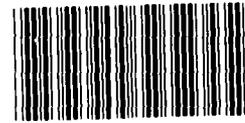SUPPLEMENT TO A REPORT BY THE

Comptroller General

OF THE UNITED STATES

Analysis Of Options For Aiding The Homebuilding And Forest Products Industries

This supplement presents the detailed results of modeling work performed under contract to GAO by Data Resources, Incorporated; Chase Econometrics/Regional Data Associates; and William B. Brueggeman of Southern Methodist University.

GAO/CED-82-121S
OCTOBER 25, 1982

FOREWORD

On August 31, 1982, the U.S. General Accounting Office issued to the Chairman, House Committee on Appropriations, a report entitled "Analysis of Options for Aiding the Homebuilding and Forest Products Industries" (GAO/CED-82-121). The report analyzed the causes of the current downturn in housing construction and compared a broad sample of homeownership and rental housing stimulus proposals in terms of their feasibility, speed of implementation, impact on construction and employment, and cost effectiveness. A special analysis of the problems of the forest products industry was also presented.

Some of the quantitative analysis in that report was based on contract modeling work performed under GAO supervision. Although the modeling results are summarized in the report, this supplement contains the modelers' detailed descriptions of their results. For further information, contact William J. Gainer, Issue Area Planning Director for Housing, on (202) 426-1780.

C o n t e n t s

POLICIES TO AID MORTGAGE FINANCE AND HOUSING

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ACKNOWLEDGEMENTS

TEMPORARY INTEREST SUBSIDY PROPOSAL - THE LUGAR PROGRAM (S.2226)

This simulation involves the study of a temporary interest rate subsidy program to homebuyers--and its effects on housing affordability, home sales, housing starts and interest rates, as well as the feedback effects on mortgage finance and housing activity.

Assumptions of the Simulation

The assumptions for this simulation include:

1)   Interest subsidies are provided to buyers of new single-family homes amounting to either the lesser of 4% or the difference between the market interest rate and 11%. In the period of the simulation, four percentage points was the lesser number. The subsidy lasts only for the first five years of the mortgage.

2)   Only low and moderate income homebuyers (those earning $30,000 or less) are eligible for the interest subsidies--about one-half the total new homebuyers according to data in the 1980 Annual Housing Survey. The program applies primarily to dwellings of 1-to-4 family units constructed, substantially rehabilitated, or manufactured after enactment of the proposal and by January 1, 1984.

3)   The total funds authorized for the Lugar program are $3.0 billion through 1983, which are divided into $2.5 billion for new construction and $0.5 billion for existing inventory sales. The program is assumed to be implemented immediately starting October 1, 1982. Buyers would compete for the subsidy on a "first-come, first served" basis until the $3.0 billion is spent.

4)   The program allocates only $0.5 billion to assist sales from existing inventories. At current home prices the average cost of the subsidy per unit would be roughly $10,500, so that only 45,000 to 50,000 units (0.5/10.5) could be assisted out of current inventories. This was not a binding constraint in the simulations.

5)   The program is assumed to start October 1, 1982 and to finish by December 31, 1983, by the date that the funding is exhausted.

6)   The loan-to-value ratio (LTV) for mortgages is assumed to be 75%. This is the standard ratio on conventional mortgage loans. Other loan-to-value ratios are possible, e.g., a 10% downpayment for a 90% FHA or VA loan. The larger downpayment for a 75% loan results in lower mortgage obligations per quarter per home owner and more new home sales if monthly repayments are of critical importance. But the bigger downpayment may prevent the initial purchase. The smaller downpayment of 10% would cause fewer buyers to qualify because of larger monthly repayments, cutting into home sales. On the other hand, a 10% downpayment would make new home sales easier for first-time homebuyers. These factors are assumed to wash and so the 75% LTV ratio is used throughout.

7)   The Government National Mortgage Association (GNMA) finances the subsidies; the subsidy equals .04x0.75 price of new homes x new homes sold during each period of the program. The mortgages are sold in the secondary market to private investors.

8)   The Federal Reserve does not accommodate the subsidy program.

9)   Any ex-ante increase in the federal budget deficit is not offset by reductions elsewhere in federal government spending nor by boosts in taxes.

Implementation

The above conditions were implemented in the DRI model by the following actions:

1)   The 4% temporary interest rate subsidy was reduced to an effective subsidy of only 1.5%, based on estimates made by Hendershott for the GAO. Since only 50% of the population of homebuyers is eligible based on historical data, the effective subsidy became roughly 0.75%.   The lever used was MORTPAYMENTNEWIS, an exogenous variable, which translated the effective interest rate subsidy to a dollar change in monthly mortgage loan repayments for new homes, lowering them by as much as $30 per month during the existence of the program.   This lever also affected the before-and aftertax user cost of new homeownership, an input into tenure choice and new home sales.

2)   The amount financed by GNMA was calculated as 0.04 x 0.75 x median price of new homes x new homes sold in each period. (New homes sold for multifamily units and mobile home sales were proxied for by multifamily units started). The results were added to the variable, SUB@SRPGF, which had the effect of raising the federal budget deficit and exerting upward pressure on interest rates.   Since GNMA financing is on-budget, the deficit was increased by the amount of the GNMA spending for the subsidies, about $0.15 billion per quarter for five years.

3)   The mortgages corresponding to the new homes sold were assumed to be passed through to private investors--pension funds, trusts, and households--by sales in the secondary market. FNMA also purchased the new mortgages. The distribution was two-thirds to private investors and one-third to FNMA. The increase of total outstanding mortgages was $2.0 billion, appearing principally in the household assets, not otherwise classified, category of household asset holdings. This figure is less than the amount authorized due to the negative feedback effects of the stimulus program.

4)   The add factor for the new issue rate on long-term corporate bonds, &RMMBCNEWNS, was raised by 2 basis points per billion dollars of increased mortgages in order to reflect the impact of the greater supply of securities in the secondary markets.

5)   Nonaccommodation by the Federal Reserve was accomplished through lowering nonborrowed reserves to keep M1 at the baseline level.

6)   The effect on 2-to-4 units and mobile homes of the policy was established by assuming the same percentage increase as for sales of single-family homes. The input were through the add factors &HUSTS2& and &SHUMBL.

7)   According to the Follaine and Alm study conducted for GAO, individuals under this program will purchase 5.3% more housing than otherwise.   To capture this effect, &ICR72, the add factor on real residential construction was raised.   An offsetting addfactor was placed on consumer durable categories some of which are interest-sensitive for furniture under the assumption that the additional housing consumption would be offset by reductions in other spending.

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8)   Other adjustments were made to the simulation in order to achieve endogenous responses for certain exogenous variables in the model that would respond in full system simulations. Fine-tuning of equation reactions rendered inappropriate by the nature of the policy program also were made.

Effects in the Augmented DRI Model

This simulation worked primarily through the demand-side of housing in the augmented DRI model used for the GAO simulations. The interest rate subsidy reduced the monthly mortgage loan repayment burden for new homes, which increased the sales of new single-family homes. The reductions ranged from $17 to $30 per month during the existence of the program. The rise in new homes sold vs. homes offered for sale induced an increase in single-family housing starts by builders, although with some lags in new construction activity.

The tenure choice between renting and owning single-family new homes and choice between purchases of existing homes and new homes also were affected by the interest rate subsidy. The effective mortgage commitment rate on new homes was reduced by the subsidy, lowering the aftertax user cost of new homeownership relative to renting, and inducing a substitution of new homes for rentals by households. The aftertax user cost on new homes also dropped relative to the aftertax user cost on existing homes, inducing a substitution against existing homes and for new homes. The demand-side stimuli to new home sales relative to the existing stock of new homes generated 1-to-4 unit starts, real residential construction and a rise in real GNP, output, and employment.

Construction loan financing was obtained from various financial institution--in particular, commercial banks. Mortgage funds were supplied by FNMA and the private sector through the secondary mortgage market where the mortgages arranged by GNMA were sold. GNMA and, ultimately, the U.S. Treasury financed the subsidy, however.

The pressure of the stronger economy, necessary financing, and a nonaccommodative monetary policy raised short-and long-term interest rates, including conventional mortgage loan rates on existing and new homes. Home prices also rose somewhat from the increased housing demand. The feedback effects of higher interest rates caused deposit inflows to weaken, the supply of mortgage money to drop, and mortgage rates to move higher. Tax receipts rose and federal government outlays fell from the stronger economy, a beneficial feedback effect in terms of the leveraged impact from the program.

The GNMA subsidies caused increased deficit financing and issues of government securities. Rising economic activity, the increased financing necessitated by the program, and a nonaccommodative stance by the Federal Reserve caused money market interest rates to rise. Monthly mortgage loan repayments on existing homes rose, as a result, cutting into sales of existing homes. The rises of interest rates subsequent to the program had negative effects on mortgage flows to housing. This occurred because profit margins on mortgage loans dropped, causing a decline in the supply of new mortgage commitments, mortgage acquisitions, and construction loans by banks and financial intermediaries. Negative feedback effects occurred on housing starts and sales as a result, but did not fully offset the stimulus to housing from the program.

The secondary round of effects thus brought reductions in mortgage availability; increased mortgage repayment burdens, especially on existing homes; and negative feedback on housing activity. Some "crowding-out" occurred in the interest rate sensitive areas of the economy because of the rises of interest rates from the effects of the new policy, mostly in limiting the responses of consumer spending, investment outlays, and housing itself to the stimulus.

With increased construction of new homes and a stronger economy, employment rose somewhat. The employment effects were modest, concentrated in the contract construction and non-manufacturing "other" categories. Response coefficients were based on historical averages, however, and did not reflect the increased utilization of existing labor likely in slack times.

Results

The results are summarized in the table Temporary Interest Subsidy versus Base Case, which is attached in the Appendix. The baseline is the DRI Control forecast of May 24, 1982. For a discussion of its characteristics see the Data Resources Review of the U.S. Economy, June 1982.

The Appendix contains the same table for the Temporary Interest Subsidy vs. the pessimistic alternative, denoted Stagflation. For a discussion of the characteristics of the Stagflation scenario, see the Data Resources Review of the U.S. Economy, June 1982. The third table in the Appendix displays the results of the simulation in which the Temporary Interest Subsidy is assumed to be accommodated by the Federal Reserve Board.

A.   Base Case Scenario

Relative to the baseline, single-family housing starts rise 34,000 (SA) units over the period from 1983:1 to 1983:4 when the program is in effect. 2-to-4 housing starts are up 6,000 units and mobile homes 10,000 units since they are also eligible. The total increase to eligible units is 51,000 units. Subsequent stock adjustment effects and financial restraint reduce total housing by 19,000 units in 1984, when the initiating phase of the program is over.

New housing affordability improves during the period of the subsidy, with declines of $17 to $30 per month in mortgage loan repayments for new homes. In 1984, the monthly repayment burden is higher for both new and existing homes due to higher interest rates.

The aftertax user cost of new homeownership drops 2.5% compared with the baseline over the period of the program, encouraging new homeownership vs. rentals and purchase of new rather than existing homes.

Inflation is somewhat higher, especially in the areas related to construction. The increase for inflation in the rate of change of the Consumer Price Index in 1983 is just 0.6%, assuming the interest subsidy is not reflected in the index. The unemployment rate drops slightly over the simulation period. Real GNP shows small rises of slightly more than $1 billion in 1983. And, there is a rise in the employment of nonagricultural establishments, with the categories of contract construction lumber and products, transportation equipment, and "other" up the most. The increase for employment, however, perhaps overstated the reponse likely in recession, since the initial impact of an increase of demand would be more utilization of existing labor.

