

## **Sounder Than The Dollar - Can we define away most market risk?**

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### **ALTERNATIVE PERSPECTIVES ON FINANCE**

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Abstract:

## **Sounder Than The Dollar - Can we define away most market risk?**

Elementary textbooks claim that money provides the measuring rod of values. However, this standard of value is itself flexible, shrinking almost every day. Even “real money” loses value over time. The present proposal is to use a modified form of Treasury bill as an Index of the changing value of money.

“Durable” Treasury bills would have no fixed rate of interest, no interest payments, no term, no par value, and not be subject to income taxes. The current value of all such outstanding bills would be defined by continuous market auction. An Index proportional to this current value would be the economy’s own measure of the rate of depreciation of money.

This paper considers only a few of the ramifications of using such an index in financial contracts throughout the economy:

- \*\* Any interest earnings at rates less than on Durable bills would be tax-free.
- \*\* Any bond with its interest payments and principal attached to this index would suffer little, if any, fluctuation in current value as a result of changes in expectations of inflation.
- \*\* Initial payments on home mortgages tied to this index would be practically independent of the current interest rate.
- \*\* These mortgages could be totally financed by customer deposits with little market risk.
- \*\* Federal budget projections might become comprehensible, as they wouldn’t be distorted by highly inflated dollars in the out years.
- \*\* If two countries tied their exchange rates to their respective Indices, they could practically eliminate currency speculation while keeping national currencies.

These alleged benefits presuppose that this Index would be well behaved. Estimates are given for the United States economy over the last half century. This different perspective on value could lead to major improvements in both economic theory and practice.

# Sounder Than The Dollar - Can we define away most market risk?

## Introduction

Elementary economics texts tell us that ours is a system that makes extensive use of *money*. The flow of money is the lifeblood of our system. It also provides the measuring rod of values.<sup>1</sup> How important is it that this measuring rod be stable? Economics is the study of the processes of creating and distributing the most value from scarce resources. It will be a severe handicap if we do not have an accurate measure of the value we are trying to maximize.

Consider a person who wants to buy a home. The Realtor will tell him that this house will cost him \$100,000 if he pays cash, or it will cost him \$250,000 if he pays 20% down and takes a 30-year mortgage at 8.92% interest. This is a simple mathematical truth. What is not so simple is the question of values. Does the mortgage cost more than paying cash? We cannot tell, for money provides a measuring rod that tends to shrink over time.

The conventional economic response to this problem has been the invention of “real money.” This is just ordinary money, adjusted by some measure of the rate of inflation. Assuming for the moment that we have a measure of inflation, our homebuyer problem changes as follows. The Realtor will tell him that this house will cost him \$100,000 in Y2K dollars if he pays cash, or it will cost him \$150,000 in Y2K dollars if he pays 20% down and takes a 30-year mortgage with an estimated 3.54% real interest rate. This is again a simple mathematical truth. However, we have failed to solve our problem of value. While the mortgage involves some extra risk and processing costs to the lender, this accounts for only a small fraction of the \$50,000 difference in real dollars. It is simply not true that a Y2K dollar paid in the year 2030 has the same value as one available immediately.

Once the problem has been rephrased in this way, the solution is self-evident. The market knows how much money tomorrow has exactly the same value as \$1.00 today. It is that same \$1.00 plus whatever one-day interest rate clears the market between available savings and risk-free investments. Repeating this calculation day after day could provide a stable measuring rod of value far into the future.

Unfortunately, we don't have “a market” for interest rates; we have many markets. We have the federal funds rate, 3 treasury bill rates, many FDIC insured bank accounts that all claim to pay “money market rates,” etc. This may appear to be the natural outcome of a free market, but it doesn't need to be this complicated. In the middle third of the 19th century, most currency consisted of privately issued Bank Notes. “It was the exception rather than the rule for bank notes and coins to exchange for each other at par. Each had different prices which varied from day to day, so that it was necessary for storekeepers to keep daily lists of values; and it became a profession in itself to change money, buying and selling it at a profit.”<sup>2</sup> Now, all the bank notes have been replaced by Federal Reserve Notes, eliminating the problem of multiple moneys and greatly simplifying comparison shopping.

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<sup>1</sup> *Economics*, 6th ed. (1964), Samuelson, p. 46

<sup>2</sup> *op. cit.*, footnote on p. 53

This paper proposes that the federal government take over the task of defining the rate of change of the value of money, thereby greatly simplifying comparison saving!

## **Durable Treasury Bills - Proposed Design**

The reader may want to skim through this section on first reading. The justification for the various properties will only become apparent as the applications are discussed. However, it will be difficult to study the applications without understanding the product. Also, please ignore questions of political viability for now. This is a hypothetical study of “What might happen in an economy where preserving value is trivial?” Only if the answers turn out to be highly favorable will we need to consider the politics of a transition.

