheet you find yourself on.

Financial discounting and interest as a rebalancing mechanism

In the history of banking, banks have always relied on information networks to clear payments between each other. But as early communications technology was much more primitive, banks relied heavily on coins and bearer notes, such as cash. It may be counterintuitive to us today, where

uniform standardized national currencies dominate, but cash can be considered simply a note issued by a bank or other entity. It doesn't even matter if that entity controls the unit of account being used: A bank in china, could, for example, issue notes denominated in U.S. dollars. Although representing them as authentic U.S. dollars would be considered counterfeiting, there is nothing to stop any bank or nation or city or state from issuing notes with a particular unit of account. In the world of crypto finance, which has rediscovered many commonly understood financial ideas, such a pegged asset is called a "stablecoin".

What was more common, is that different banks would issue different bank notes representing dollars, and a note from one bank might not be accepted at full face value should you try to use it at another bank. The reduced price of another's bank notes can be referred to as 'discounting', although it is a bit different from the typical interest sense of discounting, which is applied temporally, and not between different banks or across space.

So both a rate of interest, and a deposit penalty on external notes, can both be considered examples of "discounting", meaning that a note is bought or sold below full face value. But the question is then, what does a temporal interest rate allow you to do? The basic mechanic of interest rates between banks, is that banks charge each other interest for outstanding balances, to incentivize that balances return to zero.

However, there is no inherent reason why zero has to be the target value for outstanding credit between two entities. This is because the act of storing assets or funds or wealth, can be considered a service, which would mean that a "debtor" would charge the "creditor" a fee, instead of vice versa. It is common with credit cards and modern payments to allow for a certain amount of "overdraft", sometimes even without fees or penalties below a certain limit(especially when rates are low). Banks may offer such short term zero lines of credit in the hopes of either attracting customers who use different, more profitable financial products, or customers who subsequently overextend their credit usage to incur greater fees and costs, which results in profit to the banks. But every business faces two problems: "how can we increase total wealth and our wealth share"

Regardless, the underlying principle is that every product or service an institution offers, is not done in a vacuum, but has an impact on the other products and services they offer, and how profitable they are and their market reach. Joel Spolsky explains this principle extremely well in his article "commodify the complement", which is why gaming companies sell consoles as loss leaders, or hardware companies sponsor open source software. If a product or service being cheap or free, facilitates the creation of customers for other products and services, then you have an entirely different proposition to consider than a conventional cost/revenue/sales analysis specific to that service. (incidentally, this is very similar to the notion of externalities positive and negative, which is

one of the objectives of a government with regards to better accounting, government's financial parameter may be to do exactly those things which allow the public to save their national debt at a higher valuation).

Returning to the subject of interest, When outstanding unreciprocated balances increase between two banks, to incentivize that the balance return to zero, a creditor bank charges an increasing rate of interest to the debtor bank.

Such outstanding balances can be considered not to be loans, but rather an IOU swap or upgrade. To allow for an overdraft balance simply means you agree to hold a note or credit instrument issued by the borrower, and in exchange you offer them a more widely accepted form of money. If the quality of the issued IOUs is considered equivalent, then such issuers may swap IOUs with zero surcharge, simply to make it easier for them to process payments,

Thus, rather than being considered a temporary application of debt, credit and iou swaps can be considered upgrading one issued instrument into a more widely accepted and standardized credit instruments. When you borrow from a bank, you are upgrading your issued dollar, your IOU, to the banks issued dollar or IOU, and then the bank can in turn upgrade that to an IOU issued by the central bank.

Therefore, borrowing and lending, as a swap between assets of different quality, should be considered an upgrading process, and therefore not subject to a uniform interest rate. It depends on the quality of the instrument you start with, compared to the quality of the instrument you end with. Note, that this is not so much directly considered as "risk", although there may be correlation there. It is more a matter of universality of substitution, rather than strictly quantifiable credit assessment.

But in the cases where it is applied thus, an interest rate can be used to incentivize returning balances to zero, potentially even requiring regular payments, margin calls, and/or default if the unreciprocated balance is not addressed.

The natural vs storage rate of interest

Much discussion is often given to the "natural" rate of interest. This could be considered a false analogy between the biological process of growth and the market based profit driven capital process. In biology, certain living things may have a natural growth rate which they attain during the growth phase of their lifecycle. By comparing this biological growth to the capital process of investment and profit, people suppose that capital has a natural rate of growth given by optimal investment. This assumption has an obvious oversight, in that the analogy would be between capital and biological nutrients. It is clear in biology, that the process of gathering nutrients is very different

from the process of organizing them to create growth. In gathering nutrients predation and parasitism is not only possible, it is common.

Meanwhile, we often naively suggest that market processes involve no conflict: either implicit or explicit aggression. Lacking this, it is supposed that those who are good at organizing capital will dominate those who are merely good at collecting it. Moreover, it is frequently argued that this has some kind of universal limit: the gains to be made from capital are uniform over the types of capital inputs and the types of capital outputs, because substitution and time discounting.

If one form of capital input offers smaller profits per unit of investment, then its price will decline until it matches the uniform "natural" rate of interest. Similarly, if a capital output offers less profit, it is assumed the price will increase, until it too matches the natural rate.

One problem with this is imperfect substitution, both of inputs and outputs. We could take a long time discussing whether it is reasonable to expect a convergence of discount rates, despite imperfect substitution, but fortunately there is a much simpler way of defining a discounting rate, which does not rely on evaluating the marginal efficiency of capital and investment across the entire market system.

Instead of discussing a "natural rate" where capital flows to the most ambitious and effective investors, we can consider the discount equilibrium to be a "storage rate", which reflects the most straightforward and no nonsense way to store a given amount of wealth.

This idea is compelling because the more wealth one has, the more the storage cost problem increases, and the less attention the can give to each marginal dollar invested, without delegation, which can dilute a return.

The storage rate of interest is therefore not a convergence of optimal capital allocation, but rather the simplest low cost way(negative cost if it can passively generate returns), to store accumulated wealth.

This still leads to a uniform rate of discounting, but it is much simpler and less complex to evaluate. The more wealth one has, the more likely they will want to allocate a portion of their portfolio in this way.

Preserving the marginal efficiency of capital across scale

The biggest problem capital and capitalism faces, is not having too little wealth, but rather having too much of it. Any time you have an excess the tendency will be to waste or poorly allocate it, and

the tendency of markets to concentrate wealth exacerbates this problem. Thus many capitalists like schemes such as basic income, so they can preserve their large relative advantage, and yet never run out of opportunities to sell to the less possessed. It allows relative market power to distort without any correction or natural limit.

When a bank or anyone else, offers more interest, that is expansionary!

So I just finished saying that when a bank charges more interest, that is contractionary. It may now sound like I am contradicting myself. But this is the exact same principle at work, just from the opposite perspective. If a bank starts offering more interest, then more people will be willing to "lend" to it, which means swapping their assets for the banks assets. Both lending and borrowing are asset swaps, which are ultimately unwound with a reverse swap, though not necessarily in the same quantities. If a swap and a reverse swap have different quantities involved, then one party comes out ahead in balance sheet terms.

When you borrow from the bank, that is not so much the bank temporarily giving you money and then asking for it back, but rather, the bank accepting money that you have issued, and giving you money that they issue. It's the same thing when you lend to the bank. You accept the bank's money (deposits), and give them something in return.

So whether a higher rate is expansionary or contractionary, depends on who is on what side of the transaction, and where you are trying to expand or contract. If a bank charges more interest, that contracts externally, but expands more internally, the bank will want to make more loans and close more deals.

Meanwhile, if the bank offers more interest, that is externally expansionary, as people will swap their assets for more bank money, but the bank itself, should be more careful about to whom and how it lends. If you are offering a higher rate you are gonna have to be more careful.

The myth of an independent central bank

Even if we were able to create an institutional structure where a bank established by a sovereign polity, acted with complete disregard for the sovereign's interests, without any political influence on their goals and means, even if that were the case, the effectiveness of the bank as an institution and financial system, would still be directly tied to the success or struggles of that sovereign polity.

So what a central bank does can never be separated from what people do who are the "money users" within its scope.

Anyway, we attempted to establish an independent central bank, by trying to pretend that the country in charge is merely a customer of that bank. So what happens is, when the central bank "charges" more interest, the sovereign country is inadvertently offering more interest. So it results in an expansionary change rather than a contraction, simply because we are trying to pretend that the sovereign is merely another customer or user of the bank.