Feedback effects from the stronger economy, an increased supply of securities, and somewhat greater deficit financing bring about secondary effects which tend to diminish the stimulus to housing from the Lugar program. Higher interest rates restrain the stimulus to housing and home sales by limiting the improvement in affordability and restraining mortgage flows. But outlays are lower and receipts higher because the economy is stronger.

B.   Stagflation Scenario

The weaker economy that is described in the Stagflation simulation responds more strongly to the Temporary Interest Subsidy than the Base Case economy. However, the "crowding out" effects due to non-accommodation of the policy by the Federal Reserve limit its stimulation. Net new starts total 85,000 units over the four quarters the program is in effect, compared to 51,000 in the first simulation. The reason for the larger impact is that under the Stagflation scenario, there are fewer homebuyers who would have bought without the subsidy to compete for the subsidy funds with those buyers entitled by the subsidy.

Because of the larger housing impact, the other macroeconomic variables are correspondingly larger and the "crowding out" is more significant than in the Base Case comparison. Real GNP is up by $1.7 billion in 1983 and nonagricultural employment is 81,000 persons higher. The rate of change in the CPI grows by .07 from 6.4% to 6.47%. The prime rate is 21 basis points higher, compared to the 12 basis point increase in the baseline comparison.

C.   Base Case with Monetary Accommodation

Since the "crowding out" of much of the stimulative effect of this program is a key issue to the evaluation of the program's effect, an alternative scenario was developed where the assumption that the Federal Reserve would not accommodate the increased economic activity was relaxed.   This change was implemented through adjusting non-borrowed reserves to hold the federal funds rate at the baseline level.

Housing starts in 1983 are up by 57,000 units, a gain of 6,000 over the non-accommodation case.

The Issues

A.   Crowding-out effects occur as a result of the increased demand for homes, given that the Federal Reserve follows a nonaccommodating monetary posture and that an added supply of securities occurs in the secondary market. The crowding-out effects are significant. During the period the program is in effect, total real residential construction rises $1.2 billion while real GNP rises only $1.0 billion. The other components of final demand actually fall, particularly the interest-sensitive components.   For example, purchases of consumer durables fall $0.3 billion over the period 1982:4 to 1983:4. "Financial" crowding-out occurs through fewer issues of long-term securities by nonfinancial corporations and by state and local governments, with the former declining $0.3 billion and the latter $0.14 billion over the period 1983:1 to 1983:4.

The first table in the Appendix shows the results, relative to the baseline, for the interest rate-sensitive areas in the economy under the Lugar program, in the very last section.

B.   Substitution effects, which refer to the number of subsidized new home purchases that would have occurred anyway, are substantial in this simulation. Implicit in the baseline simulation are 0.6 million unit purchases that would have been purchased anyway.

C.   The timing of housing starts is a major finding of the subsidy, with new housing starts occurring earlier and fewer occurring later. There is a net rise of housing starts over the forecast horizon, but considerably less than the rises from 1982:4 to 1983:4, with declines in starts from the baseline in the last five quarters of the simulation.

D.   In the nonaccommodation case, there are important effects on interest rates, deposits and mortgage flows. The prime rate is up 12 basis points in 1983, and the conventional mortgage interest rate rises 6 basis points. The feedback effects on housing activity are negative because of higher interest rates on market instruments, fewer deposits, fewer mortgage loans, and reduced affordability.

E.   Employment creating effects are minimal, with the unemployment rate virtually unchanged from the baseline and nonagricultural employment up 0.05 million workers in 1983 and .007 million workers in 1984.   The increases in contract construction employment are 0.022 million workers in 1983 and 0.011 million in 1984, less than 0.25%.

Concluding Comment

The Lugar Proposal, a temporary interest subsidy program, shows a small increase in new housing starts. New homes sold respond to the program. Households substitute against existing homes and rentals.   But, the subsidy program provides only 51,000 net new housing units over the period 1982:4 to 1983:4, mainly serving to shift the timing of the starts to the present from the future. The program creates only a small number of jobs, mostly in contract construction.

Table 1
Temporary Interest Sudsidy Versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	1.092	1.908	0.000
Units Subsidized (Millions of Units)	0.000	0.154	0.262	0.000
Housing Starts (Millions of Units)	1.330	0.000	0.051	-0.019
Single Units	0.680	0.000	0.034	-0.017
Multi Units	0.386	0.000	0.006	-0.002
Mobile Homes	0.264	0.000	0.010	0.000
Unified Budget (Billions of Dollars)				
Receipts	604.616	0.015	0.458	0.198
Outlays	723.119	0.159	0.850	0.887
Surplus or deficit(-)	-118.503	-0.144	-0.391	-0.689
Unemployment Rate (Percent)	9.334	0.000	-0.020	-0.011
Nonagricultural Employment (Total)	90.831	0.001	0.050	0.007
Contract Construction	4.044	0.000	0.020	0.011
Lumber and Products	0.629	0.000	0.008	0.000
Transportation Equipment	1.723	0.000	0.000	0.000
Other	84.436	0.001	0.022	-0.004
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.01	0.06	0.05
New AAA Corporate Bonds	13.91	0.00	0.04	0.03
Prime Rate	15.31	0.00	0.12	-0.06
Bond Buyer Index of 20 Municipal Bonds	11.86	0.01	0.04	0.02
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.1	3.8	1.2
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.1	1.8	1.0
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	0.0	-0.2	0.1
Nonres. Fixed Investment (1972)	152.0	0.0	0.2	0.0
Nonfinancial Corporate Bond Issues (Current)	454.9	0.0	-0.3	0.5
State and Local Govt. Bonds (Current)	348.3	0.0	-0.1	-0.1

Table 2
Temporary Interest Subsidy Versus Stagflation

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.891	2.109	0.000
Units Subsidized (Millions of Units)	0.000	0.128	0.289	0.000
Housing Starts (Millions of Units)	1.162	0.006	0.079	-0.042
Single Units	0.588	0.000	0.056	-0.035
Multi Units	0.323	0.001	0.009	-0.006
Mobile Homes	0.251	0.005	0.014	-0.001
Unified Budget (Billions of Dollars)				
Receipts	604.601	0.037	0.665	0.190
Outlays	724.039	0.157	1.011	0.972
Surplus or deficit(-)	-119.438	-0.119	-0.346	-0.782
Unemployment Rate (Percent)	9.296	-0.001	-0.035	-0.012
Nonagricultural Employment (Total)	90.768	0.005	0.081	-0.006
Contract Construction	4.026	0.001	0.035	0.013
Lumber and Products	0.624	0.000	0.012	-0.004
Transportation Equipment	1.714	0.000	0.000	0.001
Other	84.404	0.003	0.033	-0.018
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	17.10	0.00	0.03	0.08
New AAA Corporate Bonds	14.10	0.00	0.05	0.04
Prime Rate	16.31	0.00	0.21	-0.13
Bond Buyer Index of 20 Municipal Bonds	12.29	0.01	0.06	0.02
Economic Indicators				
GNP (Billions of Dollars, SA)	3,064.9	0.3	5.9	0.3
CPI - All Urban Consumers (% chg.)	6.0	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,583.7	0.1	2.5	0.8
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.7	0.0	-0.3	0.1
Nonres. Fixed Investment (1972)	151.8	0.0	0.3	0.0
Nonfinancial Corporate Bond Issues (Current)	449.6	0.0	-0.4	0.9
State and Local Govt. Bonds (Current)	347.2	0.0	-0.2	-0.1

Table 3
Temporary Interest Subsidy with Accommodating Monetary
Policy Versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	1.092	1.908	0.000
Units Subsidized (Millions of Units)	0.000	0.154	0.262	0.000
Housing Starts (Millions of Units)	1.330	0.000	0.057	-0.016
Single Units	0.680	0.000	0.038	-0.016
Multi Units	0.386	0.000	0.007	-0.001
Mobile Homes	0.264	0.000	0.011	0.001
Unified Budget (Billions of Dollars)				
Receipts	604.616	0.016	0.841	0.410
Outlays	723.119	0.159	0.513	0.545
Surplus or deficit(-)	-118.503	-0.143	0.328	-0.136
Unemployment Rate (Percent)	9.334	0.000	-0.037	-0.031
Nonagricultural Employment (Total)	90.831	0.001	0.094	0.032
Contract Construction	4.044	0.000	0.023	0.016
Lumber and Products	0.629	0.000	0.009	0.001
Transportation Equipment	1.723	0.000	0.003	0.002
Other	84.436	0.001	0.059	0.013
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.01	0.06	0.05
New AAA Corporate Bonds	13.91	0.00	0.03	0.04
Prime Rate	15.31	0.00	0.00	-0.01
Bond Buyer Index of 20 Municipal Bonds	11.86	0.01	0.03	0.03
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.1	6.3	2.6
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.1	2.9	1.8
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	0.0	0.1	0.2
Nonres. Fixed Investment (1972)	152.0	0.0	0.3	0.2
Nonfinancial Corporate Bond Issues (Current)	454.9	0.0	-0.1	0.2
State and Local Govt. Bonds (Current)	348.3	0.0	-0.1	-0.1

PERMANENT INTEREST SUBSIDY PROPOSAL

This simulation is concerned with the analysis of a permanent interest rate subsidy to homebuyers for new 1-to-4 housing units. The effects of the subsidy on housing starts and sales, housing affordability, interest rates, and mortgage flows are analyzed. The interest rate subsidy is provided for a standard fixed term, fixed rate mortgage loan with a 30-year lifetime; paid on a first-come, first-served basis until the funds allocated to the program are spent. All other conditions are held similar to the Lugar program to facilitate comparison.

Assumptions of the Simulation

The simulated conditions include:

1) Interest rate subsidies are provided to buyers of new single-family homes and for units of size 1-to-4. The subsidy is four percentage points off the market mortgage interest rate. The interest rate subsidy remains in place for the life of the mortgage, where the rate is fixed, but only a fixed amount of funds are allocated until exhausted.

2) Eligibility is somewhat broader than under the Lugar proposal. Only low and moderate income homebuyers are eligible but the income limit is higher than under Lugar, at $37,000. The maximum mortgage amount is $67,500, the same as in the Lugar Program.

3) The funds authorized for this program are $3 billion, available until exhausted. The program applies to dwellings of 1-to-4 family units constructed, substantially rehabilitated, or manufactured after enactment of the proposal and by January 1, 1982.

4) The mortgages are purchased by GNMA from lenders at the lower subsidized rate and then resold in the secondary market at a discount. The ultimate holders, assumed here to be the FNMA and private sector investors, show an increase of mortgages outstanding. The distribution is one-third to FNMA and two-thirds to the private sector.

5) The loan-to-value ratio (LTV) is assumed to be 75%. This is the standard ratio on conventional mortgage loans. Other loan-to-value ratios are possible, e.g., a 10% downpayment for a 90% FHA or VA loan. The larger downpayment for a 75% loan results in lower mortgage obligations per quarter per home owner and more new homes sales if monthly repayments are of critical importance. But the bigger downpayment may prevent the initial purchase. The smaller downpayment of 10% would cause fewer buyers to qualify because of larger monthly repayments, cutting into home sales. On the other hand, a 10% downpayment would make new home sales easier for first-time homebuyers. These factors are assumed to wash and so the 75% LTV ratio is used throughout.

6) The cost to GNMA of the subsidy is the difference between the market and below market interest rate, assumed to be 21% multiplied by new homes sold and the median price of new homes sold.

7) The program is assumed to begin on October 1, 1982 and to end in mid-1983 when funds are exhausted.

8) The Federal Reserve does not accommodate the subsidy program.

9) Any ex-ante increase in the federal budget deficit is not offset by reductions elsewhere in federal government spending or by tax boosts.