**UNIT:** “Durable bills,” or D Bills, would come in various sizes, but not be denominated in dollars. Instead they would have a face value of, say, 100 or 1,000 or 10,000 and their dollar value would be determined using an index.

**RATE:** The interest rate on D Bills would be determined by periodic auctions. (With current weekly auctions of U. S. Treasury 3-month or 6-month bills, each bidder states the amount he wants to invest and the appreciation desired over the life of the instrument. The Treasury then sets the interest rate that will just clear the market.) With D Bill auctions, bidders would state the amount they want to invest or redeem and the appreciation needed until the next auction. The Treasury would then adjust the D Index, continuously, through the next auction to match the market-clearing interest rate.

**INDEX:** The “Durable Index”, or D Index, would be an ongoing measure of the dollar value of D Bills. At any time, the Treasury will buy or sell outstanding D Bills at a price given their face value times the current level of the index. By tradition, the index will start at 100 on the first day that D Bills are auctioned, but this will represent \$1.00 for each unit. In the unlikely event of a run on D Bills between normal auctions, an extra auction could be held that would adjust the interest rate to a new, market-clearing, level.

Take note that the biggest difference between D Bills and current Treasury bills is that the interest rate on *existing D Bills*, not just on new issues, adjusts at every auction. The original issue date of a particular D Bill is of no importance; all outstanding D Bills are equivalent (except for the convenience of coming in several sizes). No one needs to roll over an old issue to get a better interest rate. People will only redeem old issues or purchase new issues in order to adjust the total amount of their holdings. In fact, there might not be any new issues after initial saturation, since the national debt is projected to fall substantially. That would not change the auction procedures, which would go on setting rates that would just clear the market for the net level of redemptions.

**TERM:** D Bills will have no term. They will continue increasing in value by accruing interest at the then current rate as long as they are held.

**PAR:** D Bills will not have a fixed par or redemption value. They can be redeemed at any time at a dollar value given by the D Index times their face value.

**TAXES:** A D Bill's increase in dollar value will not be subject to personal nor corporate income tax. (To be justified later.)

**QUANTITY:** D Bills should eventually become the dominant form of federal debt.

## **The D Index is Not an Inflation Index**

Now that we have described how to create the D Index, let's describe what it is not. It might appear that it is just another way to index investments for inflation. However, the crucial difference is that the market is not capable of creating a measure of inflation. It can only balance supply and demand for actual products. It can tell you how much you will need to pay back tomorrow if you want an extra dollar today, but there is no market that has exactly today's mix of goods tomorrow or tomorrow's monetary policy today. So it is up to the economist to survey the economy and try to subdivide the directly measured interest rate into the real interest rate created by investment opportunities and the remainder that just represents increased prices for the same goods.

The rub, of course, is that tomorrow's products are not the same goods. So the economist must estimate corrections for quality and lifestyle changes. The elusiveness of this goal is shown by the following thought experiment:

“Suppose you were given \$10,000 and told that you may spend it on 1990-quality goods and services at 1990 prices, or on 1999-quality goods and services at 1999 prices. If you choose the latter option you are implicitly saying that quality increases between 1990 and 1999 have offset the price increases and so ‘inflation’ between 1990 and 1999 is zero or negative insofar as it affects the purchasing power of your dollar.”<sup>3</sup>

To put this in the starkest of terms, much has been made of the high cost of living for the elderly. Drug costs are rising two and three times faster than the CPI, and yet Social Security payments are indexed to the latter. Would these oldsters then jump at the chance to get their drugs at 1990 or even 1980 prices? What drugs? In many cases the alternative to today's supposed higher cost of *living* would be to not be living at all. How do you factor that into your estimate for the rate of inflation?

Various measures of inflation can serve many useful purposes, especially for short-term comparisons and comparing different countries with similar economies. However, we are just fooling ourselves if we pretend that it could, even in principle, be measured to better than 1 or 2% accuracy per year in a rapidly evolving economy such as we have today. As we tend to index more taxes and benefits and even bonds to inflation, we will never see the end to arguments that the government is carelessly or purposefully misanalyzing the data.

The D Index is an empirical measure of the changing value of money. Provided that D Bills are the dominant form of public debt, it will not be subject to major government misestimation or

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<sup>3</sup> *Macroeconomic Essentials*, 2nd ed. (2000), Kennedy, p. 21

manipulation. The Federal Reserve will still be able to adjust interest rates on D Bills by open market operations, but it cannot do so in isolation. If the Fed moves the interest rate to a level inconsistent with current economic conditions, the economic conditions will change until they are consistent with the interest rate.

