Rate of return indexes for GNMA securities*

A thorough analysis à la Ibbotson and Sinquefield

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he relative investment performance of alternative classes of marketable securities has been of interest to investors, investment company portfolio managers, and the managers of corporate securities portfolios for decades. In response to this interest, a number of studies have appeared that document the rates of return earned on various classes of marketable securities over various time periods. The motivation for these studies is to provide standards, or benchmarks, for measuring portfolio performance and to provide a means of generating probability distributions of future returns for the securities examined.[1]

In 1968, Fisher and Lorie presented indexes of yearly holding period returns on common stocks over the period 1926 through 1965. In 1976, Ibbotson and Sinquefield presented "representative" nominal and real (inflation-adjusted) rates of returns series for common stock, corporate bonds, Treasury bills, and Treasury bonds over the period 1926 through 1974. In 1976, Bildersee presented indexes of monthly rates of return for various maturities of U.S. Treasury securities over the period January 1947 through December 1973; in 1978 he presented the results of a comprehensive study of yields and monthly returns on U.S. Treasury and agency securities over the period 1965 through 1974.

In a similar fashion, this paper presents monthly rate of return indexes for Government National Mortgage Association (GNMA) mortgage-backed pass-through securities over the period January 1971 through June 1978. The GNMA authorized the first issuance of a mortgage-backed pass-through security in January 1970. Since that time, the total dollar amount of these securities has grown to over $78 billion. Currently, in terms of total volume, GNMAs are the most actively traded class of long-term fixed interest rate securities in the U.S. As Table 1 indicates, ownership of GNMAs has spread from an original narrow base of savings and loan associations to include mutual savings banks, retirement and pension funds, commercial banks, credit unions, and individuals. The financial press continues to be enamored of this relatively new investment opportunity.[2]

The purpose of this paper is fourfold. First, we construct monthly nominal rate of return and cumulative wealth relative indexes for GNMA securities over

1. Footnotes appear at the end of the article.

TABLE 1

PERCENT OF GNMA SECURITIES HELD BY VARIOUS TYPES OF INVESTORS

Holder	Dec. 31, 1972	Feb. 28, 1977	July 31, 1979
Savings banks	20.9%	12.8%	10.8%
Commercial banks	5.2%	5.2%	6.4%
Savings and loan associations	41.7%	18.1%	15.9%
Pension and retirement funds	5.0%	9.5%	11.4%
Mortgage bankers/dealers	9.4%	21.6%	6.6%
Individuals	1.3%	1.1%	1.6%
Credit unions	6.1%	2.4%	2.4%
Others[a]	10.4%	29.4%	44.9%

Source: Government National Mortgage Association

[a] Includes nominees, insurance companies, state and local governments, and corporations.

the period January 1971 through June 1978. Second, to indicate the relative investment performance of GNMAs over this period, we compare their returns with those earned on U.S. Treasury bills and long-term government bonds by constructing derived series of the sort presented by Ibbotson and Sinquefield (1976). Third, we construct real (inflation adjusted) rate of return and cumulative wealth relative indexes for GNMAs by adjusting their nominal returns for changes in the Consumer Price Index (CPI). Fourth, in the process of constructing these indexes, we introduce a new data base made available to us by Loeb, Rhoades and Co., Inc. It is our hope that these results (and the new data base) will be of interest to institutional and individual investors concerned with the relative investment performance of this class of securities and to other investigators concerned with testing hypotheses about the pricing of GNMAs.[3]

DATA

Each GNMA security is "backed" by a pool of fully-amortizing mortgage loans on residential property. The underlying loans in a pool must carry a common interest rate and a common term-to-maturity.[4] Each month, the holder of a GNMA security receives a pro rata share of the payments of principal and interest on the mortgage loans supporting the security. The principal payment includes the regularly scheduled principal repayment plus any unscheduled "prepayments" of principal made by the mortgagors.[5,6] Thus, the monthly return on a GNMA security consists of four elements: (1) the change in the security's price; (2) the coupon interest payments; (3) the scheduled principal repayments, and (4) the unscheduled principal prepayments.

Accurate computation of the return on a security required that we account for each of these elements. We did so by combining data from a variety of sources.

PRINCIPAL AND INTEREST PAYMENTS

When a GNMA security is issued, the issuer records the total dollar amounts of the outstanding balances of the loans in the pool underlying the security. Each month thereafter, the issuer computes the dollar amount of principal paid on the underlying loans and sums these amounts over time. We subtract this sum from the original balance each month and divide the difference by the original balance. This fraction is called the paydown factor on the pool. The security issuer is required to report the paydown factor to the GNMA each month.