Implementation

The above conditions were implemented in the special augumented DRI Model version developed for the GAO in the following way:

1)   The 4% permanent interest rate subsidy was reduced to an effective 1.88% for two quarters and 0.45% for a third quarter. The reasoning is as follows. Based on estimates made by Hendershott for GAO, the effective subsidy was 3.75%. Assuming that 50% of the population would be eligible, the effective rate becomes 1.88%. Since funds available in the second quarter of 1983 were only 24% of potential demand, the effective subsidy fell to 0.45%. The model lever used was MORTPAYMENTNEWIS, an exogenous variable, which translated the effective interest rate subsidy to a dollar change in monthly mortgage loan repayments for new homes. This lever also affected the before and aftertax user cost of new homeownership, an input into tenure choice and the sales of new homes relative to existing home sales. The effective subsidy is much higher than in the temporary (5 year) interest subsidy program (Lugar) because the 4% applies to the full 30 years and the funds are paid up front.

2)   The amount financed by GNMA was calculated as 0.24 x 0.75 x median price of new homes x new homes sold in each period. In each period, the result was added to the variable, SUB@SRPGF, which had the effect of raising the federal budget deficit and exerting upward pressure on interest rates. Since the GNMA financing is on-budget, the deficit was increased by the amount of GNMA spending for these subsidies, over $5 billion per quarter at annual rates for two quarters and $1.4 billion in the third.

3)   The mortgages corresponding to the new homes were assumed to be passed through to private investors by sales in the secondary market -- pension funds, trusts, and households. FNMA also was assumed to purchase some of the new mortgages. The assumed distribution was two-thirds to private investors and one-third to FNMA. The increase of total outstanding mortgages from the program was $3.0 billion, appearing principally in the household assets, not otherwise classified, category of household sector assets.

4)   The add factor on the new issue rate for long-term corporate bonds, &RMMBCNEWNS, was raised by two basis points per billion dollars of secondary market offerings of mortgages in order to reflect the impact of the increased supply of securities in the secondary markets.

5)   Nonaccommodation by the Federal Reserve was accomplished through lowering nonborrowed reserves to keep M1 at the baseline level.

6)   The effect on 2-to-4 units was established through the assumption that they increased by the same percentage as single-family home purchases. The input was made on the addfactors for multifamily housing starts (&HUSTS2&) and mobile homes (&SHUMBL).

7)   A study by Alm and Follain for the GAO estimated that individuals under this program consume 16.3% more housing per unit than otherwise by paying higher prices or trading up.   To capture this effect, &ICR72, the addfactor on real residential construction, was raised. An offsetting addfactor was placed on some consumer durable spending categories that are interest-sensitive.

8)   Other adjustments were made to the simulation in order to achieve endogenous responses for certain exogenous variables in the model that would respond in full system simulations. Fine-tuning of equation reactions rendered inappropriate by the nature of the simulation also was made.

Effects in the Augmented DRI Model

The mechanisms by which the permanent interest rate subsidy program affect housing starts, housing sales, housing affordability, mortgage finance, interest rates, jobs, inflation, and other parameters in this special version of the DRI Model are essentially the same as in the Lugar Proposal simulation. Basically, the difference was only in the amount of the subsidy, which was larger because it was based on the full life of a 30-year mortgage rather than only 5 years of interest reduction payments on graduated equity mortgages (GEMs) over a 5-year period, as in Lugar.

Thus, this simulation worked primarily through the demand-side of housing in the augmented DRI model used for the GAO simulations. The interest rate subsidy reduced the monthly mortgage loan repayment burden for new homes, which increased the sales of new single-family homes. The reductions ranged from $8 to $74 per month over the simulation horizon. The rise in new homes sold vs. homes offered for sale induced an increase in housing starts by builders, although with some lags in new construction activity.

The tenure choice between renting and owning single-family new homes also was affected by the interest rate subsidy. The effective mortgage commitment rate was reduced by the subsidy, lowering the aftertax user cost of new homeownership relative to renting, and inducing a substitution of new homes for rentals by households. The aftertax user cost on new homes also dropped relative to the aftertax user cost on existing homes, inducing a substitution against existing homes and for new homes. These demand-side stimuli to new home sales relative to the existing stock of new homes generated 1-to-4 unit starts, real residential construction, and a rise in real GNP, output, and employment.

The construction loan financing was obtained from various financial institutions; in particular, commercial banks. Mortgage funds were supplied by FNMA and the private sector through the secondary mortgage market where the mortgages arranged by GNMA were sold. GNMA and ultimately the U.S. Treasury financed the subsidy, however.

The pressure of the stronger economy, necessary financing, and a nonaccommodative monetary policy raised short-and long-term interest rates, including the conventional mortgage loan rates on existing and new homes. Home prices also rose somewhat from the increased housing demand. Deposit inflows weakened, the supply of mortgage money dropped, and mortgage rates moved higher. Tax receipts moved higher and federal government outlays were reduced.

The GNMA subsidies caused increased deficit financing and issues of government securities. Rising economic activity, the increased financing necessitated by the program, and a nonaccommodative stance by the Federal Reserve caused money market interest rates to rise. Monthly mortgage loan repayments on existing homes rose, cutting into sales of existing homes. This occurred because profit margins on mortgage loans dropped, causing a decline in the supply of new mortgage commitments, mortgage acquisitions, and construction loans by banks and financial intermediaries. Negative feedback effects occurred on housing starts and sales as a result. The rises of interest rates subsequent to the program had negative effects on mortgage flows to housing, but did not nearly offset the stimulus to housing from the program.

This secondary round of effects thus brought reductions in mortgage availability; increased mortgage repayment burdens, especially on existing homes; and a negative feedback effect on housing activity. Some "crowding-out" occurred in the interest rate sensitive areas of the economy because of the rises of interest rates from the effects of the new policy, mostly in limiting the responses of consumer spending, investment outlays, and housing itself to the stimulus.

With increased construction of new homes, and a stronger economy, employment rose somewhat. The employment effects were concentrated in contract construction, lumber and wood products, and the "other" category. However, the employment results may well have been overstated, since initial rises of employment likely would be concentrated in existing workers with so depressed a construction industry.

Results

The results are summarized in the table Permanent Interest Subsidy versus Base Case, which is in the Appendix. The baseline is the DRI Control forecast of May 24, 1982. For a discussion of its characteristics, see the Data Resources Review of the U.S. Economy, June 1982.

The Appendix contains the same table for the Permanent Interest Subsidy vs. the pessimistic alternative, denoted Stagflation. For a discussion of the characteristics of the Stagflation scenario, see the Data Resources Review of the U.S. Economy, June 1982.

A.   Base Case Scenario

Single-family housing starts increase by 68,000 units in 1983 over the baseline. 2-to-4 housing starts are higher by 15,000 units. Mobile home shipments are up 17,000 units. The total rise in housing starts is 99,000 units in 1983, offset to some extent in subsequent quarters by negative stock adjustment effects that reach 45,000 units.

The affordability of new homes is easier in 1982 and 1983 because of reductions in monthly mortgage payments, dropping by as much as $74 in the first quarter of 1983, but the effect of the interest subsidy is offset somewhat by the higher home prices and mortgage rates. The average decline for the year is only $15 for new monthly mortgage payments.

The user cost of new home ownership drops from 0.3% to 11.0% compared with the baseline over the three quarters that the program is effectively in place, but the user cost of owning existing homes is generally higher due to the increase in expected capital gains. This encourages new homeownership vs. rentals and purchase of new rather than existing homes. Inflation is somewhat higher, especially in the cost and price of construction. The unemployment rate drops slightly over the simulation, down 0.1 percentage point in 1983. Real GNP shows small rises of $2.7 billion in 1983. There is a rise in the employment for nonagricultural establishments, of 0.123 million in 1983 with contract construction, lumber and products, and the "other" categories rising the most.

Feedback effects from the stronger economy, an increased supply of securities, and somewhat greater deficit financing bring about secondary effects, such as rising interest rates, which tend to diminish the stimulus to housing from this program. But tax receipts also are higher and outlays lower because of the stronger economy, raising the "bang-for-a-buck" of these programs. Higher interest rates restrain the stimulus to housing and home sales by limiting the improvement in affordability and restraining mortgage flows.

B.   Stagflation Scenario

The weaker economy that is described in the Stagflation simulation responds more strongly to the Permanent Interest Subsidy than to the Base Case economy. However, the "crowding-out" effects due to non-accommodation of the policy by the Federal Reserve limit its simulation. Net new starts total 188,000 units over the three quarters the program is in effect, compared to 100,000 on the first simulation. The reason for the larger impact is that under the Stagflation scenario, there are fewer homebuyers who would have bought without the subsidy to compete for the subsidy funds with those buyers enticed into the market by the subsidy. Because of the larger housing impact, the other macroeconomic variables are correspondingly larger and the "crowding-out" is more significant than in the Base Case comparison. Real GNP is up by $3.7 billion in 1983 and nonagricultural employment is 176,000 persons higher. The rate of change in the CPI rises by 0.19% from 7.6% to 7.79%. The prime rate is 45 basis points higher compared with the 25 basis point increase for the baseline comparison.

Issues

A.   Crowding-out effects occur as a result of the increased demand for homes, given that the Federal Reserve follows a nonaccommodating monetary posture and that an added supply of securities occurs in the secondary market. These effects do not result in declines from baseline levels, however, but only lesser increases than otherwise would have occurred. The higher real GNP, output and income effects from the subsidy provide more stimulus than the negative feedback effects of higher interest rates. The "real" crowding-out involves effects on durable consumer outlays, spending on business fixed investment, and the real spending by state and local governments, especially on public construction. The "financial" crowding-out occurs through fewer issues of long-term securities by nonfinancial corporations and by state and local governments, down $820 million in the case of business in 1983 and to $318 million for state and local governments.

B.   Substitution effects, which refer to the number of new home purchases that would have occurred anyway without the subsidy, are substantial in this simulation. Implicit in the baseline simulation are 319,000 units that would have occurred anyway.

C.   The timing of housing starts is a major effect of the subsidy, with more new housing starts occurring earlier and fewer occurring later. There is a net rise of housing starts over the forecast horizon, but considerably less than the rises from 1983:1 to 1983:3, with declines in starts from the baseline in the last five quarters of the simulation.

D.   The nonaccommodation of the fiscal stimulus by the monetary authority has important effects on interest rates, deposits and mortgage flows. Short-term rates move up by 25 basis points and long-term interest rates rise up to 10 basis points. The feedback effects on housing activity are negative because higher interest rates on market instruments cause fewer deposits, fewer mortgage loans, and reduced affordability.

E.   Employment creating effects are noticeable, with nonagricultural employment up 123,000 in 1983, but this improvement over the baseline disappears in 1984. Also, since the model response coefficients are averages over the historical period, the employment response is likely overstated in so depressed an economy.

Concluding Comment

The Permanent Interest Subsidy for new homes provides a good-sized stimulus to housing. New homes sold respond to the program, with households substituting against existing homes and rentals. The subsidy program provides 99,000 net new housing starts over the five quarters, shifting the timing of the starts considerably toward the next few quarters. The program is considerably more effective than the Lugar proposal, given the permanent nature of the subsidy. Most jobs are created in the contract construction area.