This is a very simple yet not very well received idea, as it challenges the fundamental premise of central bank independence, as well as the notion of money as an object, rather than a relation or information. While checks and balances are important to an effective government, they work because we have shared interests, but distribute the burden of decision making. This system risks failing if we start behaving in a directly adversarial manner. As such there is no real public purpose served if the fed were to try to increase the treasury's debt through higher interest.

Furthermore, it is simple for people think of money as a thing, to objectify money, because a market system operates by us objectifying one another as either producers or consumers. To thus objectify the accounting token is very intuitive, and in limited cases even useful. It takes a high degree of awareness and insight to overcome this tendency and view money in terms of its relational impact and political origins. Most of the population in a country or polity is not directly involved in banking, finance, or political administation, and can be difficult to learn this indirectly through the media narratives or educational resources. It is important to accurately learn the both the history and modern operations of both the fed and the treasury, as they are important institutions we use to realize our political goals and organize our legal system.

And more importantly, they don't understand why taxes actually exist. It is both to transform mob instincts and tendencies into a more constructive way of creating external costs, which will actually make us all better off. But one thing the tax does not do, is fund public spending. Because we have this latent mob and a need for constant vigilance, we create projects of public service to redirect that energy, and hopefully expend some it as well. That's the only way we get along with each other.

Without a tax, it is true, the accounting of public service is a non-reciprocal obligation. But what people don't realize, is that we tax to limit ourselves and each other, not to create or allocate resources. Taxes are a way of creating external costs on individuals, to limit and constrain them and to redirect mob tendencies to creating positive constructive boundaries between each other.

So if we want to do more interesting projects and more beneficial things, we just spend the money so long as people will take it. If they won't, if they don't want to participate, then we are just creating our own limitations.

This leads to a very different analysis. If people are generally successful and doing cool things across the board, there is little reason to tax them, it is just a matter of convincing them that this public project is also a good idea. But if success is only enjoyed by a very few, if opportunity is limited by very expansive private property, then its time to tax more, to limit the influence and control that a small set of individuals can have.

In this sense, the tax actually becomes a form of liberation, for people who are oppressed by expansive and restrictive property rights. We need some boundaries to function, but this can go too far, people can claim too much, to the detriment of everyone else, and this needs some rebalancing way, and ideally non-disruptive way of being addressed. Taxation is that tool.

What we call a tax or a rent has no fundamental distinction, only a vague idea that tax is levied for public projects, while rents are a result of publicly granted property claims.

Part 1: Rate Disparity -- A novel framework for analysis of interest rate variation

Introduction

My goal in this effort is a very specific, to help take steps toward a new way of thinking about interest, which reconsiders how equilibriums emerge and what they represent. Given that a financial return represents a change in prices, you can either have a price equilibrium, or a return equilibrium, but not both. There is an inherent tension between the stability of prices and an equilibrium rate of return for financial assets. This relates specifically to the idea of relative value paths introduced earlier. Appreciation of one asset compared to another, means that any price equilibrium between them has shifted, and may be unstable or uncertain. This idea becomes very important when discussing commodity markets, and furthermore buffer stock policies(both public and private).

The origins of this new way of thinking about interest have a long and interesting history. Our story goes clear back to the origins of the Austrian School of economics, and authors such as Carl Menger. Before Menger, cost based theories of prices prevailed. It was assumed that prices reflected the underlying costs of production. Since Menger, Marginalism, a subjective theory of value, became the prevailing framework for understanding price. This is an important element to pricing, but we should be careful to not overdo it. Real world costs are still an important element to pricing, especially the long run trajectory of prices. It is important not to misinterpret or overstate the principles of marginalism and subjective value, by completely disregarding underlying costs of production.

Much later, Joseph Schumpeter was an important figure in shifting the way we think about economics today. While Schumpeter was an economist from Austria, he is not necessarily considered an "Austrian School" economist, although his doctoral advisor, Eugen von Böhm-Bawerk, definitely was.

Schumpeter himself, had a nuanced and complex perspective on the perennial topics of Capital, Socialism, and Democracy, as laid out in his book with that title.

Furthermore, one of Schumpeter's students was Hyman Minsky, who dedicated his work to studying financial instability in capitalist societies, and whose own student Randall Wray worked with Warren Mosler and Stephanie Kelton in developing what is known as "Modern Monetary Theory". William Mitchell is the other primary figure in MMT, bringing to the table experience with, and research on, simple buffer stock policies.

MMTers flip the logic of central banker's monetary "lender of last resort" on its head, with a proposed "Employer of Last Resort". The theory is in many respects rightfully controversial, but learning about MMT and its detractors has been a large part of my financial education.

As for myself, I was and currently am as of this writing, a Mathematics Undergraduate(UVU now, BYU previously). While I have done extensive coursework in both mathematics and computer science, I have only ever attended one or two lectures of an economics class. The professor talked about, how while in practice there may be more complex factors or regulations at play, the costs to rent or own housing should converge to an equilibrium.

Having taken courses in computational theory, mathematical optimization, and control/feedback, as well as having played excessive amounts of online strategy games like hearthstone or chess, I now have a slightly better idea of what is actually involved in discussing where "theory" and "practice" intersect. I hope you enjoy this book[let], and even if it does not succeed in any grand intellectual revolution, I believe it will be a worthwhile effort.

This Work Contains Errors

This work includes mistakes, including, but not limited to, typos, wording issues, and perhaps even flawed explanations. If you have any questions, feel free to ask twitter: "ratedisparity" is my current handle.

Why a new approach is needed

Economic vs. Financial Theory

One might be surprised to learn, that economic and financial theory are in fact quite distinct. For the most part, prevailing financial theory is valid, given the proper context for its assumptions(see Modern Portfolio Theory), but at the same time it is very limited, in that it focuses on how to trade assets profitably, but not much else about our political or ecological systems. On the other hand, economic theory is very different from financial theory, despite a certain amount of overlap(which is mostly time discounting). Macro-economic theory faces many challenges, but to simplify, we will focus on modelling.

Mathematical economic models almost never achieve realism, in that they match the world in terms of scale and complexity, but they are potentially relevant, in that they demonstrate real and plausible dynamics in a robust way, including by describing when and how they fail. Note that model realism is a different matter from accuracy, in that an accurate model should reflect the actual state of the world, while a model which achieves *realism*, as I am using that term, only needs to match in terms of scale and complexity. For example, a painting might look "realistic", even if it does not correspond to any real place, if the patterns are convincing to us, similar to the "real" world, given our experiences. Most macroeconomic models should not even attempt accuracy or realism, as it is generally intractable to achieve either. Instead, these models should strive for relevance. This means that the model represents dynamics that actually happen, even if it lacks details that make it unusable for any kind of predictive forecasting or historical fitting. The goal of such a model is not to fit the real world, but to provide a simplified example that can help us practice our reasoning and train our intuitions. Relevant mathematical modeling should be the focus of a sound economic model, and not realistic models.

However, under very strict behavioral constraints or strong assumptions, it is possible to achieve model realism. Perhaps the best potential example is traffic control. Individuals navigating traffic behave in generally straight- forward ways(there are limited decisions), and it is possible to accurately match real world behavior to a specific model.

But this realism is only possible because we are only concerned with a very limited amount of information about an individual's behavior, that being, how they move through space over time, and we do not analyze much else about the why or how. Furthermore, realistic traffic modeling requires not that the model be restricted, but that people's real world behavior is restricted in practice. This may or may not continue to hold over time.

But in most domains, it is not possible to achieve model realism, or really anything close to that, for large scale economic models. This is especially true if you are trying to model accounting variables,

which are created to represent our impact on the infinitely complex and vast physical world. It is simply not credible to claim model realism, if you don't also model the physical world we live in. Most economic models, concerned principally with accounting variables, are of limited inferential use and require strong assumptions.

The problem with attempted empirical science using accounting variables

Accounting variables are any representations we create to reflect the state of the world, for the purpose of some social goal or activity. The problem with trying to run statistics and derive empirical laws over accounting variables, is that for the most part, accounting variables are simply our best representations of a subjective, contextual assessment of our world. This means that these representations are constantly getting changed and updated, as we learn more about the world. This is not only an issue in how we measure accounting variables, but in many cases, even their underlying semantics can change over time.

This is especially true of variables such as prices, gdp, interest rates, income, wealth, and the distributions of these variables.

Note that it is still important to observe and analyze these variables and their relationships, but this should be more about *debugging* rather than scientific inference. Debugging is assessing and maintaining the integrity of an engineered system, while science is observations of the natural world and what is possible. Debugging specifically requires a prescribed goal or mode of operation, while science is descriptive.

What we can do with accounting variables is audit them, to ensure their integrity and usefulness.

