The Implications of the Proposals of the Hunt Commission for the Mortgage and Housing Markets: An Empirical Study

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Part I: Introduction

The Report of the President's Commission on Financial Structure and Regulation [19] (hereafter the Hunt Report) recommends important changes in the regulation, supervision, and operation of all major financial intermediaries. A common thread throughout the Hunt Report is the view that financial institutions should operate under the minimum necessary regulation. In this regard the Hunt Report proposes (1) eliminating Regulation Q and related time deposit rate ceilings, (2) authorizing a wider range of asset and deposit powers for the financial intermediaries, and (3) extending many of the service functions that financial intermediaries wish to provide. The Hunt Report acknowledges the concern that may be raised by such proposals in view of the social priority for an ample flow of funds into housing investment, but it argues that the question of the efficiency of financial markets should be separated from the question of the subsidization of socially desiable expenditures. In particular, the Report points out that housing construction may be most efficiently stimulated by direct subsidies legislated by the Congress.

An unfortunate aspect of the Hunt Report is that there is practically no attempt to quantify the likely magnitudes that would be involved if the proposals were adopted. This drawback is particularly severe in the discussion of the mortgage and housing markets. That is, even if one were to agree with the principle of limited regulatory

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intervention and direct subsidization of social priorities, some indication of the magnitudes that are likely to be involved would appear a critical input for any pragmatic evaluation of the Hunt Report.

It is with this background that we have attempted to prepare a paper describing some of the the likely quantitative implications of the Hunt Report for the mortgage and housing markets. In Parts II and III of the study the Federal Reserve–MIT–Penn Econometric Model (hereafter the FMP model) is used to evaluate many of the recommendations of the Hunt Report. Although the FMP model is the most comprehensive model available for this purpose, it should be noted at the outset that the proposals of the Hunt Report are sufficiently far reaching that models estimated using historically available data may not apply to the new regimes of the Hunt Report. The possibility that a model may not be appropriate when applied to new regimes is in fact quite apparent in much of the institutional structure of the FMP model, since the model sharply distinguishes between different financial intermediaries. Under the recommendations of the Hunt Report the distinctions between financial intermediaries will be blurred, and, perhaps, even eliminated. We have, in fact, been sufficiently concerned about this point that in Part IV an alternative analysis that does not depend on current institutional structure has been attempted. Not surprisingly, the conclusions that can be drawn from the more general analysis are not as precise as those that come from the established FMP model.

It should also be stressed at the outset that in evaluating the implications of the Hunt Report for mortgages and housing, we have considered only part of the Report's proposals. In addition to the three sets of proposals noted above, the Hunt Report also makes significant recommendations for the supervision, chartering, and branching of financial intermediaries, for the operation of trust and pension funds, and for changes in reserve regulations and tax treatment of the institutions. We have considered these proposals, but have restricted our discussion to the proposals regarding Regulation Q, to the proposals for extended borrowing and lending powers, and to the proposals for extended service functions.

Part II: **Mortgage and Housing Market Effects from the FMP Model**

A. *The FMP Model*

The results of this section are based on simulation experiments using the Federal Reserve–MIT–Penn (FMP) econometric model. A general discussion of the overall model is being prepared by Ando and Modigliani [2]. Preliminary reports on the general structure of the model can be found in Ando and Modigliani [1], deLeeuw and Gramlich [7], [8], and Rasche and Shapiro [18]. These preliminary reports provide a sufficient discussion of the general structure of the model to permit the interpretation of the results reported here.

With respect to the savings-deposit, mortgage, and housing sectors of the FMP model, the sectors used most intensively in this study, detailed discussions are available in Gramlich and Jaffee [14]; see also Appendix A. It is useful, however, to review the main structure of these three sectors. As a broad scheme, the main equations of these sectors may be summarized: (signs above symbols indicate expected partial derivatives)

(1) $TD_i = TD_i\,(\overset{+}{RT_i},\ \overset{-}{RT_j},\ \overset{-}{RCB},\ \overset{+}{NW})$

(2) $RT_i = RT_i\,(\overset{+}{RM},\ \overset{+}{RCB},\ \overset{+}{RT_j},\ \overset{+}{\text{Reg Q Ceiling}})$

(3) $M_i = M_i\,(\overset{+}{RM},\ \overset{-}{RCB},\ \overset{+}{TD_i})$

(4) $RM = RM\,(\overset{+}{RCB},\ \overset{-}{M/H})$

(5) $H = H(\overset{-}{RM},\ \overset{-}{PH},\ \overset{+}{\Delta M},\ \overset{+}{\text{Demand Variables}})$

Symbols are defined:

RT_i : time deposit rate of ith intermediary

RM : mortgage rate

RCB : corporate bond rate

NW : net worth of household sector

TD_i : time deposits of ith intermediary

M_i : mortgages held by ith intermediary

M : total mortgages held

ΔM : change in total mortgages held

H : housing stock

PH : price of housing

The explanation of these equations will be provided as the analysis proceeds.

B. *Description of Experiments*

Due to the large number of Hunt-Report proposals that may directly affect the housing and mortgage markets, it was decided to implement the proposals one by one. The following notes describe each experiment and how it was implemented in terms of equations (1) to (5). A precise description of the experiments is provided in Appendix A.

(1) *Elimination of Regulation Q.* The FMP model explicitly accounts for the effect of the Regulation Q ceiling on commercial bank deposit rates, and thus the effect of eliminating the ceiling can be ascertained over historic periods by simply raising the ceiling above the relevant level. In terms of equation (2), it can be seen that raising the ceiling directly allows the commercial bank time deposit rate to rise. The time deposit rates of the savings institutions (savings and loan associations and mutual savings banks) will also rise, but to a lesser extent. The net effect on deposits levels (as seen in equation (1)) will be a shift in deposits away from the savings institutions and to the commercial banks. Because all deposit rates rise, it is possible that the aggregate effect will be a net increase in deposits, indicating some bidding of funds away from other capital markets ("re-intermediation"). The effects of the deposit changes on mortgages and housing then follow from equations (3) to (5).

The Regulation Q ceiling experiment assumes that only commercial bank deposit rates were constrained by the ceilings. Savings institutions have also, however, had ceilings placed on their deposit rates, and it has been a matter of debate whether these ceilings actually inhibited the deposit-rate setting of the savings institutions.[1] It has been found in the FMP model, for example, that the model simulates values well above the actual rates in the late 1960s for the savings institutions. This suggests that binding ceilings also did affect the savings institutions. Thus we have carried out a second experiment in which we first constrain the savings institution deposit rates to their historic values, and then release their rates and the Regulation Q ceiling on commercial banks at the same time. The general effect of this experiment should be the same as the first, but we would expect the savings institutions to fare relatively better since they are also being released from a constraint.

(2) *Extended Service Benefits for Savings Institutions.* The Hunt Report extends the service functions allowed savings institutions in many ways. The two most important factors appear to be the consumer loan powers and the third party payment functions allowed the savings institutions. More generally, however, it seems the intention of the Report to allow savings institutions to compete with banks in all consumer related functions that may be termed "one-stop banking."

In order to evaluate this effect, we note that savings institutions have historically paid deposit rates of from 50 to over 100 basis points more than commercial banks, and that this spread has been attributed to the "one-stop banking" advantages available to the commercial banks. We should thus expect the Hunt-Report proposals to create a significant shift in time deposits from commercial banks to savings institutions if this spread is maintained. In the experiments we have shifted the demand functions for time deposits faced by the commercial banks and savings institutions such that the spread necessary to achieve the currently observed distribution of deposits is smaller. In particular, we have decreased the necessary spread by two amounts: 25 basis points and 50 basis points.

(3) *Portfolio Composition Effect of Extended Lending Powers.* The Hunt Report recommends significant extensions in the lending powers of the savings institutions. Perhaps the most important power is the consumer loan function. In addition, lending powers have also been extended to corporate bonds, state and local securitites, and equities. The lending powers in each of these areas are limited,

[1]See Vernon [22] for a discussion of ceiling regulations and deposit rate setting of non-bank intermediaries.

typically to 10 percent of assets, but their cumulative effect certainly may be quite significant. An important question is thus to what extent these powers will actually be used.

One indicator of the degree of use of these powers can be found in the experience of mutual savings banks. In several states with mutual savings banks, for example, the institutions have consumer loan powers. The experience has been that most of these institutions use these powers in the range of 3 to 8 percent of assets, whereas in most cases the legal maximum is at least 10 percent. Similarly, mutual savings banks already enjoy powers with respect to corporate bonds and equities. As of December, 1971, mutual savings banks held 20 percent of their assets in such corporate securities.

In attempting to translate this information into a reasonable assumption for the portfolio substitution effect of the extended lending powers, several considerations must be noted. First, at issue is a complicated portfolio adjustment in which the substitution of the new assets need not go only against mortgages; to the extent that the extended powers allow for more diversified, more liquid, or more marketable portfolios, we might well find a significant part of the substitution effect going against the liquid asset holdings of the institutions. Second, the savings institutions would still maintain, by virtue of their established expertise, a comparative advantage in the origination of mortgage contracts. Thus, there should be no presumption that they will necessarily use the extended powers to the full limit, or even to the degree they are used by other institutions (for example, by life insurance companies and commercial banks). Finally, it must obviously be pointed out that savings and loan associations are likely to make significantly more use of the new powers than mutual savings banks since the latter already have at least some of these powers.

To estimate the portfolio substitution effect, we shall carry out two experiments in the hope that our results will at least bound the likely outcome. For savings and loan associations we assume that the supply of mortgages is reduced by (i) 10 percent and (ii) 30 percent. For mutual savings banks we assume respectively (i) 5 percent and (ii) 15 percent.

In terms of the simple equation system above, these assumptions are introduced by reducing all the parameters determining the equilibrium mortgage stock of the institution by the appropriate amount. These shifts in the mortgage supply function will then induce an increase in the mortgage rate, leading to some increase in mortgage lending, and to an increase in the deposit rate (because the mortgage rate rises), leading to a larger portfolio size with a resulting increase in mortgage lending. Thus, although the total effect for mortgage lending from this source is likely to be negative, it will be less than the original amounts specified, and our results will indicate the magnitude of the offset.

(4) *Portfolio Expansion Effect of Extended Lending Powers.* The previous discussion has just indicated that a rising mortgage rate will induce a rise in deposit rates, and thus a rise in portfolio size that may offset portfolio composition changes. The extended lending powers may also have a more direct effect on the ability of savings institutions to compete for deposits. Specifically, by obtaining a more optimal portfolio distribution, the savings institutions should be able to increase either the safety of their portfolio (with its yield constant), or the yield of their portfolio (with risk constant), or some of both. In any of these cases, the changes should place the savings institutions in a more competitive position in the deposit market.

To evaluate these effects, we assume that funds transferred from mortgages to other extended lending powers will provide the institutions on average a gain of one percentage point in yield. This value is, in fact, roughly the net yield advantage of consumer loans over mortgage loans after accounting for all cost and default losses (see Fand [13]). In terms of the average yield on the portfolio, for an institution shifting 10 percent of its assets out of mortgages, for example, the effect on the total portfolio would be a yield gain of .1 percentage points.

