The Comparative Performance and Yields
of Seasoned U. S. Government
and Government Agency Securities

by

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I. Introduction

The market for securities issued by federally sponsored agencies has grown a great deal during the past several years. Although these securities are not generally direct obligations of the U. S. government, as are default free Treasury securities, they are relatively free of default risk.[1] In this study indexes of yields to maturity and holding period returns to Farm Credit System securities, which might be interpreted as representative of all agency securities, will be compared to those of government securities.[2] The prime purpose of this statistical comparison is to observe similarities and differences between the performance and returns of these obligations. Moreover, recent changes in the empirical relation among the securities in the study will be examined. Finally, there is a tentative analysis of the interrelationships among these securities in the market during different economic conditions.

II. The Sample

Included in the study are all negotiable direct public issues of the U. S. Government outstanding at any time from June 1953 to May 1973. In addition, all the direct public issues of the Farm Credit System including the Federal Land Bank, the Bank for Cooperatives and the Intermediate Credit Bank outstanding at any time from January 1965 to May 1973 are included. During any comparison between these two samples, the same time period is used for each sample.

Price and coupon data for the U. S. government bonds were combined into holding period return indexes described fully in Bildersee [1]. Briefly, the chosen holding period is one month - from month end to month

end. During any holding period it is assumed that the investor purchases a security, including accrued interest, at the beginning of the period. The security, including accrued and realized interest, is sold at the end of the period. A comparison of the receipts due to the sale and interest payments and the cost at the start of the period gives a measure of the rate of return to the investor for holding the security for that period.[3] Each security is included in one of the indexes in Table 1 for each month they are outstanding. The particular index depends on the remaining term to maturity at that time.

Table 1

Term to Maturity of Indexes in the Study

1 month	3-4 years
2 months	4-5 years
3-6 months	5-6 years
7-12 months	6-10 years
1-2 years	10-15 years
2-3 years	15-20 years

Over 20 years

The same technique is used to develop holding period return indexes representing the agency securities. Moreover, yield indexes based on the same information are developed for both sets of securities. In this case the yield to maturity is included in the appropriate index for each period.

III. The Premium Paid on Seasoned Agency Securities

Regardless of its term to maturity an agency security provides a premium to investors relative to the yield on U. S. Government securities with the same term to maturity.[4] On average, from February 1965 to March 1969, as seen in Table 2, the premium ranged from 20.5 to 46.5 basis points depending on the term of the security. The average premium, if each term to maturity is weighted equally, appears to be about 37 basis points. Since March 1969 this spread, on average, has been between 19.7 and 53.4 basis points. It appears that the average premium is about 34 basis points.

Note that the pattern of premiums paid on agency securities has changed. In particular, the spreads on the securities with short terms to maturity have increased. In the case of the 3-6 month maturities,the average premium has risen from 39.9 to 53.4 basis points on average and, in the case of 7-12 month maturities, the average spread between the government's securities and the agency securities has risen from 34.1 to 40.1 basis points on average. However, the yield spreads between intermediate term (1-6 years) agency securities and U. S. Government securities has narrowed. For example, the average premium on the 2-3 year securities has decreased from 46.5 to 28.1 basis points. The narrowing of the average spread between the intermediate term government and agency securities, despite the generally steeper average yield curve for 1969-1973 is consistent with a growing awareness and acceptance of intermediate term agency securities as alternatives to U. S. Treasury securities.

Assume that there are no liquidity premiums in the market place, that the interest yield curve for U. S. government securities represents the fundamental interest yield pattern in the economy and that interest costs for

