

Investors, Calm Down

The Dow is Worth its Nominal Value in Real Terms—it has to be

March 6, 2013

Last week the Dow hit 14,253.77 on March 5 for an all-time high. The business news was initially jubilant. But shortly thereafter the business sections of newspapers were full of skepticism. The WSJ, New York Times and NPR's Adam Davidson (of Planet Money) and many others, citing a variety of experts, reported that the markets should restrain their enthusiasm about the Dow's new nominal high; saying that if the Dow's nominal value was adjusted for inflation it was only 9,256.38. At this level, the skeptics say, the Dow has not made any progress since its nominal high of 14,164.53 in 2007 or in inflation adjusted terms since January 14, 2000 when it hit 10,424.28 (11,722.98 unadjusted). In fact, the skeptics say, the Dow would have to reach a nominal value of \$16,052.22 to reach a real all-time high. This would require an increase in its current nominal value of 13%.

To be clear, this is not a discussion about whether the Dow is the best representative of the health of the market. There has been much discussion and debate about whether 30 stocks weighted by market capitalization is the best measure of the market's health. That is a discussion for another day. This is a discussion about whether stocks and bonds should be discounted ex-post for inflation.

Discount the Dow? But the Dow is already adjusted for inflation. Investors consciously adjust the nominal (observed) value of their investments in real-time to reflect their view of what inflation will be in the future (ex-ante expectations) by attaching an inflation premium. Enshrined in every text book on economics and finance is the formula for the Real Interest Rate, i.e., $\text{Real Interest Rate} = \text{Nominal Interest Rate} - \text{Inflation}$.¹ If the skeptics discount the Dow again for inflation they are double discounting?

The real interest rate is what determines the price and yield of fixed income instruments. It is well known that equity investors also attach an inflation factor (known as a risk premium) to their stock investments just as do the investors in fixed income instruments. The level of the risk premium depends on whether the inflation is expected or unexpected. Stock returns are positively correlated to anticipated inflation and asymmetrically related to inflation uncertainty.²

It was equally confusing to hear some of the skeptics then concede that if dividends were included the Dow's inflation adjusted value would be higher. Suddenly, it seemed as though the financial dynamics of "Planet Money" followed a different path, obeyed different laws and sought out different investment objectives than

¹ Authorities on this formula are so ubiquitous that the author hesitates to cite any particular one. Readers can do a search on The Real Interest Rate.

² Real Interest Rates and Inflation, An Ex-Ante Empirical Analysis, pages 222: Journal of Finance, Volume LI, March 1996 by Kandel, Ofer and Sarig.

Author's note: Again, there are many similar analyses that confirm this finding just as there are many that refute the once accepted "Fisher Effect" that stated that Real Interest Rates and inflation were independent of one another.

those on Planet Earth.³ The value of dividends is always embedded in stock price; an asset is worth the present value of its expected income streams. There are only two exceptions to this rule: 1) When a stock goes ex dividend and the price of the stock has to be adjusted down unless you are the registered owner before the date of record, and 2) If the security is “stripped” so that the dividends are sold independently of the stock.

So what do the skeptics of the Dow’s new high really mean? Do they mean that equity investors do not attach a high enough inflation factor to market investments? Do they mean that investors persistently, over long periods of time, underestimate inflation? If so, virtually the entire peer reviewed academic literature on this subject for the past 30 years would disagree.⁴

Nor would this behavior make market sense. This behavior by investors would violate one of the most basic mechanisms that we observe to govern market asset pricing, i.e., Arbitrage Pricing Theory, or just APT. In a nut-shell, APT says that asset prices (bond and equity prices, the Dow, S&P, gold, etc.) do not exist in isolation from one another but rather in a tight web of mathematical interrelationships. APT predicts that if one asset in the market is trading at levels that are inexpensive relative to other assets, investors will short (sell) the expensive asset and go long (purchase) the inexpensive asset. This will drive up the price of the inexpensive asset and bring down the price of the expensive asset. This market behavior, known as riskless-arbitrage, or just arbitrage, tends to keep asset prices in equilibrium; stocks with stocks, stocks with bonds, stocks and bonds with commodities, derivatives with stocks and bonds and so forth. As long as markets are “complete” these equilibriums generally hold. A complete market is one in which the complete set of possible gambles on future states-of-the-world can be constructed with existing assets.