In implementing this experiment, we have tied our assumptions to the respective cases for the portfolio substitution effect. It will be recalled we assumed, for savings and loan associations, portfolio substitutions of (i) 10 percent and (ii) 30 percent; thus the corresponding expansion effects are an increase in the deposit rate of (i) .1 and (ii) .3 percentage points. Similarly, for mutual savings banks, we assume, in the respective cases, increases in the deposit rate of (i) .05 and (ii) .15 percentage points.

The impact of these shifts in deposit rates will be increased savings flows into the institutions, the funds coming both from the commercial banks and the general capital markets. These markets may compete, of course, and this competition in rates will drive the rates even higher and will reduce the net flows to the institutions. Whatever the amount, however, the increased deposit flows will stimulate the supply of mortgages.

(5) *Flexible Loan Rates on Policy Loans of Life Insurance Companies.* During the 1966 monetary tightness, life insurance companies experienced a significant and sudden increase in the flow of funds to policy loans. The reason for this sudden increase was that the loan rate on policy loans is generally fixed, typically at 5 percent, and thus sophisticated policy holders will take out loans when market rates rise above these fixed levels. In response to this problem, the Hunt Report recommends that life insurance companies be allowed a flexible policy with respect to the interest charges on policy loans. While the intent of the proposal is not to eliminate policy loans – they would be still used by individual policy holders as an available source of funds – a flexible rate policy would eliminate the "hot money" aspect of these funds.

Fortunately, the implementation of this policy is straightforward in the FMP model since the model is intentionally estimated with the spread between market interest rates and the fixed charge of life insurance companies. Thus, this variable is set to zero in testing for the effect of the flexible loan rate policy. The effect of the change should, of course, be a reduction in the flow of funds away from life insurance companies in periods of rising and high interest rates.

(6) *Variable-Rate Mortgages.* The Hunt Report's recommendation for variable-rate mortgages is perhaps one of its most controversial features. The use of variable-rate mortgages entails considerable change in the habits and expectations of both the borrowers and the lenders. Because of the basic changes required, we feel it is beyond the scope of the current experiments to attempt a full investigation of variable-rate mortgage effects. However, one obvious impact of variable-rate mortgages would be that they allow deposit rates of savings institutions to respond more quickly to changes in the market yield on mortgages. Currently, in the FMP model, on the other hand, deposit rates respond only with a long lag to changes in mortgage rates. Thus, to test the magnitude of the changed response of deposit rates to mortgage rates, we have eliminated all lags in the estimated relationship while maintaining the same cumulative effect. The result should be a more responsive deposit rate, although there should be no effect on average unless mortgage rates have a trend over the sample period. It is worth repeating, however, that there are many other aspects of variable-rate mortgages that should be considered in a full evaluation of this proposal. In particular, our analysis does not take into account the effect of changed cash flows that would result from variable-rate mortgages.

C. *The Implementation of the Experiments*

As already noted, a technical description of the experiments is provided in Appendix A. There are, however, certain features of the experiments that should be stressed:

(1) *Dynamics and Lead Time.* The FMP model has been carefully estimated to account for short-term dynamic relationships in the capital markets. Thus any impulses that shock the system will have short-run impacts that vary in magnitude, and sometimes even in direction, from the long-run impact. In implementing the experiments used here, we have shocked the system by the full amount of the change all at once. One can thus observe how the system dynamically adapts to the change on its path toward the final equilibrium. In particular, we show the results of the shock roughly one year after the impact (the short run), five years after the impact (the intermediate run), and 10 years after the impact (the long run).

With respect to dynamics, it should also be noted that the Hunt Report has generally recommended that its proposals be adopted on a gradual time basis. We have not attempted to capture this proposed phasing-in because of the complications created in programming the actual policies. However, it should be noted that a phasing-in lag should be added to the internal dynamics in evaluating the actual timing of the effects of the proposals.

(2)*Mortgages and Housing in the FMP Model.* A second point of note concerns the relationship between mortgage flows, mortgage interest rates, and housing investment in the FMP model. As shown in equation (5), changes in both the mortgage interest rate and the flow of mortgages will affect the amount of housing investment. Increases in the mortgage rate increase the cost of capital for housing investment, and thus lead to long-run decreases in the desired housing stock. Increases in the mortgage flow increase the availability of funds for housing, and thus stimulate housing investment.

It should be stressed, however, that the mortgage-flow effect on housing and the mortgage-rate effect on housing are mutually exclusive; that is, they both cannot be operating at the same time. The mortgage-flow effect can operate only when the mortgage market is in disequilibrium such that, at the quoted mortgage rate, the demand for funds exceeds the supply; in this situation the availability of funds will influence housing investment and the rate will be irrelevant. On the other hand, only the mortgage-rate effect will operate whenever the mortgage market is in equilibrium; in this situation the demand for funds must equal the supply of funds and thus availability effects will not matter. The relative importance of the mortgage-flow and mortgage-rate effects thus depends critically on whether the mortgage market is in equilibrium. While available evidence indicates the mortgage market may have significant deviations from equilibrium in short-run dynamic contexts,[2] there is no evidence to suggest that equilibrium is not generally attained in the intermediate or long run.

An important implication of this structure in the model is that policies affecting the mortgage market will induce long-run changes in the housing stock only to the extent that these policies change the mortgage interest rate. This factor is important because the FMP model is also characterized by a very high elasticity in the response of the demand for mortgage funds to interest rate changes.[3] That is, small changes in the mortgage rate will induce large changes in the demand for mortgage funds. The implication of these factors can perhaps be best understood with the example of a purchase of mortgages by FNMA. In the short run, assuming the mortgage market is in disequilibrium, the impact of a FNMA purchase will directly increase housing investment, because of the unsatisfied demand for mortgage funds. In the long run, however, FNMA purchases will effect housing only by their impact on the mortgage rate. Now, it could be expected that FNMA purchases would tend to lower the mortgage rate; however, because of the high elasticity of demand, small declines in the mortgage rate create large demands for funds, and thus the net effect of FNMA on the mortgage rate may be very small. Taking this one step further, one can see therefore that the long-run impact of FNMA on the housing sector may be very small.

The upshot of this discussion is that policy changes in the FMP model that result in large changes in the flow of mortgage funds may at the same time result in relatively small changes in the flow of housing investment. This is the result of the structuring of the model. It is, however, a somewhat controversial feature of the model, and thus in discussing and evaluating our results, we shall take care to show both the effects on mortgages and the effects on housing. (See Section II.D. (8) below.)

[2]See Fair [11] and Gramlich and Jaffee [14].

[3]This aspect of the mortgage sector is discussed in Gramlich and Jaffee [14], Chapter 5.

(3) *Experiments Done in Real Time.* The results obtained in this part are derived from comparative simulations of the FMP model. This means that a Hunt-Report proposal is coded into the FMP model, the model is simulated over some time period, and then the results are compared with either historic data or the results of other related simulations. The sample used in all these experiments is 1960:1 to 1970:3, and the shocks to the system generally occur in 1960:2. The results are then available on a quarterly basis for a little over 10 years after the shock. In reporting the results we have used actual dates as a convenient numbering system; for example, most of the results are reported for 1961:1, one year after the shock; for 1965:1, five years after the shock; and for 1970:3, roughly 10 years after the shock.

(4) *General Equilibrium Simulations.* The simulation experiments have been carried out in the context of the full FMP model (see Appendix A for details). This means that the results obtained for any shock to the system include all general equilibrium ramifications of the shock. For example, a shock that stimulates housing investment will, via the GNP multiplier, have feedback links to the savings-deposit, mortgage, and housing sectors, and these feedbacks will be taken into account in the final reported results. Similarly, the general equilibrium links among the savings-deposit, mortgage, and housing sectors are included in all the simulation experiments.

D. *Results of the Experiments*

(1) *Simulation Fit of the FMP Savings-Deposit, Mortgage, and Housing Sectors.* Table 1 provides results for the historic values, simulation values with the Regulation Q ceiling in effect, and summary statistics for the savings-deposit, mortgage, and housing sectors of the FMP model. The variables listed in the table are defined:

Interest Rates

RTB	Treasury bill rate
RM	Mortgage rate
RTP	Commercial bank time deposit rate
RSL	Saving and loan deposit rate
RMS	Mutual savings bank deposit rate

Deposit Levels

MP	Commercial bank time deposits
MSL	Savings and loan deposits
MMS	Mutual savings bank deposits
MIS	Life insurance company reserves

Mortgage Levels

MKCB	Commercial bank mortgage holdings
MKSL	Savings and loan mortgage holdings
MKMS	Mutual savings bank mortgage holdings
MKIS	Life insurance company mortgage holdings

Housing Investment and Stock

EH$	Current dollar housing investment (at annual rates)
KH$	Current dollar housing stock (single and multi family)

The actual historic values for these variables at three points in time 1961:1, 1965:1, and 1970:3 -- are shown in Table 1A.

Table 1B shows the simulated values that result from a dynamic simulation of the full FMP model (see Appendix A) with Regulation Q ceilings in effect. The time period for the simulation is 1960:1 to 1970:3. The initial point was chosen as essentially the earliest point at which the full system could be simulated. The end point was chosen to avoid the effects of the 1970:4 automobile strike.

Overall, the system simulates the historic data very well. Table 1C shows the means of the historic series and the root-mean-squared errors (RMSE) between the historic series and the simulated series for the full sample. It can be seen that interest rates are simulated with an error in the order of 15 basis points, deposits are simulated with an error in the order of $4 billion, mortgages are simulated with an error in the order of $4 billion, housing investment is simulated with an error of $2 billion, and the housing stock is simulated with an error of $4 billion. Perhaps the main point of error in this simulation occurs late in the sample (see 1970:3) where RSL, MSL, MMS, MKSL, and MKMS are too high and MP and MKCB are too low. This is apparently the result of not placing any ceilings on the rate-setting of savings institutions; consequently, they simulate too high in their rate setting, their deposit levels, and their mortgage levels; similarly, the commercial banks simulate too low in their deposit levels and mortgage levels. This result will be discussed further below.