## **The Payoff - A Less Risky Economy**

The existence of Durable bills with a Durable Index and changes in the tax law that go with it would cause and/or allow many changes in the way the economy works. We can only look at a few in the remainder of this paper.

**BONDS:** Conventional bonds pay a fixed number of dollars every six months and a fixed number of dollars at redemption. With D Bonds, the payments and redemption value would rise with the D Index. The nominal interest rate would, of course, need to be adjusted downward by the expected value of the rise in the D Index (actually by even more, considering the reduced risk.)

In a stable world, the change would be modest, with smaller - and still taxable - cash interest payments and a larger (tax-free) payment at final redemption. However, in the real, unstable, world the behavior of the market value of the bond would be drastically changed. If market interest rates rise 3%, a conventional 10-year bond **may lose over 20%** of its value, even if its payments are guaranteed. With a D Bond, a 3% increase in market interest rates will cause the market value of existing D Bonds to **rise an extra 3% per year**, because the higher market rates promise higher periodic and final payments. There will be no immediate direct impact in the market value of a D Bond. Undoubtedly there will be some secondary impact, due to changes in the economic prospects for the company in the tighter money environment, but these will be negligible compared to the 20% fall in value experienced by conventional bonds. Thus the market risk taken by the buyer of the bonds has been drastically reduced. His debt instruments really hold their value.

Furthermore, most of the risk saved by the lender has not been transferred to the borrower. There are two extreme cases. If market interest rates rose mainly to compensate for expected and realized increases in the rate of inflation, then the impact on the issuer is negligible. He will need to pay out 3% more than he expected each year, but inflation should increase most other items on his balance sheet by a similar amount, so he is no worse off than before. If this is purely a financial change without any change in inflation, then the borrower will be impacted, but slowly. Such a large change in interest rates is unlikely to be permanent without inflation, it is likely to represent a temporary response to an overheated economy, stock speculation, natural disasters, etc. If it lasts a year or two, then the payments on the bonds will have increased by 3 to 6% by the end of that period. This could have noticeable impact on the profitability of the company, but is still small compared to the immediate 20% loss that might be suffered by the owner of conventional bonds. So D Bonds really have reduced financial risks and not just redistributed them.

**MORTGAGES.**<sup>4</sup> The opportunities for risk reduction in home mortgages is even greater. A Durable Mortgage sidesteps the debate between fixed rate and adjustable mortgages. A D Mortgage could have a nominal fixed interest rate as low as 2%. It would not be safe to use a 30-year mortgage table and conventional qualification criteria with this low rate, because the qualification criteria were developed on the assumption that payments would remain fixed in dollar terms. The minimum payments on a D Mortgage will rise at the D Index rate, which in some historical periods was several percent higher than the rate at which wages rose. (See Figure 1 on page 11.) Thus, the fraction of total income dedicated to the first year mortgage payments should be cut by about a tenth and the term should probably be shortened to 20 years. Even with all these adjustments, a homebuyer could qualify for a 20% bigger loan by using a 2% 20-year D Mortgage than by using an 8% 30-year conventional mortgage.

There are many more benefits from the use of D Mortgages than the change in the qualification criteria. Just as D Bonds practically eliminate the fall in market value from rising interest rates, D Mortgages practically eliminate the change in qualification criterion with market interest rates. Thus it would make the housing market one of the last sectors to be hit by rising interest rates rather than the first. The total cost of housing would also be lowered. Fixed rate mortgages must, on average, charge higher rates because of the large risk the lender is taking that market rates might go up. Even adjustable rate mortgages must charge higher rates because they usually contain caps on the annual and maximum interest changes. Neither of these problems affect D Mortgages, so the rates charged to borrowers could be closer to the cost of funds for the lender. The cost of funds would itself be less, because it would be perfectly safe to rely on short term deposits (see next).

**MORTGAGE FINANCING:** If mortgage payments and principal are adjusted using the D Index, then the return to the lender will be equal to the interest rate earned on D Bills plus the nominal fixed rate of about 2% or less. If the lender qualifies for federal deposit insurance, then his deposits are as safe as Treasury bills. Thus, he will always be able to use short-term deposits to fund his mortgages without any risk that his cost of funds will rise higher than his earnings on outstanding mortgages. There are still default risks, but we have eliminated all risk related to the term structure of interest rates.

**MONETARY POLICY:** Currently the impact of monetary policy on the economy might be considered paradoxical. When we get to that part of the business cycle where the economy is in danger of overheating, the Fed sells Treasury bills, lowering their price and taking money out of circulation, both of which raise interest rates. The purpose is to reduce demand for a few months in order to avoid shortages of labor and capacity which are likely to cause more inflation. And what parts of the economy are impacted most severely by this rise in rates? New investments in capacity and housing. These are precisely the slowest parts of the economy to turn around, and cutting investment in new capacity is certainly an odd response to a shortage of capacity!

