HOW TO VALUE THE PRICE OF GOLD

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A Possible Model for the Price of Gold

One of the most controversial topics in investing is the price of gold. Eleven years ago, gold dropped as low as $252 per ounce. Since then, the yellow metal has risen more than five-fold, easily outpacing the major stock market indexes—and it seems to move higher every day.

Some goldbugs say this is only the beginning and that gold will soon break $2,000, then $5,000 and then $10,000 per ounce.

But the question is, “How can anyone reasonably calculate what the price of gold is?” For stocks, we have all sorts of ratios. Sure, those ratios can be off…but at least they’re something. With gold, we have nothing. After all, gold is just a rock (ok ok, an *element*).

How the heck can we even begin to analyze gold’s value? There’s an old joke that the price of gold is understood by exactly two people in the entire world. They both work for the Bank of England and they disagree.

In this post, I want to put forth a possible model for evaluating the price of gold. The purpose of the model isn’t to say where gold will go but to look at the underlying factors that drive gold. Let me caution that as with any model, this model has its flaws, but that doesn’t mean it isn’t useful.

The key to understanding the gold market is to understand that it’s not really about gold at all. Instead, it’s about currencies, and in our case that means the dollar. Gold is really the anti-currency. It serves a valuable purpose in that it keeps all the other currencies honest (or exposes their dishonesty).

This may sound odd but every currency has an interest rate tied to it. In essence, that interest rate is what the currency is all about. All those dollar bills in your wallet have an interest rate tied to them. The euro, the pound and the yen also all have interest rates tied to them.

Before I get to my model, I want to take a step back for a moment and discuss a strange paradox in economics known as **Gibson’s Paradox**.

This is one the most puzzling topics in economics. Gibson's Paradox is the observation that interest rates tend to follow the general price level and not the rate of inflation. That's very strange because it seems obvious that as inflation rises, interest rates ought to keep up.

And as inflation falls back, rates should move back as well. But historically, that wasn't the case.

Instead, interest rates rose as prices rose, and rates only fell when there was deflation. This paradox has totally baffled economists for years.

Yet it really does exist. John Maynard Keynes called it "one of the most completely established empirical facts in the whole field of quantitative economics." Milton Friedman and Anna Schwartz said that "the Gibsonian Paradox remains an empirical phenomenon without a theoretical explanation."

Even many of today's prominent economists have tried to tackle Gibson's Paradox. In 1977, Robert Shiller and Jeremy Siegel wrote a paper on the topic. In 1988 Robert Barsky and none other than Larry Summers took on the paradox in their paper "Gibson's Paradox and the Gold Standard," and it's this paper that I want to focus on. (By the way, in this paper the authors thank future econobloggers Greg Mankiw and Brad DeLong.)

Summers and Barsky explain that the Gibson Paradox does indeed exist. They also say that it's not connected with nominal interest rates but with real (meaning after-inflation) interest rates.

The catch is that the paradox only works under a gold standard. Once the gold standard is gone, the Gibson Paradox fades away.

It's my hypothesis that Summers and Barsky are on to something and that we can use their insight to build a model for the price of gold. The key is that gold is tied to real interest rates. Where I differ from them is that I use real short-term interest rates whereas they focused on long-term rates.