Given the paydown factors for the beginning and end of any month (or equivalently, the beginning factors for two consecutive months), we can compute the total principal payments on the loans in the pool during the month as:

$$P_{it} = (F^b_{it} - F^e_{it})B_{i0}, \qquad (1)$$

where P_{it} is the dollar amount of principal paid on GNMA security i during the month t; F^b_{it} is the paydown factor for security i at the beginning of month t; F^e_{it} is the paydown factor for security i at the end of the month t (note: $F^b_{it} = F^e_{i,t-1}$), and B_{i0} is the total original principal balance of the mortgage loans "backing" GNMA security i.

Given the monthly paydown factors and the annual coupon interest rate on the security, we can compute the total dollar amount of interest paid on the security during the month as:

$$I_{it} = (F^b_{it} \cdot B_{i0}) \frac{C_i}{12}, \qquad (2)$$

where I_{it} is the total dollar amount of interest paid on security i in month t and C_i is the annual interest rate on the security.

In computing the rate of return on the GNMA securities, we used two sources of paydown factors.

The bulk of the paydown factors were made available to us on a computer tape by Loeb, Rhoades & Co., Inc.[7] This tape contains monthly paydown factors for over 25,000 individual pools issued over the period January 1970 through June 1978. Of this total, approximately 9,400 are 8% securities, which were the pools that we used in our computations.[8] Although the computer tape included paydown information on securities issued as early as January 1970, our actual paydown factors did not begin until February 1972 because Loeb, Rhoades did not record the information prior to that date.

We supplemented the computer tape with data provided to us by National Homes Acceptance Corporation (NHAC). NHAC provided us with the monthly balances for twelve 8% pools issued between December 1, 1970 and January 30, 1971. From these data, we computed monthly paydown factors for the period January 1, 1971 to February 28, 1972 for each of the twelve pools.

By combining these two data sets, we constructed a continuous series of monthly paydown factors for the period January 1, 1971 to June 30, 1978. Of course, conclusions about rates of return on GNMAs over the period January 1971 to February 1972 are dependent upon the assumption that the twelve pools obtained from NHAC are representative of all outstanding GNMA securities over that period.[9]

MARKET PRICES

Monthly market prices of GNMA securities are the second ingredient needed to compute rates of return. In this case, we used three data sources.

For the period August 30, 1974 through June 30, 1978 we collected month-end prices for 8% GNMAs from *The Wall Street Journal*. Prior to that time, the *Journal* did not report GNMA prices. However, Salomon Brothers' *Yield Book* does contain "first-of-month" yields on GNMA 8% securities beginning with December 1, 1971. These yields are based on the "consensus" market price at the beginning of each month and with the assumption of a twelve-year average life for GNMAs. By reversing the procedure used by Salomon Brothers to obtain yields, we were able to estimate market prices over the period December 1, 1971 through July 30, 1974.

For the period January 1, 1971 through November 30, 1971, we estimated market prices from a weekly yield series computed by Merrill, Lynch. This series uses Friday prices to compute week-end yields. Again, we reversed the process used to obtain yields to estimate market prices. We used the week-end price closest to each month-end as an estimate of the month-end price. As with the paydown factor data, the earlier observations in this series may be less reliable than the more recent ones.

By combining these three price sales, we constructed a continuous price series over the period January 1, 1971 through June 30, 1978.[10]

CONSTRUCTION OF RETURNS SERIES

With the paydown factor and price data described above, we computed monthly rates of return on each individual 8% GNMA security for which we had paydown factor information as

$$R_{it} = \frac{(M_i^e \cdot F_{it}^e) + \left(F_{it}^b \cdot \frac{.08}{12}\right) + (F_{it}^b - F_{it}^e) - (M_i^b \cdot F_{it}^b)}{M_i^b \cdot F_{it}^b} \quad (3)$$

where R_{it} is the rate of return on GNMA security i in month t; M_i^b is the market price of 8% GNMA securities at the beginning of month t expressed as a fraction of the dollar amount of the principal balances of the loans in the pool (for example, a price of .955 means that the buyer of a security would be required to pay $95.50 for each one-hundred dollars of unpaid principal); M_i^e is the market price of 8% GNMAs at the end of month t (note: $M_i^b = M_{t-1}^e$), and other terms are as defined above. In equation (3), the combination of the first and last terms on the right-hand side represents the change in the market price of the security; the second term represents the interest payment, and the third term represents the total principal payment (i.e., both scheduled and unscheduled principal payment) during month t.