Table 2

Average U.S. Government and Agency Yields

	February, 1965 - March, 1969			April, 1969 - May, 1973		
	U. S. Government	Agency	Premium	U. S. Government	Agency	Premium
1 Month	4.262 %/Yr. (0.381)	4.733 %/Yr. (0.570)	0.471 %/Yr. (0.087)	4.826 %/Yr. (1.510)	5.181 %/Yr. (2.661)	0.355 %/Yr. (0.438)
2 Months	4.467 (0.394)	4.931 (0.511)	0.464 (0.062)	5.063 (1.650)	5.580 (2.248)	0.517 (0.175)
3-6 Months	4.723 (0.450)	5.123 (0.500)	0.399 (0.019)	5.282 (1.900)	5.816 (2.129)	0.534 (0.059)
7-12 Months	4.807 (0.396)	5.148 (0.424)	0.341 (0.023)	5.581 (1.507)	5.983 (1.877)	0.401 (0.041)
1-2 Years	4.724 (0.360)	5.139 (0.408)	0.415 (0.019)	5.938 (1.250)	6.199 (1.453)	0.261 (0.029)
2-3 Years	4.768 (0.376)	5.233 (0.420)	0.465 (0.014)	6.183 (0.903)	6.463 (1.028)	0.281 (0.031)
3-4 Years	4.785 (0.342)	5.229 (0.407)	0.444 (0.018)	6.281 (0.683)	6.478 (0.655)	0.197 (0.044)
4-5 Years	4.759 (0.287)	5.196 (0.405)	0.437 (0.027)	6.342 (0.656)	6.641 (0.809)	0.299 (0.051)
5-6 Years	4.964 (0.407)	5.169 (0.382)	0.205 (0.025)	6.557 (0.495)	6.784 (0.620)	0.199 (0.059)
6-10 Years	5.065 (0.392)	5.284 (0.446)	0.219 (0.012)	6.553 (0.396)	6.925 (0.439)	0.373 (0.025)
10-15 Years	4.961 (0.315)	5.243 (0.383)	0.282 (0.030)	6.383 (0.274)	-- --	-- --
15-20 Years	4.888 (0.282)	-- --	-- --	6.008 (0.268)	-- --	-- --
Over 20 Yrs.	4.730 (0.208)	-- --	-- --	5.734 (0.185)	-- --	-- --

The numbers in the parentheses are the variances of the distribution. Much of the variance in the yield is due to interest rate trends. However, in so far as the U.S. government and agency yields move together, the distribution of the difference between the yields abstracts from the trends.

The yields for Treasury bills are bond equivalent yields. All yields are based on "ask" prices and continuous compounding.

the government are expected to be the same to a given horizon regardless of the selection of terms to maturity for various government issues.[5] In this limited case, the premium above the U. S. government rate on a specific security represents a special fee paid by an issuer of the securities in order to obtain funds from the market for that maturity. If the issuer wants to issue securities with the same term to maturity whenever a new issue is necessary, then the goal, in the absence of issue costs, can be stated as the minimization of the spread between the U. S. government securities and the issuer's securities. If an issuer faces average yield curves similar to those observed here, then its policies would differ for the two periods. During the latter period the premium paid on intermediate term securities in excess of the cost of U. S. government securities decreased relative to the premium paid on short term securities and the intermediate term securities became better substitutes for short term securities that would have been used in the former period.

Although the premiums paid on short term securities appear to be greater than those paid on intermediate term securities currently, note that the variances of the premiums on the short term securities are somewhat greater than those on the intermediate term securities. The difference in the size of the variances and standard deviations of the distribution suggest that, at selected times during the chosen periods, premium paid on the security with the higher average premium may be less than that which would be paid on the security with the lower average premium. Then, even in this restricted case, as long as some uncertainty is introduced, there is no single financing approach, with respect to term to maturity, that will always minimize costs with certainty.

IV. The Relative Performance of U. S. Government and Agency Securities

It appears that the judicious selection of the term to maturity of a security may affect interest costs. However, the issuer can minimize its costs only if it uses this feature and other features of the security to discriminate, in some manner, among markets or take full advantage of any systematic differences in the markets. If the issuer can discriminate among different purchasers of securities, then it can pay different rates to different purchasers for the same security. The extreme cases include discrimination due to completely segregated markets and no discrimination because there is only one market or several markets perfectly correlated in rate levels and changes in rate levels.

A survey of the correlations among holding period returns for U. S. Government and Agency securities with varying terms to maturity suggests that the correlations are quite high. These data, in Table 3, are representative of the correlations among the other indexes mentioned in Table 1.

The data suggest strongly that seasoned U. S. Government securities and the agency securities are part of one broad market. Moreover, the correlations among the holding period returns to securities of one issuer with different terms to maturity are consistent with the contention that there is little room for discrimination within this market. At most, the relatively decreasing correlation between securities with larger differential maturities supports the suggestion that some security holders restrict themselves to particular portions of the market, voluntarily or otherwise. Moreover, note that the correlations among holding period returns for U. S. government securities and the agency securities with the same maturity are