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<sup>4</sup> The forerunner of the D Mortgage was presented in "Inflation and the Housing Market: Problems and Potential Solutions", by Donald Lessard and Franco Modigliani, in *New Mortgage Designs for Stable Housing in an Inflationary Environment*, Proceedings of a conference held in January 1975, sponsored by the Federal Reserve Bank of Boston, HUD, and FHLBB. This seminal work got the author started on his 20-year study of the perverse impacts of inflation on the economy.

As we have seen above, the impact of monetary policy on bonds and mortgages will be much less if they are redesigned to use the D Index. Thus interest rates would need to be raised higher than before in order to slow the economy (but certainly not enough to undo the advantages listed above for new bonds and mortgages). The larger increases would allow the impact to spread more quickly to other sectors of the economy that can adjust much more quickly -- and recover more quickly -- than durables. This might well reduce the delay between changes in monetary policy and in the level of economic activity. The net result of weakening the impact of monetary policy on long-term investments could well be to improve the Fed's ability to fine-tune the economy by shortening the lags in the adjustments.

**THE FEDERAL BUDGET:** The tax treatment of D Bills is the source of its greatest benefits, but it will also be the greatest impediment to implementation. Unfortunately, it just won't work without a revamping of the tax laws.

Part of the problem is philosophical. On the margin, people will invest in D Bills because they believe that the value of the money they can collect, after taxes, by selling D Bills next year will be the same as the value of the money it takes to purchase them this year. Thus the D Index cannot represent constant value without a complicated correction for the average marginal tax rate of all purchasers.

However, the main problem is very practical. Consider bonds that are created with low contract interest rates, but with the principal and payments tied to the D Index. Under present tax law, the increase in the principal is considered to be taxable income. So, if the rate of inflation grows to several times the contract interest rate, the taxes levied on the creditor will become greater than the interest payments and he will experience negative cash flow, perhaps until maturity. If nominal interest remains taxable when accrued, this negative cash flow would certainly reduce the desirability of these bonds, so the market price of D Bonds could not remain stable under rising inflation.

Part of the solution is also philosophical. If the D Bill represents constant value, then the selling price is worth no more than the purchase price, so where is the income to be taxed? (There is a subtle point here. If the D Bill rate has been determined with foreknowledge of the tax impacts, then the amount of the tax itself is truly income. However, this leads to an infinite regress, since this "income" should only be taxed at, say, 30%, but, that means there is less "income" and still less tax, etc. , until the "income" and tax go to zero.) If investors are using D Bills just to keep from losing wealth, any tax on the nominal income from D Bills is not really an income tax, but a wealth tax. Of course, this problem is not unique to D Bills; we will get to other interest income below.

For those who have given up on the idea that tax policy should have a rational basis, there are still two ways to make D Bills tax-free in practice. One is simply to declare taxes on D Bills to be redundant. Since the federal government is both the creditor and the tax collector, why pay out money with one hand that will just be taken back by the other? Declaring that no taxes will be collected on the increased dollar equivalent of D Bills will reduce federal revenues, but it will reduce federal expenses for interest payments by almost as much, as the market will factor in the tax savings in setting the market price. Another way to make them practically tax-free would be to claim to withhold taxes at the source. By setting the withholding rate near the tax rate of most purchasers, we could again avoid paying out more than an effective tax-free rate.

However it is justified, the existence of a D Index that purports to be a measure of the changing value of money over time, and of D Bills that pay tax-free interest equal to this changing value, will have a profound impact on other interest, dividend, and capital gain income. Why should someone need to pay capital gains on the sale of stock if the price has risen less than the D Index? Why should a savings account paying 2% be considered taxable income, if a D Bill paying 4% is just considered to be holding its value? The obvious answer is that they should not have to pay such taxes. All investments should be compared to the D Index in figuring taxable income. (This would not be nearly as complicated as opponents of inflation corrections to taxes seem to believe, but this is not the place to go into detailed examples.)

The immediate impact of declaring part of what is currently considered interest and capital gains income to be tax-free will obviously be to reduce federal tax receipts. This will be partly offset by major reductions in interest payments on the national debt. Much of the remaining loss could be recovered if the many existing tax breaks that were allegedly designed to compensate for the effects of inflation are reduced or eliminated because they have become redundant. These would include such major items as the tax deduction for mortgage interest and exemptions or lower rates for capital gains. (Refer back to page 4 for discussion of political viability.)

