

## **The Real Interest Rate**

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### **Summary**

Inflation is now ingrained world-wide in good times and bad. The public will increasingly expect protection of purchasing power, in financial services products and other services. It therefore becomes necessary to earn a satisfactory real interest rate over and above inflation.

This article discusses the importance of the real interest rate. It presents real interest rates which have been earned over a 100 year period for the United States, and over a 7 year recent period for six other countries. Variations are shown by era, by country, by recent calendar year, and especially by investment strategy. The effect of expenses and taxes is considered. Suggestions are made for improvement in real rates earned.

The paper determines 4.38% as the absolute real rate of return. This is the real interest rate which money can be expected to earn, measured over a very long period of time.

### **Résumé**

#### **Le Taux d'Intérêt Réel**

L'inflation est aujourd'hui enracinée dans le monde entier dans les bons moments comme dans les mauvais. Le public s'attendra de plus en plus à une protection de son pouvoir d'achat, dans les produits des services financiers et d'autres services. Il devient donc nécessaire d'obtenir un taux d'intérêt réel satisfaisant supérieur à l'inflation.

Cet article traite de l'importance du taux d'intérêt réel. Il présente les taux d'intérêt réels qui ont été gagnés sur une période de 100 ans pour les Etats-Unis, et sur une période récente de 7 ans pour six autres pays. Des variations sont indiquées par époque, par pays, par année récente et surtout par stratégie de placement. L'effet des frais et des impôts est étudié. Des suggestions sont faites sur la façon d'améliorer les taux réels obtenus.

L'article détermine que le taux réel absolu de rendement est de 4,38%. C'est là le taux d'intérêt réel que l'on peut s'attendre à obtenir de l'argent, calculé sur une durée très longue.

## Introduction

I have been studying the difficult subject of inflation ever since developing the Cost-of-Living Policy for Life Insurance Company of Georgia in 1968. Inflation is now ingrained worldwide, in good times and bad. It is a challenge which needs response. Buyers of financial services products will increasingly feel entitled to protection of purchasing power. Such protection is already required by law in some instances, and this requirement is likely to grow in importance. I have one book and six published articles dealing with inflation and related subjects; they are identified in the bibliography. This new article, "The Real Interest Rate" is next in that series.

### I. Importance of the Real Interest Rate

The real interest rate is the rate which can or has been earned over-and-above the inflation rate. Its importance can be summarized as follows:

(1) There are prospects of counteracting inflation if a satisfactory real interest rate can be earned.

(2) If a fund is expected to throw off a permanent income stream in constant purchasing power, then only the real interest, equivalent to its total earnings, may be withdrawn; if this happens the fund will continue to

consist of "real capital"; this is a point which is crucial to numerous educational and other endowment funds, and should be crucial for pension funds and life insurance products which seek to maintain purchasing power payouts.

(3) A point similar to (2) applies to national social security systems for retirees; such systems can work in the long run only through real interest earnings on the nation's stock of real capital.

(4) If a financial services product is to be denominated entirely in "purchasing power units", then the correct interest rate to use in the funding of it is similar to the real interest rate.

(5) If a satisfactory savings rate is to be expected, savers must receive a reasonable real interest rate over-and-above inflation.

## II. What Real Interest Rate Has Been Earned?

The real interest rate obviously depends on the degree of inflation and the actual interest rate earned; the latter, in turn, depends on the investment strategy employed. I now have 100 years of data and have summarized the results in Exhibit A.

**Exhibit A**  
**Actual and Real Interest Rates Earned - USA**  
**(by Investment Strategy)**

<u>Strategy</u>	1890-1989 (100 years)		1983-1989 (seven years)	
	<u>Actual</u>	<u>Real</u>	<u>Actual</u>	<u>Real</u>
Retrospective Worst	- .99%	-3.69%	4.43%	.80%
3-Month Treasury Bills	3.88	1.05	7.47	3.74
3-month Commercial Paper	4.33	1.49	8.13	4.37
Long-Term Treasury's	4.71	1.86	13.50	9.56
Corporate Bonds	5.09	2.23	14.60	10.62
Common Stocks	10.50	7.49	18.93	14.80
Prudent Mixture Strategy	10.18	7.18	15.60	11.58
Mean Prudent Mix. Strategy	7.76	4.82	15.21	11.21
All-Out Strategy	12.25	9.19	15.84	11.81
Retrospective Best	<u>15.30</u>	<u>12.16</u>	<u>20.93</u>	<u>16.73</u>
<b>Averages</b>	<b>7.30%</b>	<b>4.38%</b>	<b>13.46%</b>	<b>9.52%</b>