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Table 1
Permanent Interest Subsidy Versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	1.277	1.723	0.000
Units Subsidized (Millions of Units)	0.000	0.174	0.231	0.000
Housing Starts (Millions of Units)	1.330	0.001	0.099	-0.045
Single Units	0.680	0.000	0.068	-0.037
Multi Units	0.386	0.000	0.015	-0.006
Mobile Homes	0.264	0.000	0.017	-0.002
Unified Budget (Billions of Dollars)				
Receipts	604.616	0.064	1.312	0.313
Outlays	723.119	1.304	2.421	0.881
Surplus or deficit(-)	-118.503	-1.240	-1.109	-0.568
Unemployment Rate (Percent)	9.334	-0.001	-0.051	-0.017
Nonagricultural Employment (Total)	90.831	0.004	0.123	-0.006
Contract Construction	4.044	0.001	0.049	0.022
Lumber and Products	0.629	0.000	0.018	-0.002
Transportation Equipment	1.723	0.000	0.001	-0.001
Other	84.436	0.002	0.056	-0.025
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.02	0.14	0.08
New AAA Corporate Bonds	13.91	0.01	0.10	0.07
Prime Rate	15.31	0.00	0.25	-0.06
Bond Buyer Index of 20 Municipal Bonds	11.86	0.03	0.09	0.04
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.4	9.1	1.2
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.3	5.2	1.6
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	-0.1	-0.6	0.1
Nonres. Fixed Investment (1972)	152.0	0.0	0.5	-0.1
Nonfinancial Corporate Bond Issues (Current)	454.9	-0.1	-0.8	1.2
State and Local Govt. Bonds (Current)	348.3	-0.1	-0.3	-0.3

Table 2
Permanent Interest Subsidy Versus Stagflation

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	1.088	1.912	0.000
Units Subsidized (Millions of Units)	0.000	0.150	0.252	0.000
Housing Starts (Millions of Units)	1.162	0.019	0.169	-0.081
Single Units	0.588	0.000	0.111	-0.064
Multi Units	0.323	0.005	0.027	-0.015
Mobile Homes	0.251	0.014	0.032	-0.001
Unified Budget (Billions of Dollars)				
Receipts	604.601	0.090	1.830	0.400
Outlays	724.039	1.033	3.096	1.332
Surplus or deficit(-)	-119.438	-0.943	-1.266	-0.933
Unemployment Rate (Percent)	9.296	-0.002	-0.077	-0.011
Nonagricultural Employment (Total)	90.768	0.008	0.176	-0.047
Contract Construction	4.026	0.002	0.083	0.022
Lumber and Products	0.624	0.000	0.026	-0.012
Transportation Equipment	1.714	0.001	0.001	0.000
Other	84.404	0.005	0.066	-0.057
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	17.10	0.00	0.12	0.22
New AAA Corporate Bonds	14.10	0.01	0.13	0.10
Prime Rate	16.31	0.00	0.45	-0.14
Bond Buyer Index of 20 Municipal Bonds	12.29	0.02	0.13	0.05
Economic Indicators				
GNP (Billions of Dollars, SA)	3,064.9	0.7	13.5	-1.2
CPI - All Urban Consumers (% chg.)	6.0	0.0	0.2	0.0
Personal Income (Billions of Dollars, SA)	2,583.7	0.4	7.4	2.4
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.7	-0.1	-1.0	0.1
Nonres. Fixed Investment (1972)	151.8	0.0	0.7	-0.3
Nonfinancial Corporate Bond Issues (Current)	449.6	-0.1	-0.9	1.8
State and Local Govt. Bonds (Current)	347.2	-0.1	-0.5	-0.3

TAX - EXEMPT FINANCING OF SINGLE FAMILY HOMES:
EASING 1980 SUBSIDY BOND ACT RESTRICTIONS

This program involves easing some of the restrictions placed on mortgage revenue bond financing by the Mortgage Subsidy Bond Act of 1980. The 1980 Act established limitations on mortgage revenue bond issues, including:

--   Tax-exempt bond issues by a state or locality in that state for a given year could not exceed $200 million or 9 percent of all mortgages offered during the previous year, whichever was greater.

--   Interest rates on mortgages financed by tax-exempt bonds were not to exceed the bond yield by more than one percentage point, with any fee to the originating agent paid out of this spread.

--   Mortgages had to be limited to houses with prices not exceeding 90 percent of the average area purchase price, except in targeted areas.

--   Mortgages could only be offered to first-time homebuyers, except in targeted areas.

Before the 1980 limitations, 20% of state and municipal bond issues were mortgage-backed issues. Since these issues sold at yields consistently higher than other securities, some funds were siphoned from other munis. After the limitations were adopted, mortgage issues fell to only $3.5 billion in 1981 from $10.5 billion in the prior year.

Because of the 1981-82 collapse in housing activity, more tax-exempt financing may now be desired, suggesting a need for measures to ease the 1980 limitations. Proposed changes include:

--   The spread between bond yields and mortgage interest rates would grow to as much as 1.25 percentage points.

--   Price limits on eligible housing would increase to 100 percent of the average area price in nontargeted areas and 120 percent of the average area price in targeted areas.

--   All homebuyers would be eligible for these mortgages.

--   The proposal would apply to construction started after passage and completed before January 1, 1984.

--   Construction would include substantial rehabilitation of substandard housing and conversion of housing from non-residential uses.

Results

Discussions with the Joint Committee on Taxation (JCT) revealed that the response would be small, obviating any need for simulation. The main reason is that the new proposals, as they now stand, would not change the cap on the tax-exempt mortgage bond issues of a given state from the present formula of 9% of all mortgages offered in that state during the previous year or $200 million, whichever is larger. In 1981, an obviously depressed year for the home mortgage market, outstanding mortgages increased $16.4 billion. The JCT did not believe the changes in bond yield spreads or eligibility requirements would be enough to revive the mortgage financing tool for single-family homes. As a result, no model simulations were conducted for this proposal.

HOMEBUYER TAX CREDIT PROPOSAL

This simulation examines the effects on single-family home sales and housing starts of a tax credit that effectively lowers the purchase price to homebuyers. This program is a direct subsidy, through tax credits, for single-family homebuyers and operates by reducing home prices and increasing affordability. The tax credit would have a ceiling of $5,000 or 5% of the house price, whichever is less. Eligible housing includes new construction, substantial rehabilitation, or manufactured 1-to-4 family housing which commences on or after the date of enactment of the proposal and is substantially complete before January 1, 1984.

Assumptions of the Simulation

The conditions of the simulation include:

1)   A 5% tax credit on single-family home purchases by qualified buyers. Given a median price of new single-family homes near $70,000, a 5% credit would cost less than $5,000 per home.

2)   All new homebuyers are deemed eligible. There are no income limits on eligibility.

3)   The program is assumed to commence on October 1, 1982 and to end by January 1, 1984.

4)   The tax credit is like other tax credits, reported at year end on tax returns and accompanied by smaller tax payments, thus decreasing receipts to the federal government.

5)   There is no stated funds limitation.

6)   The Federal Reserve does not accommodate the subsidy program.

7)   Any ex-ante increase in the federal budget deficit is not offset by reductions elsewhere in federal government spending nor by tax boosts.

Implementation

The above conditions were implemented in the augmented DRI Model in the following way:

1)   The tax credit was calculated as 5% of the median price for new homes in each period. This effective reduction in the price of new homes was inputted into the model through the add factor that affected the monthly mortgage loan repayment variable for new homes. It also reduced the user cost of new home ownership, relative to renting. The changes were made to the add factors on the monthly mortgage payment for new homes (&MORTPAYMENTNEW) and the before and aftertax user cost of homeownership for new homes (&PCHOBT, &PCHOAT). This reduced the monthly mortgage loan repayment on new homes by $24 to $34 per quarter over the period the program was effective.

2)   The cost to the government in lost tax receipts was calculated as the 5% subsidy multiplied by the median price of a new home times the number of new homes sold and was reflected in reductions of personal tax receipts, entered through its add factor, &TPGF. This assumes that personal tax collections change at the same rate as personal tax liabilities.

3) Estimates made by Follain and Alm in a study prepared for the GAO indicate that individuals who would have purchased homes anyway respond to this program by purchasing a home that is 6.9% more expensive than otherwise would have been bought. To capture this effect, &ICR72, the add factor on real residential construction was raised. An offsetting add factor was placed on consumer durable categories some of which are interest-sensitive.

4) Effects on 2-to-4 housing units starts and mobile home shipments were captured by add factors on multifamily starts (&HUSTS2&), and mobile home shipments (&SHUMBL). The add factors were determined by assuming that multifamily starts and mobile homes increased by the same percentage as new single-family home sales (HUINSOLD).

5) The nonaccommodation by the Federal Reserve was achieved by setting the values of nonborrowed reserves to those levels which kept M1 at baseline simulation values.

6) Other adjustments were made to the simulation in order to achieve endogenous responses for certain exogenous variables in the model. Finetuning of equation reactions deemed inappropriate by the nature of the simulation were also made.

Effects in the Augmented DRI Model

The tax credit effectively reduces by 5% the purchase price of new homes and, in turn, lowers the monthly mortgage loan repayments and the user cost of new home ownership. The lower monthly loan repayments increases new housing sales relative to the existing inventory of unsold homes and induces builders to supply new housing starts. The impact increases if the new homes sales are met through a drawdown of existing inventories. With no corresponding subsidy on the purchase price for existing homes, the feedback effects from the rising interest rates and increased home prices from the stimulus raise the monthly repayment burden for existing single-family homes. This leads to substitution of new for existing homes and rental homes for existing homes.

The reduction in home prices because of the tax credit reduces the aftertax user cost of owning a new home, but does not change the user cost for owning existing homes. There is a substitution of new homes for existing homes as a result which stimulates new home sales further. Through changing the relation of inventories to sales of new homes offered for sale and new homes sold, builder supply is activated to produce more new single-family starts.

Tenure choice also is affected, through the reduction of the aftertax cost of homeownership vs. renting. The demand for new and existing homes rises as a result, along with the demand for mortgage money.

The increased mortgages that result from the homebuyer subsidy program is the product of the new home price and change in new homes sold. The increased demand for mortgages at banks, thrifts and life insurance companies causes mortgage rates to rise, leading to a greater supply of mortgage money and equilibration in both the mortgage and housing markets through the supply of new finance. The higher mortgage rate serves to somewhat lessen new and existing home sales and provides a negative feedback effect on housing activity.

Initially lower tax receipts for the federal government increase the deficit and necessary Treasury financing. The resulting new issues of Treasury debt tend to push interest rates higher. More importantly, the central bank does not accomodate the fiscal stimulus, driving interest rates higher to keep M1 from rising above targets.

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In turn, the higher interest rates depress deposit inflows to financial institutions and restrain the availability of mortgage funds, causing secondary negative impacts on mortgage markets. But later, increased tax receipts and lower outlays from the stronger economy help the deficit to improve, increasing the impact of the program relative to outlays.

Housing price inflation is greater, which, in turn, tends to raise monthly repayments for both new and existing homes. Financial crowding-out takes place through fewer issues of nonfinancial corporate and state and local government bonds.

This program has significant effects on employment, especially in nonagricultural sectors such as lumber and forest products, stone, clay and glass, and transportation equipment. However, the employment impacts may be overstated, since the average response coefficients of the equations would be greater than the actual response that typically occurs in a deep recession.

Results

The results are summarized in the table Homebuyer Tax Credit versus Base Case, which is in the Appendix. This table shows the differences (at seasonally adjusted quarterly rates) between the homebuyer tax credit simulation and the baseline simulation. The baseline simulation is the DRI Control forecast of May 24, 1982. For a discussion of its characteristics, see the Data Resources Review of the U.S. Economy for June 1982.

The Appendix contains the same tables for the Homebuyer Tax Credit Proposal vs. the pessimistic alternative, denoted as Stagflation. For a discussion of the characteristics of the Stagflation scenario, see the Data Resources Review of the U.S. Economy for June 1982.