Great as its impact would be on the current federal budget, a D Index might have an even greater impact on the planning for future budgets. It is difficult to calculate or to comprehend projections of expenses and surpluses in dollars for 10 or more years into the future. A percent change in the assumed inflation rate can cause a trillion dollars to disappear in an instant. If all future values were corrected by the D Index, they would grow much more slowly and be much less sensitive to inflation and interest rate projections. They would also illuminate the subterfuge behind the current projections that we can eliminate the public debt in 12 years. These are predicated on a 1997 budget agreement to hold much spending constant in "real" dollars. However, correcting by the D Index will show that the value of this spending is projected to keep falling. Releveling these expenditures (which would still leave them falling relative to GDP, see p. 11) would eliminate much of the projected surplus.

A very rough application of this proposal to the July budget projections of a \$2.17 trillion surplus over the next decade would go as follows. Allowing expenditures to rise as fast as the D Index would cut the surplus by at least half. "Deflating" out years by the D Index would drop what was left by another quarter. Then divide by 10 to get about \$75 billion dollars a year of surplus. This is about **4%** of the current federal budget, a nice piece of change, but nothing to get excited about. For example, the deficit in 1992 was **26%** of income, and this was just five years after it had been projected to go zero in that year!

So eliminating the national debt will be more difficult than is now claimed, but D Bills also weaken the rationale for eliminating it. Once the debt is in the form of D Bills, it is essentially sterile. If the federal budget is balanced before considering interest payments, then the debt will remain constant when measured by the D Index, and fall slowly as a fraction of GDP. So where is the pain that we are bequeathing to future generations? Furthermore, we need a national debt in order to have a D Index. No one wants to go too far and redeem all Federal Reserve Notes, because then what would we use for money? Similarly, we shouldn't want to get rid of a debt that provides the United States, and the world, with a highly liquid and low risk store of value.

**INTERNATIONAL TRADE:** It should be possible to use D Bills to buffer the risks of international transactions in much the same way they worked to smooth out the interest rate impacts on the market prices of bonds and mortgages. The method would be for two or more governments to agree to support a fixed exchange rate between each others Durable Bills.

The benefit here would be two-fold. First, the governments would control a bigger pot of funds than the speculators. Currency markets transact on the order of a trillion dollars a day, which can swamp any existing government reserves of gold or foreign currencies. However, the collective national debts run to over ten trillion dollars. Second, and more important, any attempt to break a currency would be self limiting. For example, if the Pound were expected to weaken, British citizens could all try to buy dollars. This would mean that they would first buy British bills and then exchange them for American bills and sell those for dollars. However, the strong demand for dollars would lower the interest rate on American D Bills and all other dollar investments. Similarly, the weak demand for Pounds would raise interest rates in Britain. The net result would be that the Pound would fall in value at a rate equal to the difference in the two interest rates, and no gain at all for the speculators! The speculators could not gain because they would end up with just as many D Bills as they started with, whether they parked their money in America or left it in Britain.

This is an exaggeration. For example, if the American stock market was expected to do much better than the British market, then transferring funds to American would be profitable. However, there would be no hurry. Since the drift rate between the two currencies would be equal to the difference in their local interest rates, this would be a small fraction of one percent in any one week. So there would be no overnight rushes to beat the expected fall in the exchange rate.