Sources: See Endnotes a) and b)

Readers are referred to Source 1, chapter 2 for a detailed discussion of the various strategies. Suffice it to say here that the Mean Prudent Mixture Strategy is a balanced portfolio consisting of 22% three month Treasury's; 22% long-term Treasury's; and 56% common stocks. Henceforth in this article this strategy will be called the "Balanced Portfolio". Real interest rate has been calculated by the formula on page 25 of Source 1.

It is worth noting that all strategies are based on "total yield" - i.e. on purchase January 1 and sale on December 31; all results are arithmetic averages of the results for individual calendar years. The author believes that total yield is the proper way to look at investment results. Furthermore, the year-by-year strategy is in keeping with the consistent object of counteracting current inflation. Endnote b comments further

If there is one average real rate earned, then it is probably a composite of the rates earned by various strategies - good, bad, and indifferent. The averages in Exhibit A estimate such a result; it was 4.38% for the 100-year period and 9.52% for the last seven years. (The fact that the recent result is much higher will be commented upon later.)

There may be an "absolute real rate of return", which would be the real rate which money can be expected to earn on average measured over a very long period of time and based on a conglomerate of investment strategies - good, bad, and indifferent. Exhibit A would suggest 4.38% as the absolute real rate of return.

### III. Variations by Era

Not surprisingly, the real interest rate has varied remarkably according to economic era. The ten economic eras shown in Exhibit B were selected on the basis of their widely different inflationary characteristics. I show real rates of return for two strategies: three month bills and the balanced portfolio. I show the former because there is a common propensity to compare inflation with short rates; and the latter because it came close to duplicating the absolute real rate over the 100-year period; furthermore, a balanced portfolio not unlike this one is representative of numerous foundation, endowment, and pension funds.

EXHIBIT B

Real Interest Rates Earned by Economic Era - USA

<u>Era</u>	<u>Comment</u>	Infl. <u>P. A.</u>	<u>Real Interest Rate</u>	
			<u>3-month Bills</u>	<u>Balanced Portfolio</u>
1890-15	Very low infl	.5%	3.6%	5.2%
1916-20	Very high infl	14.7	-8.9	-8.5
1921-22	Deflation	-8.5	14.1	19.5
1923-30	Stability	-0-	3.6	12.2
1931-33	Deflation	-7.0	8.5	- .3
1934-40	Stability	1.1	- .9	5.0
1941-48	High Infl	7.1	-6.2	-1.4
1949-68	Moderate Infl	1.9	.8	7.7
1969-82	High Infl	7.6	.0	.3
1983-89	Moderate Infl	<u>3.6</u>	<u>3.7</u>	<u>11.2</u>
Averages (100 Years)		2.8%	1.05%	4.82%

Sources: See Endnote C)

The two World War periods resulted in high inflation and were devastating to the real interest rate. The high inflation period (1969-82) of recent memory, was also devastating to the real interest rate. Although real interest appears to suffer in high inflationary eras, there are better periods even within such eras; also it is possible to improve real interest in any period, by use of proper investment strategy. Such matters require further study.

In the most recent seven year era, 1983-1989, real returns were unusually high and in marked contrast to those of the preceding era of high inflation (1969-1982). Results were very similar to those of the famous era of stability, 1923-1930 and are the best achieved since that long-ago era. A look at Exhibit B might lead to the conclusion: "The good times can't continue".

#### IV. Recent Variations by Country

Real interest rates also varied by country, but not as widely as the results by era. I have obtained data similar to those shown in Exhibit B for seven countries. The data refer only to the most recent period 1983-1989. Real returns from the balanced portfolio were approximated in the case of six countries (see Endnote d), but are accurate for the USA.