Units of Growth and Survival

Growth and survival are very different issues, which often require polar opposite adaptations or strategies. Growth and survival are the two defining obstacles of the evolution of dynamic biological and social ecosystems. The rate disparity approach, focuses on analyzing "units of growth", in the context of these two environmental phenomenon: growth and survival. This requires analyzing two basic perspectives: what defines entities internally, and their strategies for navigating their external environment. It is not that analysis using these unit boundaries is a new or unique practice, quite the contrary, that is the way we talk about the world both intuitively and quantitatively. But conventional interest rate theory(discounting) typically focuses on only one level of these boundaries, not a messy hierarchy of entities, with overlap and ambiguity.

A unit of growth could be an individual organism, or it could be a group of organisms, or it could be a social group(a social group may be something individuals participate in part time, and so what that individual does outside of the group context may not be relevant). Such social groups could be governments, the populace of a political unit, religions, clubs, communities of shared interest and more. They do not have to be financial, although financial entities like firms and institutions definitely qualify as entities to analyze using this approach. It is important that the focus be on analyzing group dynamics, and not merely the behavioral response of individuals to such group settings, as any degree of uncertainty between levels or resolution of system representation, makes it impossible to build up the group dynamics from individual behavioral representations alone. This is the "composition problem", and is a major issue in mathematical analysis as well as subjective analysis. There is enough that is unknown and not measured, that it is the most accurate representation requires analyzing both individuals and higher level dynamics, and not simply inferring the high level dynamics from a description of decomposed units. Social behaviors must be analyzed in context, with high level outcomes being analyzed directly.

This analysis can and should be descriptive. In other words, it should not be about describing the *merits* of a group's social norms, but what makes them *unique* from other social groups in their observed attributes and behavior. Some of this can be studied formally and quantitatively, while some may require subjective descriptions, that is the nature of this level of analysis, which is about social perception itself.

Because of the inherently subjective nature of describing group dynamics and social elements, such analysis should never be taken as final or definitive, but should be backed up with specific examples in context. For example, if one wishes to study interest in different musical groups, you might take survey's about elements of the music that appeal to listeners.

Thus there is an aspect of formally documenting subjective experiences and relationships, using subjective concepts and ideas. A phrase of music might be called warm or inviting by listeners, which is difficult or impossible to map to scientific concepts. But this documentation, while it could be abused to degrade the quality of science and analysis, should be viewed as a way to delineate the boundary between subjective experiences and relationships(which may have an underlying physical reality, but which is intractible to analyze), and objective high level external analysis of the social dynamics thus created.

In this sense, analyzing units of growth should integrate, rather than alienate, social science and anthropology.

Fewer Special Cases

It is not that the conventional way interest is described in finance is wrong, or not useful, but rather that ends up leading to a number of special cases. In most cases, these anomalies are called risk, or friction. If you are unsure of what a return will be, that is a risk. In some cases, risk or uncertainty can be measured based on historical outcomes, in other cases, they cannot, and the difference is not always clear. The other common exception to the rule is friction. Frictions are anything that prevent a market from behaving like a market. You know, things like human bias or geographical distance. My contention is, that with a different conceptual starting point, these special cases, can and should be viewed as the norm, and not the exception, and while the conventional analysis is valid, that it often is limiting. Specifically, social and geographic boundaries create self-contained *units of growth* where growth and rates of discounting will vary more across unit types and size, than across time.

Better Clarification of Basic Rate Arithmetic

Additionally, there are some cases where the conventional view of interest rates poorly presents, I would argue, some of the basic financial logic of interest rates. In this case, I am using the phrase financial *logic* to distinguish this from market dynamics, which can be complex and unpredictable. Regardless of how markets or individuals respond, there are certain relations that hold, specifically with regards to the fisher equation and the term structure of prices(futures markets as discussed in keynes' General Theory Chapter 17).

Selling future money at a discount, ie a higher rate of interest, is in itself, a form of relative devaluation of money, compared to the securities to which that rate applies. This is true regardless of the path of CPI indexes or exchange rates. A yield on bonds *is* the relative devaluation of cash, compared to those bonds as financial assets. In this sense, a real rate, may be viewed as merely another example of arbitrage, although it is limited by initial capital and the lack of time travel technology, rather than merely the market capacity to fulfill profitable trades.

Such basic arithmetic facts are not presented clearly or directly in the conventional story of interest rate dynamics. At best, they are acknowledged in a cursory fashion by discussion of fisher equation or neofisherism. Importantly, the assertion that a higher interest rate is a relative devaluation of cash is not dependent on any other empirical outcomes and should be acknowledged early in any credible discussion of interest rates dynamics. Once this fact is acknowledged, it frames the rest of the interest rate analysis. If elevated nominal or real rates are expected to reduce inflation, it must act through some effect compared to a counterfactual scenario. The research on this can easily be questioned, given that rates are purported to act with long time lags. Furthermore a lot of adjustment to models and analysis is often made to account for the so called "price puzzle", when a higher rate

corresponding with more inflation should not be considered surprising, given the arithmetic described here. On the other hand, there are many clear and plausible mechanisms by which conventional practice of rate increases might achieve their intended purpose.

It is completely plausible for elevated interest rates to stabilize inflation, Although, importantly, "stabilize" is not the same thing as "reduce". In some cases, an elevated, but predictable rate of inflation, may be more desirable that a lower, yet unpredictable rate of inflation. The section in this work on the three types of inflation "demand pull, cost push, and price drift" should help to clarify why that is the case.

A very different possible dynamic is that elevated rates and duration shocks erode private sector balance sheets, especially bank balance sheets, leading to recession. Because recessions are typically both contractionary and deflationary, inflation can be reduced. Compared to using rate increases as a way to continuously and smoothly devalue a currency, so as to smooth over underlying volatility like a shock absorber, this effect relies a completely polar opposite dynamic. Whereas inflation smoothing relies on making markets more predictable and smoother, monetary shocks rely on uncertainty and instability to force the market itself into a more conservative position. This is not unlike nudging a friend a little bit when they are standing too close to a pile of dog excrement, so they back off and keep their distance from the fecal hazard. Another example would be the counterintuitive practice of counter-steering a bicycle or motorcycle, requiring the operator to first steer left to turn right, so that they start falling in the direction of the turn. Astrom and Murray's classic text on control thoroughly acknowledges how control systems exhibit many counterintuitive and complex effects, making simple reasoning about the pieces independently difficult. I highly recommend that anyone "interested" in this topic, gain as much background in control theory and feedback, as they can.

The Case For Logarithmic Growth

Conventional interest rate theory implicitly assumes exponential growth curves. In many contexts an "S curve", where a variable transitions from an exponential to an asymptotic trajectory, is a better model of the behavior of many systems, as it integrates both growth patterns and systemic limitations.

A logarithmic growth pattern differs from a typical "S-curve", in that a logarithm represents a continual increase, but at a constantly decreasing rate. The derivative of the logarithmic function is simple 1 over x, or conversely, the log function is the integral of 1 over x.

Logarithms are a good model for processes where continual increase is possible, but also increasingly difficult. I would argue that this fits the economy very well. Asset prices often follow exponential paths based on network adoption, but then when the network becomes saturated, it must then grow the underlying network, which is a process with a different trajectory.

Summary

In summary, "rate disparity" is a novel synthesis of well established ecological and social principles. It is largely compatible with prevailing financial theory(but not necessarily economic theory), such as modern portfolio theory, but seeks to extend these principles in a robust and rigorous way.

The rate disparity approach is intended to be equally suited for both economic and financial analysis, and where it may differ in its conclusions, it is able to more directly anticipate certain anomalous results. The conventional approach might still work, but require a great deal more detailed analysis to get within the same ballpark of accuracy(balance sheet analysis, asset appraisal, empirical testing, etc).

The rate disparity approach recognizes why natural social, financial, or economic boundaries arise, which result in a variation of interest rates. Trust and informational and social boundaries create social and ecological units, where rates of growth and discounting will vary more across the types of these units, than across time.

We will begin, by discussing what should be less controversial, albeit sometimes counter-intuitive claims, along the lines of Sargeant and Wallace's well received paper "Some unpleasant monetarist artithmetic", after that we move on to what may be considered more contentious topics, but I still try to present these ideas from common foundation of shared assumptions. Towards the end I present what I consider to be relatively new and/or unique ideas, although in economics and finance, there have been many profilic authors over hundreds of years, so it is hard to come up with a completely new idea.