## **An Historical Approximation of Durable Money in the U. S.**

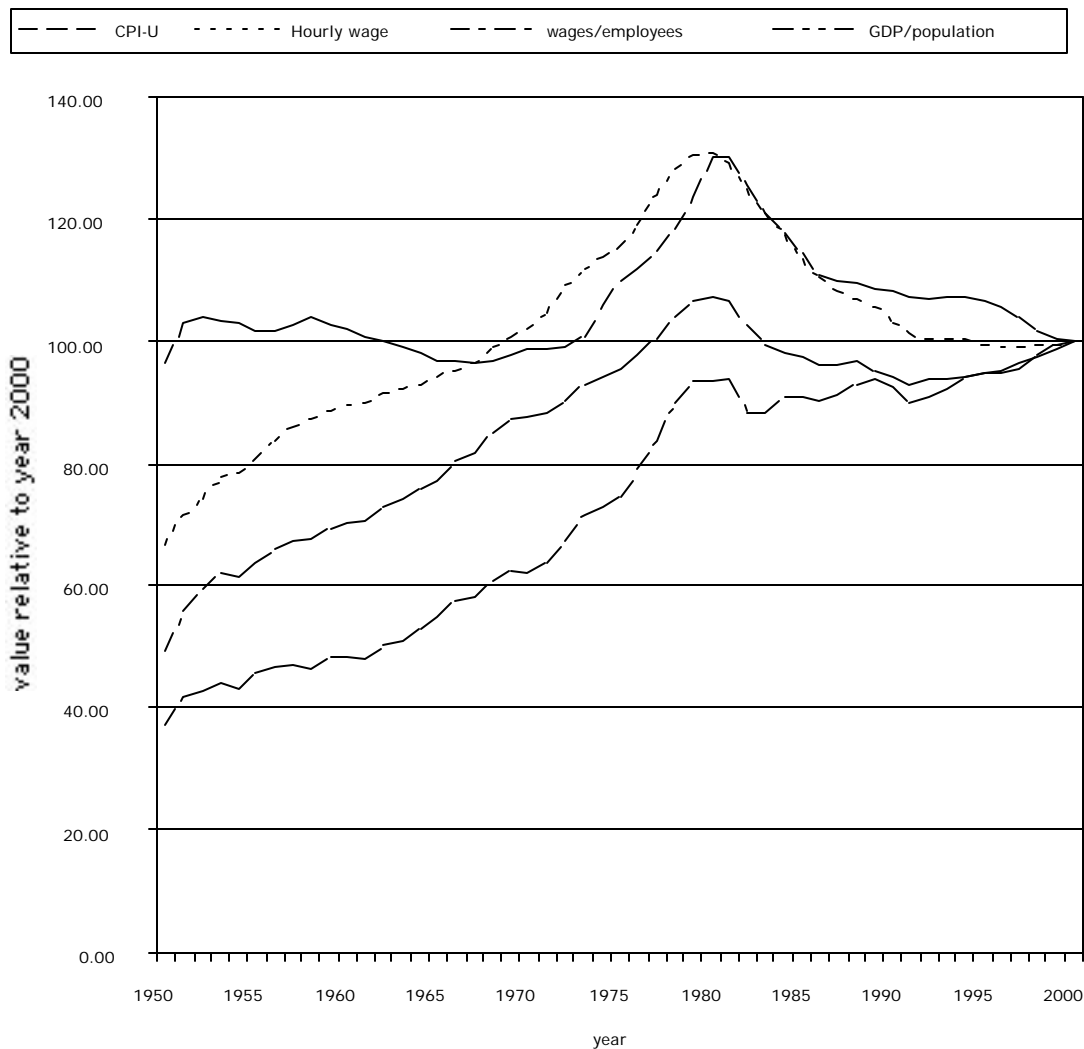
All this theory would be meaningless if it turned out that payments on D-Indexed bonds or mortgages become unaffordable to the borrowers. For example, if payments are adjusted by the D Index and it rises 4% a year, this means that after 20 years, the payments will have increased by 119%. And the index might rise even faster than this. This is much more than payments are allowed to rise on any common current bonds or mortgages. Whether this is affordable is an empirical question about how interest rates, inflation, and wages move in the real economy.

Figure 1), below, shows the change in value of four different economic indicators for the United States economy over the last 50 years, where the value of the dollar has been adjusted using the D Index. Since the D Index does not yet exist, it has been approximated by averaging the yield on all 91-day U. S. Treasury bills outstanding each month and reducing the yield by 28% to account for income taxes. Income tax brackets have changed drastically over 50 years, but if you look for the “middle” taxpayer, that is, the one such that half of the taxes are paid by richer taxpayers, his marginal bracket has generally been at or slightly above 28% in recent decades. Tax rates were higher in the 1950s, but this makes little difference, because the interest rates were so low at the time. (This method was disdained on page 8, but I have to take history as I find it.)

The indicators that are shown are the Consumer Price Index for all Urban consumers (CPI-U), the average hourly earnings of production or non supervisory workers (Hourly wage), total wage and salary income divided by total employment (wages/employees), and the Gross Domestic Production divided by total population (GDP/population). These have all been normalized to the value of 100 for Jan. 1, 2000.

An abbreviated listing of the data in the graph is also given in the table below it. The final line in the table shows the value, according to the D Index, of \$100 in each of these years.

Figure 1



**Figure 1) - Four Economic Indicators normalized by the D Index**

Year	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000
CPI-U	97	102	102	97	99	110	130	114	108	107	100
Hourly Wages	67	81	90	94	102	115	131	113	103	100	100
Wages/Empl.	49	63	70	77	87	95	107	97	94	95	100

GDP/person	37	46	48	55	62	74	93	91	92	94	100
\$100	677	642	587	526	439	353	277	184	143	120	100

The first item to note is that the D Index approximately keeps up with inflation. After tax interest rates failed to rise as fast as inflation in the 1970s and they failed to slow down as much as inflation in the 1980s, but otherwise they tracked each other within 10% over the entire period. Even the **30%** bump near 1980 is a modest deviation when you consider that the conventional CPI-U measured in dollars rose **600%** from 24.1 to 168.5 over the 50-year period! This provides another justification for making the “gains” of D Bills tax-free. While it was argued in the abstract that income should be calculated by using a market-determined measure of value rather than a government calculation of the rate of inflation, the practical results are not much different.