A.   Base Case

Single-family housing starts begin rising in 1983, after new homes sales rise in 1982:4. The rise in new homes sales is motivated by reductions in the monthly mortgage payments for new single-family homes and the aftertax user cost of new homeownership as a result of the tax credit. With inventory-sales ratios declining, builders supply new housing starts. A total of 62,000 additional single-family units are constructed in 1983. 2-or-more units rise by 11,000 units, representing the increases in owner-occupied units, while mobile home shipments are up 20,000. The total increase in starts for 1983 in 93,000 units. The shifting of starts from the future plus the results of crowding-out depress starts in 1984 by 19,000 units compared with the baseline scenario. The median sales price of new and existing single-family homes rises by $436 and $678, respectively, in 1983:4 as a result of the increased demand for housing. The affordability of new homes improves through the lower monthly payments for principal and interest. Monthly mortgage payments are down $24 to $35 in 1982 and 1983 and the user cost of new homeownership drops by 9.7% to 11.7% compared with the baseline.

The employment effects from the homebuyer tax credit are fairly sizeable. Nonagricultural employment is increased by 94,000 persons in 1983. The largest increases in employment occur for contract construction, lumber and products, stone, clay and glass, machinery except electrical, and the "other" category. However, the employment impact could be overstated, given the initial condition of so deep a recession in construction. Real GNP rises over $2 billion in 1983 compared to the baseline and the rate of change in the Consumer Price Index is 0.1 percentage point higher. Lumber and wood prices rise more sharply, however, with an increase in the inflation rate of lumber and wood prices of almost two percentage points during 1983.

A somewhat higher deficit, initially a stronger economy, and the nonaccommodating stance of the Federal Reserve tend to drive interest rates higher under the homebuyer tax credit. Short-term interest rates rise up to 32 basis points and long-term interest rates are up by 5 basis points in 1983. In 1984, short-term rates average 14 basis points higher while long-term rates are 8 basis points higher. Mortgage rates rise as well, with the conventional new loan commitment rate up 14 basis points in 1984. But favorable feedback effects impact on tax receipts and federal government outlays, increasing the "bang-for-a-buck" of this highly leveraged program.

These higher interest rates tend to depress deposit inflows to bank and thrift institutions and result in cutbacks in mortgage activity. Profit margins are more narrow, limiting the amount of mortgage loans that financial intermediaries grant.

B.   Stagflation Scenario

The responses by the housing sector and the overall economy to this program are strong. Total new starts are 133,000 units higher in 1983 and real GNP rises by $2.5 billion. Nonagricultural employment grows by 119,000 jobs in 1983. Crowding-out is also more significant because the larger stimulus under Stagflation requires a bigger negative response by the Federal Reserve. The prime rate is higher by 42 basis points in 1983, and new AAA corporate bonds are up by 6 basis points.

Issues

A.   Some crowding-out occurs as a result of the increased demand for homes, given that the Federal Reserve is nonaccommodating and that the reductions in tax receipts put somewhat more pressure on the capital markets. These effects generally do not result in declines from baseline levels, however, but only lesser increases than otherwise would have occurred.

The "real" crowding-out involves effects on durable consumer outlays, spending on business fixed investment, and the real spending by state and local governments, especially on public construction. The "financial" crowding-out occurs through fewer issues of long-term securities by nonfinancial corporations, down $742 million in 1983, and by state and local governments, down $250 million.

B.   Substitution effects, which refer to the number of new home purchases that would have occurred anyway without the subsidy, are significant in this simulation. Implicit in the baseline simulation are 560,000 sales of single family homes that would have occurred anyway.

C.   The timing of housing starts is a major effect of the subsidy, with new housing starts occurring earlier and fewer occurring later because of "real" and "financial" stock adjustment effects. There is a net rise of 93,000 housing starts over the forecast horizon, but with declines in starts from the baseline in the last three quarters of the simulation.

D.   The nonaccommodation of the fiscal stimulus by the monetary authority has important effects on interest rates, deposits and mortgage flows. Short-term interest rates move up to 32 basis points and long-term interest rates rise by up 5 basis points. The negative feedback effects on housing activity arise because of higher interest rates on money market instruments, fewer deposits, fewer mortgage loans, and worsened affordability.

E.   Employment creating effects are noticeable, although probably overstated to some extent, with nonagricultural employment up 3,000 persons in 1982, 94,000 in 1983, and 37,000 in 1984. The increases are greatest in contract construction (43,000 and 46,000 1983-84); lumber and wood products (15,000 and 8,000, 1983-84); and "other" (28,000 and 7,000, 1983-84).

Concluding Comment

The homebuyer tax credit, a direct credit against the purchase price of new homes, has a moderately stimulative effect on housing starts, housing sales, and the economy. The affordability of new homes is substantially improved from the credit, although at the expense of existing and rental units. Revenue feedback effects from increased U.S. economic activity prevent the deficit from rising anywhere near the decrease in personal tax revenues. The employment affects are of good-sized magnitude under this program.

Table 1
Homebuyer Tax Credit versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.593	2.746	0.000
Units Subsidized (Millions of Units)	0.000	0.233	1.036	0.000
Housing Starts (Millions of Units)	1.330	0.000	0.093	-0.019
Single Units	0.680	0.000	0.062	-0.017
Multi Units	0.386	0.000	0.011	-0.001
Mobile Homes	0.264	0.000	0.020	-0.001
Unified Budget (Billions of Dollars)				
Receipts	604.616	-0.520	-1.622	0.782
Outlays	723.119	0.023	0.862	1.652
Surplus or deficit(-)	-118.503	-0.543	-2.484	-0.870
Unemployment Rate (Percent)	9.334	-0.001	-0.034	-0.033
Nonagricultural Employment (Total)	90.831	0.003	0.094	0.037
Contract Construction	4.044	0.001	0.043	0.046
Lumber and Products	0.629	0.000	0.015	0.008
Transportation Equipment	1.723	0.000	-0.001	-0.003
Other	84.436	0.002	0.037	-0.014
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.01	0.11	0.14
New AAA Corporate Bonds	13.91	0.00	0.05	0.08
Prime Rate	15.31	0.00	0.32	0.14
Bond Buyer Index of 20 Municipal Bonds	11.86	0.00	0.05	0.06
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.3	7.5	4.4
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.1	4.0	3.4
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	-0.1	-1.3	-0.1
Nonres. Fixed Investment (1972)	152.0	0.0	0.3	0.1
Nonfinancial Corporate Bond Issues (Current)	454.9	0.0	-0.7	1.2
State and Local Govt. Bonds (Current)	348.3	0.0	-0.3	-0.4

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Table 2
Homebuyer Tax Credit versus Stagflation

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.475	1.917	0.000
Units Subsidized (Millions of Units)	0.000	0.188	0.731	0.000
Housing Starts (Millions of Units)	1.162	0.000	0.133	-0.063
Single Units	0.588	0.000	0.093	-0.057
Multi Units	0.323	0.000	0.018	-0.005
Mobile Homes	0.251	0.000	0.022	-0.002
Unified Budget (Billions of Dollars)				
Receipts	604.601	-0.396	-0.577	0.552
Outlays	724.039	0.022	1.026	1.764
Surplus or deficit(-)	-119.438	-0.417	-1.603	-1.212
Unemployment Rate (Percent)	9.296	0.000	-0.048	-0.022
Nonagricultural Employment (Total)	90.768	0.004	0.119	-0.014
Contract Construction	4.026	0.001	0.064	0.049
Lumber and Products	0.624	0.000	0.021	0.001
Transportation Equipment	1.714	0.000	-0.002	-0.003
Other	84.404	0.002	0.037	-0.061
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	17.10	0.00	0.07	0.20
New AAA Corporate Bonds	14.10	0.00	0.06	0.08
Prime Rate	16.31	0.00	0.42	0.02
Bond Buyer Index of 20 Municipal Bonds	12.29	0.00	0.07	0.05
Economic Indicators				
GNP (Billions of Dollars, SA)	3,064.9	0.3	9.9	1.5
CPI - All Urban Consumers (% chg.)	6.0	0.0	0.1	0.1
Personal Income (Billions of Dollars, SA)	2,583.7	0.1	4.9	2.9
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.7	-0.1	-1.4	-0.2
Nonres. Fixed Investment (1972)	151.8	0.0	0.4	-0.1
Nonfinancial Corporate Bond Issues (Current)	449.6	0.0	-0.7	2.1
State and Local Govt. Bonds (Current)	347.2	0.0	-0.3	-0.3

MORTGAGE INTEREST TAX CREDIT PROPOSAL

This program is designed to provide a tax credit to encourage acquisitions of mortgage assets related to investment in housing. The investors would be financial institutions who have allocated at least 50% of new investments to mortgages for housing. The tax credit would equal 2.5% of the income derived from the institution's total investment in mortgage and mortgage-backed securities and reduce the effective costs of funds used for mortgages by the institution. A key element is the flow-through of the tax credit to lower effective mortgage rates for the homebuyer because of the reduced costs of funding. The goal of this proposal is to decrease the cost of mortgages and to increase the supply of mortgage funds through incentives to those financial institutions that are important to housing.

Assumptions of the Simulation

1)   All institutions making mortgage loans are eligible.

2)   Taxes are reduced by 2.5% of the income derived from the institution's total investment in mortgage and mortgage-backed securities.

3)   It is assumed that the reduced costs of funds to the financial institutions induced by the tax credit is passed on to new and existing homebuyers through reduced monthly mortgage loan repayments. All new and existing homebuyers are eligible.

4)   The tax credit is reflected in lower corporate profits tax receipts to the federal government and is treated similarly to other tax credits, even though the credit is refundable.

5)   Additional mortgage financing is induced by the tax credit and results in increased mortgage funds commensurate with the increased demand.

6)   The program is assumed to start October 1, 1982 and continues to the end of the forecast interval, December 30, 1984.

7)   The Federal Reserve does not accommodate this fiscal stimulus.

8)   Any ex-ante increase in the federal budget deficit is not offset by reductions elsewhere in federal government spending nor by tax boosts.

Implementation

1)   The mortgage interest tax credit effectively lowers monthly mortgage repayment burdens, assuming that the credit is passed forward to buyers of new and existing homes. The levers used in the model to capture this effect are MORTPAYMENTNEWIS and MORTPAYMENTEXIS, which translate the effective reduction in the mortgage rate to dollars of monthly mortgage repayments.

2)   The aggregate amount of the tax credit is calculated by the size of the credit times the current interest rate times the change in mortgages outstanding. It is entered in the model through a negative on the add factor, &TCGF, which raises the federal budget deficit.

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3)   The supply of mortgages that corresponds to the increased demand is obtained by assuming that the mortgages are held in a residential household assets category (HHASSETSNECCH), bought in the secondary market by the private sector.

4)   Nonaccommodation by the Federal Reserve was accomplished through lowering nonborrowed reserves to keep M1 at the baseline level.

5)   Other adjustments were made to the simulation in order to achieve endogenous responses for certain exogenous variables in the model that normally respond in full system simulations.   Fine-tuning of equation reactions rendered inappropriate by the nature of the simulation also were made.

Effects in the Augmented DRI Model

There are five principal effects in this simulation from the mortgage interest tax credit.

First, the effective cost of funds is lowered to financial institutions through the 2-1/2% tax credit applied to income from mortgage holdings and holdings of mortgage-backed securities.   This reduction increases the supply of funds and also impacts through a reduction in monthly mortgage loan repayments.   These reductions occur in both the monthly payments for new single-family units and for existing single-family units.   The demand for new and existing homes rises, with increases occurring in sales.   Higher sales of new and existing homes relative to the existing inventory raises home prices, increasing the profitability of building.   The change in the inventory-sales ratio also provides a signal to builders to engage in new construction.   There is a good-sized improvement in the affordability of new and existing homes, sales of existing and new homes show increases, housing starts rise, and the sales price of homes moves higher.