Table 1

HISTORIC VALUES AND STANDARD DYNAMIC SIMULATION WITH REGULATION Q CEILING
($ billions)

	1A: Historic Values			1B: Simulation			1C: Summary Statistics	
Variables	1961:1	1965:1	1970:3	1961:1	1965:1	1970:3	Mean	RMSE
Interest Rates								
RTB	2.35	3.89	6.33	2.48	4.16	6.30	4.17	.22
RM	6.11	5.83	8.60	6.10	5.90	8.22	6.55	.18
RTP	2.66	3.83	4.75	2.72	3.72	4.75	3.80	.06
RSL	4.03	4.32	5.55	4.06	4.29	5.95	4.56	.14
RMS	3.68	4.17	5.91	3.68	4.04	5.86	4.38	.12
Deposit Levels								
MP	61.9	109.9	171.5	63.6	108.0	155.3	112.1	4.8
MSL	64.3	104.1	142.9	63.7	105.6	160.3	102.2	6.5
MMS	37.1	50.1	69.7	37.2	49.6	76.7	51.2	2.1
MIS	97.6	119.1	153.6	97.7	119.7	158.3	121.8	1.5
TOTAL	260.9	383.2	537.7	262.2	382.9	550.6	–	–
Mortgage Levels								
MKCB	28.8	44.6	71.4	29.4	45.2	57.6	47.2	3.4
MKSL	62.0	103.6	146.5	61.3	105.3	157.8	101.6	5.0
MKMS	27.6	41.7	57.2	28.1	40.3	66.0	41.7	2.4
MKIS	42.4	56.4	73.8	42.2	57.5	77.4	57.2	1.3
TOTAL	160.8	246.3	348.9	161.0	248.3	358.8	–	–
Housing								
EH$	21.7	27.4	28.7	21.5	27.8	29.7	26.6	2.0
KH$	488.6	564.3	829.3	488.0	564.5	821.8	601.0	4.0

(2) *Removing Regulation Q Ceilings.* Table 2A shows the changes introduced with respect to the simulation with ceilings (Table 1B) when Regulation Q is removed from the commercial banks. Since the ceiling did not bind the banks (in the model) until 1968:1, the table shows results only for three recent points – 1968:1, 1969:1, and 1970:3. Before 1968:1 there were no changes compared with simulation with ceilings in effect.

Looking first at the impact on mortgages, we find that the mortgage holdings of the non-bank intermendiaries fall, by a total of $14.7 billion in 1970:3, while the holdings of commercial banks rise, by $4.7 billion in 1970:3. Thus the net effect of removing Regulation Q from the commercial banks is a decline in total mortgage holdings of $10 billion in 1970:3. The effect on housing is a decline of $1.8 billion in the stock of housing in 1970:3.

The mortgage changes have their source in the deposit rate and deposit flow changes introduced by the removal of the ceiling. It is seen that commercial banks raised their deposit rates in 1970:3 by 95 basis points and received additional deposits of $27.7 billion. The non-bank intermediaries also raised their deposit rates in order to compete, but still lost deposits by 1970:3 in the amount of $17:3 billion. Total deposits of the intermediaries thus rose by $10.4 billion in 1970:3. We thus have the result that total deposits of the intermediaries rose (obtaining funds from other markets) but that mortgage levels fell; the explanation, of course, is that there was a shift in deposits toward the less mortgage-intensive commercial banks.

The effect on housing is in part due to the decreased mortgage flows, but, quantitatively, the increase in the mortgage rate by 20 basis points in 1970:3 is the major source. The mortgage rate rose, in turn, in part because of the shift in the supply of mortgage funds, but, quantitatively, the major source of the rise is due to the increase in the Treasury bill rate by 42 basis points. The change in the Treasury bill rate is worth explaining at this point since a similar effect will be observed in experiments below. The change in the Treasury bill rate is the result of the increased level of time deposits at the commercial banks. The mechanism is that increased commercial bank time deposits require additional reserve funds, and thus the narrowly defined money supply must fall. This decline in the narrowly defined money supply results in the rise in the Treasury bill rate.[4]

[4]The money demand-money supply sector of the FMP model is described in detail in Modigliani, Rasche, and Cooper [17].

Table 2

SIMULATED VALUES: WITHOUT DEPOSIT RATE CEILINGS

	2A			2B			2C		
	No Ceilings on Commercial Banks: Deviations from Table 1B			No Ceilings on Any Intermediary: Deviations from Simulation (not shown) with Ceilings on all Intermediaries			No Ceilings on Any Intermediaries Simulated Levels		
Variables	1968:1	1969:1	1970:3	1968:1	1969:1	1970:3	1961:1	1965:1	1970:3
Interest Rates									
RTB	.01	.52	.42	.01	.49	.31	2.48	4.16	6.72
RM	0	.04	.20	0	.02	.03	6.10	5.90	8.42
RTP	.02	.37	.95	.02	.37	.95	2.72	3.72	5.70
RSL	0	.09	.38	0	.21	.78	4.06	4.29	6.33
RMS	0	.15	.57	0	.25	.52	3.68	4.04	6.43
Deposit Levels									
MP	.1	5.4	27.7	.1	4.5	21.7	63.6	108.0	182.9
MSL	0	−2.3	−11.5	0	−1.2	1.1	63.7	105.6	148.8
MMS	0	−.9	−3.8	0	−.3	−1.0	37.2	49.6	72.9
MIS	0	−.1	−2.0	0	−.1	−1.2	97.7	119.7	156.3
TOTAL	.1	2.1	10.4	.1	2.9	20.6	262.2	382.9	560.9
Mortgage Levels									
MKCB	0	.3	4.7	0	.3	3.0	29.4	45.2	62.3
MKSL	0	−1.8	−10.6	0	−1.1	1.4	61.3	105.3	147.2
MKMS	0	−.6	−3.1	0	−.2	−.6	28.1	40.3	62.9
MKIS	0	0	−1.0	0	0	−.7	42.3	57.5	76.4
TOTAL	0	−2.1	−10.0	0	−1.0	3.1	161.1	248.3	348.8
Housing									
EH$	0	−.5	−1.3	0	−.3	−.2	21.5	27.8	28.4
KH$	0	−.2	−1.8	0	−.1	−.3	488.0	564.5	820.0

Table 2B shows the changes introduced when deposit ceilings are removed from all financial intermediaries. We observed above that the basic FMP model does not have ceiling effects on non-bank intermediaries; furthermore, we observe that the basic simulation shown in Table 1B indicated that at least since 1968 the non-bank intermediaries were behaving as if ceilings were binding them to some extent. To obtain some quantitative measure of this effect we performed an additional "standard" simulation in which, since 1968:4, RSL and RMS were constrained to the observed historic values. This is interpreted as constraining the savings and loan associations and mutual savings banks to ceiling levels. The deviations shown in Table 2B are then the difference between the simulation without any ceilings (the same simulation underlying Table 2A) and the simulation with savings and loan associations and mutual savings banks constrained to ceiling (historic) levels.

Comparing Table 2B with Table 2A, we find that the non-bank intermediaries fare better under 2B, with the result that the mortgage stock actually rises by $3.1 billion in 1970:3 and the decline in the housing stock is a negligible $.3 billion in 1970:3. The difference in the results is the expected outcome of assuming that the non-bank intermediaries were constrained historically by rate ceilings and then calculating the effect of removing the ceilings.

Thus, in evaluating the total effects of removing Regulation Q we obtain at least somewhat different results depending on whether non-bank intermediaries were also constrained by deposit-rate ceilings. If only commercial banks were constrained, then Table 1A indicates that removing the constraint will, in 1970:3, result in a decline in mortgages of $10.0 billion, a rise in the mortgage rate of 20 basis points, and a decline in housing of $1.8 billion. If it is assumed all intermediaries were constrained, then Table 1B indicates that removing all constraints will, in 1970:3, result in a rise in mortgages of $3.1 billion, a rise in the mortgage rate of 3 basis points, and a decline in housing of $.3 billion. If these results are compared with the historic values in Table 1A, however, it is seen that for both assumptions the actual changes are quite small. We feel that this should be the major implication drawn from these results; *the removal of deposit-rate ceilings from depositary institutions will have minor quantitative effects on mortgage levels and housing and even the direction of the change is in doubt.*

We now turn to consider other proposals of the Hunt Report. In evaluating these other proposals we shall use as our standard of comparison the simulation of the FMP model when no ceilings are present.[5] This is the assumption used in obtaining Tables 2A and 2B. For purposes of reference, the levels simulated under this no ceiling assumption for the periods 1961:1, 1965:1, and 1970:3 are shown in Table 2C. Since these results are already implicit in preceding tables, they require no further discussion.

(3) *Extended Service Functions.* Table 3A shows the effect of allowing savings institutions extended service functions. This is implemented, as discussed above, by changing the necessary rate spread between savings and loan association deposit rates and commercial bank deposit rates, and mutual savings bank deposit rates and commercial bank deposit rates. In the case of Table 3A, the spreads are changed by 25 basis points wherever they enter the deposit demand functions.

The principal effect of this change is a large decrease in commercial bank deposits and a large increase in savings institution deposits. By 1970:3 the magnitude of the changes are – $25.7 billion for commercial banks and $32.2 billion for savings and loan associations and mutual savings banks. In percentage terms, this indicates that commercial bank deposits decline and that savings institution deposits rise about 15 percent 10 years after the change. There is also a large shift in deposits from savings and loan associations to mutual savings banks, but this is primarily a function of the way the equations were estimated, and consequently we have shown only the sum of the effect.

The response in mortgage holdings follows the same lines, taking into account that the mortgage rate falls by 30 basis points in 1970:3. In percentage terms, by 1970:3 commercial bank mortgages have fallen by almost 20 percent and the non-bank intermediary holdings of mortgages have risen by over 15 percent. The net absolute effect is positive because the shift in deposits has been toward the more intensive mortgage issuers.

The response in housing capital is also quite significant. By 1970:3 the housing stock increases by $9.2 billion, which is over 1 percent of the stock. The explanation for why the housing change is much smaller than the mortgage stock change has been given above.

[5]This avoids multiple counting of the Regulation Q ceiling effects. It should also be stressed that each of the following proposals are implemented one by one without an attempt to calculate directly the cumulative effect.

Table 3

SIMULATED VALUES, ALLOWING EXTENDED SERVICE FUNCTIONS; DEVIATIONS FROM TABLE 2C

	Rate Spreads RSL-RTP and RMS-RTP Reduced by:					
	3A: 25 Basis Points			3B: 50 Basis Points		
Variables	1961:1	1965:1	1970:3	1961:1	1965:1	1970:3
Interest Rates						
RTB	−.08	−.20	−.29	−.15	−.39	−.53
RM	−.04	−.21	−.30	−.08	−.42	−.55
RTP	−.01	−.01	−.13	−.02	0	−.19
RSL	−.01	−.11	−.22	−.02	−.22	−.29
RMS	−.01	+.18	−.30	−.02	+.24	−.55
Deposit Levels						
MP	−1.9	−11.0	−25.7	−3.7	−21.6	−49.7
MSL+MMS	2.4	16.8	32.2	4.7	34.8	63.9
MIS	1.2	.9	5.6	.1	1.7	9.1
TOTAL	1.7	6.7	12.1	1.1	14.9	23.3
Mortgage Levels						
MKCB	−.1	−4.5	−11.6	−.2	−8.9	−21.9
MKSL+MKMS	1.3	18.4	34.8	2.6	37.8	68.5
MKIS	0	.2	3.4	0	.4	5.5
TOTAL	1.2	14.1	26.6	2.4	29.3	62.1
Housing						
EH$	.3	.8	.8	.5	1.8	1.8
KH$	0	2.5	9.2	0	5.0	19.7

Table 3B presents the results when the rate spread is changed by 50 basis points. The shock to the system is thus twice as large, and it is apparent that the resulting changes are roughly proportional by a factor of 2.