Table 3

Correlations Among Selected Holding Period Return Indexes

February, 1965 - May, 1973

	U.S. Government Indexes					Agency Indexes			
	3-6 Months	7-12 Months	2-3 Years	5-6 Years	6-10 Years	3-6 Months	7-12 Months	2-3 Years	5-6 Years
U.S. Government Indexes									
7-12 Months	0.899								
2-3 Years	0.730	0.885							
5-6 Years	0.611	0.788	0.911						
6-10 Years	0.598	0.748	0.884	0.942					
Agency Indexes									
3-6 Months	0.912	0.880	0.702	0.576	0.569				
7-12 Months	0.859	0.936	0.838	0.724	0.706	0.886			
2-3 Years	0.714	0.869	0.939	0.899	0.836	0.730	0.841		
5-6 Years	0.631	0.786	0.874	0.772	0.776	0.628	0.738	0.877	
6-10 Years	0.622	0.777	0.896	0.837	0.856	0.585	0.717	0.896	0.919

greater than those for differing maturities. Finally, note that the corre-
lations among the U. S. government indexes are, on average, only slightly
greater than those for the agency indexes. This suggests that the inter-
relations within the market for agency securities are only slightly weaker
than those within the market for U. S. government securities

V. The Market and 'Tight Money'

The results in Table 3 cover many market conditions. In particular,
at various times, there has been a general consensus that new money has
been "easy" to obtain in that there has been less demand than normal by
borrowers of new funds relative to the available supply of funds. Alternatively,
there has been a general consensus at other times that the market has been
"tight" in that there has been more demand than normal by borrowers of
new funds relative to the available supply of funds. This section includes
a tentative comparison of the interrelations among yields in the market
under relatively tight money conditions with those under relatively easy
money conditions.

An examination of the correlation of the detrended yields of U. S.
government securities during the last 20 years indicates that there is a
stronger correlation among these yields during relatively tight money
conditions.[6] In particular, a comparison of the correlations when
net free reserves are negative with the comparable ones when net free
reserves are positive in Table 4, indicates that, in every case but two,
the correlations are stronger in the negative free reserve case. When
returns are used, the correlations are stronger in the negative net free
reserve case in over two thirds of the comparisons with the correlations
obtained in the positive net free reserve case.[7]

Table 4

Correlations Among Detrended U.S. Government Yield Indexes

June, 1953 - May, 1973

Negative Net Free Reserves

127 Observations

	2 Months	3-6 Months	7-12 Months	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	6-10 Years	10-15 Years	15-20 Years	Over 20 Years
1 Month	0.917	0.900	0.874	0.826	0.758	0.686	0.651	0.632	0.633	0.590	0.629	0.557
2 Months		0.944	0.935	0.890	0.825	0.750	0.716	0.699	0.700	0.653	0.687	0.599
3-6 Months			0.946	0.906	0.834	0.756	0.718	0.689	0.700	0.659	0.690	0.590
7-12 Months				0.952	0.901	0.841	0.806	0.777	0.776	0.735	0.736	0.648
1-2 Years					0.979	0.944	0.924	0.858	0.879	0.855	0.831	0.754
2-3 Years						0.983	0.970	0.912	0.928	0.917	0.879	0.821
3-4 Years							0.986	0.912	0.939	0.940	0.882	0.835
4-5 Years								0.913	0.937	0.951	0.889	0.857
5-6 Years									0.900	0.913	0.863	0.840
6-10 Years										0.954	0.933	0.921
10-15 Years											0.961	0.937
15-20 Years												0.950

Positive Net Free Reserves

113 Observations

	2 Months	3-6 Months	7-12 Months	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	6-10 Years	10-15 Years	15-20 Years	Over 20 Years
1 Month	0.919	0.817	0.737	0.611	0.473	0.313	0.303	0.339	0.250	0.145	0.207	0.164
2 Months		0.875	0.808	0.705	0.567	0.421	0.387	0.391	0.354	0.234	0.303	0.262
3-6 Months			0.918	0.876	0.752	0.639	0.597	0.495	0.466	0.425	0.472	0.400
7-12 Months				0.915	0.804	0.698	0.669	0.525	0.545	0.511	0.521	0.459
1-2 Years					0.948	0.877	0.848	0.700	0.707	0.705	0.676	0.642
2-3 Years						0.950	0.930	0.825	0.826	0.842	0.775	0.777
3-4 Years							0.931	0.828	0.844	0.899	0.832	0.824
4-5 Years								0.807	0.839	0.906	0.820	0.821
5-6 Years									0.833	0.842	0.748	0.825
6-10 Years										0.934	0.849	0.933
10-15 Years											0.897	0.923
15-20 Years												0.925

These results suggest that, during tight money conditions, it is likely that each portion of the market is more highly correlated with other portions of the market than in the case of positive net free reserves. The increased correlations are consistent with the argument that, as money becomes increasingly difficult to obtain,various segments of the market are more likely to move together and it becomes increasingly difficult to find any segment of the market that can act as a relatively cheap source of funds. Put in different terms, any lack of continuity in the market place which might allow issuers to discriminate among sources of funds may fade away as money conditions tighten.