Arbitrage pricing also has another feature that incorporates one of the most sophisticated concepts in all financial economics—that of “risk neutral” asset pricing and discounting. Risk neutral asset pricing is the mechanism that is used to price all financial derivatives. An essential feature of the derivative markets is that all financial instruments traded in complete markets can be replicated by holding various combinations of a derivative security and the underlying asset on which the derivative’s value is based. In so doing, the investor is able to hold a neutral market value position regardless of whether the prices of the different components to the position go up or down. This means that the investment position is dynamically hedged, and as such, should be discounted at the risk-free rate (because the position has no risk).⁵ This concept (risk neutrality) contributes to this discussion by asking the following question: Are the Dow skeptics right about deflating the nominal value of the Dow by the CPI when all of these values (including the Dow) are already mediated by arbitrage asset pricing and discounting dynamics?

Constructing dynamically hedged positions to take advantage of mispricing between assets is a complicated process requiring great skill and has historically been the province of professional traders and arbitragers. At

³ The WSJ’s E.S. Browning cited “other experts” making this claim in his article: Dismal Science takes a dim view of Dow High, WSJ, by E.S. Browning, March 6, 2013.

⁴ See Note 2

⁵ Arbitrage Pricing Theory and Risk Neutral Measures, Miklos Rasonyi: Decisions in Economics and Finance—Spring 2004.

Predyct Analytics, we construct and customize dynamically hedged portfolios to meet our clients investing objectives. But today's markets make many aspects of this type of investing strategy easy for non-sophisticated investors. The US Treasury makes a number of investment instruments available as a hedge against inflation, most notably, TIPS (Treasury Inflation Protected Securities). TIPS can be purchased from the Treasury at par or in the secondary markets at market prices. TIPS offer both a coupon rate of interest as well as the ex-post actual rate of inflation as determined by the CPI. Investors have the option of purchasing a regular Treasury instrument with its coupon or purchasing inflation protected Treasuries. The investor can look at the coupon differential between the two instruments, make an assessment about what they believe the future inflation rate will be and then purchase the instrument they believe will provide the greatest real return. If investors believed that their bond and stock investments were being as punished by inflation, as the skeptics say, wouldn't rational behavior have them shifting into inflation protected investments? With this choice available to investors would they really keep investing in financial instruments (stocks or bonds) that lose every time to inflation?

Currently, TIPS with maturities of 2, 5, 7 and 30 years with coupons of .257%, .777%, 1.26% and .639% respectively are all selling at a discount to par, indicating that, at least for now, investors believe that inflation will be less than the promised yield of the TIPS (i.e., coupon +/- inflation). Since these instruments are all selling at discounts to par investors must believe that the real return on a corresponding Treasury note without inflation protection must be higher.⁶ There are also a large number of ETFs (electronically traded funds) that promise to hedge against inflation by investing in a variety of assets that make up the CPI (Consumer Price Index), including real estate, oil, metals and bank loans, as well as TIPS and conventional Treasuries.⁷ So there are a number of investment vehicles that investors can purchase to replicate (i.e. track) the CPI. If the skeptics of the Dow's current nominal value were correct you would expect that investors would be shorting the Dow on a "Relative Basis" (the overvalued index) and buying either TIPS (the undervalued index) or ETF's that synthetically replicate the CPI (This is called Relative Basis Arbitrage).⁸ After all, they are saying that today's Dow does not have the same purchasing power today that it had in 2007 or even in 2000 even while it is at an all-time current high—it must be overvalued!

I think the problem with the skeptic's position lies in their application of the CPI as a discounting mechanism. Professor Richard Sylla, a professor of financial history at New York University, was quoted in the WSJ as

⁶ These notes would all sell at par (face value) if investors believed that the promised interest rate (coupon) of the TIPS plus the CPI (the CPI inflation rate that is determined at the maturity of the TIPS note) was equal to the value of a matching Treasury instrument. The inevitable conclusion is that investors believe that a matching Treasury has a higher real return than TIPS. How then is it possible for the skeptics to conclude that investment returns need to be discounted by inflation? In fact, the opposite is happening since the TIPS notes are selling at a discount to par.

⁷ John J. Neumann of the Peter J. Tobin college of Business, St. John's University provides an example of an ETF that has a Long short position on the Dow in which the Dow is shorted with a corresponding Long position in Diamonds. The Free Library: Demonstrating Arbitrage using Diamonds and the Dow Jones Industrials.