In summary, we place the expected effects of the extended service functions as somewhere between the results of Tables 3A and 3B. In either case, the results are somewhat surprising in that they indicate that *extending service functions to the non-bank intermediaries will result in significantly increased mortgage lending and, given the elasticities of the FMP model, relatively large increases in the housing stock.*[6]

(4) *Portfolio Substitution Effect of Extended Lending Functions.* Table 4 shows the results of reducing the supply of mortgage funds by savings institutions on account of the opportunities for investment in other earning assets. Using Table 4A as the example, it is seen that savings and loan association mortgages decline by slightly more than the initial 10 percent, whereas mutual savings bank mortgages actually rise. The explanation for both of these results is found in the behavior of their respective deposits: MSL declines, thus reinforcing the shift away from mortgages by savings and loan associations; MMs rises, and in fact, rises enough to offset completely the initial shift against mortgages by mutual savings banks. The total impact on mortgages remains negative, but it is considerably less than the initial shifts would indicate. In addition, the mortgage rate shows only a short-run effect of importance, and thus in the long run, by 1970:3, the effect on KH$ is negligible.

Table 4B illustrates the same type of shifts against mortgages, but the magnitudes are roughly three times as great. Even in this case, the total change in the stock of mortgages in 1970:3 is less than 15 percent of the outstanding stock, and the change in the housing stock is a small proportion of the housing stock. The evaluation of the importance of the portfolio composition effect thus depends on which case is considered relevant – 4A or 4B – and on whether mortgages or the housing stock is considered the relevant indicator. It may be concluded, however, that the *total portfolio substitution effect, including general equilibrium ramifications, is substantially less than the magnitude indicated by the initial shifts.*

[6] While the interest rate elasticities of deposits in the FMP model are high, they are within the range of other studies. For further discussion see Gramlich and Jaffee [14].

Table 4

SIMULATED VALUES, PORTFOLIO SUBSTITUTION EFFECT OF EXTENDED LENDING FUNCTIONS; DEVIATIONS FROM TABLE 2C

	Mortgage Supply Reduced by:					
	4A			4B		
	Savings and Loans: 10% Mutual Savings Banks: 5%			Savings and Loans: 30% Mutual Savings Banks: 15%		
Variables	1961:1	1965:1	1970:3	1961:1	1965:1	1970:3
Interest Rates						
RTB	−.02	.01	0	−.02	.08	.05
RM	.12	.03	.01	.30	.18	.13
RTP	0	.06	.04	−.01	.14	.08
RSL	.03	.04	.02	.06	.13	.11
RMS	.03	.26	.11	.08	.20	.18
Deposit Levels						
MP	0	.7	−.5	0	3.8	3.2
MSL	.1	−1.2	−2.0	.2	−5.3	−5.0
MMS	0	1.8	6.3	.1	1.8	6.4
MIS	−.1	−.3	−.1	−.3	−1.1	−2.2
TOTAL	0	1.0	3.7	0	−.8	2.4
Mortgage Levels						
MKCB	.2	.9	.3	.5	3.1	3.6
MKSL	−5.3	−11.8	−16.9	−13.9	−35.3	−48.5
MKMS	−1.5	−.1	4.8	−2.5	−4.9	−2.0
MKIS	0	.2	.1	0	2.5	−.7
TOTAL	−6.6	−10.8	−11.7	−15.9	−34.6	−47.6
Housing						
EH$	−1.3	0	.1	−2.4	.4	.5
KH$	−.9	0	−.4	−1.2	−1.7	−2.4

(5) *Portfolio Expansion Effect of Extended Lending Powers.* Tables 5A and 5B show the expansion effect of deposit-rate shifts that correspond to the substitution effects of Tables 4A and 4B. In both Tables 5A and 5B, RSL and RMS rise by 1961:1 by roughly the amount of the shift. As the deposits of these institutions expand, however, the deposit rates decline, and by 1970:3 the changes are quite small and for mutual savings banks they are actually negative. The resulting changes in deposits, including the induced effects on commercial banks and life insurance companies, in 1970:3 are $10.3 billion in Table 5A and $31.0 billion in Table 5B. The corresponding changes in mortgage stocks are $12.2 billion and $37.0 billion. In the case of Table 5A this change in mortgages more than offsets the decline observed in the portfolio substitution experiment 4A, while in the case of 5B the offset to 4B is not quite complete. In both cases, however, the summed effects of experiments 4 and 5 on the housing stock are positive. Thus, in summary, the combined results of our portfolio substitution and portfolio expansion experiments is that *the net effect on mortgages may be either positive or negative depending on the magnitude of the shift, while the net effect on housing is always an addition to the housing stock.*

(6) *Flexible Rate on Life Insurance Company Policy Loans.* The results of allowing flexible rate setting on policy loans by life insurance companies are shown in Table 6A. The effects of the proposal were negligible until the very end of the sample period, and thus we have shown the results only for the last observation, 1970:3. Even then, it can be seen that the total change in life insurance company reserves net of policy loans is only $2.1 billion. The induced changes in mortgages and housing are thus not significant.

This conclusion may seem surprising in view of the publicity given to the unexpected policy loan withdrawals faced by life insurance companies. It is thus useful to review the actual behavior of policy loans during the 1966 monetary tightness. During 1966, policy loans of life insurance companies increased from $7.7 billion to $9.1 billion, a change of $1.4 billion. Of this amount, roughly $.5 billion can be attributed to the natural growth in life insurance policies outstanding (this, for example, was the increase in policy loans in 1965), leaving $.9 billion as the unexpected component. This number is quite consistent with the FMP model, which simulates an unexpected increase in policy loans of $.7 billion during 1966. Clearly, the magnitude is small relative to the levels of outstanding policy loans and life insurance reserves. It thus appears reasonable to

Table 5

SIMULATED VALUES: DEPOSIT EXPANSION EFFECT OF EXTENDED LENDING FUNCTIONS, DEVIATIONS FROM TABLE 2C

	Deposit Rates Increased by:					
	5A			5B		
	Savings & Loan: 10 b.p.[a] Mutual Sav. Bank: 5 b.p.			Savings & Loan: 30 b.p. Mutual Sav. Bank: 15 b.p.		
Variables	1961:1	1965:1	1970:3	1961:1	1965:1	1970:3
Interest Rates						
RTB	0	−.05	−.07	.01	−.13	−.21
RM	−.02	−.05	−.09	−.04	−.16	−.27
RTP	.04	0	−.02	0	0	−.06
RSL	.11	.08	.04	.34	.24	.12
RMS	.07	.04	−.01	.21	.11	−.04
Deposit Levels						
MP	0	−1.7	−5.6	0	−5.0	−17.0
MSL	.6	5.3	12.2	1.6	16.4	38.7
MMS	.2	.7	2.0	.5	2.0	4.8
MIS	0	.2	1.7	0	.6	4.5
TOTAL	.8	4.5	10.3	2.1	14.0	31.0
Mortgage Levels						
MKCB	0	−.7	−2.9	0	−2.0	−8.4
MKSL	.4	5.2	12.1	1.3	16.0	38.2
MKMS	.1	.7	2.1	.2	2.0	4.9
MKIS	0	0	.9	0	−.1	2.3
TOTAL	.5	5.2	12.2	1.5	15.9	37.0
Housing						
EH$	.1	.1	.2	.3	.4	.6
KH$	0	.5	2.4	.1	1.7	7.3

[a] b.p. equals basis points.

Table 6

SIMULATED VALUES, (A) FLEXIBLE LIFE INSURANCE POLICY LOAN RATE AND (B) VARIABLE-RATE MORTGAGE

	6A Flexible Policy Loan Rate	6B Variable Rate Mortgage		
Variables	1970:3	1961:1	1965:1	1970:3
Interest Rates				
RTB	0	0	0	−.13
RM	−.01	0	.01	−.18
RTP	0	0	.02	.01
RSL	0	−.07	.04	.14
RMS	0	−.09	−.03	.15
Deposit Levels				
MP	.1	0	.4	−6.9
MSL	−.1	.1	−.3	16.5
MMS	−.1	−.1	−1.5	5.6
MIS	2.1	0	−.1	2.0
TOTAL	2.0	0	−1.5	17.2
Mortgage Levels				
MKCB	0	0	.3	−3.1
MKSL	−.1	.1	−.3	14.5
MKMS	0	−.1	−1.8	5.2
MKIS	1.2	0	0	.7
TOTAL	1.1	0	−1.8	17.3
Housing				
EH$	.2	0	.1	.7
KH$	.1	0	−.2	2.4

conclude that *the flexible rate proposal will not have any important aggregate effect on mortgages and housing.*

(7) *Timing Effects of Variable-Rate Mortgages.* Table 6B shows the effects on deposit rate-setting of allowing for the faster response adjustment that would be expected in the presence of variable-rate mortgages. From the results for RSL and RMS, it can be seen that in the early part of the period, these rates were below the simulation norm, whereas late in the period they rose above the simulation norm. This behavior mirrors the simulated changes in the mortgage rate: early in the period mortgage rates were steady and actually fell slightly, whereas late in the period mortgage rates rose significantly. The implication, of course, is that over time, given that the mortgage rate has no long-run trend, there can be no net gain from the timing implications of variable-rate mortgages. Over the historic period 1960 to 1970, however, *there would have been a net gain, due to the trend in the mortgage rate, but there are no grounds for expecting this trend to continue necessarily into the future.*

(8) *Summary of the Results.* Table 7 provides a summary of the results of our experiments for mortgages and housing, 10 years after the simulated implementation of the Hunt Report. The results of the life insurance rate flexibility and the variable-rate mortgages have not been included since there is no presumption that these proposals would influence the long-run levels of mortgages and housing.

Table 7

SUMMARY OF THE MORTGAGE AND HOUSING RESULTS
($ billion)

Proposal	Effect 10 Years After Implementation: Mortgages	Housing
Remove Deposit Rate Ceiling (Tables 2A and 2B)	–$10 to +$3.1	–$1.8 to –$.3
Extended Service Function (Tables 3A and 3B)	+$26.1 to +$52.1	+$9.2 to +$19.7
Portfolio Substitution and Corresponding	–$47.6 to –$11.7	–$2.4 to –$.4
Portfolio Expansion (Tables 4A and 4B and 5A and 5B)	+$37.0 to +$12.2	+$7.3 to +$2.4

We feel that *these results indicate that the implementation of the Hunt Report would not have serious repercussions for the mortgage and housing markets.* Looking first at housing, given the magnitude of the positive effect on housing from the extended service function proposal, the net effect of all the proposals could well be positive. Even neglecting this effect, however, and choosing the lower bounds on the other estimates, the final effect on housing would be negligible. Turning to mortgages, the positive effect of the extended service function proposal also dominates these results, and the net effect would be positive. If the extended service function proposal is ignored, and the lower bounds on the other estimates are used, it is then possible that a decline by as much as 10 percent of the mortgage stock would be observed. This would be a "worst of all worlds" case, however, and thus a negligible effect would appear to be the reasonable conclusion.

Stating this conclusion in a slightly different way, our results indicate that the Hunt-Report proposals create only a minor net shift in the total mortgage supply function of the private financial intermediaries. This aspect of our conclusion is important because it suggests that our results are not significantly dependent on the specific interest elasticities for mortgages and housing that are built into the FMP model. These elasticities become critical when there are significant shifts of the demand and supply functions. Our results, however, indicate that the Hunt-Report proposals do not create an important disturbance from the initial equilibrium, and thus there is not a significant degree of further adjustment needed to restore the equilibrium.