Recommended Readings

- **George Selgin** *The Menace of Fiscal QE*
- **Marianna Mazzucato** *The Value of Everything*
- **Stephanie Kelton** *Deficit Myth*
- **Joseph Schumpeter** *Capitalism, Socialism, and Democracy*

- **John Maynard Keynes** *General Theory of Employment, Interest, and Money*
- **Warren Mosler** *The Seven Deadly Innocent Frauds of Economic Policy*
- **Perry Mehrling** *The New Lombard Street*
- **Cullen Roche** *Pragmatic Capitalism*
- **John Cochrane** *The Fiscal Theory of the Price Level*
- **Brian Romanchuk** *Understanding Government Finance*

Recommended Academic Papers

- **Sargent and Wallace** "Some Unpleasant Monetarist Arithmetic"
- **Goodfriend and King** "The Incredible Volcker Disinflation"
- **Sam Levey** "Modelling Monopoly Money: Government as the Source of the Price Level and Unemployment"
- **Romer and Romer** "A New Measure of Monetary Policy Shocks: Derivation and Implications"
- **Marc Lavoie** "Endogenous Money in a Coherent Stock-Flow Consistent Framework"

Technical Background

Much of this approach is inspired by my experience and training in mathematics and computer science. An understanding of feedback and control theory, mathematical optimization such as linear programming or convex optimization, theory of computation, algorithms, and dynamical systems, is very beneficial for understanding how the economic system functions from a technical perspective. While I did not complete an undergraduate degree, due to personal circumstances and other university challenges, I did successfully complete coursework in all these topics, and such technical training can serve as a good background or foundation. This is not to say, that mathematics or computer science alone can replace education or training specifically on economic or financial issues. Similarly, other technical fields can provide a good foundation, especially if these mathematical topics are applied to those disciplines.

While mathematical training and proficiency is essential for those who wish to contribute to the technical side of economic analysis, a great deal can be learned and understood with a limited mathematical toolset. Accounting utilizes primarily addition and subtraction; calculus, commonly taught in high schools, is the mathematics describing infinitesimal and continuous changes in quantities. With accounting math and introductory calculus only, a great deal can be understood

about economics and finance. The nature of mathematics is that generally, there is always more to learn, and for most us, there will be always individuals who are more proficient and advanced in their mathematical mastery.

The good news is, that while this mathematical training was important in motivating me to develop a new perspective on interest rate variation, that the ideas themselves should be accessible even with only the basic mathematical knowledge described. If you understand how speed, acceleration, and distance are related, then that should be a sufficient mathematical level of knowledge for most of this analysis. Furthermore, the mathematics I cover in this technical sections is intended to be accessible and teach people common and uncontroversial mathematical principles relevant to economic analysis.

Aside from the this section on technical material and mathematics, the rest of this book intentionally avoids such mathematics, presenting ideas and concepts in the most basic comparative fashion. This does not mean that further mathematical techniques cannot be developed. Indeed it is very useful to transform concepts and relationships into specific formal mathematical representations. This often allows for clearer communication, more rigorous thinking, and accurate and precise quantitative applications of more general concepts.

But such mathematical work is optional. I do not have the time or resources to invest in the level of technical research and academic publication one might want to see on these issues, I hope to move the technical side of things in the right direction, but this section is far from a fully developed research program, that should be expected to conclusively move the needle on such important policy issues.

More than anything, I would argue that experience and competence in mathematical and scientific topics is instructive about the limitations of these tools, and any more general philosophical limitations of knowledge and epistemology. Many unexpected mathematical and logic results, like Goedel's incompleteness theorem, the halting problem or related entscheidungsproblem, Modeling challenges related to chaos theory as demonstrated by the three body problem or lorenz systems, are all examples how the initial ambitions of mathematicians and philosophers resulted in discoveries of how, in some cases, knowledge and abstract representations, can be inherently limited. In other cases, mathematical problem can remain unsolved for decades or centuries after they are first articulated. This indicates that these pursuits are both extremely difficult, but they have value and progress with concrete answers can be made.

Technical Notes, Basic Simulations and Models, and Research Ideas

Technical Notes

These are well known and established mathematical principles which I attempt to make accessible. The goal is to teach the mathematics, in an accessible and rigorous way.

- r_total (https://codepen.io/math3737/full/VwdZzqm) : computing cumulative geometric growth from a continuously variable rate function

Basic Simulations and Models

- Martingale Betting Simulator (https://codepen.io/math3737/full/ZEmYBOL)

Research Ideas

- ABC Price Anchor Model (https://drive.google.com/file/d/1afce3hvES6yEjirWBPdgXs-t7t8WvfOO/view?usp=drive_link)

TODO: Planned Technical Notes and research ideas

- Multiple Ways to derive the exponential function, including using compounding interest
- Modern Portfolio theory: Quantifying Asset Performance Using Practical, but not Universally Valid Assumptions
- k-percent debt model
- reserve commodity price anchor model
- exchange commodity price anchor model
- gambling and the half-life of deficient investment strategies
- St Petersburg paradox: Expected values versus contingency or probability trees.
- Doubling Down and Divergent Outcomes: Double or nothing bets in investing are common and go well beyond the sunk cost fallacy.

Part 3: SOOMF (Some Observations On Modern Finance)

Bonds: A self imposed interest cost

What must be understood about raising interest rates, is that in modern floating exchange fiat systems, countries raise interest rates on themselves. The rate setting set by a nation's central bank, is what their own treasury must pay on private savings of the country's debt. It is both an incentive to the holder and a *nominal cost* to the issuer(compared to private parties holding cash). For currency

unions, central banks similarly play a role in managing the rate and convertibility of member countries' debts.

The practice of using interest rates to manage the price level goes back to the gold standard.

Please see this article from the federal reserve website: "Historical Approaches to Monetary Policy" https://www.federalreserve.gov/monetarypolicy/historical-approaches-to-monetary-policy.htm

Also, Perry Mehrling has a great online course for understanding the foundations of banking and modern finance.

https://www.youtube.com/watch?v=7iu5xWByF5g

https://www.coursera.org/instructor/~3149120

Inflation

Demand-Pull, Cost-Push, and Price Drift

It is possible to categorize inflation into one of three basic types. Which one applies depends on how you determine how consumption has changed during the inflationary episode, compared to a historical or expected trend. Many economic issues like this, technically rely on what is called a *counterfactual* which is a hypothetical alternative timeline under some alternative treatment.

Controlling and accounting for such counterfactuals through experimentation is the basic premise of science.

If total consumption increases over the historical pattern, then you can classify this as demand-pull inflation, if it is reduced, then it can be classified as cost push. If the historical pattern of consumption and production is unchanged, then you simply have price drift.

To understand price-drift, it is beneficial to look at wealth and purchasing power, and prices from a balance sheet view. When all prices and all balance sheet positions change by a constant factor, without any change to the real world, that is an example of price drift.

For the most part, interest rate increases, ie, a central bank indirectly increasing the nominal yields of treasury bonds, has the potential to transform either type of inflation into a price drift inflation, through the duration shocks that continuously devalue cash relative to bonds and treasury securities, and cause a one time penalty to the present value of outstanding treasury securities(although their full nominal value is still realized at maturity), when the rate of discounting

is increased. Price drift is comparable to a stock split, in that it is a modification to the unit of account, rather than a change in relative accounting positions or relative prices. The principal difference is that a stock split is a discrete event occurring at one fixed point in time, while price drift can happen continuously and gradually over time. But both accounting phenomenon affect the unit of account rather than relative balance sheets and relative prices.

In this sense, not all inflation is inherently problematic. Price drift may be annoying and induce a sense of economic nostalgia, but it tends to not be inherently harmful or beneficial to any particular parties.

Three General Ways to Measure Inflation

There are many different ways people describe and measure inflation. But all measurements require something to compare against. Two of these potential measurements are common, while the third may be more controversial

1. Currency to Commodity: CPI indexes or commodity based money
2. Currency to Currency: Exchange rate change over time or pegged currency
3. Currency to Itself: The rate of discounting guaranteed by the currency issuer.

In the conventional practice of monetarist rate increases, when policy rates are increased, currency issuers indirectly end up guaranteeing a higher discount rate: the return on treasury securities.

It is possible or even likely that these nominal rate increases lead to a higher real return on treasury securities, making bonds issued at this higher rate more attractive to traders and investors.

However, all that the issuer can directly control, is the relative yield between cash and treasury securities. If the yield on treasury increases, then in relative terms cash loses value.

Instead of using an inflation metric to measure a real yield, we can ignore the arbitrage opportunity or "time value of money", and consider the interest rate a direct exchange rate between money now and money later.