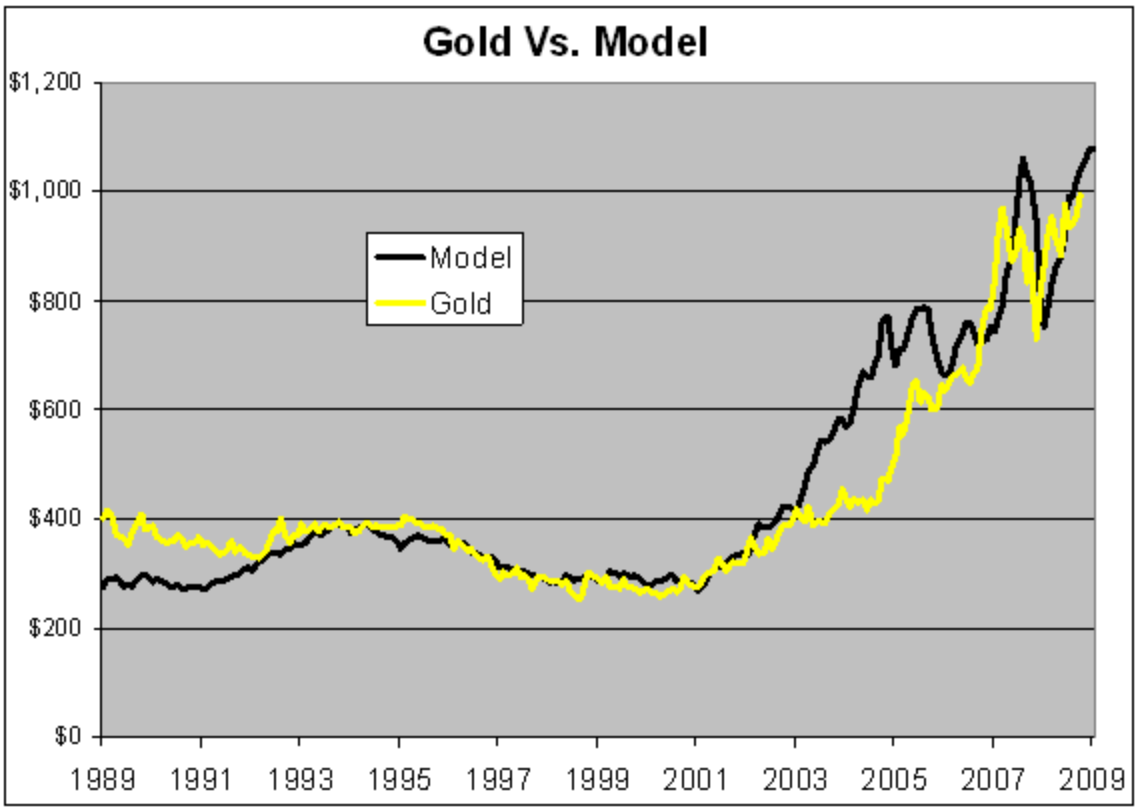
Here's how it works. I've done some back-testing and found that the magic number is 2% (I'm dumbing this down for ease of explanation). Whenever the dollar's real short-term interest rate is below 2%, gold rallies.

Whenever the real short-term rate is above 2%, the price of gold falls. Gold holds steady at the equilibrium rate of 2%. It's my contention that this was what the Gibson Paradox was all about since the price of gold *was tied to* the general price level.

Now here's the kicker: there's a lot of volatility in this relationship. According to my backtest, for every one percentage point real rates differ from 2%, gold moves by eight times that amount per year.

So if the real rates are at 1%, gold will move up at an 8% annualized rate. If real rates are at 0%, then gold will move up at a 16% rate (that's been about the story for the past decade). Conversely, if the real rate jumps to 3%, then gold will drop at an 8% rate.

Here's what the model looks like against gold over the past two decades:



The relationship isn't perfect but it's held up fairly well over the past 15 years or so. The same dynamic seems at work in the 15 years before that, but I think the ratios are different.

In effect, gold acts like a highly-leveraged short position in U.S. Treasury bills and the breakeven point is 2% (or more precisely, a short on short-term TIPs).

Let me make this clear that this is just a model and I'm not trying to explain 100% of gold's movement. Gold is subject to a high degree of volatility and speculation. Geopolitical events, for example, can impact the price of gold.

I would also imagine that at some point, gold could break a replacement price where it became so expensive that another commodity would replace its function in industry, and the price would suffer.

Instead of explaining all of gold, my aim is to pinpoint the underlying factors that are strongly correlated with gold. The number and ratios I used (2% break-even and 8-to-1 ratio) seem to have the strongest correlation for recent history. How did I arrive at them? Simple trial and error. The true numbers may be off and I'll leave the fine-tuning for someone else.

In my view, there are a few key takeaways.