For a similar reason, our results indicate that the short-run adjustments to the Hunt-Report Regime would not be difficult. It is, of course, possible for short-run changes in flows to be large and yet for the long-run equilibrium to be unchanged. Assuming, however, that all aspects of the Hunt Report are implemented at the same time, and given the adjustment speeds estimated in the FMP model, there is no indication that any short-run "bottlenecks" would occur. In addition, of course, the Hunt Report recommends that the proposals be implemented slowly, and this would provide a further safeguard.

Part III: The Direct Subsidization of Housing and Mortgages

A. *Housing as a Goal of Public Policy*

The analysis of this section is based on the assumption that private markets will not provide, say over the span of the next 10 years, the socially desirable increment to the stock of housing. Given this assumption, our analysis is an attempt to quantify the relative costs and efficiency of some of the alternative subsidy schemes that are available. Before preceeding, however, we feel that several *caveats* with respect to this assumption should at least be noted:

(1) *Housing as a Separable Goal of Policy.* It is important to distinguish three possible objectives of public policy: the well-being of financial intermediaries, subsidization of the mortgage market, and subsidization of housing investment. In many discussions of public policy in these areas, the three objectives become inseparable: in order to promote housing investment, we must stimulate the flow of mortgage funds; but the provision of mortgage funds strains the intermediaries operating in these markets; and thus further regulations and subsidies are required for the intermediaries. The Hunt Report has argued, and we believe correctly, that these issues should be separated. The social objectives for housing may be determined and then acted upon without recourse to mortgage subsidies or aid to the financial intermediaries. Indeed, the causation may run the other way, since direct subsidies to housing may increase the demand for mortgage funds and thus stimulate the mortgage market and the position of the financial intermediaries. For this reason, our results for housing subsidies may be considered independent of the Hunt-Report proposals for financial intermediaries.

(2) *Analysis Applies to Long-Run Effects on Housing.* Even taking the social priorities for housing as given, one must still distinguish between the cyclical movements and the long-term trend growth of housing. Our results in this section apply only to the long-run effects of subsidy schemes on housing. We shall argue in the following section that the cyclical movements in housing are the result of at least two factors: first, imperfections in the mortgage market that lead to short-run rationing of mortgage credit; and second, the high interest elasticity of the demand for housing. The Hunt-Report proposals move in the direction of perfecting the mortgage market, and it could be hoped that this would reduce the cyclical movements

in housing that result from short-run rationing of credit. The cyclical variations that result from the high interest elasticity of housing are not, however, dealt with in the Hunt Report. At a cost of some oversimplification, two remedies for this form of cyclical variation are available: first, require the Federal Reserve to maintain more stable interest rates, or, second, shield the housing market with policies that offset Federal Reserve actions. The difficulty, of course, is that both remedies would seriously impair the impact of monetary policy as a contra-cyclical tool of stabilization policy.

(3) *Aggregate versus Disaggregate Subsidy Schemes.* In discussing the policy objectives for housing, it is critical that one distinguish programs of aggregate subsidization from programs aimed at specific parts of the housing stock. It appears that public policy has been increasingly directed at the latter. This is important since, as our results below indicate, the efficiency of subsidization may be significantly greater when the objective is only part of the housing market.

B. *Direct versus Indirect Subsidization*

The Hunt Report argues in favor of *direct* subsidies for housing; for example, page 117, "... the Commission recommends that, in the event a properly functioning intermediary system leaves housing goals unmet, subsidies should be provided directly to those citizens qualifying for assistance." The distinction between direct subsidies, and the alternative, presumably indirect subsidies, is however not made precise in the Hunt Report.

To be explicit, we shall use the term *direct subsidies* to refer to three forms of subsidization of housing: (1) subsidies of construction costs and implicit or explicit rental payments; (2) subsidies of mortgage costs to borrowing units; and (3) subsidies of mortgage yields to lending institutions. *Indirect subsidies,* in contrast, take the form of constraints and regulations that force or induce financial institutions to lend in the mortgage market without directly affecting the interest cost of mortgages. The Hunt Report argues, and we proceed under the assumption, that indirect subsidies are not efficient. Our intent in this section is thus to evaluate the relative merits of various direct subsidy programs.

C. *Evaluation of Three Direct Subsidy Programs*

(1) *Direct Housing Subsidies.* Table 8 provides data for evaluating various programs that directly subsidize housing investment. The first row of the table shows the simulated values for housing investment, the housing stock, and the mortgage stock, for 1970:3, assuming only that there were no deposit rate ceilings. These data come directly from Table 2C. The following rows in the table show the results in 1970:3 for various policy changes undertaken in 1960:2. Subtracting these results from the simulated values in row 1 thus yields the differential that may be attributed to the policy after roughly 10 years.

Table 8

DIRECT SUBSIDY OF HOUSING
SIMULATED VALUES 10 YEARS AFTER IMPLEMENTED (1970:3)
($ billions)

Program	Housing Investment (EH$)	Housing Stock (KH$)	Mortgage Stock (Total Private)
(1) Simulated Value (Table 2C)	28.4	820.0	348.8
(2) 10% Direct Subsidy of Construction Cost	29.7	840.6	352.3
(3) 25% Direct Subsidy of Construction Cost	31.1	881.4	357.9
(4) 25% Decrease in Personal Property Tax Rate	29.4	842.2	352.5
(5) 25% Increase in Income Tax Rate	29.5	825.4	338.9
(6) $1 Billion Open Market Purchase by Federal Reserve	32.4	839.2	358.9

Row 2 in the table shows the results of a 10 percent direct subsidy on construction costs. It is assumed in this experiment, in other words, that the construction cost of a house, as viewed by the builder, is subsidized 10 percent by the government. The results are that housing investment rises by $1.3 billion (at annual rates), the housing stock rises by $20.6 billion, and the mortgage stock rises by $3.5 billion. The low incremental mortgage-to-house ratio is due to an increase in the mortgage rate which reduces the demand for mortgage funds. It can be seen in the table that a relatively small increase in the outstanding mortgage stock is a characteristic of all the programs except the Federal Reserve open market purchase (row 6).

In order to evaluate the policy, some indication of the costs necessary to achieve the $20.6 billion increment to the housing stock is necessary. The most optimistic appraisal follows if it assumed that the subsidy is paid on the incremental housing investment. In this case, the cost would be 10 percent of the $20.6 billion increment, and the efficiency would be exactly 10:1.[7] This case might apply if the subsidy only were to some form of housing that would not otherwise have been built. A less optimistic appraisal is derived if it is assumed that the subsidy is paid on all housing construction during the period. For example, the initial value of housing at the time of the policy was simulated to be $485 billion and the end value is $840 billion; 10 percent of the difference is thus $35.5 billion or an efficiency of roughly 2/3:1. This calculation overstates the cost, however, because although the price of housing has been rising, the subsidy would not be paid on the capital gains that accrue over time. If the same calculation is made in real terms, the efficiency ratio is slightly greater than 1, but this, of course, overstates the efficiency. Thus, it appears reasonable to assume that if all additions to the housing stock are subsidized, then the efficiency of the program is roughly 1.

Row 3 in the Table 8 shows the same experiment as row 2, but with the subsidy rate at 25 percent. Evaluating the housing stock effect, we find an increment to the housing stock of $61.4 billion. If the subsidy were paid only on this increment, then the efficiency would be 4:1. In other words, *if direct housing subsidies are paid only on the incremental housing stock, then the efficiency falls as the subsidy rises, but, of course, a larger effect is obtained for larger subsidies. On the other hand, if the subsidy must be paid on all housing constructed during the period, the efficiency then remains at roughly 1.*

Rows 4 to 6 in the table show the results of alternative programs that operate in a similar fashion to the construction cost subsidy just described. Row 4 shows the results of a 25 percent decrease in the aggregate property tax rate. This stimulates housing because it decreases what is essentially a tax on the capital, and it can be seen that the effect is roughly the same as the 10 percent construction cost subsidy. Row 5 shows the effect of a 25 percent increase in the effective personal income tax rate. This stimulates housing because mortgage payments are tax deductible, and thus an increase in the

[7] That is, $10 of housing construction would be obtained for each $1 of subsidy payment that is made.

tax rate decreases the relative cost of capital for housing. It can be seen that this policy has a relatively small effect on the housing stock. Row 6 shows the results of a Federal Reserve open market purchase of $1 billion of government bonds that is carried out in 1960:2 and then maintained throughout the period. It is apparent that this policy is also roughly equivalent to the 10 percent construction subsidy, although it leads to a significantly greater mortgage stock.[8]

(2) *Direct Subsidies of Mortgages.* Table 9 provides results for evaluating the effectiveness of programs that directly subsidize the mortgage market. Row 1 of the table provides the basic simulation values and is the same as presented in Table 8. Row 2 of the table shows the results of providing a 10 percent subsidy to mortgage borrowers. In other words, it is assumed for this program that the government rebates, in one form or another, 10 percent of the interest cost of mortgage loans. The results are not very surprising: the policy stimulates an increase in mortgage demand and the mortgage stock of almost $60 billion, but an increase in the housing stock of less than $5 billion. The efficiency of the policy for stimulating housing depends on whether the subsidy iis paid on all mortgages or only on the increment induced by the policy itself. In either case, however, it is clear the program is significantly less efficient than the direct subsidy program for housing discussed in the previous section.

Table 9

DIRECT SUBSIDY OF MORTGAGES
SIMULATED VALUES 10 YEARS AFTER IMPLEMENTATION (1970:3)
($ billions)

Program	Housing Investment (EH$)	Housing Stock (KH$)	Mortgage Stock (Total Private)
(1) Simulated Value (Table 2C)	28.4	820.0	348.8
(2) 10% Borrower Subsidy	28.7	824.7	408.7
(3) 10% Lender Subsidy	28.7	824.5	405.6

[8]The larger mortgage stock is obtained because the Federal Reserve actions reduce interest rates, including the mortgage rate, and thus the demand for mortgages is directly expanded. This effect is even more evident in the direct mortgage subsidies discussed below.

Row 3 of Table 9 shows the results of providing a 10 percent subsidy to the lenders of mortgage contracts. That is, it is assumed under this program that the lenders received, in one form or another, 10 percent more interest than the borrowers are paying at the market determined rate. The results of this policy are almost identical to the mortgage borrower subsidy. Thus we may conclude quite generally *that direct subsidies for housing are significantly more efficient than direct subsidies for mortgages in stimulating housing investment.*

Part IV. Housing Fluctuations in Perfect Financial Markets

A. *Introduction*

The first half of this paper has been concerned with analyzing within the context of the FMP model the effects of each of the Hunt-Report proposals. The conclusions reached in the first half of the paper are subject to two main possible sources of error: (1) The FMP model may not have been specified correctly over the period for which it is intended to be relevant; (2) The regime proposed by the Hunt Report may differ so radically from the present regime that the use of a model that has been specified for the present regime (even if specified correctly) may not be adaptable for analyzing questions concerning the properties of the new regime. The seriousness of these two possible sources of error is, of course, unknown, but fortunately there is a second approach that can be taken in analyzing the Hunt Report. Since the main brunt of the Hunt-Report proposals is to make the financial markets more perfect, one can carry the proposals to their logical conclusion and ask the question of what the economy would be like if there were no restrictions of any sort on the financial markets, i.e., if the financial markets were perfect markets. If the conclusions reached by this exercise are similar to the conclusions reached by analyzing the properties of the FMP model, then more confidence can be put on the basic conclusions of the paper. The purpose of this section is thus to consider what the economy would be like if there were no restrictions on the financial markets. Particular attention will be placed on analyzing the effects that perfect financial markets would have on housing activity.