VI. Conclusions

It appears that selected portions of the market place are correlated and move together to varying degrees over time depending, to some extent, on general market conditions. Since these conditions and relationships facing the issuer also appear to change over time, no issuing policy is necessarily the best issuing policy to follow merely because it has been relatively successful in the past. Also, since it appears that the market for high quality fixed income securities is not segmented, but that it changes in degree of continuity over time, general issuing policies must be examined in the context of the market conditions prevailing at the time of the issue in order to reduce costs.

The results stated here do not explain the premium observed on agency securities as the agency securities appear to perform like U. S. government securities. However,in the absence of differential default risks between agency and U. S. government securities and if agency issues are

correctly priced, an investor would not be able to make an arbitrage profit by shifting from investments in Treasury securities to investments in agency securities. In this case the differential yields must be explained by differences other than default risk between the securities. Such other characteristics might include the various aspects of the marketability of the agency securities such as size of issue and transactions costs. If, however, the premium on agency issues exceed that which could be explained by these other characteristics, they would be arbitrage possibilities.

Footnotes

[1]Despite the lack of exacting guarantees by the government, there are indirect guarantees of agency securities by the government. For example,borrowers from the agencies are often helped through disaster relief legislation when needed and the government would be loath to allow a default on an issue due to the potentially massive secondary effects.

[2]The features and guarantees on Farm Credit System securities are generally typical of those for other agency securities not specifically guaranteed by the U. S. Government. Since some other agencies are more active in the long term markets than is the Farm Credit System, the results stated here and based on Farm Credit System securities emphasize short and intermediate term securities.

[3]No transactions costs are included.

[4]See Silber [2] for a comparison of agency and U.S. Government yields on new issues.

[5]This represents the pure expectations interest rate hypothesis based on U.S. Government securities.

[6]The data used here are adjusted for a linear increase in interest rate levels over time.

[7]There is a 99% chance that this pattern of results is not random.

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2. Silber, William H., _The Market for Federal Agency Securities: Is There an Optimal Size of Issue?_ Presented to the Federal Home Loan Bank System.

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2 Months	4.467 (0.394)	4.931 (0.511)	0.464 (0.062)	5.063 (1.650)	5.580 (2.248)	0.517 (0.175)
3-6 Months	4.723 (0.450)	5.123 (0.500)	0.399 (0.019)	5.282 (1.900)	5.816 (2.129)	0.534 (0.059)
7-12 Months	4.807 (0.396)	5.148 (0.424)	0.341 (0.023)	5.581 (1.507)	5.983 (1.877)	0.401 (0.041)
1-2 Years	4.724 (0.360)	5.139 (0.408)	0.415 (0.019)	5.938 (1.250)	6.199 (1.453)	0.261 (0.029)
2-3 Years	4.768 (0.376)	5.233 (0.420)	0.465 (0.014)	6.183 (0.903)	6.463 (1.028)	0.281 (0.031)
3-4 Years	4.785 (0.342)	5.229 (0.407)	0.444 (0.018)	6.281 (0.683)	6.478 (0.655)	0.197 (0.044)
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5-6 Years	4.964 (0.407)	5.169 (0.382)	0.205 (0.025)	6.557 (0.495)	6.784 (0.620)	0.199 (0.059)
6-10 Years	5.065 (0.392)	5.284 (0.446)	0.219 (0.012)	6.553 (0.396)	6.925 (0.439)	0.373 (0.025)
10-15 Years	4.961 (0.315)	5.243 (0.383)	0.282 (0.030)	6.383 (0.274)	-- --	-- --
15-20 Years	4.888 (0.282)	-- --	-- --	6.008 (0.268)	-- --	-- --
Over 20 Yrs.	4.730 (0.208)	-- --	-- --	5.734 (0.185)	-- --	-- --

The numbers in the parentheses are the variances of the distribution. Much of the variance in the yield is due to interest rate trends. However, in so far as the U.S. government and agency yields move together, the distribution of the difference between the yields abstracts from the trends.