Second, the effective reduction in mortgage rates reduces the aftertax user cost for new and existing homes.   Tenure choice shifts toward purchases of new and existing homes and away from rentals.   With rising home prices and stable rentals, builders substitute construction of new homes for multi-family units.

Third, since the bulk of mortgage financing activity occurs in the existing home market, there is a greater reaction in sales for existing homes than new homes.   Existing home sales have much less impact on builders so that fewer new housing starts are initiated as a result of this program.

Fourth, the tax credit reduces federal government tax receipts, adding to the deficit and exerting some upward pressure on interest rates.   With the Federal Reserve keeping M1 constant under the fiscal stimulus, short and long-term interest rates rise somewhat as a result.   This subsequent rise of interest rates generates negative feedback effects on mortgage finance and housing activity, although these secondary effects only diminish the stimulus of the mortgage interest tax credit in its final result, and do not offset it.   Later feedback effects tend to raise receipts and lower federal government outlays because of the somewhat stronger economy.

Fifth, the employment effects are quite small since the tax credits do not amount to a great deal of funds, even though for purposes of the analysis, the tax credit was considered to be refundable.   Also, there is not much employment creating effects from existing home sales, the area most helped by the program.

Results

The results are summarized in Table 1 in the Appendix, denoted as Mortgage Interest Tax Credit Proposal versus the Base Case. The baseline simulation is the DRI Control Forecast of May 24, 1982. For a discussion of its characteristics, see the Data Resources Review of the U.S. Economy, June 1982.

The Appendix contains the same table for the Mortgage Interest Tax Credit Proposal versus the pessimistic alternative, Stagflation. For a discussion of the characteristics of the Stagflation scenario, see the Data Resources Review of the U.S. Economy, June 1982.

A. Base Case

The program stimulates a considerable amount of existing single-family home sales, from 23,000 units in 1982:4 to a high of 43,000 units in 1983:2. For 1983, 135,000 existing unit sales are stimulated or a 3.5% increase compared to the baseline. New single-family home sales rise by 15,000 units, or 2.8% of the baseline in 1983.

There is a substantial rise in the median sales price of existing single-family homes of $542 to $1,079 per quarter, increasing expectations of higher profitability by homebuilders and helping to induce new housing starts. Since there is not as much increase in the demand for new homes relative to those existing, the increase in single-family housing starts considerably limits the increase in the median sales price of new single-family units, with rises of only of $46 to $122 per quarter in 1983.

Nevertheless, some 27,000 new single-family housing starts are generated as a result of the program in 1983. Only 1,000 multi-family units are induced.

Affordability is enhanced, although not substantially. Monthly mortgage payments for new and existing single-family homes drop by from $7 to $16 per household per quarter. Monthly mortgage payments as a percent of median family income are down from 0.2% to 0.5%.

This program has very little effect on the unemployment rate, bringing it down by 0.03 percentage points through 1984. The main reason is that the program principally stimulates existing home sales rather than new construction.

Mortgage funding for the program is generally evenly spread among the mortgage-financing institutions. Since there is no pass-through of mortgages into the secondary market, the holdings of FNMA and the private sector actually dropped somewhat in some quarters.

Interest rates are little changed by this program, with the increased supply of mortgages tending to depress the mortgage rate but higher demand tending to raise it. On balance, the mortgage rate for conventional new loan commitments is up only 3 basis points in 1983 and 5 basis points in 1984.

Real GNP rises by $0.5 billion in 1983 with slight rises in the relevant implicit deflator, the CPI, and the WPI. The higher inflation arises from the rise in housing and related prices.

There is little crowding-out in the simulation, since the increased supply of funds prevents interest rates from rising so much as in some of the other programs. A slight reduction in bond issues by business and the state and local government sector occurs in 1983.

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B.   Stagflation Scenario

With the lower level of existing home and new home sales in the Stagflation simulation, there are fewer buyers able to compete with buyers induced to purchase by the subsidy. Consequently, the program has slightly stronger effects in Stagflation than under the baseline scenario. Total starts are up by 34,000 units in 1983 versus 28,000 in the Base Case comparison. Nonagricultural employment gains are 30,000 persons in 1983, with real GNP and inflation also up slightly more than in the baseline.

Issues

A.   Crowding-out effects are minimal under the Mortgage Interest Tax Credit Proposal, since the program provides incentives for both the supply and demand for funds. Also, the lost tax revenues are quite small, since thrift institution profits are so weak. It is the nonaccommodating posture of the Federal Reserve that most impacts on interest rates. The effects are quite slight as summarized in the table where the results are shown for the interest rate-sensitive areas in the economy under the program in the very last section, relative to the baseline.

B.   Substitution effects, which refer to the number of new home purchases that would have occurred anyway without the subsidy, are very small in this simulation. Implicit in the baseline simulation are 560,000 units that would have occurred anyway.

C.   The timing of housing starts is not a major effect of this program. The program impacts to raise new housing starts across the forecast horizon, although with lesser effects later as stock adjustments occur.

D.   The nonaccommodation of the fiscal stimulus by the monetary authority has only minor effects on interest rates, deposits and mortgage flows. Interest rates are essentially unchanged.

E.   Employment creating effects are slight, with the unemployment rate down only 0.02 percentage points later in the forecast horizon.

Concluding Comment

The mortgage interest tax credit proposal is primarily of help to existing home sales and the financial institutions that provide mortgages. By lowering the cost of funds to these institutions, mortgage availability is increased, effective mortgage rates depressed, monthly mortgage repayments lowered, and affordability enhanced. Since the major mortgage lending institutions are primarily concerned with existing home financing, it is not surprising to see the simulation produce a very sizeable increase in existing home sales but very little change in new housing activity. Given that the program mostly enhances the existing home market, the employment-creating effects are quite tiny.

Table 1
Mortgage Interest Tax Credit versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.050	0.200	0.200
Units Subsidized (Millions of Units)	0.000	0.027	0.150	0.094
Housing Starts (Millions of Units)	1.330	0.000	0.028	0.011
Single Units	0.680	0.000	0.027	0.012
Multi Units	0.386	0.000	0.001	0.000
Mobile Homes	0.264	0.000	0.000	0.000
Unified Budget (Billions of Dollars)				
Receipts	604.616	-0.048	-0.025	-0.045
Outlays	723.119	0.000	0.106	0.255
Surplus or deficit(-)	-118.503	-0.048	-0.132	-0.300
Unemployment Rate (Percent)	9.334	0.000	-0.009	-0.014
Nonagricultural Employment (Total)	90.831	0.000	0.023	0.024
Contract Construction	4.044	0.000	0.008	0.013
Lumber and Products	0.629	0.000	0.004	0.004
Transportation Equipment	1.723	0.000	0.000	-0.001
Other	84.436	0.000	0.012	0.008
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.00	0.03	0.05
New AAA Corporate Bonds	13.91	0.00	0.01	0.02
Prime Rate	15.31	0.00	0.07	0.03
Bond Buyer Index of 20 Municipal Bonds	11.86	0.00	0.01	0.02
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.0	1.8	2.4
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.0	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.0	0.7	0.6
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	0.0	0.0	0.0
Nonres. Fixed Investment (1972)	152.0	0.0	0.1	0.1
Nonfinancial Corporate Bond Issues (Current)	454.9	0.0	-0.2	0.2
State and Local Govt. Bonds (Current)	348.3	0.0	-0.1	-0.1

Table 2
Mortgage Interest Tax Credit versus Stagflation

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.050	0.200	0.200
Units Subsidized (Millions of Units)	0.000	0.032	0.162	0.111
Housing Starts (Millions of Units)	1.162	0.000	0.034	0.016
Single Units	0.588	0.000	0.030	0.019
Multi Units	0.323	0.000	0.003	-0.002
Mobile Homes	0.251	0.000	0.001	-0.001
Unified Budget (Billions of Dollars)				
Receipts	604.601	-0.042	-0.016	-0.125
Outlays	724.039	0.000	0.222	0.496
Surplus or deficit(-)	-119.438	-0.042	-0.239	-0.620
Unemployment Rate (Percent)	9.296	0.000	-0.014	-0.006
Nonagricultural Employment (Total)	90.768	0.002	0.030	0.004
Contract Construction	4.026	0.000	0.013	0.013
Lumber and Products	0.624	0.000	0.005	0.003
Transportation Equipment	1.714	0.000	-0.001	-0.001
Other	84.404	0.001	0.012	-0.010
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	17.10	0.00	0.04	0.04
New AAA Corporate Bonds	14.10	0.00	0.02	0.03
Prime Rate	16.31	0.00	0.12	0.05
Bond Buyer Index of 20 Municipal Bonds	12.29	0.00	0.02	0.03
Economic Indicators				
GNP (Billions of Dollars, SA)	3,064.9	0.1	2.3	1.5
CPI - All Urban Consumers (% chg.)	6.0	0.0	0.0	0.0
Personal Income (Billions of Dollars, SA)	2,583.7	0.0	0.7	0.3
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.7	0.0	-0.1	-0.1
Nonres. Fixed Investment (1972)	151.8	0.0	0.1	0.0
Nonfinancial Corporate Bond Issues (Current)	449.6	0.0	-0.2	0.3
State and Local Govt. Bonds (Current)	347.2	0.0	-0.1	-0.1

INDIVIDUAL HOUSING ACCOUNTS

This section discusses the effects of the introduction of Individual Housing Accounts (IHA's) on housing markets, mortgage markets, interest rates, aggregate output and employment. For reasons discussed below, no simulation was performed for this proposal.

Assumptions

1. Individual Housing Accounts (IHA's) are accounts whose interest income is exempt from federal taxation.

2. Contributions and interest earned on the IHA's must be used towards a down payment on a home purchase within 10 years or be subjected to taxation and a 16% penalty on the amount of tax liability.

3. The downpayment must be for a home that serves a principal residence of the payee.

4. The maximum tax-free contribution is $2,500 per single household or $5,000 for households with two or more persons.

5. Premature withdrawal of deposits for purposes other than home purchases would be assesed the full tax liability and a 16% penalty of the amount of the tax liability.

6. Eligibility is limited to first-time homebuyers.

Economic Analysis and Issues

The rationale for the IHA's proposals is to enable eligible homebuyers to build sufficient equity tax-free to help purchase a home. The obvious economic linkage is between household wealth accumulation and homebuying. Certain issues cloud the analysis. First, there is the question of intertemporal substitution, i.e., the effect of this proposal may be only to speed up the timing of home purchase. However, some increase in long-run demand would have occurred as these IHA's have reduced the relative cost of homeownership. Second, there is the question of financial substitution, i.e., whether the IHA's change only the composition and not the size of household saving.

For these reasons, the effect of the IHA's in the short run could be mild, as most participants are building up equity in their tax-free accounts rather than drawing down their accounts in order to purchase a house. Since the analysis made of the intertemporal substitution effects is so uncertain over the forecast period 1982-84, no simulation was constructed for this proposal.

Concluding Comment

The IHA's represent a tax subsidy to help eligible potential homebuyers to build up equity. Due to the unclear understanding of the timing (and magnitude) of the possible short-run economic effects of the proposal, simulation results for this proposal would produce results too uncertain to be useful.

SAVINGS AND LOAN RELIEF - BELOW MARKET MORTGAGE ORIGINATIONS

This simulation is concerned with a $3 billion program that provides relief to mortgage lenders. The GNMA purchases low interest mortgages at par values, thereby enabling mortgage lenders to offer below market interest rate mortgages to eligible first time homebuyers. The effects of this subsidy on housing starts, home sales, housing affordability, interest rates, and mortgage flows are analyzed.

Assumptions of the Simulation

1)   Available funds for GNMA purchases is $3 billion, beginning October 1, 1982 and ending December 31, 1983.