B. *The Model*

The four major types of real assets in the economy are the following:

1)	the value of the housing stock, H	$ 834 billion
2)	the value of the stock of consumer durable goods, D	306 billion
3)	the value of the corporate capital stock, K	1,343 billion
4)	the value of the government capital stock, G	?
	Total value of assets	$2,483 billion + ?

The figures given for the value of the assets are estimates in current dollars for the end of 1971. The figures for H and D were obtained from estimates in the FMP model, and the figure for K was obtained from Kaufman and McKeon [16], Tables I and IIIC, by adding the value of corporate bonds, the value of corporate stocks (market value), the value of business loans, and the value of open-market paper. The sum of corporate bonds, corporate stocks, business loans, and open-market paper is roughly the market value of corporations, and so this sum can be considered to be an estimate of the market value of the corporate capital stock.[9] A value for G will not be needed for the work below, and so no attempt was made to estimate a value for G.

Each of the major assets can be considered to have a demand schedule associated with it. The demand for housing, say H^d, is likely to be a function of population, of income or expected future income, and of the price of housing services relative to other prices. One aspect of the price of housing services is the cost of borrowing the resources to finance the purchases of the house or, alternatively, the opportunity cost of putting resources into housing stock as opposed to, say, putting resources into corporate capital stock. The

[9]To be more precise one should subtract from the sum the non-physical assets of corporations (such as corporate holdings of currency, demand deposits, Treasury bills, certificates of deposits, and the like) to get an estimate of the market value of corporate capital stock, but sufficient data are not available to do this. Data, for example, are not available on corporate holdings of currency and demand deposits. Fortunately, non-physical assets of corporations are a small proportion of total assets, and little is lost in the following analysis by not adjusting for non-physical assets.

demand for consumer durable goods, D^d, is also likely to be a function of population, of income, and of the price of consumer durable goods relative to other prices. One aspect of the price of durable goods is the borrowing cost. The demand for corporate capital stock, K^d, is likely to be a function of expected future sales on the part of firms and of the size of the wage rate relative to the cost of capital. One aspect of the cost of capital is the cost of borrowing resources. It will be assumed for simplicity that each of the three demand schedules just described is linear in interest rates, and the three schedules will be written as:

(1) $H^d = a_1 + b_1 r_1$

(2) $D^d = a_2 + b_2 r_2$

(3) $K^d = a_3 + b_3 r_3$.

The a coefficients denote all other factors that influence demand aside from the interest rates. Each r variable is the relevant interest rate corresponding to the demand for the particular asset in question. With respect to the government, it will be assumed that the demand for government capital stock, G^d, is not a function of interest rates, and the demand schedule will be written as:

(4) $G^d = a_4$.

The coefficient a_4 denotes all of the factors that influence the demand for the government capital stock.

Turning to the supply side of the market, the supply of resources to meet the four demands comes from current and past savings. Let Y_t be the total output of the economy in period t, let CON_t be private consumption in period t, let GOV_t be government consumption in period t, and let DEP_t be depreciation on all forms of capital during period t. Then net saving during period t, S_t, is:

(5) $S_t = Y_t - CON_t - GOV_t - DEP_t$.

The change is wealth during period t is thus:

(6) $W_t - W_{t-1} = S_t$,

where W_t is aggregate wealth, and so aggregate wealth is:

$$(7) \quad W_t = \sum_{i=0}^{\infty} S_{t-i} \; .$$

Interest rates and income, among other varibles, are likely to affect S_t and thus W_t, but for now W_t will be taken to be independent of income and interest rates. This assumption will be relaxed later.

In equilibrium the supply of wealth must equal the demand for assets, and so in equilibrium it must be the case that

$$(8) \; W = H^d + D^d + K^d + G^d = a_1 + b_1 r_1 + a_2 + b_2 r_2 + a_3 + b_3 r_3 + a_4 \; .$$

So far no mention has been made of any debt instruments in the system. Equation (8) equates the supply of real resources to the demand for real resources. In practice, of course, much of the real wealth in the economy is financed by debt instruments of one sort or another. It will be convenient for the following analysis to assume that *all* of the wealth in the economy is financed by debt instruments. Let HB denote the debt instrument used to finance the housing stock, DB the debt instrument used to finance the consumer durable stock, KB the debt instrument used to finance the corporate capital stock, and GB the debt instrument used to finance the government capital stock. Then it is assumed that

$$(9) \quad \begin{aligned} HB^d &= H^d \\ DB^d &= D^d \\ KB^d &= K^d \\ GB^d &= G^d \, , \end{aligned}$$

where the superscript d denotes the demand for the debt instrument in question. The assumption in (9), that all assets are financed by the issuing of debt instruments, is made only for convenience and is not really restrictive. Units which in practice, for example, do not issue debt instruments to finance their housing stock, but rather finance the stock directly out of their own savings, can be considered to have issued debt instruments to themselves, from which they both pay and receive interest payments.

In practice there may also be more than one type of debt instrument used to finance one type of asset. Corporate capital stock, for example, is financed in part by corporate bonds, in part by corporate stocks, and in part by other instruments. Likewise, government capital stock can be considered to be financed in part by government bonds and in part by currency. For purposes of the present analysis the different types of debt instruments that are used to finance one type of asset are assumed to be aggregated into one instrument. For the perfect-markets case described below, this assumption is not restrictive, since in this case all of the instruments are perfect substitutes for each other and it really does not matter how many different types of instruments there actually are in the system.

Now, if no restrictions were placed on the asset and liability powers of financial intermediaries, one would expect that the interest rate differentials between various types of debt instruments (such as the differential between HB and KB) would reflect only the different attributes of the instruments. If, for example, instrument HB was more costly to purchase in terms of transactions costs or was more risky than instrument KB, then the interest rate corresponding to HB should be higher than the interest rate corresponding to KB by the amount necessary to make financial intermediaries or other investors indifferent between purchasing HB and purchasing KB. If the differential were higher than this amount, investors would be expected to try to move out of HB into KB, which would drive the differential down to the appropriate level. If the attributes of the various debt instruments remain the same over time, then the differential between any two pairs of instruments should remain constant over time. The overall effect of the "perfect-markets" case is thus that the debt instruments become perfect substitutes for each other from the point of view of the lenders. In this case there is in effect only one interest rate to be determined in the system. Let r denote "the" interest rate, chosen in any convenient way. Then the actual interest rates on the four debt instruments will differ from r by constant amounts:

$$(10) \qquad r_i = r + \bar{r}_i \quad , \quad i=1,2,3,4,$$

where the $\bar{r}_i$ are constants. (r_4 is the interest rate on debt instrument GB.) The $\bar{r}_i$ coefficients reflect the different attributes of the debt instruments. It should be noted that the perfect-markets case does require that the interest rate on GB be allowed to vary. This means that if currency is one of the means by which the government finances its capital stock, then the interest rate on currency must not be fixed at zero, as it is now, but must be allowed to vary along with all of the other rates in the system.[10]

[10]There will also be welfare gains from allowing the interest rate on money to vary. See the "optimal supply of money" discussion in, for example, Clower [4] and Johnson [15].

Equation (8) turns out to be easy to analyze for the perfect-markets case. Substituting (10) into (8) yields:

$$\text{(11)}\quad W = a_1 + b_1 (r+\bar{r}_1) + a_2 + b_2 (r+\bar{r}_2) + a_3 + b_3 (r+\bar{r}_3) + a_4 .$$

Since there is in effect only one interest rate in the system, equation (11) determines the interest rate. The determination of the interest rate can be seen graphically in Figure 1. The demand components are graphed consecutively in Figure 1 so that the curves reflect the sum of the components as indicated. The equilibrium interest rate is r*, and once r* is determined, the demand for the individual assets can be determined from the graph.

Figure 1

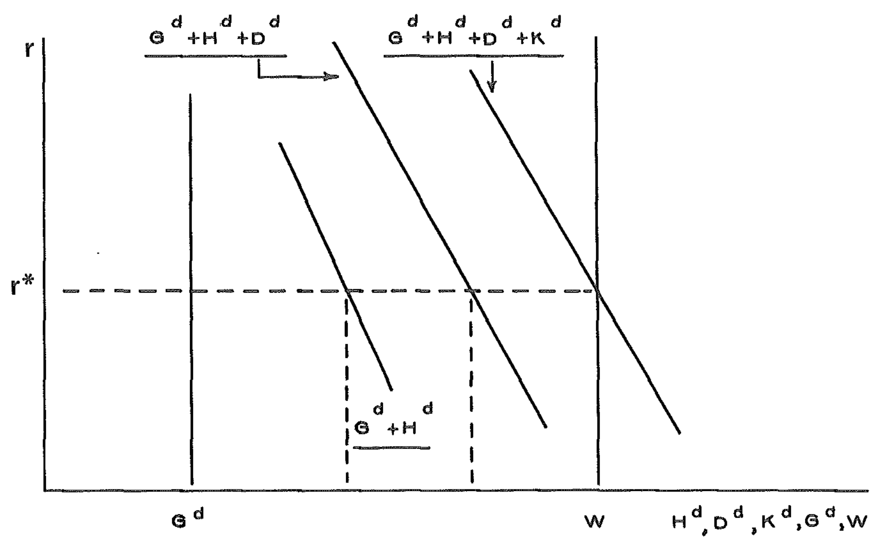

Figure 1 or equation (11) can be used to analyze what happens when one or more of the demand schedules shift. Assume, for example, that the demand for government capital stock increases (a_4 increases). This shifts the G^d curve to the right in Figure 1, which has the effect of shifting all of the other curves (except W) to the right as well. If W remains fixed, then the interest rate must rise in order to achieve a new equilibrium in the market. Since individual interest rates differ from each other by constant amounts, the new equilibrium will correspond to all interest rates being higher. Likewise, if the demand for, say, K^d increases (a_3 increases), the new equilibrium will correspond to higher interest rates. Because of the higher interest rates, the actual increase in K^d will be less than the size of the initial shift of the curve, since there will be a movement back along the curve. If W shifts to the right, this will, other things being equal, correspond to lower interest rates and thus to higher levels of H^d, D^d, and K^d.