While there are major uncertainties in the measurement of inflation over the long term, the sharp break in the curve near 1980 is very real. It is the direct result of a change in Federal Reserve (and other federal) policy, from one of trying to moderate interest rate hikes in the face of growing inflation to trying to destroy inflationary expectations by raising interest rates enough to cause a double recession. This provides us with almost a textbook case of how far the D Index can deviate from direct measures of inflation. The answer it gives is that the D Index can rise about 3% a year faster or slower than the rate of inflation for several years.

The other measures in the figure are more relevant to the uses of the D Index. There is no perfect way to measure an average income. Three different measures are shown here. We see in Figure 1) that hourly wages of hourly workers rose much faster than inflation before 1970 and have about held even with it since then. A more inclusive measure is to take total salaries and wages in the economy and divide by the total employment. This shows that incomes have been rising faster than inflation for almost all periods except during the late 1970s stagflation. However, we are now including all workers, even CEOs, so much of this increase may be concentrated in the upper tier of incomes. Finally, we simply compare the entire economy to its population. This shows that the economy grew enough to increase the wealth per person, even in terms of the D Index, over nearly the entire period, but much more slowly since 1980.

So there is room in the economy for tax-free, risk-free Durable Bills. Any consistently employed debtor with payments indexed to D Bills has little risk of his payments becoming substantially larger relative to his income.

However, some people are much more risk adverse than others. A homebuyer contemplating using over a third of her income for mortgage payments for the next 20 years would not consider the 30% rise in the graph around 1980 to be a minor perturbation. It is straight-forward to modify a D Indexed mortgage to reduce her risk substantially. If the lender will be charging a 2% fixed rate on a D indexed mortgage, the mortgage payments can, nevertheless, be calculated each year by reference to a 4% mortgage table. This will raise the initial monthly payment by almost 20%, but will allow the remaining payments to grow 2% less than the D Index each year. This will lead to the following result

during the worst period shown on the table, namely the drop in value of hourly wages from 131 in 1980 to 113 in 1985 and 103 in 1990. Under the original D-Indexed mortgage, payments would have risen relative to hourly wages by 16% by 1985 and another 10% by 1990. Using the 4% mortgage table, payments would rise only 5% more than wages by 1985 and then less than wages by 1990. So a D-mortgage with a 2% tilt will remain affordable.

A similar adjustment can be made with D-bonds, for those buyers who would like a larger cash flow at the expense of less appreciation in the principal.

## Questions needing further study

**Would it be inflationary?** If Durable Bills merely provide a baseline for interest rates and a substitute for existing Treasury bills, they should just make the Feds fight against inflation a little easier, because policy changes would be more obvious and operate more quickly. Problems could arise if other uses are found for it. Individuals might start saving it at home, since it gives much better protection against inflation than cash does. But what if they then start using it for transactions? What if labor contracts or even retail prices get tied to the D Index? Not only could this effectively increase the money supply 10 fold, but it might ultimately displace Federal Reserve Notes. Then the D Index would be undefined, and the whole concept would be in limbo!

There are ways to avoid this slippery slope. It would be very convenient to have D Bills in the form of bearer bonds that could be passed around like cash. However, if this has too much impact on control of the money supply, then there can be a requirement that the owner be registered. There already is a risk if too many union contracts are indexed to the CPI. If the D Index increases this risk, it could be controlled by legislation.

**Is the CPI too large or too small?** At one point I argue that the true rate of inflation in the 1990s may be as small as zero, but Figure 1) shows that I claim that \$100 in 1990 has the same value as \$143 in 2000. Can both be correct? They are not measuring the same thing. A person living in the year 2000 may need more money to compensate for the more limited selection if he must purchase only items available in 1990. A person living in 1990 will need more money to compensate for delaying his purchases for 10 years. So both statements may be true. However, while the first is merely a conjecture about the inflation rate, the second is a market measure of comparative value.

**Are the tax changes practicable?** Almost all the suggested tax changes are likely to be opposed by those they effect. It will be very important to present the whole picture. For example, states will lose their special tax break on bond issues. They must consider how everyone can enjoy lower bond costs by indexing to D Bills (and thereby getting the advantage of short-term interest rates even on long-term investments). Furthermore, if the state has a good credit rating, its interest rate will be only slightly higher than growth in the D Index, so it's bonds will still be nearly tax-free.

**Would it bring competitive interest rates to the lower classes?** Currently the term "money market account" is applied to accounts that may pay well below 2% interest (less than the rate of inflation) or more than 5% (as much as treasury bills themselves). The D Index could provide a "gold standard" for interest bearing accounts. Only the smallest of accounts could afford to pay significantly

less, since anyone can rent a safe deposit box for about \$1 a month and stuff it with D Bills. This would give them the same return (and tax-free) that banks get when they loan money to the government.