The first and perhaps the most significant is that **gold isn't tied to inflation**. It's tied to low real rates which are often the by-product of inflation. Right now we have rising gold and low inflation. This isn't a contradiction. (John Hempton wrote about this recently.)

The second point is that when real rates are low, the price of gold can rise very, very rapidly.

The third is that when real rates are high, gold can fall very, very quickly.

Fourth, there's no reason for there to be a relationship between equity prices and gold (like the Dow-to-gold ratio).

Fifth, the TIPs yield curve indicates that low real rates may last for a few more years.

The final point is that the price of gold is essentially political. If a central banker has the will to raise real rates as Volcker did 30 years ago, then the price of gold can be crushed.

Technical note: If you want to see how the heck I got these numbers, please see this spreadsheet.

Column A is the date.
Column B is an index of real returns for T-bills I got from the latest Ibbotson Yearbook. It goes through the end of last year.
Column C is a 2% trendline.
Column D is adjusting B by C.
Column E is inverting Column D since we're shorting.
Column F computes the monthly change the levered up 8-to-1.
Column G is the Model with a starting price of $275 (in red).
Column H is the price of gold. It goes up to last September.

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The Gold Model Revisited

Four years ago, I wrote a post discussing my thoughts on how to build a model for the price of gold. That post received by far the most attention of anything I've written. I still get emails about it today.

Over time, I've thought more about this issue, and I've altered my thinking somewhat. I also want to clarify some points from my original post. Instead of writing an addendum to it, though, I thought it would be clearer to rewrite the whole thing. What follows is the updated version.

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One of the most controversial topics in investing is the price of gold. Fifteen years ago, gold dropped as low as $252 per ounce. The yellow metal then enjoyed a furious rally as it soared above $1,920 per ounce, easily outpacing the major stock-market indexes. Over the last three years, however, it has sunk back down to $1,300.

Like Linus in the pumpkin patch waiting for the Great Pumpkin, many gold bugs hold out hope. They claim that any day now, gold will resume its march upward to $2,000, then $5,000 and then $10,000 per ounce. But my question is, "How can anyone reasonably calculate what the value of gold is?"

For stocks, we have all sorts of ratios. Sure, those ratios can be off, but at least they're something. With gold, we have nothing. No assets or liabilities. Not even a dividend. After all, gold is just a rock (OK, OK, an *element*). How can we even begin to analyze gold's value? There's an old joke that the price of gold is understood by exactly two people in the entire world. They both work for the Bank of England, and they disagree.

In this post, I want to put forth a possible model for evaluating the price of gold. The purpose of the model isn't to say where gold will go but to look at the underlying factors that drive the price of the precious metal. Let me caution you that as with any model, this one has its flaws, but that doesn't mean it isn't useful.

More importantly, I'll explain why our model makes theoretical sense, rather than just mashing up numbers and seeing what correlates.

The key to understanding the gold market is understanding that it's not really about gold at all. Instead, it's about currencies, and in our case that means the U.S. dollar. Properly understood, gold is really the anti-currency. It serves a valuable purpose in that it keeps all the other currencies honest—or exposes their dishonesty.

This may sound odd, but every major currency has an interest rate tied to it. It doesn't matter if it's the euro, the pound or the yen. In essence, that interest rate is what the currency is all about.

Before I get to my model, we need to take a slight detour and discuss a fascinating paradox known as Gibson's Paradox. This is one the most puzzling topics in economics. Gibson's Paradox is the observation that interest rates tend to follow the general price level and not the rate of inflation.

That's very strange, because it seems obvious that as inflation rises, interest rates ought to keep up. Similarly, as inflation falls back, rates should move back as well. But historically, that hasn't been the case. Instead, interest rates have risen as prices have gone up, and only fallen when there's been deflation.

This paradox has totally baffled economists for years. Yet it really does exist. John Maynard Keynes called it "one of the most completely established empirical facts in the whole field of quantitative economics." Milton Friedman and Anna Schwartz said that "the Gibsonian Paradox remains an empirical phenomenon without a theoretical explanation."