If it is possible for the treasury to achieve a given real yield on treasuries, over the long run, there is no reason why they could not achieve a comparable deflation of cash, if the debt were entirely monetized, or a permanent zero interest rate was enacted.

It is helpful to think of this in terms of the following question: "Who pays the costs of a real yield?" In other words, when treasury securities offer a real yield, who is losing in relative terms. Aside from the

one time duration response, holders of cash stand to lose in real terms if the rate of inflation increases in response to the elevated nominal rate.

The basic thesis of the rate disparity approach is that real yields do not change as much over time, as they change over space(incidentally, modern inflation happens more over space as well, through cost of living differences and purchasing power [dis-]parity)

Offering real yields is a cost that must be paid for through a decreased relative share of wealth to some other party. And typically that party is currency holders, whether they hold it directly or merely contracts denominated in that currency.

Yield Curves

Yield curves reflect at least two different kinds of information:

1. The anticipation of future interest rate policy settings
2. A premium for longer term securities

Note that even securities with far future maturities may trade very actively, and thus be considered highly "liquid". Yields of many assets may also reflect risk expectations, but this may be difficult to assess, or in some cases, not applicable. For fiat in particular, if the risk of convertibility into cash eliminated, then devaluation is possible, but not default.

Temporal Exchange Rates

Interest serves as an exchange rate between money now and money later. This is not simply an expression of time preference, as a debt to pay money, can potentially circulate in markets themselves, or even be used as a payment instrument! As we describe with treasury bonds, they can almost be viewed as merely a different form of money, or nominal purchasing power in a unit of account, which is anchored to their date of maturity, rather than having a specific denomination today.

A temporal exchange rate allows for two things:

1. For traders to speculate on real rates.
2. To devalue the currency in relative terms by offering a nominal yield.

The Most Valuable Traded Asset Likely Yields The Discount

Rate

In this sense, we are talking about the rate of discounting used for present value calculations(not the discount window rate). The discount rate is the assumed return that is possible for investors, when adjusted for risk. The discount rate could be denominated in any unit of account, whether that is dollars, commodities like gold, silver, or food, or financial assets like bonds.

If there is a uniform discount rate possible for any size of principle, then it is highly probable that the most valuable asset will have that discounting rate. This means that describing the discount rate in terms of the most valuable asset, will be very close to zero.

With enough financial uncertainty large and relatively stable assets tend to set the rate of discounting, rather than the rate of discounting determining the valuation of those assets. In an uncertain financial environment, it is increasingly more difficult for rates and returns to be compared and compete directly.

Most People Care About Wages, Not Financial Returns

As is stated subsequently, a return is an asset which is more valuable in the future than it is today. For the vast majority of people in modern society, the value they attain from their labor, is more important to their decision making and financial outlook. In other words, the discounting horizon is relatively short. It can be difficult to effectively correspond the alternative views of value expressed by labor and capital.

If, for example, you look not at the distribution of people, but the distribution of capital, suddenly rates of return become very important to achieving the most value. The question is, are these perspectives equivalent, that is, "Is the optimal allocation of labor time and the optimal allocation of capital the same problem, with necessarily the same solution, given proper analysis?"

If the issue is merely maximizing the total wealth in the system, then yes, these two questions will have the same answer. But for most people, the distribution of wealth is more important, and thus their interests are often focused on increasing their relative share of wealth, rather than increasing total wealth. Indeed, the things that generate a return on financial capital are often precisely the things that create costs for the rest of the world, in other words: rents. It would be nice to be able to talk about this issue from entirely a theoretical or mathematical perspective, devoid of political contentions but I question whether that is possible. You cannot discuss relative allocation of costs

and income without discussing the politics of what has historically been called "rent" and "rent seeking".

Nevertheless, I wish to keep this discussion brief, acknowledging it is a real issue that requires continual attention, but this book is not about giving definitive answers to these contentious political topics. But it must be acknowledged they are real and important.

Survival, or Post-hoc Rates, Affects Future Rate Strategies, in a Fractal Learning Pattern

Much of the conventional economic theory of interest rates focuses on expected rates of inflation or expected returns. While that helps describe how the market is behaving today looking forward, the current prevailing strategies and expectations may not accurately reflect how things will evolve moving forward. When things fail, that may either be due to new and unique circumstances, or repeated circumstances from the past. Learning is the practice of evaluating historical information and experience, with the goal of eliminating repeatable failures, using new adaptations or strategies. Thus the lifecycle length of an entity, is important in their expected rate of return.

If one is merely looking at the discounted prices of assets, compared to other assets in the present market, then both mark to market wealth and price sensitivity(what would happen if you actually tried to sell all of an asset) will affect any rate of asset discounting. But once the market goes through a survival filter, the discounting of assets can be adjusted significantly. Entities with long lifecycles will use a longer horizon for their training information, which may possible be well suited to analyze a longer future discounting horizon. Entities with short lifecycles may be better suited to analyze short term trends, if their learning information primarily integrates that short term history.

This creates a fractal structure of learning horizons and varied discounting rates which is reflected by the population and diversity of living entities in an ecosystem.

The basic reason why post-hoc rates matter more, is because they assess who has survived from the last generation into this one! Expected rates quickly become irrelevant when the expectations of the past are destroyed, and a new set of survivors determine the future.

Post-hoc rates determine who has the means to continue investing in the future.t

Yields cannot be assumed to be uniform for widely variable principle amounts

The ephemeral nature of wealth and value, dictates that yields will always be highly sensitive to the amount of your principle. Indeed. the challenge of wealth management, is a storage problem: "can we anticipate and meet our future needs?"

It does not seem appropriate, to compare yields on multi-billion dollar projects, with yields on $10k being invested at a time, when the more wealth you are trying to store, the further into the future it must last. This is because both absolute and relative yields matter. An absolute yield is simply subtracting the final value of a portfolio from the value of the principle.

The need for more overhead on large projects and large portfolios, makes any direct comparison of yields unreasonable. This is also true of living organisms, larger organisms tend to grow more slowly and have a longer reproductive lifecycle period(doubling time).

Wealth Storage and Marginal Returns (plus time horizons)

Simplified models, even if unrealistic, can provide insight and help us learn principles. It is possible to describe the premise of investment, saving, and financial returns, (ie interest rates) even in the context of lone person stranded on a deserted island. A yield is simply an asset which is more valuable in the future, than it is today. In the context of individual use value, this issue collides with marginal utility and indifference curves.

As you accumulate more wealth, you have to anticipate a longer time horizon. You will likely become increasing willing to stack assets with smaller returns. Such is the dilemma of "free time". Thus the greater total wealth, the smaller marginal returns tend to be. Storage costs similarly scale with total wealth, reinforcing the inverse relationship between total wealth and returns or rates.

Far future discounting is difficult, and more difficult for some assets than others

When you play chess, there is a knowledge horizon, beyond which it becomes very difficult to analyze the minimax tree of potential outcomes. The world of finance is no different. The further into the future you are trying to store wealth, the more difficult it is to anticipate what and how you should store it.

While this is true for all assets, it is more true of some assets than others. Stocks and industrial commodities are difficult to predict over long time horizons. But some assets tend to be more predictable. In particular, treasury bonds and fiat currency, which can be described as "tax credit

accounts", may present long term stability, due to the longer lifecycles of countries and the certainty of the need to pay taxes.

The simple nature of wealth, means that the more you have stacked, the longer the relevant time horizon. This tends to push people into long term stable assets, like treasury bonds(tax credits).

In general, wealthier people tend to also favor assets they can influence or control, for this reason as well.

Prices And Yields are Relative

Inherently, any yield is the relative devaluation of the currency or unit of account. If a bond yields 10%, that means the currency depreciates 10%, compared to the bond.

Bond Yield Targeting

Instead of using interest rates to try to control the change in value of a currency, it makes more sense to try to control the CPI adjusted yields of treasury bonds. This is best when allowed to float within a range.

While some experimentation may be needed to determine the best yield ranges, one could start with +3%/-2%. If inflation adjusted yields of tsy bonds drop below -2%, then rates can be increased. If these yields rise above 3%, then rates can be lowered.

For more persistent inflation(over 3-4 years), the range may need to be relaxed, with a larger potential upside or downside, for example, +5%/-3%,

Why Inflation Adjusted Securities are Unstable

Inflation adjusted financial assets have the same issue as fixed exchange or pegged currencies. Instead of graceful/gradual failure like equity, it makes the system unstable. A peg is essentially, a commitment for a currency issuer to not profit from any price fluctuations, allowing users to always redeem a currency at a predefined price, against another asset or commodity. While such guarantees can be a foundation for financial stability, throughout the rest of the financial system, it does end up being more costly and unpredictable for the currency issuer, especially when a peg is tied to a single commodity(gold), or an asset outside their control(dollar pegs). When this foundation fails, it does so all at once.