We then computed a rate of return for each month for each of the approximately 9,400 8% securities if a paydown factor was available for the beginning and end of the relevant month. If an individual monthly factor for a specific pool was missing from the tape, no rate of return was computed for that specific month for that specific pool.

One could literally construct an infinite number of rate of return series for GNMA securities. The structure of the series should conform to its intended use. Here we are concerned that the series be representative of the average performance of the entire GNMA market. With that purpose in mind, we combined the rate of return series for the individual securities to construct four different "representative" return series:

1. Equally-Weighted Returns Series: This series gives equal weight to the return on each individual security and includes all available monthly returns for all 8% GNMAs.
2. Value-Weighted Returns Series: This series weights the return on each individual security according to the market value of that security relative to the total market value of all outstanding 8% GNMAs. It includes all available monthly returns for all 8% securities.
3. "New Issues" Equally-Weighted Returns Series: This series gives equal weight to the return on each individual security, but includes only the returns computed for the individual securities for the first 14 months each was outstanding.[11]
4. "New Issues" Value-Weighted Return Series: This series weights the return on each individual security according to the market value of that security relative to the total market value of all outstanding 8% GNMAs. It includes only the returns computed for the individual securities for the first 14 months each was outstanding.

Equally-weighted and value-weighted indexes were constructed because they provide different perspectives on security performance. The equally-weighted indexes document representative security performance, while the value-weighted indexes represent the "aggregate" market experience. The "new issues" indexes were constructed because the great majority of the total dollar volume of transactions in GNMA securities consists of securities that have been outstanding a relatively short period of time. As a consequence, observed market prices may be more representative of the value of "new" issues than of the entire GNMA market. If the "true" market values of "old" and "new" securities differ (as they probably do), the use of current market prices in conjunction with paydown factors on "old" pools will give a distorted picture of the rate of return experience of GNMA securities.[12]

These return series were converted to cumulative wealth relative indexes using December 1970 as the base month according to equation (6) in Ibbotson and Sinquefield (1976, p. 19).

With the GNMA monthly return series and monthly return series for U.S. Treasury bills and long-term Treasury bonds, provided to us by Roger Ibbotson,[13] we derived two net returns series. The first net return series is the monthly return on GNMAs less the monthly return on Treasury bills; the second is the return on GNMAs less the return on long-term Treasury bonds. We computed the first net returns series according to equation (13) in I&S (1976, p. 39), with the return on GNMAs substituted for the return on long-term Treasury bonds. The second net returns series was constructed according to their equation (14) (p. 39), with the return on GNMAs substituted for the return on high grade corporate bonds.[14] The net return series were converted to net cumulative wealth relatives according to I&S Equation (6).

Finally, the nominal GNMA returns were converted to real returns by adjusting for changes in the CPI according to I&S equation (16), with the GNMA return substituted for the long-term Treasury bond return.

RESULTS

Summary statistics for the period January 1971

through June 1978 for each of the returns series appear in Table 2. These statistics include the arithmetic mean monthly return, the standard deviation of monthly returns, the cumulative wealth relative index as of June 30, 1978, the highest and lowest monthly return, and the number of positive monthly returns (out of 90). Table 3 presents correlation coefficients among the various series.

One question often arises in constructing series of this sort: to what degree do the results obtained depend upon the specific method used to construct the index? As it turns out, there is very little difference among the returns computed for each of the GNMA series. Table 2 shows that the largest mean monthly return computed with the equally-weighted series was .00558, while the smallest computed with each of the new issues series was .00552. These translate into arithmetic mean annual returns of 6.70% and 6.62%, respectively.

The largest standard deviation of the monthly returns for the GNMAs computed with each of the new issues series was .01839, while the smallest computed with the equally-weighted returns series was .01836. The maximum differences between the means