Even many of today's prominent economists have tried to tackle Gibson's Paradox. In 1977, Robert Shiller and Jeremy Siegel wrote a paper on the topic. In 1988 Robert Barsky and none other than Larry Summers took on the paradox in their paper "Gibson's Paradox and the Gold Standard."

It's this paper that I want to focus on. (By the way, in this paper the authors thank future econo-bloggers Greg Mankiw and Brad DeLong.)

Summers and Barsky agree that the Gibson Paradox does indeed exist. They also say that it's not connected with nominal interest rates but with real (meaning after-inflation) interest rates. The catch is that the paradox only works under a gold standard. Absent that standard, the Gibson Paradox fades away.

Now here's my big idea: the Gibson Paradox doesn't go away. It's still here, just harder to see. It's my hypothesis that Summers and Barsky were on to something, and that we can use their insight to build a model for the price of gold.

The key is that gold is tied to real interest rates. Where I differ from them is that I use real *short-term* interest rates, whereas they focused on long-term rates.

We're getting closer to our model, but we need to take yet another detour, this time to Sweden to discuss the great Swedish economist Knut Wicksell. Wicksell was an interesting character who wrote on many topics, but he was deeply concerned with the theory of interest rates.

Now Wicksell was an economist, and consequently he wasn't always the clearest writer. He often seemed to get his interest rates confused. One economist referred to this as the "Wicksellian muddle."

But what's important is that Wicksell believed there was a constant tug-of-war between two interest rates. One is the interest you see in the real world, the money rate. The other is an invisible phantom rate called the natural rate.

While unseen, this natural rate does make its presence known in various ways. Wicksell believed that when the money rate drops below the natural rate, the economy grows and prices rise. When the opposite happens, the economy contracts and prices fall.

I believe that if we take the Wicksellian natural rate and view it through the prism of a still-functioning Gibson's Paradox, we can understand how gold's value works.

Here's what Wicksell wrote (page 102):

> *There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tend neither to raise nor to lower them. This is necessarily the same as the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. It comes to much the same thing to describe it as the current value of the natural rate of interest on capital.*

Bingo! It's that natural rate that's the key to our model. In the first iteration of my model, I used 2%. That was wrong, but I was fooled because 2% works well enough as a long-term approximation of the Wicksellian natural rate. But the natural rate is not a constant.

Here's how it works. Whenever the dollar's real short-term interest rate is below the Wicksellian natural rate, gold rallies. Whenever the real short-term rate is above the natural rate, then gold falls.