Price flexibility, especially an issuer redeeming a currency at a lower price point than it was issued, while it means that currency users and contract holders, may take losses in the short term, it allows the entire system to potentially be more resilient against total failure, provided the issuer manages the price level effectively, balancing their costs against user losses and the total stability and resilience of the system.

Like a bungee or trampoline, the further the price can change without compromising the fundamental integrity of the system, the less stress the system will take all at once, and still exhibit the ability to recover, or at least stabilize at a new price level, comparable to the conventional idea of a "soft landing".

Adjusting rates upward to delay inflation, to stretch it out over a longer time frame, is a reasonable monetarist practice, however, as discussed, targeting inflation, instead of the real yield, also creates instability. If the policy rate is elevated, then bonds can achieve a positive real yield, even with a high rate of inflation. For example, if the policy rate is 8%, and inflation is 7%, then bonds have a real yield of 1%, which could be considered acceptable. If inflation unexpectedly falls, then the real yield could be as high as 8%, if inflation falls to 0.

Counter-Cyclical Fiscal Space, and a k-percent debt model

Introduction

Milton Friedman proposed a k-percent rule, to control the expansion of the money supply at a constant rate. While monetarism was a theoretical failure, Friedman's k-percent idea can be modified to apply to fiscal programs, as a potential compromise, to balance fiscal and monetary control of inflation.

A k-percent debt rule would limit the nominal increase in public debt by *k-percent* each year, absent special conditions (if a employer of last resort buffer stock policy were implemented, it might be exempted from this limit and subject to other limitations). This means that under normal conditions, if a fiscal authority wants to spend more, they must either justify an exemption, or pursue a degree of deflation, to allow the real budget expansion to fit within the nominal budget constraint. In my opinion, this would be much better than proposals like nominal GDP targeting, and is based on a much more financially realistic theory, compared to John Cochrane's debt valuation equation, where the present value of future primary surpluses(excluding interest payments) is conjectured to determine the market valuation of the debt.

In a k-percent fiscal framework, regardless of how the market values the debt, a higher real valuation facilitates more real fiscal space.

The Monetarist Era and Its Mixed Result (1971-2001)

The general economic and social success of the monetarist era in the US, is sharply contrasted with the specific failure of monetarist theory to anticipate and accurately describe inflation. Milton Friedman, as a leading proponent of monetarism, thought that regulating the money supply was the most important and effective way to control the rate of inflation.

Despite the failure of this theory in its analysis, the U.S. and other developed countries generally did very well financially, socially, and economically in this era. For one thing, the monetarist era oversaw the economic explosion of information tech, a transition from the telephone to the internet, paving the way for further innovations like smartphones and social media. Many business efficiencies can be gained from these technologies, as well as creating new opportunities for manufacturing and production of new technology.

To what degree the monetarist framework helped or influenced this can be debated, and certainly proponents may be inclined to overstate the impact of these policies. But despite its theoretical and empirical failure, monetarism is good for at least one thing: to allow the financial sector independence, autonomy, and great deal of influence.

The societal dominance of finance has many negatives, but it is at least good for the main thing many economists advocate: economic growth through financial investment in technology and commercial development. What it is not good at, is controlling the business cycle and preventing financial instability, recessions, and general social harm from artificial scarcity.

I would argue that it is not necessarily a bad thing that this monetarist philosophy dominated this era of history, except to the extent that it marginalized social issues, which helped create many of the modern social problems we see today. These issues go beyond a mere inequality of status, position, and financial means, and have lead to a society that looks very different day to day, for different people. Despite this, things have been improving steadily. While public investment in good jobs has been deficient, the issues of widespread unemployment and bottom-up labor precarity have improved significantly. This does not mean that the lower social tiers are not still very precarious in other ways, such as in terms of financial savings and access to healthcare, but at the least, availability of entry level and basic employment has improved.

I think this is how the labor market should be. Any precarity and volatility should affect the top of the market first, and the bottom of the market last. Moreover, entry level and basic employment should

be widely and readily available(for example MMT advocates for a job guarantee). In this regard, this narrow aspect of the labor market has improved significantly.

A k-percent debt rule would facilitate counter-cyclical fiscal action

Conventional wisdom would dictate that countries with low debts can spend more money, and countries with high debts can spend less. However this conventional wisdom runs counter to basic financial strategy. A private company, for example, will want to raise more capital when their share price and total valuation is high, and limit share issue when they have a low share price, to prevent further devaluation. Strong currencies and high debt levels are often associated, because when currencies inflate, the associated debt shrinks, and such countries have difficulty issuing more debt.

A great example or model of this, would be a modification of Milton Friedman's famous "k-percent" rule. Milton Friedman suggested increasing the money supply by a fixed "k-percent" each year. I argue that in many cases, national debts are a more indicative measure of the amount of currency issued, rather than monetary aggregates, like M1, M2, and others. Monetary aggregates include different kinds of currency denominated assets issued by diverse financial institutions, whereas national debts are currency denominated assets issued exclusively by the associated sovereign country.

It can be contended that the aggregate valuation of national debts, and the unit valuation of currency, is inherently linked. Thus, debt valuation may be a better indication of financial outlook, than conventional monetary aggregates.

Limiting fiscal deficits to k-percent of outstanding debt, means that countries can spend MORE, when the value of their currency and debts are high.

This also naturally leads countries and sovereign governments to perform a much needed counter-cyclical financial role. When the rest of the market does poorly, the relative value of currency and public debt increases in proportion, leading to more fiscal space.

Compared to a more conventional debt metric, such as managing Debt-to-GDP ratios, a k-percent debt rule facilitates counter-cyclical spending: spending more when the rest of the economy does poorly, and less in relative terms when the private sector is strong, which allows fiscal spending to play a stabilizing role against market fluctuations and volatility.

Duration: Mechanical Effects of Temporally Anchored Money

When you purchase a security, you are buying a temporal monetary anchor. It pays out a specific amount of money at a specific date.

Duration is the well understood phenomenon of how an asset price changes in response to a change in the discount rate. There are many conventional sources that accurately describe how duration works.

However, duration shocks in response to a rate increase, as a reduction in the present value of an asset or security, are generally presented as disinflationary. I think this framing is a mistake, because such securities represent a fixed amount of future money, and an increase in the discount rate, represents relative devaluation of future money, regardless of the path of CPI inflation measured with price indexes.

In other words, a duration shock, reducing the present value of "future money" is a form of relative inflation, compatible with an upward term structure of prices or futures market(see keynes general theory chapter 17)

Entities that don't issue Equity

Equity is a flexible, but costly financing tool. It is flexible in the sense that its value adjusts dynamically, and cannot create insolvency. It is costly in the sense that equity holders retain all the residual value, there is an unlimited upside for equity holders. In financial terms, the returns or success of one party are necessarily a relative cost or reduced share to others, given the same real outcomes. Financial returns are typically justified by their recipients creating a better "counterfactual timeline", as we have discussed, but that may not always be the case. While proactive measures can help the different participants in a business to benefit comparably from business success, the design of equity makes the shareholder profit the lowest priority in disbursing payouts in the short term, but the highest priority in terms of decision making and future gains.

Equity benefits are paid out after all debts, which include wages and other obligations, thus in a procedural sense, equity claims have the lowest priority. But in terms of governance and decision making, equity claims are treated as the highest priorities.

There are many financial entities that don't issue equity shares. For many of these, the reason is simply size and complexity. Many small owner run businesses or partnerships cannot meet the requirements of publicly traded companies, and therefore miss out on the benefits and flexibility of equity financing.

However, democratic institutions generally avoid equity issue for an entirely different reason. They may have the size and complexity to manage and issue these financial instruments, but equity issue is generally viewed as incompatible with their governance and purpose, if not an overt form of corruption.

Equity and debt are complementary financial tools, and for firms, a combination of both can often give them a much better toolkit for meeting their financing needs. While democratic entities avoid equity, they are not simply issuing bonds into an institutional vacuum filled with private investors. Democratic entities have direct political or civic relationships with currency issuing central banks, and while neutrality is an explicit goal of most banking systems, such institutional relationships do shape the financial space and potential for these democratic institutions.

For a country with a central bank operating under its umbrella, currency and bond issue can be seen as a similarly potent combination, having many of the benefits of equity issue, although with some important distinctions.