TABLE 2

SUMMARY STATISTICS FOR MONTHLY RETURN SERIES

Series	Arithemtic Mean	Standard Deviation	Cumulative Wealth Relative as of 6/30/78	Minimum Monthly Return	Maximum Monthly Return	Number of Positive Monthly Returns
GNMA Equally-weighted	.00558	.01836	1.6269	-.0372	.0634	58
GNMA Value-weighted	.00557	.01837	1.6250	-.0372	.0634	58
GNMA New-Issues Equally-weighted	.00552	.01839	1.6173	-.0373	.0633	58
GNMA New-Issues Value-weighted	.00552	.01839	1.6173	-.0372	.0633	58
U.S. Treasury Bills	.00458	.00122	1.6069	.0025	.0075	90
Long-Term Treasury Bonds	.00494	.02047	1.7145	-.0468	.0526	51
Inflation (changes in CPI)	.00551	.00319	1.7296	.0008	.0129	90
GNMA Equally-weighted less T-bill	.00100	.01833	1.0784	-.0433	.0575	50
GNMA Value-weighted less T-bill	.00099	.01834	1.0772	-.0433	.0575	50
GNMA New-Issues Equally-weighted less T-bill	.00094	.01836	1.0721	-.0434	.0573	50
GNMA New-Issues Value-weighted less T-bill	.00094	.01836	1.0720	-.943.	.0573	50
GNMA Equally-weighted less Government Bond	.00078	.01375	1.0638	-.0497	.0345	50
GNMA Value-weighted less Government Bond	.00077	.01376	1.0625	-.0497	.0345	50
GNMA New-Issues Equally-weighted less Government Bond	.00071	.01376	1.0575	-.0497	.0345	50
GNMA New-Issues Value-weighted less Government Bond	.00070	.01376	1.0575	-.0498	.0345	50
Inflation-adjusted GNMA Equally-weighted	.00009	.01915	.9922	-.0458	.0570	43
Inflation-adjusted GNMA Value-weighted	.00008	.01916	.9911	-.0458	.0570	43
Inflation-adjusted GNMA New-Issues Equally-weighted	.00007	.01916	.9864	-.0463	.0568	43
Inflation-adjusted GNMA New-Issues Value-weighted	.00007	.01916	.9865	.0463	.0568	43

and standard deviations of monthly returns for the four GNMA series were only .00005 and .00003, respectively.

In terms of their cumulative wealth relatives (as of 6/30/78), the largest computed with the equally-weighted series was 1.6269, and the smallest computed with each of the new issues series was 1.6173. Thus, if an individual had adopted any one of the investment strategies implied by the method used to construct each of the various wealth relative indexes, his nominal wealth would have increased approximately 62%, over the 90-month period included in this study.

Examination of columns 5 and 6 of the Table indicates that the minimum and maximum monthly returns (approximately −.0372 and +.0634, respectively) were virtually identical across the four series. Column 7 shows that each series had 58 positive (42 negative) monthly returns. Finally, Table 3 shows that the correlations among each of the four GNMA series was in excess of .99. Because of the similarities among the four series, comparison results obtained with any *one* series will be similar to those obtained with any other. For that reason (and for ease of exposition), subsequent discussion of the results will focus on those obtained with the equally-weighted series computed with all available data.

Over the period of the study, the arithmetic mean of the monthly returns on T-bills was .00458, while the standard deviation was .00122. For long-term government bonds, the mean monthly return was .00494 and the standard deviation was .02047. These translate into mean annual returns of 5.05% and 5.93% for the two securities, respectively. Thus, the mean annual return of GNMAs was greater than the mean return of both T-bills and long-term government bonds. Although the standard deviation of returns on the GNMAs was about 15 times the standard deviation of T-bills, it was marginally less than the standard deviation of long-term goverment bonds.

The net returns series provide additional information on the relative investment performance of GNMAs. The mean net return on GNMAs versus T-bills was .00100 per month or 1.2% per year.[15] In comparison with long-term governments, the net return on GNMAs was .00078 per month or .94% per year.

The net cumulative wealth relative index on GNMAs versus T-bills was 1.0784, while on GNMAs versus long-term government bonds it was 1.0638. Thus, if an individual had chosen to remain continuously invested in 8% GNMA securities over the period beginning December 31, 1970 and ending June 30, 1978, his nominal wealth would have been approximately 7.84% greater than if he had invested in U.S.

Treasury bills. If the choice had been between GNMAs and U.S. Treasury bonds, his wealth would have been about 6.38% greater with GNMAs.

Table 3 shows that the correlation of .75 between GNMAs and long-term government bonds was significant at the .01 level. Perhaps surprisingly, the correlation between GNMAs and T-bills was −.02. Thus, the investment performance of GNMA securities was very similar to that of long-term government bonds.