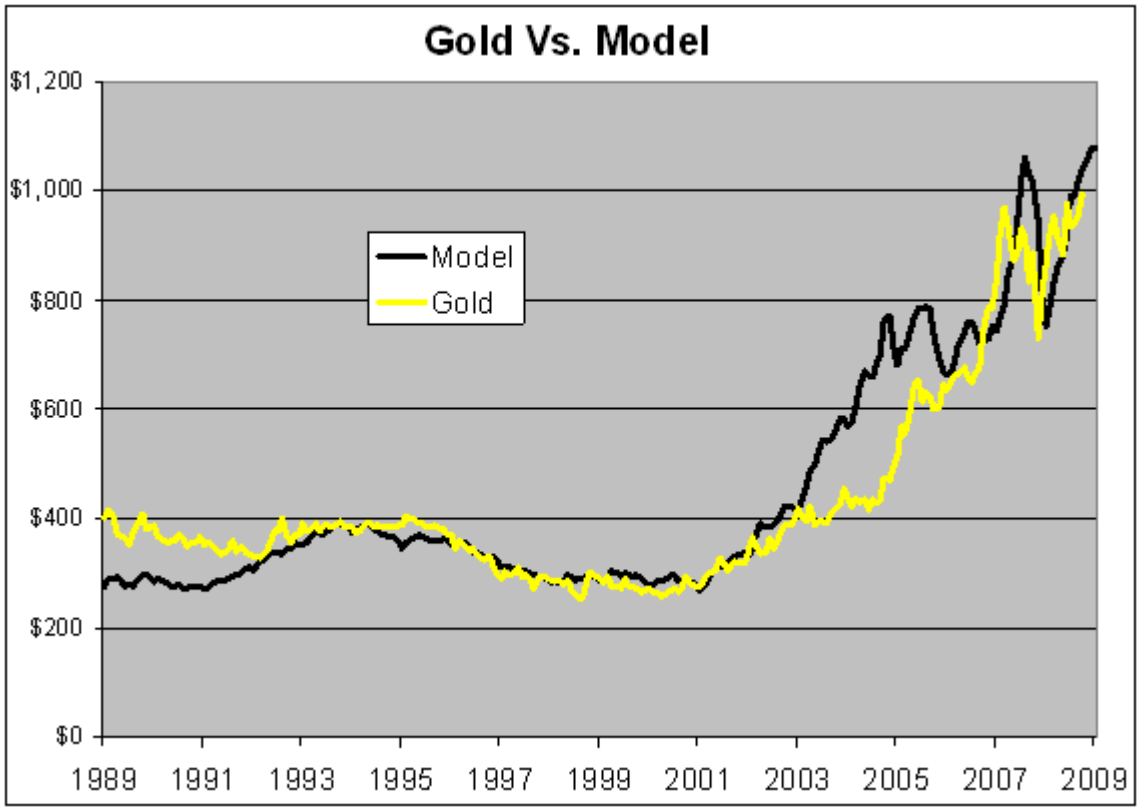
Just as the Knut Man describes. When gold holds perfectly still, you know you're at the natural rate. It's my contention that this was what the Gibson Paradox was all about, since the price of gold *is tied to* the general price level.

Now we get to the messy parts. There's a lot of volatility in this relationship. According to my original model, for every one percentage point real rates differ from the natural rate, gold moves by eight times that amount per year.

So if the real rates are at 1% and the natural rate is at 2%, gold will move up at an 8% annualized rate. If real rates are 2% below the natural rate, then gold will move up at a 16% rate (that was about the story from 1999 to 2011). Conversely, if the real rate jumps to 1% above the natural rate, then gold will drop at an 8% rate.

Why eight fold? There, I don't know. When I did the back test, that number fit the best. I assume it's a risk factor to compensate for owning gold.

Here's the graph from my original model, bearing in mind that I used 2% as the natural rates.



I realize I have a problem with using an unspecified Wicksellian natural interest rate, since I'm using one variable to explain another variable. That's not quite kosher in the model-building biz.

Perhaps I could use the price of gold and current interest rates to reverse-engineer the Wicksellian natural rate. Gold has been falling for the last three years, even though real short-term rates have been quite low. In fact, negative. The natural rate may have fallen as well.

Let me make it clear that this is just a model, and I'm not trying to explain 100% of gold's movement. Gold is subject to a high degree of volatility and speculation. Geopolitical events, for example, can impact the price of gold.

I would also imagine that at some point, gold could break a replacement price where it became so expensive that another commodity would replace its function in industry, and the price would suffer.

Instead of explaining every aspect of gold's behavior, my aim is to pinpoint the underlying factors that are strongly correlated with it.

There are a few key takeaways.

The first and perhaps the most significant is that **gold is not tied to inflation**. It's tied to low real rates, which are often the by-product of inflation. Rising gold and low inflation isn't a contradiction. We had both for a few years.

The second point is that when real rates are low, the price of gold can rise very, very rapidly.

The third is that when real rates are high, gold can fall very, very quickly.

Fourth, there's no reason for there to be a relationship between equity prices and gold (like the Dow-to-gold ratio).

The final point is that the price of gold is essentially political. If a central banker has the will to raise real rates as Volcker did 35 years ago, then the price of gold can be crushed.

Silver — The Poor Man's Gold

Silver, which is often called "the poor man's gold," has failed to move up recently even though gold has regained a tiny bit of its luster. Last Tuesday, April 16th, spot silver got down to $22 per ounce. That was Ag's lowest print since October 5th, 2010.