Debt Valuation

Money without debt has no fundamental value or cost, so the price level is arbitrary.

But once you attach debt to money, then the price level determines the valuation of said debt.

The rise of cryptocurrencies has led to a common appreciation of the aggregate valuation of currencies, expressly calling this valuation a "marketcap" or "market capitalization", There is a well known website https://coinmarketcap.com which uses this to track performance and dominance of cryptocurrencies.

But suppose we wanted to create a website titled "fiatmarketcaps"?

What measure would one use? The size of a central bank's balance sheet? Some other monetary aggregate?

There is a strong case to be made that in countries that issue a unique national currency, the national debt's valuation is the closest analogy to comparable ideas of a "coin market cap", or "fiat market cap".

Part 4: Does MMT Have Insights Into Price Changes?

Most discussions about modern monetary theory, among both supporters and detractors, involve either ontological issues: "What is money?", or operational issues: "Should we assume a

consolidated fed/treasury balance sheet in analyzing government finance?".

I wish to mostly avoid those discussions in this book, because they have been covered thoroughly elsewhere, and because the discussions often devolve into being unproductive. I will merely point out, that, in general, MMT views money ontologically as a tax credit, and operationally from a consolidated monetary/fiscal viewpoint. Certainly others authors have adopted these viewpoints for specific analysis, but MMT assumes this viewpoint from start to finish in a coherent framework. But it is not always clear when a supporter or detractor is arguing about the usefulness or limitations of these viewpoints, or rather, trying to argue about a more specific scenario using this framework. Thus such discussions frequently result in people talking past each other.

Instead, it is often more instructive to discuss the issue of price level determination, which is essentially the same issue as inflation, although from a slightly different perspective. Inflation measures the *change* in prices, while the price level describes the relative price structure at a given point in time. Focusing on this measurable issue, over the philosophical questions of ontology and operational viewpoint, generally leads to more productive discussions between opposing viewpoints. Once an argument about the price level is clarified, it is much easier to adjust to a different operational or ontological viewpoint, and accurate arguments can be made from any such philosophical viewpoint.

In my opinion, Warren Mosler, who worked in banking and finance over a long career, was able to bring forward a unique idea about how "the price level" is determined. Mosler's unique idea, known today in MMT discourse as "price anchoring" is not only a description of why prices change relative to currency value, but also a clear template or algorithm as to how to flexibly and dynamically "self balance", both the fiscal and monetary sides of money issuance. This happens by setting a fixed nominal bid for financial collateral or fiscal public services, and then allowing the market and private sector to determine how much money should be issued at that fixed bid. A Job Guarantee is an example of this, but so is a gold standard, which I explain in greater detail subsequently.

Importantly, it is essential to acknowledge what the price level even is. I think this is the root of much of the contention around discussions of inflation. The price level is merely a measurement of the market value of a currency, which we use to measure a currency, because everything else in an economy is generally measured using the currency itself. In this respect, the price level is a "measurement of the measurement", basically asking the question "who is watching the watchers". If people disagree with how we should measure the price level, that is a useful debate to be had, but to establish what the price level is-- at the very least-- allows us to discuss how and why it changes.

Mosler's principle idea is that a currency is like any monopoly. A common quoted phrase of Mosler's is "the currency is a public monopoly". Whether or not you consider modern fiat currencies to be a

public monopoly, they are certainly issued solely by the associated governments through the institutional structures prescribed, subject to strict enforcement against counterfeiting.

By calling fiat currencies a "public monopoly", we are making a stronger claim. That is, that the government is responsible to the general public for its use of the "monetary printing press", and that this powerful tool, which has the potential do good or ill by directing or misdirecting our accounting practices, should be used for things that benefit the general public. Some may assert that there are no accounting activities that can benefit the general public at large, that any attempt to bring projects under a common accounting umbrella will result in abuse, capture, or increased inefficiencies. My argument against that is very simple, as modern accounting practices have been developed, such as the use of fiat currencies, violence and conflict has decreased, and commerce and mutual collaboration has grown. Beyond the historical trend, which some may see as causal or instrumental, while other may see otherwise, it is hard to make arguments about the benefits or drawbacks of public accounting frameworks, and the role that formal governments and institutions can or should serve within such frameworks.

Thus that relatively inconspicuous phrase: "The currency is a simple public monopoly", actually encapsulates much of the contention and controversy surrounding modern currencies and finance, and its uses and abuses within society.

On the other hand, the possibility of a publicly issued currency, without a government, is of great interest to independent individualists, thus bitcoin and countless variations exist.

Whether tax credit status is critical to a publicly issued currency, is really an ontological question, and really, an experimental question where we are constantly going to discover and learn new things. As such that specific debate, about tax credits vs commodity credits, is outside the scope of my discussion of the price level. Now I will present specifically what Mosler intuited how currency value generally is determined. We will learn that this idea has many similarities to more traditional ideas like a gold standard, but has important subtle differences as well.

Price anchoring has a foundation in previously existing financial ideas, but extends them in an interesting and unique way. It is based on concepts like *financial collateral*, where a borrower uses an asset they own as a pledge to enforce a loan, and *reserves*, where an an asset issuer uses another asset to "defend" their issued asset. These concepts are long established and well understood ideas in finance, but price anchoring offers a new perspective on what role they play in modern financial systems, and how this knowledge might be taken advantage of in a mechanical or algorithmic way to stabilize prices across a complex financial and economic landscape.

The unique insight attributed to Warren Mosler by his colleague and co-developer of MMT, Randall Wray, is the integration what are called the "horizontal" (endogenous) and "vertical" (government issued) money circuits, and in terms of specific operations, that bond sales drain reserves to maintain an elevated nominal yield on treasury bonds, regardless of whether this operation is done by the Fed, or by the treasury itself. Wray explains in a lecture which is currently featured in a youtube clip. The video is titled "Endogenous Money | Randall Wray Explains Warren Mosler's Unique Insight"(https://www.youtube.com/watch?v=LUBquM3LB3Q). This clip is an excerpt from a longer lecture series by wray, published on the "instituto de economia da unicamp" youtube channel, on endogenous money and MMT, "Aula 1", "Aula 2", etc.

Compared to monetarism, which seeks to manage the value of a currency by controlling the quantity of money in circulation, price anchoring seeks to stabilize the bid at which money is issued, either for fiscally compensated public services, or by monetary issue through the banking system backed by collateral assets, which are appraised on bank balance sheets according to various accounting and regulatory protocols.

Thus I would describe price anchoring, as a multi-faceted collateral view of money issuance, and in my opinion, it is most unique and insightful part of MMT and Mosler's work.

Mosler's Unique Theory of the Price Level: Price Anchoring

Warren Mosler has provided an effective critique of conventional rate policy, and an alternative framework for analysis of the price level:

> The price level is a function of prices paid by government when it spends, or collateral demanded when it lends.

This means that whenever the government spends or lends money, it must necessarily do so at a specific price level. If the government overpays for any good or service, compared to what it paid the the past, then it has effectively defined the value of its currency downward.

Similarly, as government is involved in the federation of the banking system, especially the instigation of a common currency or unit of account, it must necessarily play a role in assessing and appraising bank balance sheets and collateral assets that banks use to secure loans. When government allows banks to lend money for homes or other assets at prices that are too high, it allows the price level to increase, and thereby the value of currency to decline.

The Nature of Banking Regulation

This regulation of banking is not an interference by government, but rather merely a condition imposed on banks for their privilege to deal in government issued money, practice interbank lending of government issued currency, and the enjoy the public guardrails of financial stability which make a fiat currency what it is. So the regulation of banking is merely a "terms of service" for using dollars(or whatever the currency may be), not a interference of government into markets.

Banks arose historically for the purpose of smoothing over "what is money". Banking has always been a distributed activity, simply by the necessities of early primitive communications technology. Banks serve to collateralize assets, essentially turning any asset into money. This was true even on a gold standard. What is unique about a commodity standard is not what can serve as money-- credit money will still exist-- but rather that the unit of account is fixed to that commodity.

Commodity Money and Commodity Units of Account

While some may assert fixing a unit of account to a commodity may prevent manipulation, in reality, commodity markets are incredibly sensitive to manipulation and all other kinds of general volatility. Rather than reducing manipulations and distortions, such a commodity based unit of account, especially a non-essential commodity like an ornamental metal, makes it easy for special interests to interfere. All units of account require "accountability", by their very nature, and accountability is always a political process.

A unit of account which has no fixed ties to commodities, makes this accountability process much more direct and transparent. Practicing overt monetary financing would only increase this transparency, by eliminating the confusing and unpredictable distinction between government issued money, and government issued fiat debt.