TABLE 3

CORRELATIONS AMONG MONTHLY RATE OF RETURN INDEXES:
JANUARY 1971-JUNE 1978

Security	Correlations Security						
	EW	VW	NEW	NVW	T-B	LTG	INF
EW	1.00						
VW	.99[a]	1.00					
NEW	.99[a]	.99[a]	1.00				
NVW	.99[a]	.99[a]	.99[a]	1.00			
T-B	−.02	−.02	−.02	−.02	1.00		
LTG	.75[a]	.75[a]	.75[a]	.75[a]	−.20[b]	1.00	
INF	−.21[b]	−.21[b]	−.21[b]	−.21[b]	.59[a]	−.03	1.00

Definitions:

EW = Equally-weighted GNMA Index (all data)
VW = Value-weighted GNMA Index (all data)
NEW = New-issues Equally-weighted GNMA Index
NVM = New-issues Value-weighted GNMA Index
T-B = U.S. Treasury Bills
LTG = Long-term Government Bonds
INF = Change in CPI

a = significant at .01 level.

b = significant at .05 level.

The last four rows of Table 2 summarize the real rates of return on GNMAs. The real arithmetic mean return was .00009 per month or about .11% per year. However, the real cumulative wealth relative was approximately .99. Thus, an individual who was continuously invested in GNMAs over this period suffered a slight decline in his real wealth.

Table 4 contains the monthly rates of return and cumulative wealth relatives for the equally-weighted GNMA returns series computed with all available data. Tables 5 and 6, respectively, contain the net monthly rates of return and the net cumulative wealth relatives for GNMAs versus T-bills and GNMAs versus long-term government bonds computed with the same GNMA index. Finally, Table 7 presents the real monthly rates of return and the real cumulative wealth relatives for the same series.[16]

[1] See Ibbotson and Sinquefield (1977).

[2] See, e.g., *Forbes* (1979), *Fortune* (1978), and *The Wall Street Journal* (1978).

TABLE 4

RATES OF RETURN AND CUMULATIVE WEALTH RELATIVES FOR GNMA SECURITIES: JANUARY 1971-JUNE 1978

4-A. Monthly Rates of Return: GNMA Equally-Weighted Returns (All Data)

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	.0452567	.0061482	−.0054910	−.0054910	−.0149247	.0063886	−.0152354	.0285172	.0062648	.0260933	.0031701	.0085815
1972	.0100152	.0142751	−.0000260	−.0000260	.0100857	.0038362	.0034690	.0034292	−.0035835	.0083016	.0153585	.0036655
1973	.0012799	.0010277	−.0008130	.0035483	.0018545	−.0010378	−.0125862	−.0125862	.0492189	.0078888	.0140552	.0065253
1974	.0016199	.0066050	−.0280508	−.0134379	−.0005462	−.0216749	−.0335886	−.0335886	.0305185	.0627586	.0293181	−.0036930
1975	.0501236	.0068752	−.0130293	−.0222784	.0369773	.0080132	−.0118401	−.0031726	−.0164200	.0633976	−.0119355	.0259207
1976	.0191446	.0061527	.0090394	.0151639	−.0212678	.0153575	.0089081	.0257754	.0091643	.0157980	.0258523	.0183876
1977	−.0220142	.0039354	.0079775	.0063689	.0063762	.0167254	−.0030669	.0076956	−.0016175	−.0034993	.0148989	−.0106884
1978	−.0046422	.0061018	−.0012663	.0053251	−.0120399	−.0029112						

4-B. Monthly Cumulative Wealth Relatives: GNMA Equally-Weighted Returns (All Data)

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	1.0453	1.0517	1.0631	1.0573	1.0415	1.0481	1.0322	1.0616	1.0683	1.0961	1.0996	1.1090
1972	1.1202	1.1361	1.1357	1.1357	1.1471	1.1515	1.1555	1.1595	1.1553	1.1649	1.1828	1.1872
1973	1.1887	1.1899	1.1889	1.1932	1.1954	1.1941	1.1497	1.1352	1.1911	1.2005	1.2174	1.2253
1974	1.2273	1.2354	1.2007	1.1846	1.1840	1.1583	1.1483	1.1098	1.1436	1.2154	1.2510	1.2464
1975	1.3089	1.3179	1.3007	1.2717	1.3188	1.3293	1.3136	1.3094	1.2879	1.3696	1.3532	1.3883
1976	1.4149	1.4236	1.4365	1.4582	1.4272	1.4491	1.4621	1.4997	1.5135	1.5374	1.5771	1.6061
1977	1.5708	1.5770	1.5895	1.5997	1.6099	1.6368	1.6318	1.6443	1.6417	1.6359	1.6603	1.6425
1978	1.6349	1.6449	1.6428	1.6516	1.6317	1.6269						