C. *The Effect of Perfect Financial Markets on Housing Activity*

The above framework can be used to analyze the effects that perfect financial markets would have on housing activity. First, equation (11) can be solved for r to yield:

$$(12)\quad r = \frac{1}{b_1+b_2+b_3}\,[W-a_1-b_1\bar{r}_1-a_2-b_2\bar{r}_2-a_3-b_3\bar{r}_3-a_4]\ .$$

Since r_1 in equation (1) is equal to $r+\bar{r}_1$ (from equation (10)), (12) can be substituted into (1) to yield:

$$(13)\quad H^d = a_1 + b_1\bar{r}_1 + \frac{b_1}{b_1+b_2+b_3}\,[W-a_1-b_1\bar{r}_1-a_2-b_2\bar{r}_2-a_3-b_3\bar{r}_3-a_4]\,.$$

Equation (13) can now be used to analyze the effects of, say, fluctuations in W on housing demand. Differentiating equation (13) with respect to W yields:

$$(14)\quad \frac{\partial H^d}{\partial W} = \frac{b_1}{b_1+b_2+b_3}\ ,$$

which says that if, say, W increases by one billion dollars, H^d will increase by $b_1/(b_1+b_2+b_3)$ billion dollars. The derivative of H^d with respect to shifts in the demands for other assets is $-b_1/(b_1+b_2+b_3)$:

$$(15)\quad \frac{\partial H^d}{\partial a_i} = -\frac{b_1}{b_1+b_2+b_3}\ , \qquad i = 2,3,4.$$

Given estimates of b_1, b_2, and b_3, therefore, it is possible to determine how sensitive housing demand will be to changes in aggregate wealth and to changes in the demands for the other assets.

Results from other studies can be used to obtain estimates of the relative sizes of the b coefficients, but before discussing previous results, it will be useful to examine the case in which the interest-rate elasticities are equal for the three assets. The elasticity of H^d with respect to r_1, $E_{H^d r_1}$ is:

$$(16) \quad E_{H^d r_1} = \frac{\partial H^d}{\partial r_1} \cdot \frac{r_1}{H^d} = b_1 \frac{r_1}{H^d} ,$$

or

$$(17) \quad b_1 = E_{H^d r_1} \cdot \frac{H^d}{r_1} ,$$

and similarly for D^d and K^d. If the four elasticities are equal (to, say, $\bar{E}$) and if the interest rates are all equal (to, say, r)[11] then $b_1/(b_1+b_2+b_3)$ is:

$$(18) \quad \frac{b_1}{b_1+b_2+b_3} = \frac{\bar{E}\frac{H^d}{r}}{\bar{E}\frac{H^d}{r}+\bar{E}\frac{D^d}{r}+\bar{E}\frac{K^d}{r}} = \frac{H^d}{H^d+D^d+K^d} .$$

In other words, in this case the ratio $b_1/(b_1+b_2+b_3)$ is merely the proportion of the housing stock to the total wealth in the economy exclusive of government capital stock. Using the above estimates of the value of each asset, the proportion is .34, which means that for each one dollar increase in wealth (holding government capital stock constant), 34 cents goes into housing stock. Likewise, for each one dollar increase in demand for alternative assets, holding aggregate wealth constant, the demand for housing stock decreases by 34 cents. It should be noted, of course, that if the three demand equations are linear in interest rates, as specified in (1)-(3), then the elasticities are not constant over time. Because of this, it would probably be more realistic to specify equations (1)-(3) in log form so that the elasticities are constant over time, but because of the complications that this involves for the rest of the analysis, the log

[11]The assumption that all of the interest rates are equal, rather than merely differing from each other by constant amounts, is necessary if $\bar{E}/r$ is to cancel out in equation (19). If, however, the interest rates are not all equal, the final answer in (19) is changed by only a small amount.

specification was not used. The linear specifications should therefore be interpreted as holding merely in a small neighborhood around the values of the variables in question.

The results from other studies can be used in an attempt to determine the actual sizes of the various elasticities. For example, deLeeuw in his survey article on the demand for housing [6] has estimated the price elasticity of the demand for housing to be between -0.7 and -1.5 (p. 9). In the FMP model, the elasticity of the demand for single family housing with respect to the interest rate is about -1.3. Coen [5] has estimated the elasticity of the demand for corporate capital stock with respect to the cost of capital to be -0.579 for one model and -0.292 for another (p. 209). For the equipment-investment equation in the FMP model, Bischoff [3] reports a long-run elasticity of demand with respect to the bond rate of -.360 (Table 5, p. 30). Evans in his review of investment functions [9] states that the elasticity of investment with respect to the interest rate is between -.25 and -.50 (p. 138). For the demand for consumer durables, Evans [9] estimates a price elasticity of demand of -1.5 for automobiles and zero for other nondurables (p. 171). In the FMP model the elasticity of the demand for consumer durables with respect to the interest rate is about -.90.

In terms of the effect on the $b_1/(b_1+b_2+b_3)$ ratio, the size of the elasticity of the demand for consumer durables is of less importance than the sizes of the elasticities of the demand for housing stock and for corporate capital stock. This is because of the relative small proportion of consumer durable goods in total wealth. Of much more importance is the size of the elasticity of demand for corporate capital stock relative to the size of the elasticity of demand for housing stock. Consider the following cases.

	$E_{H^d r_1}$	$E_{D^d r_2}$	$E_{K^d r_3}$	$b_1/(b_1+b_2+b_3)$	$b_2/(b_1+b_2+b_3)$	$b_3/(b_1+b_2+b_3)$
(1)	−0.7	−1.0	−0.4	.41	.21	.38
(2)	−1.0	−1.0	−0.4	.50	.18	.32
(3)	−1.5	−1.0	−0.4	.60	.15	.25
(4)	−1.0	−1.0	−0.3	.54	.20	.26
(5)	−1.0	−1.0	−0.5	.46	.17	.27

For all five cases the elasticity of demand for consumer durables has been assumed to be equal to -1.0. The elasticity of demand for corporate capital stock varies between -0.3 and -0.5, and the elasticity of demand for housing varies between -0.7 and -1.5. The computations are based on the assumption that the interest rates are all equal (see footnote 11). The worst case for housing is case (3), where the elasticity of demand for housing stock is high. For this case the ratio is .60, which means that for every dollar change in wealth or change in demand for alternative assets, demand for housing stock changes by 60 cents. In this case, because of the sensitivity of housing demand to the interest rate relative to the sensitivity of the demand for corporate capital stock to the interest rate, housing activity would fluctuate by fairly large amounts as a result of changes in the supply of wealth or demand for assets.

The results from previous studies indicate that the demand for housing stock is more sensitive to interest rates than is the demand for corporate capital stock. Just how much more sensitive is difficult to say, but a reasonable case might be case (5) above, where the elasticity of demand for housing stock is twice as great as the elasticity of demand for corporate capital stock. For this case, the ratio of b_1 to $b_1+b_2+b_3$ is .46. An important question to ask in this regard is if a case like case (5) were true, would housing activity fluctuate more or less in a perfect-markets regime than it now does in the present regime. Although it is difficult to answer this question very precisely, a few observations can be made. Under the present regime it is the case that the mortgage rate fluctuates less than, say, the corporate bond rate. This in itself would indicate that going from the present segmented-market regime to a regime in which there was in effect only one interest rate would increase housing fluctuations. The interest rate in the new regime would presumably fluctuate more than the mortgage rate in the present regime does, which would mean more fluctuations in housing demand. On the other hand, there may be a significant amount of credit rationing in the housing market in the present regime, which if true means that the "effective" mortgage rate really fluctuates much more than the observed mortgage rate does. If credit rationing is significant in the housing market – and many studies indicate that it is significant[12] – then it is quite possible that housing activity would fluctuate less in the perfect-markets regime than it now does. In fact, Tucker's analysis [21] indicates that the speed of the effects of monetary policy on economic activity is likely to be greater if there is credit rationing than if there is not, which reinforces the conclusion here

[12]See Fair [11] for a review of previous studies of the housing and mortgage markets as they relate to disequilibrium effects, and see Fair and Jaffee [13] and Fair [10, Chapter 8] for empirical estimates of disequilibrium effects in the housing and mortgage markets.

that housing activity is likely to fluctuate less in a perfect-markets regime than it now does. If credit rationing causes the economy to respond more quickly to policy changes (or to other exogenous changes), then lack of credit rationing should cause the economy to respond more slowly and thus to fluctuate less.

In summary, therefore, the probability that fluctuations in housing activity would be less in the perfect-markets regime than they are in the present regime is greater the greater is the amount of credit rationing in the present regime and the smaller is the elasticity of the demand for housing stock relative to the elasticity of the demand for corporate capital stock. Since credit rationing does appear to be significant in the housing and mortgage markets, it is likely that fluctuations in housing activity would be less in a perfect-markets regime than they now are.

It should be remembered that housing activity will also fluctuate corresponding to fluctuations in variables other than the interest rate that affect housing demand, i.e. corresponding to fluctuations in a_1 in equation (1). The fluctuations in a_1 should not, however, be much different in the perfect-markets regime than they are in the present regime, and so for purposes of making comparisons between the two regimes, we can concentrate on flucutations in housing activity due to fluctuations in interest rates and credit rationing. It is true, of course, that in a perfect-markets regime fluctuations in a_1 will put less pressure on the overall financial market than fluctuations in a_1 now put on the mortgage market. Therefore, in a perfect-markets regime large increases in a_1 will not necessarily lead to large increases in the mortgage rate or to credit rationing as they now are likely to do. (See discussion in the next section on housing subsidies for a further elaboration of this point.)

D. *The Effect of Perfect Financial Markets on the Level of the Housing Stock*

So far attention has only been concentrated on fluctuations in housing activity. Unfortunately, in order to say anything about the effect of perfect financial markets on the level of the housing stock, one would have to estimate the $\bar{r}_i$ coefficients in (10) as well as the individual demand equations, (1)-(3). The $\bar{r}_i$ coefficients reflect the different attributes that debt instruments would have in a perfect-markets regime. The current interest rate differentials cannot be used as estimates of the $\bar{r}_i$ coefficients because the current differentials reflect in part the imperfect nature of existing financial markets. A graduate student in the economics department at Princeton University is currently working on the question of trying to estimate what the $\bar{r}_i$ coefficients would be in a perfect-markets regime, but for now no results are available. All that can be said at this stage is that the greater is the spread between, say, the mortgage rate and the corporate bond rate (due to different attributes of the two debt instruments), the less will be the demand for housing stock relative to the demand for corporate capital stock. It should be noted, of course, that the demand for housing can always be subsidized if it turns out that the demand for housing stock in the perfect-markets regime is less than is socially desired. One possible way to subsidize housing demand would be to change the attributes of mortgages (say, by making them less risky or more liquid), which would have the effect of narrowing the spread between the mortgage rate and other rates.

Another way to subsidize housing demand would be to engage in activities that shift a_1 in (1). From (14) the partial derivative of H^d with respect to a_1 is $1\text{-}b_1/(b_1+b_2+b_3)$, which means that a one dollar increase in a_1, holding aggregate wealth constant, would increase housing demand by $1\text{-}b_1/(b_1+b_2+b_3)$ dollars. Housing demand would not go up by the entire dollar because the interest rate must rise to equate overall demand and supply. Note, however, that subsidies designed to shift a_1 are likely to be more effective in the perfect-markets regime than they are now. In the present segmented-markets regime, a subsidy designed to shift a_1 will put pressure on the mortgage market, which will either drive up the mortgage rate a lot or else lead to credit rationing. In the perfect-markets regime, funds will flow into housing to the extent that they are needed. There is in effect only one large financial market, and stimulating housing demand only requires that "the" interest rate in the market rise enough to equate overall demand with supply. In summary, then, subsidies designed to increase housing demand are likely to be more effective in a perfect-markets regime than they now are.