The nature of government, is that all their debts represent a political commitment to their constituents, and furthermore are about relative obligations among the constituency; a government is composed of constituents, and therefore cannot "owe" them anything, except what they imagine will be achieved through the vehicle of government. But this is always conjecture and speculation.

So while it is possible to distinguish between government issued money, and government issued debt, and even tie the latter to a commodity standard, this does not change the underlying political nature of collaboration through government. Governments are not better suited to delivering on their overall political promises by fixing their financial commitments to a commodity. It only makes it more fragile and prevents the process of fair and continuous adjustments.

The nature of inflation is that while it may represent a degradation of financial performance and delivery of government, it is the most transparent and fair process for this to happen. A society which protects civil liberties will also give people the opportunity and information to invest in other financial assets, so that their savings are not vulnerable to the inflation process. Transparency and accountability are the key, not artificially attempting to impose financial inflexibility.

Going back to the challenges of a commodity money, the difficulty or regularity of production for a commodity, does not prevent manipulation either. There is still plenty of potential to monopolize or manipulate the market, even with capped supply.

Much like how investors should seek to diversify their portfolios, it is not prudent to tie a unit of account to a single commodity either.

Interest Rates And Price Anchors

It may not be immediately obvious, but the assertion that a government or currency issuer increasing its bids for goods and services, is an explicit downward redenomination of that currency, can also be applied to interest rates and interest spending. As discussed interest is an exchange rate for money, in the own unit of account, between two parties at two points in time. As such, when a government, or any entity, sells a greater amount in the future, for a lesser amount today, they devalue the unit of accout.

The government instigating such a trade is uniquely determining, as they are the monopoly issuer, and can do so at any scale.

The concept of price anchoring can be applied either descriptively to analyze price dynamics, or prescriptively in shaping fiscal and monetary policies.

Descriptive Price Anchoring

This is merely analyzing or researching how the government's bids or its collateral appraisals, drive the price level over time, if at all.

Prescriptive Price Anchoring

Prescriptive price anchoring, is recommending specific policies designed to help manage the price level. In this case, the typical proposal is a permanent zero interest policy, and a Job Guarantee.

Zirp Plus Job Guarantee

While zirp plus a job guarantee, is the broadest and most universal example of price anchoring, and therefore useful for thinking about an economy where price anchoring is the primary or only tool for price management, it does present the issue of differing significantly from conventional practiced monetarist and fiscal programs, and requiring tremendous transformative policy changes.

While this has the potential to be good, and it also establishes what makes an economic perspective informed by the principle of price anchoring unique, it is difficult to analyze the impact of such a transformative shift.

A Price Anchor is A One-Sided Currency Peg

The most helpful way I have to explain a price anchor, is that it is similar to a currency peg or fixed exchange rate, but it only applies in one direction.

For example, a currency pegged to gold, involves a commitment to buy and sell gold at a fixed price. If you think about this from a trading perspective, it necessarily guarantees no profitable trading, because to profit from a trade, you must sell it at a higher price than you bought it.

A currency which is instead "anchored" to the price of gold, is one in which the issuer guarantees to buy all gold at a fixed price, but not necessarily sell it. So, a dollar currency issuer could buy gold at $1,000 per, oz, but hold it and only sell when the price reached $2,000 per ounce.

In other words, a price anchor allows reserve or exchange assets to be used profitably and discretionally according to the issuers judgement or strategy.

"Anchoring" Function Refers to Balance Sheet Impact

Conventionally, a commitment to always buy an asset or commodity, is a support level for that asset or commodity, and thus technically would be a resistance level for the other asset involved in the trade, specifically the issued currency.

From this perspective, a price anchor appears like it would not keep the price level down, but rather prop it up.

However, there is a level of nuance, where an issued asset reflects the financial state of the issuer, whether that asset happens, to be currency, debt, or equity.

In this case, as price anchoring allows issuers to benefit from price fluctuations, ie swap reserve or exchange assets profitably from a trading perspective, the goal or expectation is that it would in fact promote a higher valuation of issued assets over the long run, while stabilizing the economy and addressing potential imbalances.

The Price Level is not the Price of Everything, it is only the Relative Valuation of The Currency

Because price levels are measured using commodity indexes or other aggregate measures, it may appear like managing the price level involves manipulating or controlling all the prices in an economy.

While there may be benefits in promoting general economic fairness, the price level is really only about the price level of one thing: the currency itself. But because a currency is used as the unit of account for measuring all other prices, it is easy to misinterpret it as an aggregate of all prices and the total economic system, rather than simply a way to measure the unit of account itself.

I think this is a common misinterpretation, because we have become accustomed to very stable currencies or unit of accounts, compared to historical patterns.

Price Anchors allow you to link a currency to consumables like labor or energy

Because a reserve peg requires bi-directional price control, it requires assets or commodities that are easy to both buy and sell. We can call such assets reserve assets. But price anchoring can applied to assets that are not easy to store or resell, like labor or energy. This makes it potentially more useful and flexible, compared to a pegged currency.

We can call any such asset an "exchange asset", in contrast to reserve assets used for a peg, or a flexible reserve commodity price anchor.

Other Price Anchoring Possibilities

We have so far presented 3 different price anchors:

1. **A Job Guarantee:** Always buy labor at minimum wage

2. **A Permanent Zero Interest Rate Policy:** Never sell future money at a discount, always buy treasury credit
3. **A Gold or Reserve Commodity Price Anchor:** Always buy at minimum price, sell at some higher price

Technically, a permanent zero interest rate differs from these other two. It is a commitment to never sell future money at a discount, it is not a guarantee to always buy(ie extend credit) at a minimum price, which is available to everyone. It is only a commitment to buy treasury issued credit. This could done by a central bank coordinating directly with a treasury, rather than indirectly through a primary dealer system.

But a permanent zero interest rate and the other two price anchoring policies are similar, in that you would avoid selling below the minimum price. So with a reserve commodity, you would avoid selling that reserve commodity below the price you bought it, and with a permanent zero rate, you would never sell future money at a discount, in other words, you would never borrow your own currency at interest, that you can simply issue yourself. Other than these 3 price anchoring policies, you could also limit public service pay increases, or create commodity buffer stocks for specific critical or strategic resources.

A housing buffer stock could lower housing rents

A housing buffer stock would simply involve paying landlords to keep housing empty. This would create less volatility, and lead to a reduced supply curve for housing, by supporting the creation of a slight excess of housing inventory, which would reduce price shocks.

While such a policy would have to be limited, and preferably encourage inventory rotation(capping the vacancy time for a particular unit to receive subsidies, say at 6 months to a year), it could potentially dramatically improve housing markets for renters and reduce nimby attitudes.

A housing buffer stock policy, therefore becomes a highly targeted price anchoring tool. While this is a more direct form of market manipulation, it should be noted that reserve commodity pegs, like a gold standard, also manipulate market prices to a high degree. Many similar targeted or strategic price anchoring/buffer stock combination policies are possible.

Part Five: Rate Disparity, or Why Rates Of Change Vary Comparably in Ecology and the Economy

Dynamic Growth: Finance and Ecology are Similar

In ecological systems, rates of growth vary widely. Doubling time for most bacteria varies on a distribution between minutes and days, according to this study:

https://pubmed.ncbi.nlm.nih.gov/29899074/

Other living things have a rate of growth, as they increase in size and mass, and a reproductive rate, as they create more copies of themselves. The world of finance has many parallels to such ecological systems. Companies spin off other companies and ventures, capital is raised, or shares bought back. There are many both physical and political boundaries that affect how investments and financial returns flow.

Rather than simply describing any unanticipated return difference as "risk", and anticipated differences as "friction" it is helpful to think of economy as a dynamic living system.

Interest rates vary for many reasons, including the incentives and interests of investors, and their relationship and role in the overall system.

Thinking about finance as a total system, is something I hope to see more people adopt, and I hope that I can help contribute to this, in an accurate and rigorous way.

Competitive vs. Adaptive Equilibrium

Competitive Equilibrium is directly leveling, while adaptive equilibrium is when market participants face similar constraints and converge to a similar cost structure.

The ecological comparison would be that tree height in a forest is an adaptive equilibrium, while the surface of a lake is a competitive equilibrium. These two types of equilibrium differ, in that a competitive equilibrium levels underlying differences, while an adaptive equilibrium preserves the contour of underlying differences. With an adaptive equilibrium, there is not enough direct and local competitive pressure, for this to serve to equilibriate returns or prices, but there is still similarity based on similar constraints or design between businesses or firms.