TABLE 5

GNMA RETURNS NET OF T-BILLS RETURNS: JANUARY 1971-JUNE 1978
EQUALLY-WEIGHTED GNMA RETURNS (ALL DATA)

5-A. Monthly Net Rates of Returns

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	.04130	.00284	.00784	−.00827	−.01777	.00268	−.01916	.02371	.00256	.02231	−.00053	.00406
1972	.00709	.01175	−.00307	−.00292	.00706	.00093	.00037	.00053	−.00696	.00428	.01162	−.00003
1973	−.00311	−.00306	−.00539	−.00164	−.00323	−.00611	−.04334	−.01945	.04213	.00138	.00841	.00012
1974	−.00465	.00080	−.03346	−.02078	−.00799	−.02751	−.01550	−.03935	.02224	.05737	.02379	−.01062
1975	.04407	.00256	−.01706	−.02656	.03243	.00390	−.01656	−.00793	−.02161	.05748	−.01597	.02102
1976	.01438	.00274	.00502	.01092	−.02488	.01101	.00419	.0214⁹	.00474	.01165	.02177	.01433
1977	−.02552	.00043	.00416	.00256	.00267	.01267	−.00724	.00328	−.00589	−.00836	.00985	−.01551
1978	−.00950	.00149	−.00653	−.00007	−.01705	−.00827						

5-B. Monthly Cumulative Net Wealth Relatives

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	1.0413	1.0443	1.0524	1.0437	1.0252	1.0279	1.0082	1.0321	1.0348	1.0579	1.0573	1.0625
1972	1.0700	1.0826	1.0792	1.0761	1.0837	1.0847	1.0851	1.0857	1.0781	1.0827	1.0953	1.0953
1973	1.0919	1.0885	1.0827	1.0809	1.0774	1.0708	1.0244	1.0045	1.0468	1.0482	1.0571	1.0572
1974	1.0523	1.0531	1.0179	.9967	.9888	.9616	.9467	.9094	.9296	.9830	1.0063	.9957
1975	1.0395	1.0422	1.0244	.9972	1.0296	1.0336	1.0165	1.0084	.9866	1.0433	1.0266	1.0482
1976	1.0633	1.0862	1.0716	1.0833	1.0563	1.0679	1.0724	1.0955	1007	1.1135	1.1377	1.1540
1977	1.1246	1.1251	1.1297	1.1326	1.1356	1.1500	1.1417	1.1455	1.⁻87	1.1292	1.1403	1.1226
1978	1.1120	1.1136	1.1064	1.1063	1.0874	1.0784						

[3] Although the studies cited document returns for a substantial fraction of the total dollar amount of outstanding financial claims in the U.S., one important class of securities is notable by its absence. That is mortgage loans secured by "single-family" housing. As of August 1979, there were approximately $1.1 trillion worth of such securities outstanding. There is a dearth of information on the investment performance of these securities largely because they are not actively traded in an organized market. As a consequence, reliable estimates of their market prices are not available. However, as GNMAs are "backed" by pools of single-family mortgage loans, their returns should closely parallel those of such loans. If so, then returns series computed for GNMAs should be suitable for generating future return distributions for the portfolios of those financial institutions with large holdings of single-family mortgage loans.

[4] Every loan in a pool must be either insured by the Federal Housing Administration (FHA) or guaranteed by the Veterans Administration (VA). Detailed descriptions of the institutional characteristics of the GNMA security and the GNMA market are contained in The Ginnie Mae Manual (1978).

[5] The issuer of the GNMA security is required to pass-through the scheduled monthly principal and interest payments on each mortgage loan in the pool in an "orderly and timely manner," whether or not they have been collected from the individual mortgagors. When a mortgagor

TABLE 6

GNMA RETURNS NET OF LONG-TERM GOVERNMENT BOND RETURN: JANUARY 1971-JUNE 1978
EQUALLY-WEIGHTED GNMA RETURNS (ALL DATA)

6-A. Monthly Net Rates of Returns

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	−.00509	.02282	−.03965	.02347	−.01433	.02265	−.01818	−.01775	−.01385	.00924	.00791	.00416
1972	.01652	.00543	.00788	−.00272	−.01647	.01040	−.01775	.00053	.00476	−.01475	−.00708	.02719
1973	.03449	−.00037	−.00894	−.00105	.01249	.00106	.00636	−.04974	.01688	.02116	−.00201	.01485
1974	.01000	.00903	.00118	.01217	−.01269	−.02606	−.00572	−.01064	.00568	.01321	−.00027	−.02044
1975	.02702	−.00614	.01405	−.00415	.01545	−.02059	−.00317	.00365	−.00669	.01518	−.00104	−.01259
1976	.01005	−.00005	−.00744	.01334	−.00556	−.00533	.00110	.00458	−.00526	.00734	−.00778	−.01386
1977	.01746	.00837	−.00091	−.00092	−.00566	.00022	.00074	−.00847	.00109	.00596	.00535	.00601
1978	.00369	.00520	.00104	.00533	−.00558	.00331						