Exhibit C

Real Interest Rates Earned 7 Countries

<u>Country</u>	CPI Increase <u>Per Annum</u>	Real Interest Rate	
		<u>3-month</u> <u>Bills</u>	<u>Balanced</u> <u>Portfolio</u>
U.S.A.	3.6%	3.7	11.2%
Japan	1.4	3.7	17.8
Germany	1.7	3.0	15.7
United Kingdom	5.1	5.4	11.4
France	5.0	4.3	19.4
Spain	8.3	4.0	13.1
Canada	<u>4.5</u>	<u>5.0</u>	<u>8.8</u>
International Average	4.2%	4.2%	13.9%

Sources: see endnote d)

Real interest rates arising from 3-month bills were relatively flat by country, despite marked differences in inflation rates. (The United Kingdom might be an exception on the high side. That country is the only one which rather consistently showed a "reverse yield curve", according to published information)

Real interest from the balanced portfolio was very high, reflecting stock market gains in all countries, especially France, Japan, and West Germany; also reflected were substantial market value gains in long-term bonds. (Incidentally, "junk bonds" were not taken into consideration in this article.) The conclusion may again be reached: "The good times can't continue".

#### V. Recent Variations by Calendar Year

Exhibit D shows recent variations by calendar year, for the seven countries combined.

EXHIBIT D

Real Interest Rates Earned by Calendar Year - 7 Countries

<u>Year</u>	<u>CPI Increase</u> <u>Per Annum</u>	<u>Real Interest Rate Earned</u>	
		<u>3-month</u> <u>Bills</u>	<u>Balanced</u> <u>Portfolio</u>
1983	5.8%	4.3%	15.5%
1984	5.3	4.1	12.4
1985	4.6	4.0	22.9
1986	3.0	4.1	20.2
1987	3.0	4.0	- .4
1988	3.2	4.1	14.0
1989	<u>4.7</u>	<u>4.7</u>	<u>12.5</u>
Average (7 years)	4.2%	4.2%	13.9%

Sources: see Endnote e)

Considerable variation took place in inflation rates across this seven year period, and yet the real interest rate earned from 3-month bills was remarkably stable. There was considerable variation in the balanced portfolio rate; it did especially well in 1985, which was a very good year for stock market gains and was the maximum year for ride-up in long bond market values. The balanced portfolio suffered severely in 1987, which was the year of the stock market "crash".

## VI. The Effect of Expenses and Taxes; Implications for the Savings Rate

Data shown above do not take account of expenses and taxes. It is of course necessary to do so, and the effect can be devastating.

For an individual investor, I have used a 5% expense rate for 3-month bills and a 15% expense rate for the balanced portfolio; I have used a 35% tax rate to represent Federal, State and miscellaneous taxes. These assumptions lead to the results for the United States shown in Exhibit E.

Exhibit E - Actual and Real Rates (adjusted) - USA

	<u>100 years</u> <u>1890-1989</u>	<u>7 years</u> <u>1983-1989</u>
Three Month Bills:		
Actual	3.88%	7.47%
Real		
Adjusted for inflation only	1.05	3.74
Real		
Adjusted for expenses, taxes and inflation	- .39	.97
Balaanced Portfolio		
Actual	7.76%	15.21%
Real		
Adjusted for inflation only	4.82	11.21
Real		
Adjusted for expenses, taxes and inflation	1.45	4.63
Sources: see Endnote f)		

It appears that three month bills yield only a miniscule return for an individual investor, after expenses, taxes, and inflation are taken into account. This surely is one explanation for the low savings rate in the United States. Middle class families accumulate very little other than their homes. Even for the balanced portfolio, expenses, taxes, and inflation eat up 70% or more of the actual return.

The situation is far better if expenses can be limited and especially if taxes can be avoided or deferred. There are numerous endowment, foundation, and qualified pension funds in the United States which effectively avoid or defer taxes, and even achieve low expense rates. For those, the unadjusted real interest rates shown in this paper may be close to realistic. the "inside interest build up" on individual life insurance is another example of a tax deferred vehicle. Any vehicle which avoids or defers tax is vastly superior to a fully taxed investment.