2)   GNMA purchases at par mortgages holding below market interest rates of 8% to · 10%. The $3 billion of new funds is used to absorb the discount.

3)   Mortgage lenders, who have sold these mortgages to GNMA, are required to originate new loans at 11% to 13% rates, or at a rate three percentage points higher than the average rate on the mortgages sold to GNMA.

4)   These 11% to 13% mortgages are allocated by lottery to first time homebuyers, who purchase homes selling for less than $100,000. Eligible homes are limited to units constructed, or manufactured after September 30, 1982. The interest subsidy to homebuyers is worth roughly 4%.

5)   The Federal Reserve does not accommodate the subsidy program.

6)   Any ex-ante increase in the federal budget deficit is not offset by reductions elsewhere in federal government spending nor by boosts in taxes.

Implementation

The above conditions were implemented in the special version of the DRI model used for GAO in the following ways:

1)   It was assumed that the subsidy to eligible homebuyers averaged 4% over the life of the program, which is the difference between the mortgage interest rate and the subsidized rate over the life of the proposal (16% - 12%). However, the per unit subsidy cost to the government is 8% (16% - 8%). Based on calculations derived from data collected by the U.S. Savings and Loan League, only 13.5% of all homebuyers in 1981 were first-time homebuyers and 88.8% of all first-time homebuyers purchased a home valued at less than $100,000. Hence the effective interest subsidy to new homebuyers (MORTPAYMENTNEWIS) was reduced to 0.48% (0.48 = 4*0.135*.888).

2)   The cost to the government of the interest subsidy (SUB@SRPGF) averaged $3.0 billion (at seasonally adjusted quarterly rates). Hence, the program exhausted the available funding by 1983:3. Assuming that all eligible individuals take advantage of the program, the cost to the government to provide the subsidy to those who would have purchased homes anyway is about $2.2 billion per quarter. This figure was calculated by multiplying the number of eligible buyers by the average cost of the subsidy per unit. The number of eligible buyers is equal to 0.150 million persons or .888*.135* (the number of new homes sold (HUINSOLD) + multifamily housing starts (HUSTS2&) + shipments of mobile homes (SHUMBL)). The cost to the federal government of the subsidy to

homebuyers who would have purchased without the program was $0.8 billion per quarter. This was calculated by taking the number of additional single family units, multifamily housing starts, and mobile home shipments times the average cost of the subsidy per unit. The additional new housing units is the difference between the simulation with the subsidy and the baseline simulation, or 0.05 million buyers.

3)   The mortgages on the new homes were assumed to be held by savings and loan associations (S&Ls). The add factor on new S&L mortgage commitments was raised by roughly $0.7 to $1.0 billion, equal to the number of new units times its purchase price times 0.7509 times 0.58. The scalar 0.7509 is the loan-to-value ratio; 0.58 is equal to (1-.42) or the amount of mortgages not purchased by GNMA.

4)   The add factor on the new issue for long-term corporate bonds, &RMMBCNEWNS, was raised by two basis points per billion dollars of increased holdings of mortgages by S&L's.

5)   Nonaccommodation by the Federal Reserve was accomplished through lowering nonborrowed reserves to keep M1 at the baseline level.

6)   The effect on multifamily units (HUSTS2&) and mobile home shipments (SHUMBL) was established through the assumption that they increased by the same percentage as single-family home purchases. The addfactors on these two variables were raised by the appropriate amount.

7)   A study of Follain and Alm for the GAO estimated that individuals who would have purchased a home anyway under similar programs (the permanent interest subsidy) would consume 16.3% more housing per unit. This effort was captured through the addfactor on real residential construction (&ICR72). A negative add factor was placed on the durable consumption category of purchases to offset the increased demand for housing.

8)   Other adjustments were made to the simulation in order to achieve endogenous responses for certain exogenous variables in the model. Finetuning of the equation reactions rendered inappropriate by the nature of the simulation also were made.

Effects in the Augmented DRI Model

The mechanisms by which the below market mortgage originations program affect housing starts, housing sales, housing affordability, mortgage finance, interest rates, jobs, inflation, and other parameters in the augmented DRI Model for the GAO are similar to the Permanent Interest Subsidy Proposal simulation. Basically, the difference was only in the amount of the subsidy, which was smaller because it applied just to first-time homebuyers.

Thus, this simulation worked primarily through the demand-side of housing in the augmented DRI model used for the GAO simulations. The interest rate subsidy reduced the monthly mortgage loan repayment burden for new homes, which increased the sales of new single-family homes. The reductions ranged from $15 to $20 per month over the simulation horizon. The rise in new homes sold vs. homes offered for sale induced an increase in housing starts by builders, although with some lags in new construction activity.

The tenure choice between renting and owning single-family new homes also was affected by the interest rate subsidy. The effective mortgage commitment rate was reduced by the subsidy, lowering the aftertax user cost of new homeownership relative to renting, and inducing a substitution of new homes for rentals by households. The aftertax user cost on

new homes also dropped relative to the aftertax user cost on existing homes, inducing substitution against existing homes and for new homes. These demand-side stimuli to new home sales relative to the existing stock of new homes generated new unit starts, real residential construction, and a rise in real GNP, output, and employment.

The construction loan financing was obtained from various financial institutions; in particular, commercial banks. Mortgage funds were supplied by FNMA and the private sector through the secondary mortgage market where the mortgages arranged by GNMA were sold. GNMA and ultimately the U.S. Treasury financed the subsidy, however.

The pressure of the stronger economy, necessary financing, and a nonaccommodative monetary policy raised short-and long-term interest rates, including the conventional mortgage loan rates on existing and new homes. Home prices also rose somewhat from the increased housing demand. Deposit inflows weakened, the supply of mortgage money dropped, and mortgage rates moved higher. But later in the simulation horizon, feedback effects raised tax receipts and reduced federal government outlays, increasing the "bank-for-a-buck" of the program.

The GNMA subsidies caused increased deficit financing and issues of federal government securities. Rising economic activity, the increased financing necessitated by the program, and a nonaccommodative stance by the Federal Reserve caused money market interest rates to rise. Monthly mortgage loan repayments on existing homes rose, cutting into sales of existing homes. This occurred because profit margins on mortgage loans dropped, causing a decline in the supply of new mortgage commitments, mortgage acquisitions, and construction loans by banks and financial intermediaries. Negative feedback effects occurred on housing starts and sales as a result. The rises of interest rates subsequent to the program had negative effects on mortgage flows to housing, but did not nearly offset the stimulus to housing from the program.

This secondary round of effects thus brought reductions in mortgage availability; increased mortgage repayment burdens, especially on existing homes; and negative feedback on housing activity. Some "crowding-out" occurred in the interest rate sensitive areas of the economy because of the rises of interest rates from the effects of the new policy, mostly in limiting the responses of consumer spending, investment outlays, and housing itself to the stimulus.

With increased construction of new homes and a stronger economy, employment rose somewhat. The employment effects were concentrated in contract construction, lumber and wood products, and the "other" category. This effect probably was overstated to some extent, given the less-than-average hiring response likely because of the depression in construction when the program was implemented.

Results

The results are summarized in the table Savings and Loan Relief simulation versus Base Case in the Appendix. The baseline simulation is the DRI Control forecast of May 24, 1982. For a discussion of its characteristics, see the Data Resources Review of the U.S. Economy, June 1982.

The Appendix contains the same table for the pessimistic alternative, denoted Stagflation. For a discussion of the characteristics of the Stagflation scenario, see the Data Resources Review of the U.S. Economy, June 1982.

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A. Base Case Scenario

Single-family housing starts rise by 10,000 units in 1982 and 31,000 units over 1983. Multifamily housing starts in 1983 are up 22,000 units; and mobile home shipments are up 16,000 units. The total rise in housing starts is 69,000 units in 1983, offset to some extent in subsequent quarters by negative stock adjustment effects that reach 8,000 units in 1984.

The affordability of new homes is easier in 1982 and 1983 because of reductions in monthly mortgage payments, dropping from $15 to $20, but the effect of the interest subsidy is offset somewhat by the higher home prices and mortgage rates.

The user cost of new home ownership drops from 2.0% to 2.7% compared with the baseline in 1983, but the user cost of owning existing homes is generally lower due to an increase in expected capital gains on homes. This encourages new home ownership vs. rentals and purchase of new rather than existing homes. Inflation is somewhat higher, especially in the cost and price of construction. The unemployment rate is little changed over the simulation. Real GNP shows rises of $1.5 billion, with real economic growth up by only 0.1 percentage point in 1983. There is a rise in the employment for nonagricultural establishments, with contract construction, lumber and products, and "other" categories rising the most.

Feedback effects from the stronger economy, an increased supply of securities and somewhat greater deficit financing bring about secondary effects, such as rising interest rates, which tend to diminish the stimulus to housing from this program. Higher interest rates restrain the stimulus to housing and home sales by limiting the improvement in affordability and by restraining mortgage flows. But federal government outlays are lessened later in the simulation period and tax receipts raised somewhat because of the program's stimulux.

B. Stagflation Scenario

The response of housing starts and the overall economy to this proposal in the Stagflation scenario is slightly smaller than in the baseline simulation. Housing starts for 1982 and 1983 are up by 5,000 and 65,000 units, respectively. In 1984, starts decline by 16,000 from the level in the Stagflation scenario. Increases in real GNP and employment are higher than in Stagflation, but the increase is correspondingly lower in this comparison. There are fewer homebuyers under Stagflation that would have bought the subsidy to compete for the funds with buyers brought into the market by the subsidy. This positive effect on housing starts relative to the Base Case comparison is outweighed, however, by the negative impact of the significantly worsened economy facing homebuyers in the Stagflation case. The interest subsidy nature of this proposal does not provide sufficient incentive to draw more first-time buyers into the market.

Issues

A.   Crowding-out effects occur as a result of the increased demand for homes, given that the Federal Reserve follows a nonaccommodating monetary posture and that an added supply of securities occurs in the secondary market. These effects result in declines from baseline levels in various components of final demand, notably purchases of consumer durables. The "financial" crowding-out occurs through fewer issues of long-term securities by nonfinancial corporations and by state and local governments, down by $460 million in the case of business and $180 million for state and local governments in 1983.

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The table in the Appendix shows the results, relative to the baseline, for the interest rate-sensitive areas in the economy under the Lugar program, in the very last section. A main area of crowding-out is within housing activity itself, with substitution of new housing for existing homes and against rentals. As a result, the program generates new activity that offsets the initial increase in the federal deficit. Nonetheless, the deficits are higher in all periods of the forecast.

B.   Substitution effects, which refer to the number of new home purchases that would have occurred anyway without the subsidy, are substantial in this simulation. Implicit in the baseline simulation are 0.150 million units that would have occurred anyway.

C.   A change in the timing of housing starts is a major effect of the subsidy, with more new housing starts occurring earlier and fewer occurring later. There is a net rise of housing starts over the forecast horizon, but considerably less than the rises from 1982:4 to 1983, with declines in starts from the baseline in the last three quarters of the simulation. By 1984:4, starts are 8,000 units below the baseline.

D.   The nonaccommodation of the fiscal stimulus by the monetary authority has important effects on interest rates, deposits and mortgage flows. Short-term rates move up as much as 13 basis points in 1983 and long-term interest rates rise slightly. The feedback effects on housing activity are negative because of higher interest rates for money market instruments, fewer deposits, fewer mortgage loans, and reduced affordability.

E.   Employment creating effects are minimal due to crowding-out, with nonagricultural employment up only 70,000 persons in 1983 and 45,000 persons in 1984. Even this result could be an overstatement of the employment impact, given a likely less-than-average hiring response under current economic conditions.