Gold now trades at 62 times silver. During the worst of the financial crisis in 2008, gold got to more than 80 times silver. The Gold/Silver ratio has been an important ratio through history. Way back in antiquity, Plato mentioned that the ratio was 12-to-1. In 1792, the U.S. Congress, at the advice of Alexander Hamilton, passed the Coinage Act of 1792.

This was the government's first attempt at price-fixing (and not the last). The act defined a U.S. dollar as 371.25 grams of silver or 24.75 grams of gold.

In other words, Hamilton pegged the Gold/Silver ratio at 15. In 1834, Congress had to bump it up to 16.

The all-time high for the Gold/Silver Ratio came during the first Gulf War. On February 22, 1991, gold was going for 102 times silver.

In 1979-80, there was an absolutely crazy rally in silver when two Texas brothers tried to buy all the silver in the world.

What's even crazier is that if it hadn't been for those meddling exchanges, they would have gotten away with it.

When Nelson Bunker Hunt and Herbert Hunt started their plan, silver was around $6 per ounce. By early 1980, it got $50 per ounce. Time Magazine estimated they made between $2 billion and $4 billion in just nine months. To pull this off, they had to borrow zillions of dollars. At one point, it was estimated that they held one-third of the world's silver. **Tiffany** (TIF) took out a full-page article to denounce them.

Since I'm probably the only person who knows this trivia, the Hunt brothers were the sons of the legendary oilman, Haroldson Lafayette "H.L" Hunt, Jr. Hunt the senior wrote a totally batshit-crazy novel based on his idea of a fascist utopia called "Alpaca." It's literally one of the worst books ever written. I remember one person calling it "1984, but Big Brother is the good guy." I wish I were making this up.

Not all the Hunts were nuts. Lamar Hunt was one of the most influential people in the development of modern football. He was the one who came up with the name "Super Bowl."

Anyway, back to silver. The Hunts were convinced that the Establishment was out to crush them and they were pretty much right. The exchange changed the margin requirement which forced the brothers to put up much more collateral. (By the way, one of my first jobs in this industry was making margin calls. That's not a metaphor. I had to actually *call* people to tell them they had to sell or put up more money. Good times!)

On March 27, 1980, the bottom fell out of the silver market. This is now known as “Silver Thursday.” The Hunts had to put up more money, but they couldn’t reach their margin requirement.

The government was worried (tell me if you’ve heard this one before) that Wall Street banks were so much in debt to the Hunts that if the Hunts went under, so would the banks. In fact, a silver panic could start a banking panic.

The Hunts had finally been broken and even today, silver is still far short of its peak in 1980. The Hunts eventually become the models for brothers Randolph and Mortimer Duke in the movie *Trading Places*.

The Attraction of Gold

I wanted to say a few things about people who invest in gold. There are some people, not all, who are quite simply unreasonably attracted to gold. They make Goldfinger look like an amateur.

Maybe one day some cognitive scientist will find a connection between our brains and gold. For whatever reason, gold has dazzled men for millennia.

For example, gold NEVER rusts. I mean never! You can take the gold out of an Egyptian pyramid and stick it in your cavity (though you might want to clean it first). It’s also non-toxic which helps.

Gold is incredibly soft. One ounce can be stretched for 50 miles. It can be pounded down to a few MILLIONTHS of an inch thickness.

Gold is very heavy. Despite what you see in the Treasure of the Sierra Madre (“Badges? We ain’t got no badges!”), gold dust wouldn’t have blown away.

Gold has been found on every continent on earth. Gold has also had strong religious connections. It’s mentioned in the Bible more than 400 times. Marx writes of commodity fetishism, which is meant to have a religious connotation.

And I won't even get into Freud's talk of the psychological connection of gold to feces (no, I'm not making this up).

When Moses came down from Sinai with the Ten Suggestions, the Jews were making a golden calf to worship. God instructed Moses to overlay a sanctuary for him in pure gold. In other words, gold had its bases covered—it was on both sides!