The yields for Treasury bills are bond equivalent yields. All yields are based on "ask" prices and continuous compounding.

Table 4

Correlations Among Detrended U.S. Government Yield Indexes

June, 1953 - May, 1973

Negative Net Free Reserves

127 Observations

	2 Months	3-6 Months	7-12 Months	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	6-10 Years	10-15 Years	15-20 Years	Over 20 Years
1 Month	0.917	0.900	0.874	0.826	0.758	0.686	0.651	0.632	0.633	0.590	0.629	0.557
2 Months		0.944	0.935	0.890	0.825	0.750	0.716	0.699	0.700	0.653	0.687	0.599
3-6 Months			0.946	0.906	0.834	0.756	0.718	0.689	0.700	0.659	0.690	0.590
7-12 Months				0.952	0.901	0.841	0.806	0.777	0.776	0.735	0.736	0.648
1-2 Years					0.979	0.944	0.924	0.858	0.879	0.855	0.831	0.754
2-3 Years						0.983	0.970	0.912	0.928	0.917	0.879	0.821
3-4 Years							0.986	0.912	0.939	0.940	0.882	0.835
4-5 Years								0.913	0.937	0.951	0.889	0.835
5-6 Years									0.900	0.913	0.863	0.840
6-10 Years										0.954	0.933	0.921
10-15 Years											0.961	0.937
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	2 Months	3-6 Months	7-12 Months	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	6-10 Years	10-15 Years	15-20 Years	Over 20 Years
1 Month	0.919	0.817	0.737	0.611	0.473	0.313	0.303	0.339	0.250	0.145	0.207	0.164
2 Months		0.875	0.808	0.705	0.567	0.421	0.387	0.391	0.354	0.234	0.303	0.262
3-6 Months			0.918	0.876	0.752	0.639	0.597	0.495	0.466	0.425	0.472	0.400
7-12 Months				0.915	0.804	0.698	0.669	0.525	0.545	0.511	0.521	0.459
1-2 Years					0.948	0.877	0.848	0.700	0.707	0.705	0.676	0.642
2-3 Years						0.950	0.930	0.825	0.826	0.842	0.775	0.777
3-4 Years							0.931	0.828	0.844	0.899	0.832	0.824
4-5 Years								0.807	0.839	0.906	0.820	0.824
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127 Observations

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1 Month	0.917	0.900	0.874	0.826	0.758	0.686	0.651	0.632	0.633	0.590	0.629	0.557
2 Months		0.944	0.935	0.890	0.825	0.750	0.716	0.699	0.700	0.653	0.687	0.599
3-6 Months			0.946	0.906	0.834	0.756	0.718	0.689	0.700	0.659	0.690	0.590
7-12 Months				0.952	0.901	0.841	0.806	0.777	0.776	0.735	0.736	0.648
1-2 Years					0.979	0.944	0.924	0.858	0.879	0.855	0.831	0.754
2-3 Years						0.983	0.970	0.912	0.928	0.917	0.879	0.821
3-4 Years							0.986	0.912	0.939	0.940	0.882	0.835
4-5 Years								0.913	0.937	0.951	0.889	0.857
5-6 Years									0.900	0.913	0.863	0.840
6-10 Years										0.954	0.933	0.921
10-15 Years											0.961	0.937
15-20 Years												0.950

Positive Net Free Reserves

113 Observations

	2 Months	3-6 Months	7-12 Months	1-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years	6-10 Years	10-15 Years	15-20 Years	Over 20 Years
1 Month	0.919	0.817	0.737	0.611	0.473	0.313	0.303	0.339	0.250	0.145	0.207	0.164
2 Months		0.875	0.808	0.705	0.567	0.421	0.387	0.391	0.354	0.234	0.303	0.262
3-6 Months			0.918	0.876	0.752	0.639	0.597	0.495	0.466	0.425	0.472	0.400
7-12 Months				0.915	0.804	0.698	0.669	0.525	0.545	0.511	0.521	0.459
1-2 Years					0.948	0.877	0.848	0.700	0.707	0.705	0.676	0.642
2-3 Years						0.950	0.930	0.825	0.826	0.842	0.775	0.777
3-4 Years							0.931	0.828	0.844	0.899	0.832	0.824
4-5 Years								0.807	0.839	0.906	0.820	0.821
5-6 Years									0.833	0.842	0.748	0.825
6-10 Years										0.934	0.849	0.933
10-15 Years											0.897	0.923
15-20 Years												0.925