E. *Possible Extensions of the Model*

The perfect-markets regime that has been discussed here has obviously been simplified in a number of ways. Some of these simplifications will now be discussed, and suggestions will be made on how the model might be extended and some of the simplifying assumptions relaxed.

First, savings, and thus wealth, have so far been taken to be exogenous. Savings are in fact likely to be a function of income and interest rates, and in an extension of the model one could incorporate assumptions about the determination of savings and thus wealth in equation (11) and then proceed more or less as above. It seems unlikely that the addition of these assumptions would significantly change the above conclusions.

It is also useful to consider within the above framework the different effects that the government can have on economic activity. First, note that GB refers only to the sum of government bonds and currency used to finance real government capital stock. To keep this distinction in mind, let GBB denote the bonds of the government that do not back real capital stock. Now, government activity can affect the level of real wealth, W, in the economy in two main ways: through its effect on private consumption and investment, and by its own consumption and investment activities. There are a number of examples that can be considered. First, assume that the government merely gives people GBB bonds and takes nothing in return. This action will have no effect on W directly, but if people feel more wealthy by holding these bonds (even though real wealth is unchanged), they may consume more and save less, which will have the effect of lowering W and thus increasing interest rates. Private consumption, in other words, may be a function of both W and GBB bonds, and in this case issuing GBB bonds will indirectly affect real wealth and interest rates. Next, assume that the government issues bonds, takes real resources from the private sector, and *invests* the resources in real capital stock. If private consumption is not affected by this action, then W is unchanged, G and GB are higher, and so interest rates are higher since the G^d curve in Figure 1 has shifted to the right. If private consumption is affected by this action, then, of course, W will be changed. Considering a third case, if the government issues a bond, takes real resources from the private sector, and *consumes* the resources, then if private consumption is not affected, W is decreased and so interest rates are increased. In this case the bonds that the government has issued are GBB bonds, since the bonds do not back real capital stock. Since in this case there is less real wealth in the economy (although more GBB bonds), this may have a negative effect on private consumption, which will cause W to decrease less than otherwise. Finally, consider the case in which the government takes real resources from the private sector by taxing. If the government invests the resources, then W will increase unless all of the taxes paid by the public come out of private savings (in which case W will remain unchanged). To make this situation consistent with the above model, the government must be considered in this case as issuing GB bonds to itself. If the government consumes the taxed resources, then W will decrease unless all of the taxes come out of private consumption (in which case W will remain unchanged).

It was mentioned above that the two main debt instruments of the government are government bonds and currency, and it was thus implicitly assumed above that the interest rate on currency is not fixed. The unique nature of currency, as Tobin [20] has emphasized, is that its interest rate is not allowed to vary. If the interest rate on currency is fixed, then one must separate GB into bonds and currency and introduce a postulate about what determines holdings of currency (usually called the demand for money). If currency holdings are made a function of income and an interest rate, then it is no longer the case that the interest rate can be determined from equation (11) independent of income. Therefore, even if savings and thus W were independent of income, the fixing of the interest rate on currency means that the determination of income and the interest rate must be considered simultaneously. Again, it does not seem likely that this addition would significantly change the above conclusions.

The model has also made no distinction between short-term rates and long-term rates. By assuming constant interest-rate differentials, the model has implicitly assumed that the yield curve does not change over time. Because the yield curve may be affected by expectations of the future level of rates, the assumption of constant interest-rate differentials between short-term and long-term debt instruments may not be realistic. This is an area in which more work would be useful.

Finally, it should be noted that the analysis in the above model is not dependent on there being any particular type of debt instrument in the system. All that really matter are the demand schedules for real assets. In the perfect-substitutes regime whether the housing stock is financed by things called mortgages or by something else is completely irrelevant. Therefore, in discussing the effects of the Hunt-Report proposals on housing activity, one should concentrate on the effects on real housing demand and not on the effects on mortgages. There is more than one way to finance the housing stock, and in a perfect-markets regime it is not important how it is financed.

F. *Conclusion*

The two main conclusions of this part of the paper are: (1) Fluctuations in housing activity appear likely to be less in a perfect-markets regime than they now are. This is because there would be no credit rationing in a perfect-markets regime, unlike the present situation where there does appear to be credit rationing in the housing and mortgage markets. (2) Subsidizing housing activity is likely to be easier in a perfect-markets regime than now because of the fact that there is in effect only one large financial market in the perfect-markets regime. Funds can flow much more freely and there is no danger of putting so much pressure on one particular market (the mortgage market in the case of housing) that credit rationing results.

Two other conclusions of this part of the paper are: (1) The effect of a perfect-markets regime on the level of the housing stock depends on the rate spread between the debt instruments used to finance the housing stock and the debt instruments used to finance other capital stock. (2) In analyzing the Hunt-Report proposals one should concentrate on the effects on the housing market and not on the effects on the mortgage market.

Part V: **Summary and Conclusions**

The major findings of our Study are:

1) With respect to the impact of specific Hunt-Report proposals on the mortgage and housing markets, the FMP model indicates:
   a) The removal of all deposit-rate ceilings from depositary institutions will have minor quantitative effects on mortgage and housing levels and even the direction of the change is in doubt.
   b) Allowing savings institutions extended service functions will result in significant increases in mortgage lending, and, given the elasticities of the FMP model, relatively large increases in the housing stock.
   c) Allowing savings institutions extended lending powers will result in a portfolio substitution, against mortgages, and a portfolio size expansion, favoring mortgages. The net effect of the two changes on mortgages is small and

may be either positive or negative depending on specific assumptions, while the effect on housing is generally positive, although small.

d) Flexible loan rates on the policy loans of life insurance companies will have only minor impacts on the mortgage and housing markets.

e) The implications of variable-rate mortgages for the short-run timing of deposit rate-setting decisions are favorable and important. We have not, however, been able to consider many of the ramifications of variable-rate mortgages, and thus have no final evaluation of this proposal.

2) With respect to the overall impact of the Hunt Report on mortgages and housing, the FMP model indicates that the proposals would not have serious repercussions for the mortgage and housing markets. Our results indicate that the housing market would probably, on net, gain under the Hunt Report, while the mortgage stock may gain or lose depending on the specific assumptions. In any case, the magnitudes involved are small relative to the current outstanding stocks of these assets.

3) We concur with the Hunt Report that *indirect mortgage subsidies* are not efficient. With respect to *direct* subsidies for housing and mortgages, the FMP model indicates that *direct subsidies in the mortgage market* are also generally not efficient—they subsidize mortgages, not housing directly—while *direct subsidies for housing* may be quite efficient. Furthermore, the efficiency of direct housing subsidies is greatest if the subsidies are paid only on those units that respond directly to the subsidy, and they are least efficient if the subsidies must also be paid on units that would have been produced in any case.

4) The results of analyzing the "perfect-markets" regime indicate that:

a) Fluctuations in housing activity appear likely to be less in a perfect-markets regime than they now are because there would be no credit rationing in a perfect-markets regime.

b) Subsidizing housing activity is likely to be easier in a perfect-markets regime than it is now.

c) The effect of a perfect-markets regime on the level of the housing stock depends on the rate spread between the debt instruments used to finance the housing stock and the debt instruments used to finance other capital stock.

d) In analyzing the Hunt-Report proposals one should concentrate on the effects on the housing market and not on the effects on the mortgage market.

APPENDIX A

1. Description of FMP Model

The simulation experiments described in Parts II and III were carried out using a version of the FMP model known as *50B.* This was the version current during the Fall, 1971. Studies of the FMP model include Ando and Modigliani [1], [2], deLeeuw and Gramlich [7], [8], Gramlich and Jaffee [14], Modigliani, Rasche, and Cooper [17], and Rasche and Shapiro [18]. In particular, Gramlich and Jaffee [14] provides a complete analysis of the savings-deposit, mortgage, and housing sectors of the FMP model.

In carrying out the experiments, the full FMP model was used with the exception of three sectors: currency, labor, and employment. These sectors were kept as exogenous because of computer programming difficulties encountered at the time the experiments were being carried out. These problems have since been solved, but it was not felt necessary to rerun the experiments because the indicated changes were very small.

2. Description of the Experiments

The following notes describe the experiments undertaken in the text. Equation numbers refer to the model listing in Gramlich and Jaffee [14, Appendix B]. Symbols have been defined above, and a more complete list is available in Gramlich and Jaffee [14, Appendix A].

a) *Removing Regulation Q from Commercial Banks.* In determining RTP, the system uses the minimum of RTP* (equation B-12) and the ceiling rate. In this experiment, the ceiling rate was increased throughout the period by 20 percentage points, so it was not effective.

b) *Placing Ceiling Restrictions on Savings and Loan Associations and Mutual Savings Banks.* Equations (B-13) and (B-14) for RSL and

RMS, were omitted from 1968:4 to 1970:3. In their absence, RSL and RMS were set equal to the historic values.

c) *Extended Service Functions of Savings Institutions.* The variable (RTP-RA) in equation (B-8), for MP, was reduced by the indicated amount, and the variable (RA-RTP) in (B-9), for MSL + MMS, was raised by the indicated amount.

d) *Portfolio Substitution Effect of Extended Lending Functions.* The coefficients of the following variables in mortgage supply equations were reduced by the indicated amount in 1960:2:

Equation B-16: constant, MLS, (RM-ZRFH) MSL
Equation B-17: constant, MMS, Δ MMS, (RM-RCB) MMS
Equation B-20: constant, DUM, Δ $\overline{\text{MSL}}$, MSL, ZAFH
Equation B-21: constant, DUM, Δ $\overline{\text{MMS}}$, MMS

e) *Portfolio Expansion Effect of Extended Lending Powers.* The constant terms of equations (B-13) and (B-14) were raised by the indicated amounts in 1960:2.

f) *Flexible Rate Policy on Life Insurance Policy Loans.* The variable JR in the life insurance reserves equation (B-11) was set equal to zero.

g) *Timing of Deposit-Rate Setting with Variable-Rate Mortgages.* In equations (B-13) and (B-14), for RSL and RMS, the coefficients for lagged values of RM were collapsed into the current term, thus eliminating the lagged effect but maintaining the same cumulative effect.

h) *Direct Cost of Construction Housing Subsidy.* The variable PHCA in the housing starts equations (B-29) and (B-30) was reduced by the indicated amount starting in 1960:2.

i) *Decrease in Personal Property Tax Rate.* The variable TP in the cost of capital equations (B-27) and (B-28) was reduced by the indicated amount starting in 1960:2.

j) *Increase in Effective Personal Income Tax Rate.* The variable T in cost of capital equation (B-27) was increased by the indicated amount starting in 1960:2.

k) *Direct Mortgage Subsidy to Borrowers.* The coefficients of the first four variables in the mortgage rate equation (B-12) were raised by the indicated amounting starting in 1960:2.

l) *Direct Mortgage Subsidy to Lenders.* The RM variable was raised by the indicated amount, starting in 1960:2, in mortgage supply equations (B-15), (B-16), and (B-17).

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