The United States government would be well advised to stimulate the savings rate by permitting more favorable tax treatment for "individual retirement accounts" and similar plans; and by encouraging rather than discouraging the adoption of pension plans by employers.

## VII. Strategies to Achieve Real Interest

Satisfactory real interest may be improved by using vehicles with low expense rates and which avoid or defer taxes. Investment strategy considerations are even more important, as is made clear by the vast differences between results from 3-month bills and from the balanced portfolio (both of which are fixed strategies). A "trading strategy" which varies asset allocation, by economic period, such as the Prudent Mixture Strategy described in Source 1, may improve results even more.

## VIII. Conclusion

The real interest rate is grail-like. It is elusive but very important. In this modern era of built-in worldwide inflation the achievement of real interest is especially important.

## Bibliography & Sources

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2. Addendum (to the above book) Showing 1986-89 Data, published by UPDATE, 28 Lenox Pointe N.E., Atlanta, Georgia 30324 (\$12.00 for four years)
3. "Life Insurance Based on the Consumer Price Index" by John M. Bragg and David A. Stonecipher, Transactions of the Society of Actuaries, Volume 22.
4. "Life Insurance with Guarantees Against Inflation" by John M. Bragg, Transactions of the 19th International Congress of Actuaries, Volume 1, Oslo (1972).
5. "Inflation Rates and Investment Yields: The Interrelationships", by John M. Bragg, Transactions of the 22nd International Congress of Actuaries, Volume 5, Sydney (1984).

6. "Real Interest, Real Capital, and the Prudent Mixture Strategy", by John M. Bragg, Transactions of the International Association of Consulting Actuaries, Volume 2, Eleventh Conference, Munich (1988).

7. "A Practical System of the Economics/Investments World" by John M. Bragg, Transactions of the International Association of Consulting Actuaries, Volume 2, Twelfth Conference, Auckland, New Zealand, 1990.

8. "International Financial Statistics", a monthly publication of the Bureau of Statistics of the International Money Fund, Washington D.C. The issue of July 1990 was especially used for this paper.

9. Wall Street Journal - first issue of every calendar year, 1984 - 1990.

10. Reply to Review of Source 1 by John M. Bragg - The Journal of Risk and Insurance, ISSN 0022-4367, March 1990 page 141.

## Endnotes

- a) Exhibit A was compiled from Source 1 (above), page 56; Source 2; Source 8; and Source 9.
- b) The data are arithmetic averages for individual calendar years. "Total Yields" are based on purchase Jan 1 and sale Dec. 31. No long term compounding is involved, as such. However, I will point out that if a fund compounds at rate  $i$  for  $n$  years, then a solution for the compound rate involved, using only  $n$  and the beginning and ending values, will yield the answer  $i$ , which of course is the same as the arithmetic average rate used for the  $n$  years involved.
- c) Exhibit B was compiled from Source 1, page 53 and Source 2. The balanced portfolio consists of 22% three-month bills; 22% long-term bonds (total yield); and 56% common stocks (total yield).
- d) Data for the U.S.A. are the same as in Exhibit B. The basic sources for other countries were 8 and 9. In determining estimated balanced portfolio results it was necessary to approximate increases in long-term bond market values from changes in coupon yields (using compound change

over 7 years); and to estimate dividend payments at the U.S. level of 4.17 over the 7-year period. However, stock market performance for each country was available accurately, from source 9 (source 8 in the case of Spain for 1983-5). Using the estimated method for the U.S.A. gave a result of 10.8%, which was close to the actual result of 11.2%

e) This is the same as the data shown in Exhibit C, but arranged by calendar year rather than by country.

f) Actual rates and real rates adjusted for inflation, only, are as shown in Exhibit A; real rates adjusted for expenses and taxes, were obtained by multiplying actual rates by  $(1-E)(1-T)$  where E and T are the expense and Tax rates involved, and then by determining real rate by the formula shown at Source 1, page 25. This formula was used throughout this paper. Inflation rates involved in the formula are shown in Exhibits B & C.