6-B. Monthly Cumulative Net Wealth Relatives

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	.9949	1.0176	.9773	1.0002	.9859	1.0082	.9899	.9723	.9588	.9677	.9753	.9794
1972	.9956	1.0010	1.0089	1.0061	.9896	.9999	.9821	.9826	.9873	.9727	.9659	.9921
1973	1.0263	1.0259	1.0168	1.0157	1.0284	1.0295	1.0360	.9845	1.0011	1.0223	1.0203	1.0354
1974	1.0458	1.0552	1.0564	1.0693	1.0557	1.0282	1.0223	1.0115	1.0172	1.0307	1.0304	1.0093
1975	1.0366	1.0302	1.0447	1.0403	1.0564	1.0347	1.0314	1.0351	1.0282	1.0438	1.0427	1.0296
1976	1.0400	1.0399	1.0322	1.0460	1.0401	1.0346	1.0346	1.0357	1.0405	1.0350	1.0426	1.0201
1977	1.0380	1.0467	1.0457	1.0447	1.0388	1.0391	1.0398	1.0310	1.0321	1.0383	1.0438	1.0501
1978	1.0540	1.0595	1.0606	1.0662	1.0603	1.0638						

TABLE 7

INFLATION ADJUSTED (REAL) RETURNS ON GNMA SECURITIES: JANUARY 1971-JUNE 1978
EQUALLY-WEIGHTED GNMA RETURNS (ALL DATA)

7-A. Monthly Net Rates of Returns

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	.04442	.00444	.00744	−.00876	−.01983	.00059	−.01769	.02595	.00546	.02445	.00157	.00446
1972	.00921	.00933	−.00198	−.00242	.00686	.00143	−.00053	.00183	−.00755	.00509	.01293	.00046
1973	−.00181	−.00593	−.01002	−.00333	−.00422	−.00778	−.03943	−.03014	.04608	−.00021	.00671	.00003
1974	−.00702	−.00621	−.03891	−.01893	−.01152	−.03098	−.01598	−.04580	.01830	.05370	.02064	−.01072
1975	.04542	−.00012	−.01677	−.02724	.03243	−.00019	−.02220	−.00625	−.02122	.05695	−.01792	.02163
1976	.01670	.00374	.00662	.01092	−.02701	.01000	.00299	.02098	.00504	.01165	.02289	.01544
1977	−.02756	−.00630	.00177	−.00152	.00077	.01006	−.00743	.00388	−.00540	−.00618	.00995	−.01443
1978	−.00999	−.00079	−.00811	−.00364	−.02172	−.01308						

7-B. Monthly Cumulative Net Wealth Relatives

YEAR	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1971	1.0444	1.0491	1.0569	1.0476	1.0268	1.0274	1.0093	1.0355	1.0411	1.0666	1.0682	1.0730
1972	1.0829	1.0930	1.0908	1.0882	1.0957	1.0972	1.0966	1.0986	1.0903	1.0959	1.1101	1.1106
1973	1.1086	1.1020	1.0909	1.0873	1.0827	1.0743	1.0319	1.0008	1.0471	1.0467	1.0538	1.0538
1974	1.0464	1.0399	.9984	.9805	.9692	.9392	.9242	.8818	.8980	.9462	.9657	.9554
1975	.9988	.9986	.9819	.9552	.9861	.9860	.9641	.9580	.9377	.9911	.9733	.9944
1976	1.0110	1.0148	1.0215	1.0327	1.0048	1.0148	1.0179	1.0392	1.0445	1.0566	1.0808	1.0975
1977	1.0673	1.0605	1.0624	1.0608	1.0616	1.0723	1.0643	1.0684	1.0627	1.0561	1.0686	1.0512
1978	1.0407	1.0399	1.0315	1.0277	1.0054	.9922						

defaults on his payments, the security issuer must continue to make regular monthly payments to the security holder until the loan is foreclosed and either the FHA or VA pays off the remaining unpaid principal balance of the loan. The remaining principal is then passed-through to the security holder.