**Would it encourage savings?** There are two beneficial impacts here. We have been inventing special tax-free retirement accounts for generations to help encourage saving. With D Bills, anyone can have as much tax-free saving as they want. Also, as mentioned above, the poor would have easier access to accounts that pay a competitive interest rate. These higher rates would also encourage more saving. On the other hand, successful investments in the stock market would be taxed substantially, perhaps even more than today. But we don't need more incentives for people to get into stocks.

**Is my historical data relevant?** Maybe not. One source says 80% of current buyers of 91-day Treasury bills (banks) don't pay taxes on the interest they receive. If that remains true for D Bill purchasers, it would not seem reasonable that the interest rate would drop 28% when they become tax-free. However, the data might still work because of the pass-through of benefits and substitution. If the bank depositor saves on taxes, then he will be willing to accept a lower rate on passbook accounts and this will flow through to affect the bank's cost of funds. Also, those people in the highest tax brackets would be the most likely to seek out tax-free funds, so the composition of Treasury bill purchasers would change to include a much higher percentage of persons subject to income tax.

Ultimately, the historical data is just one example of how the economy might behave. We are unlikely to go through the same stagflation of the late 1970s again, with or without D Bills, because we, hopefully, have learned something from the experience. Earlier data is even less relevant because the financial market is much less regulated now.

**Would it change investment decisions?** In theory, businesses already take monetary policy and inflation into account when they decide on capital investments. They also have a large supply of financial instruments available to hedge their risks. So why would either businesses or their lenders want to change to the less predictable payments associated with the use of D-indexed bonds?

Predictability is in the eye of the beholder. People used to measuring everything in terms of current dollars will be put off by the wide range of scenarios of possible payments with D-Bonds. However, those who get used to thinking in terms of equal values will be amazed at how much more stable and balanced their cash flows will be. If inflation suddenly ends, it will be conventional bonds, not D-bonds, that will be difficult to retire. If inflation suddenly increases, it will be adjustable rate bonds, not D-bonds, that will have excessive interest charges. As we found in Figure 1), uncertainties in value projections are limited to about 3% a year for a few years, and even less over longer terms. Uncertainties in inflation projections can be much larger.

It may be a tougher sale for D-indexed mortgages, because homebuyers think that nothing could be lower risk than fixed payments. If lenders are forced by mortgage disclosure rules to provide worst case scenarios in isolation, they won't sell a single D-Mortgage. Who would want a mortgage where payments are likely to rise 200%, when they could have one where payments are absolutely fixed? The correct answer to this question is people who want the biggest house they can afford, who have good prospects for a growing income, who want to minimize their interest rate, and who understand economics. This may be a rather small group! However, it could grow substantially as experience accumulates. During times of high inflation there will also be another group, those who cannot afford a

decent sized convention mortgage or ARM, but could afford the starting payments on a D-mortgage. In this case it will be the lender who must be well informed, so that borrowers are not qualified too easily for mortgages that could become unaffordable. Once the lenders learn how to qualify borrowers for the new instruments and gain from experience over a complete business cycle (we haven't repealed them yet, have we?), D-indexed mortgages should have the potential to dominate the market, because the interest costs should generally be lower than with either conventional mortgages or ARMs and the payments will tend to follow the earnings of the purchaser.

## **Closing and Apology**

Clearly the introduction of Durable Bills would have major impacts on the operation of the national and international economy. It would not eliminate many kinds of risk, but it could end the compounding of risk that occurs when short-term changes in market interest rates are extrapolated far into the future and capitalized into the present value of various investments. Reduction of this source of variability should make the economy run more smoothly and more efficiently for all concerned. This should be a goal worth much further study and eventual implementation.

Footnotes are sparse in this paper, only partly for lack of trying. The author doesn't pretend to have located all other researchers interested in the topic of how to measure value over time. However, he has undertaken enough discussions, mostly with faculty at Washington University in St. Louis, to determine that the literature must be rather small. There is an interesting literature on alternative mortgage instruments that grew out of the Modigliani reference given earlier and almost led to a Price Level Adjusted Mortgage (PLAM) designed by HUD in the 1980s. The D-Mortgage would be much much simpler than any of these, but only because it assumes that the D-Index has already been invented. There is, of course, a voluminous literature on federal tax policy, but even that subpart concerned with indexing for inflation has little to say about the path taken here.

So where did these ideas come from? The author's penchant for reconsidering how to measure basic properties probably derives from his background in physics, where the meaning of space, time, light, particles, etc. seems to change each century. After more than a decade studying how mortgages fail to work well under conditions of rapidly changing interest rates and inflation, it became apparent that much of the problem was related to the lack of a firm yardstick of value over time.

For numerical examples of the operation of D-Bonds and D-Mortgages, as well as updates on the author's attempts to find more relevant literature on the subject, please send him an E-mail.