⁸ Relative Basis Arbitrage is utilized when an investor/trader desires to take advantage of the "relative" difference (as opposed to the absolute value difference) in values between different investment positions.

providing that the Dow is currently 140 times more valuable today than 100 years ago, but that when discounted for inflation during this period of time it is only seven times larger.⁹ Really?

The CPI factor inputs to the economy have changed so much in their character, purpose, importance, definitions and functionality in even the last decade that they are no longer perfect substitutions for discounting today's asset prices. CPI factors from earlier periods (and 100 years ago) are about as relevant to today's asset prices as whale oil. A trip from San Francisco to Paris today is a five minute phone call and a \$1,000.00 ticket; in 1913 it was an expedition. A minor medical procedure today was a death sentence in 1913. Moving terabytes of information today requires pressing down on a computer key. In 1913, well in 1913 you would have a hard time finding a terabyte of information. Even 25 years ago 85% of the Dow's market value was supported by tangible assets (real-estate, equipment, drill lathes, etc.). Today that ratio has flipped and 85% of the Dow's value is supported by intangible assets (intellectual properties, R&D, patents, trade-marks, copyrights, etc.) that are largely expensed at cost rather than capitalized on corporations' balance sheets. Surely this fact alone will have an influence on asset prices that are not accounted for in the CPI.

You get the idea, making these types of substitutions for the CPI over time to arrive at an equivalent basket of goods to compare purchasing power from one period of time to the next is as much about philosophy and inter-generational preference and utility curves as it is about economics. You can't buy the same basket of goods today (that make up the CPI) as in previous years so why would you discount today's asset prices by old CPI factors. All investors can do is look out across the investment horizon and purchase, trade and swap assets by their perceived value today. The CPI is a good reference to observe in making real-time investment decisions but asset prices are not determined historically but in real time.¹⁰ This is not to say that the Dow will not crash tomorrow; nothing in this article restricts that possibility. This article only makes the point that investors are valuing the Dow today relative to the value of all other assets that are traded in complete markets.

The skeptics of the Dows nominal value are saying something quite different: 1) That investors do not take inflation into account when making investments. Therefore it is necessary to adjust the Dow's value for

⁹ Wall Street Journal, March 6, 2013: "Dismal Science takes a Dim View of Dow Record," by Jim Browning.

Author's note: The subject of what is the appropriate discount factor to account for inflation is one of the richest and most heavily published in all economic theory. The results of this research are varied but there is general agreement about a couple of issues: 1) That discount factors (and the asset prices that are used to account for discount factors) do not sufficiently account for consumers ability to substitute goods and services for those that are experiencing sharp price increases, and 2) For inter-temporal consuming decisions by consumers from one period of time to the next. Michael Boskin (In government, Boskin is best known for serving as chair of the Council of Economic Advisors under George H. W. Bush), along with fellow authors, makes the argument that the CPI is overestimated by about 1.1 percentage points annually, which compounded over time makes an enormous difference—See "Consumer Prices, the Consumer Price Index, and the Cost of Living; Journal of Economic Perspectives—Volume 12, pages 3-26. Number 1, 1998.

Author's note: The author also recommends: "**What Weight Should be Given to Asset Prices in the Measurement of Inflation?** By Charles Goodhart, 12-23-2001.

¹⁰ How could it be otherwise? Investors, traders and arbitragers make decisions in real time based on real-time information. The CPI is based on history.

inflation; 2) They do not acknowledge that asset prices are mediated in real-time through arbitrage pricing; and finally, and incomprehensibly, 3) That the value of stock dividends are not embedded in stock price. The evidence presented here should make it clear that these observations are not supported by theory, data or practice.

So how does this new observation that the Dow's nominal value is a real value assist investors? Believing otherwise, an investor holding stocks may be inclined to shift their asset allocation away from the Dow, stocks and even fixed income instruments. This may influence investors to become less diversified and actually engender more risk. Corporate managers may be persuaded to adjust certain financial values and projections by the CPI that are already mediated by real interest rates and APT considerations. This may cause a substantial misallocation of resources and hurt shareholder value. The author believes that investors should remain diversified at all times and recognize when it is and is not appropriate to adjust values for CPI guided inflation—this is not always easy but there are some rules that can be applied. This will be the focus of a future article.

Professor Sylla may say that the Dow is not keeping pace with inflation but value is ultimately in the eyes of the beholder and the beholders (investors) say the Dow is worth 14,253.77 as of March 6, 2013, an all-time high. Investor's rejoice!