[6] Because the maximum FHA/VA interest rate typically is set below the current market interest rate, GNMAs typically sell at a discount from their face values. One peculiarity of these securities is that the underlying mortgage loans are often called or "prepaid" before maturity even when the coupon interest rate on the loan is less than the current market rate. Again, the full amount of the prepayment is passed-through to the holder of the security.

[7] We believe this data base is unique. The GNMA constructs a three-month "rolling" tape of pool factors. Thus, at any time the GNMA has a computer readable record of only the most recent three months of paydown factor information for each security. Additionally, each month Telerate, Inc. publishes the most recent factors for all pools on microfiche. Although these are a continuous series, they are not computer readable.

[8] There were securities with 32 different coupon rates represented on the tape. Securities backed by mortgage loans on single-family housing have been issued with coupon rates of 6.5%, 7.0%, 7.25%, 7.5%, 7.75%, 8.0%, 8.25%, 8.5%, and 9.0%. Coupon rates on the securities are tied to the maximum allowable rate on FHA-insured and VA-

guaranteed loans. The interest rate on the security is .50% less than the rate on the underlying loans. The .50% difference represents the servicing fee on the loans and the GNMA guarantee fee [See McConnell (1976, 1977)].

The remaining coupon rates represent securities backed by pools of mobile home loans and "project" loans. Such securities may be backed with loans of any coupon rate.

8% securities were chosen for this study for several reasons: First, they are by far the largest single interest rate category in terms of total dollar amount of loans issued; second, at least one 8% security was issued every month over the period studied; third, continuous market prices are not available over the period examined for securities with any other coupon interest rate; fourth, 8% securities are the most actively traded group of GNMAs.

⁹ Several quality checks of the Loeb, Rhoades data were conducted. First, we checked for systematic factor omissions. After February 1972, when the data on the tape began, we found only one systematic omission. All of the pools outstanding at the time were missing the March 1973 factor. We have no explanation for that omission. We used the NHAC data to compute the return for that month. Again, the return for this month may not be representative of the entire market.

In terms of the percentage of omitted factors, several statistics were computed. Approximately 5% of the pools were missing at least one factor. However, that number is somewhat misleading, because approximately 75% of the securities were issued after January 1, 1976. Of those issued before that date, approximately 25% were missing at least one factor. Of course, 100% of the pools issued before March 1973 were missing at least one factor.

We also checked for "inverted factors." Factors for an individual pool should decline each month. An inverted factor occurred when a factor was larger than the one preceding it. In those cases, the questionable factor was removed from the file. We found that about 4% of the pools contained inverted factors. This meant that less than 1% of the factors themselves were inverted. The error rate on this tape compares favorably with those on other large, widely used data bases [See Rosenberg and Houglet (1974)].

¹⁰ Each of these prices (yields) is a "representative" or "consensus" price (yield) based on a survey of GNMA dealers. As a consequence, they are, in fact, estimates of "true" market prices. It is likely that the more recent prices in the series represent better estimates of "true" market prices than the earlier ones. Over the time period when both the prices based on Salomon Brothers yields and WSJ prices were available, we compared the two. In general, the two price series were highly correlated, but the difference between the two was as much as one point in some months. As time progressed, the differences in the two price series became small and the two were virtually identical during 1977 and 1978. Furthermore, over time, as the market for this security has become more active, the bid-ask spread has declined from about one point to ⅛ or ¹/₁₆ of a point. A recent study by Garbade, Pomrenze, and Silber (1979) indicates that GNMA dealers actively communicate with other market participants and that, although bid-ask spreads are not identical across dealers, the differences are on the order of ¹/₃₂ of one point.

¹¹ Fourteen months was chosen arbitrarily as the demarcation point for "new issues."

¹² In a separate paper [Dunn and McConnell (1980)], we examine the impact of "age" on the value of GNMA securities.

¹³ The methods used to construct the series are described in Ibbotson and Sinquefield (1976). The returns series in their paper end in 1974. We are indebted to Roger Ibbotson for providing us with the updated series through the end of 1978.

¹⁴ We also computed net returns series for GNMAs versus common stocks and GNMAs versus long-term corporate bonds. These series are available upon request from the authors.

¹⁵ Because of the method used to compute the net return series, the mean net return does not equal the difference between the arithmetic mean returns on the two relevant series [See Ibbotson and Sinquefield (1976, p. 35)].

¹⁶ Raw returns series and net returns series for the "new issues" indexes and for the two value-weighted indexes are available from the authors. Because of their similarity to the equal-weighted index with all data, they are not presented here.

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