Plato mentions the gold/silver ratio to be 12. Recent historical evidence suggests that Isaac Newton was mainly an alchemist. The other stuff he did was just playing around on the side, and was probably an offshoot of his efforts to makes gold. Pieces of his hair have traces of lead and mercury.

Newton was also Master of the Mint and inadvertently put England in the gold standard. This means that one of the greatest geniuses in human history was also a civil servant who made economic policy based on a forecast. A forecast that was dead wrong.

There's more gold at the New York Fed, waaaay below 33 Liberty Street, than in Fort Knox. Gold is also a really good conductor. So despite its high prices, it's used in many electronics.

Earlier I mentioned Goldfinger. The Ian Fleming book was published in 1959. The plot (made into a classic 1964 movie) featured a crazy idea -– to blow up all of the U.S. gold at Fort Knox, making it radioactive and worthless.

That would make Auric Goldfinger's gold worth more. But here's the odd part — he didn't need to stage all that drama to make money. If he had just held on to his gold for 20 years, it would have been worth 25 times as much.

I highly recommend Peter Bernstein's *The Power of Gold: The History of an Obsession*.

The First Black Friday

If you got slammed by gold's sudden drop over the past couple of days, take comfort in the fact that things have been worse. Much worse.

In 1869, Ulysses Grant was in the White House. The government was struggling with massive domestic debt, incurred by four years of civil war and subsequent efforts at Southern reconstruction. To raise money for these expenditures, the Treasury had issued vast quantities of "greenbacks" (paper currency), which Grant promised to redeem for gold as soon as was practical.

This he then proceeded to do: over the course of some six months at the start of his administration, the government paid out its gold reserves little by little, thus easing the debt while keeping the price of the precious metal under tight control.

If the government wanted the price of gold to go down, it released more of its holdings; if it wanted it to go up, it paid out less.

Enter two unscrupulous speculators, Jay Gould and James Fisk. Their scheme was to corner the gold market by means of insider information. They reasoned that if they could find out beforehand exactly what the Treasury was planning to do as regards the gold supply, they would be able to buy up the yellow metal when the price was low and then sell when it was high.

This would not only net them huge profits but also drive up the rate of traffic by wheat farmers on the Erie Railroad, of which Gould was president. Both men were well versed in incestuous economic dealings; both were very much in league with Boss Tweed's Tammany Hall, and Gould would later post bond when Tweed was indicted.

But to pull it all off, they needed a hook. This was provided in the form of Abel Corbin, Grant's brother-in-law. It's not clear whether Corbin fully knew what the pair was up to, but he nonetheless served as their point of entry to the Oval Office, where they tried to persuade Grant to tip his hand regarding the government's gold policy. This Grant, to his credit, refused to do.

But Gould and Fisk now seemed, in the eyes of the financial community, to have the president's ear. Thus when they started buying up large quantities of gold in early September 1869, prices spiked.

The one to put a stop to these shenanigans was George Boutwell, Grant's Secretary of the Treasury. Honest and intelligent, he quickly saw through Fisk and Gould's scam and approved the sale of $4 million worth of government gold to lower prices. Grant, too, realized what was up and told his brother-in-law to cut ties with his sketchy partners. But thieves' honor prevailed, and Corbin tipped off Gould, who then was able to sell off his gold before the market crashed.

Fisk, too, escaped serious economic damage, even though Gould omitted to tell him the news. The only one screwed was Corbin—together with grain farmers (whose prices fell 50%), stockholders (the market lost 20% in a single week), and countless ordinary Americans (who found themselves out of work in the ensuing economic turmoil).

On Black Friday, September 24, 1869, gold prices went from a high of $162 to a low of $133 in a matter of hours.

What became of Gould and Fisk? Neither was prosecuted, thanks to a good lawyer and support from Tammany Hall. Gould went on to a glorious career as a railroad and communications magnate; Fisk was shot dead in an argument over a prostitute a few years later. As for Grant, his name was permanently besmirched: the years of his administration were branded ¨The Era of Good Stealings.¨