Concluding Comment

The Saving and Loan Relief Proposal for new homes provides a decent stimulus to housing. New homes sold respond to the program, with households substituting against existing homes and rentals. The subsidy program provides 71,000 net new housing starts over the forecast period, shifting the timing of the starts considerably toward the next few quarters. However, higher interest rates choke off much of the stimulus from this proposal. Interest sensitive sectors of the economy, notably purchases of consumer durables, actually decline relative to the baseline. Employment generation is quite modest, with 70,000 new jobs created in 1983, and the increases concentrated in contract construction.

Table 1
S&L Below Market Originations versus Base Case

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.763	2.237	0.000
Units Subsidized (Millions of Units)	0.000	0.039	0.114	0.000
Housing Starts (Millions of Units)	1.330	0.010	0.069	-0.008
Single Units .	0.680	0.000	0.031	-0.010
Multi Units	0.386	0.005	0.022	0.001
Mobile Homes	0.264	0.004	0.016	0.002
Unified Budget (Billions of Dollars)				
Receipts	604.616	0.041	0.729	0.593
Outlays	723.119	0.767	2.675	0.671
Surplus or deficit(-)	-118.503	-0.726	-1.946	-0.078
Unemployment Rate (Percent)	9.334	-0.001	-0.027	-0.033
Nonagricultural Employment (Total)	90.831	0.004	0.070	0.045
Contract Construction	4.044	0.001	0.024	0.027
Lumber and Products	0.629	0.000	0.007	0.004
Transportation Equipment	1.723	0.000	0.001	0.000
Other	84.436	0.002	0.038	0.013
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.42	0.00	0.05	0.07
New AAA Corporate Bonds	13.91	0.00	0.05	0.06
Prime Rate	15.31	0.00	0.13	0.02
Bond Buyer Index of 20 Municipal Bonds	11.86	0.01	0.06	0.04
Economic Indicators				
GNP (Billions of Dollars, SA)	3,067.9	0.2	5.1	4.1
CPI - All Urban Consumers (% chg.)	5.8	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,578.6	0.2	2.9	2.4
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.8	0.0	-0.3	0.2
Nonres. Fixed Investment (1972)	152.0	0.0	0.3	0.2
Nonfinancial Corporate Bond Issues (Current)	454.9	0.0	-0.5	0.6
State and Local Govt. Bonds (Current)	348.3	0.0	-0.2	-0.2

Table 2
S&L Below Market Origination versus Stagflation

	Baseline Projection	Changes Resulting from Implementing Proposal (Difference)		
	1982	1982	1983	1984
Gross Funding for Policy (Billions of Dollars)	0.000	0.624	2.376	0.000
Units Subsidized (Millions of Units)	0.000	0.030	0.113	0.000
Housing Starts (Millions of Units)	1.162	0.005	0.065	-0.016
Single Units	0.588	0.000	0.041 •	-0.014
Multi Units	0.323	0.003	0.017	0.000
Mobile Homes	0.251	0.002	0.007	-0.001
Unified Budget (Billions of Dollars)				
Receipts	604.601	0.028	0.851	0.694
Outlays	724.039	0.611	2.951	0.971
Surplus or deficit(-)	-119.438	-0.584	-2.100	-0.277
Unemployment Rate (Percent)	9.296	0.000	-0.026	-0.029
Nonagricultural Employment (Total)	90.768	0.003	0.062	0.031
Contract Construction	4.026	0.000	0.024	0.021
Lumber and Products	0.624	0.000	0.007	0.002
Transportation Equipment	1.714	0.000	-0.001	0.000
Other	84.404	0.002	0.031	0.008
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	17.10	0.00	0.04	0.07
New AAA Corporate Bonds	14.10	0.00	0.03	0.04
Prime Rate	16.31	0.00	0.20	0.04
Bond Buyer Index of 20 Municipal Bonds	12.29	0.00	0.04	0.03
Economic Indicators				
GNP (Billions of Dollars, SA)	3,064.9	0.2	4.5	2.8
CPI - All Urban Consumers (% chg.)	6.0	0.0	0.1	0.0
Personal Income (Billions of Dollars, SA)	2,583.7	0.1	3.8	3.1
Crowding-Out Effects (Billions of Dollars)				
Consumer Spending - Durables (1972)	139.7	0.0	-0.1	0.2
Nonres. Fixed Investment (1972)	151.8	0.0	0.3	0.1
Nonfinancial Corporate Bond Issues (Current)	449.6	0.0	-0.3	1.1
State and Local Govt. Bonds (Current)	347.2	0.0	-0.2	-0.2

APPENDIX

The Augmented DRI Model for GAO - A Brief Description

The version of the DRI model used for this project included a number of new innovations designed to more fully reflect emerging key demand-side factors affecting housing, more competitive financial markets under the Depository Institutions Deregulations and Monetary Control Act of 1980, price equilibration in the mortgage markets rather than quantity-constrained relations, mortgage-supply and portfolio considerations for the major suppliers of funds to housing, and impacts of the federal budget deficit on interest rates under the New Fed Policy instituted during October 1979.

All together, 26 behavioral equations were added to the 1981C version of the DRI model through new specification, elaboration, or reestimation—then integrated to obtain the augmented version used in the policy simulations performed for GAO. Four equations related the demand and supply for new and existing homes; two equations described the supply of new single-family and multi-family housing starts; two equations described the determination of prices for new and existing homes; four equations were concerned with mortgage finance—for construction loans, new mortgage commitments, and mortgage acquisitions by all lenders; seven equations were specified on the sources of funds to financial institutions, including deposit inflows except money market certificates and mortgage repayments at thrift institutions; three key interest rate equations were specified to more fully account for impacts of the deficit—the federal funds rate, 90-day Treasury bill rate, and AAA-equivalent new bond issue rate; a new equation for M1, the narrow money supply, was developed; and an equation was developed for a competitively determined new mortgage loan commitment rate on a 25-year loan with a 75% loan-to-value ratio, resulting from the interaction between the demand and supply of mortgage money, cost-push factors, and competition with the corporate bond market. Several policy variables also were estimated in endogenous equations, including new mortgage commitments provided by the Federal Home Loan Mortgage Corporation (FHLMC), Federal Home Loan Bank Board (FHLBB) advances, and the outstanding mortgages held by the Federal National Mortgage Association (FNMA) and Government National Mortgage Association (GNMA).

The structure of the augmented model stressed 1) a separation in the demand and supply for new and existing homes, with new variables to capture the dimensions of affordability; 2) a supply approach to housing starts by builders in response to expected profitability, home sales relative to vacancies, and funds availability; 3) household allocation of savings to various financial institutions in the form of deposits and loan repayments; 4) the supply of construction loans and new mortgage commitments by commercial banks and thrift institutions to the mortgage market; 5) the determination of mortgage rates from the demand and supply of mortgage money, costs of funds; and secondary market activity in other long-term securities; and 6) new determinants of short- and long-term interest rates under the New Fed Policy, especially the federal budget deficit.

The demand for new and existing homes, relative to supply, is the principal mechanism by which builders receive signals to supply new housing starts. As demand shifts higher, home prices rise and enhance the expected profitability of building. New homes sold relative to those offered also rise or vacancy rates decline in a positive signal to builders. Housing demand depends upon income, household net worth, the user cost of homeowning

vs. the cost of renting, the burden of monthly mortgage loan repayments relative to income, macroeconomic and financial risk, and demographics. It is through the user cost and monthly repayment burden that considerations on affordability play an important role. Monthly mortgage loan repayment burdens and the user cost of home ownership were two new variables added to the model.

Home prices, mortgage rates, lending terms, and income prospects all affect the mortgage loan repayment burden and the demand for new and existing homes. Interest rates, property and income taxes, and operating costs impact on the user cost of home ownership relative to renting; hence tenure choice. This user cost was calculated in aftertax terms. Many of the policies to aid mortgage finance and housing that were considered in the study had their primary impact on the demand-side variables. New and existing home sales relative to the existing stock of housing provide a measure of demand and disequilibrium between the desired stock of housing and the actual stock, with builders responding through new housing starts to close the gap. For example, the single-family housing starts equation has as a key input the ratio of new home sales relative to those offered. For multi-family units, the analogous concept was the vacancy rate.

A major factor affecting the determination of housing is the cost and availability of funds, modeled through the flows of funds of household and financial institutions. In the augmented DRI model, households purchase houses but also provide a major source of funds when allocating disposable income between consumption, various forms of financial assets, and liabilities. Since 1980, numerous new market-related instruments have been instituted which both raise the costs of funds to financial intermediaries and also provide competitive returns to savers. These include mony market mutual funds, six-month money market certificates, and 30-month small savers certificates. Real aftertax returns on these and other financial asset alternatives are specified to affect the flow of funds from households to banks and thrift institutions in the model, impacting the availability of mortgages and mortgage loan rates. The costs of funds also are an important determinant of the mortgage rate, which in a market where legislated ceilings no longer exist, can move flexibly to equate the demand and supply of funds.

The total of funds available to financial intermediaries includes loan repayments generated through existing outstanding mortgage loans and is the budget constraint to financial institutions in allocating funds across various assets, including mortgage loans. Deposits plus loan repayments, given existing mortgage rates and the returns on alternative investments, are allocated to those investments having the greatest expected return. The supply of mortgage finance impacts the mortgage rate, but also in times of monetary restraint funds availability becomes a critical element in the construction of new housing starts by restraining the funds available to builders. In past years, such restraint also was evident in the case of homebuyers, helping to bring about a collapse in housing during tight money periods. But, more recently, this restraint has occurred principally through mortgage rate effects on affordability, modelled in the augmented version of the DRI model as the monthly loan repayment burden relative to disposable income and aftertax user cost of homeownership. The mortgage rate itself depends on the demand for mortgages for new and resale purposes, the supply of mortgage finance in the form of new commitments by thrift institutions, cost-push effects based on a weighted average cost of funds to thrift institutions, and secondary market impacts from the yields on competitive investments such as high-quality corporate bonds. In the augmented version of the DRI model, the mortgage rate is not sticky, moving up or down in order to equate the demand and supply of mortgage money.

Another important major factor impact on mortgage finance and housing is the disequilibria present in the mortgage and housing markets. Long-run disequilibrium is represented by the discrepancy between the existing stock of housing and the desired stock as related to household net worth, demographics, and relative prices. The flow demand for new and existing homes relative to available units provides a measure of this disequilibrium and a signal affecting builder response in the form of new single-family housing starts. For multi-family housing starts, a similar role is played by the vacancy rate. A second type of disequilibrium is possible in the mortgage market, where sticky or sluggish movements in the mortgage rate have in the past resulted in fund-constrained mortgage or construction loan demand which, in turn, has sharply reduced housing market activity. The third type of disequilibrium is related to the own and cross-adjustment lags in household allocation of funds across various savings media and in the supply of mortgage financing by financial institutions. Expected own and alternative real aftertax returns generally are specified to affect the portfolio decisions of households and financial institutions, but with lagged effects. An elaborate modelling of each type of disequilibrium characterizes the augmented DRI model used for the GAO simulations.

Finally, since the New Fed Policy, federal financing of the deficit has had a greater impact on interest rates, hence mortgage flows. Under the New Fed Policy of October 1979, the Federal Reserve does not necessarily accommodate any new Treasury financing; instead, operates to achieve certain desired growth rates for bank reserves. With fixed growth in the supply of reserves, any source of credit demand, whether from the private sector or Federal Reserve, quickly impacts on interest rates. Although too few periods have passed since the New Fed Policy for regressions to fully show deficit impacts under the new regime, new equations for the federal funds rate, 90-day Treasury bill rate, and AAA-equivalent yield on long-term corporate bonds, appear in the augmented DRI model to more fully reflect deficit impacts. Crowding-out thus is greater in this version of the model than in previous versions, since any rise in federal financing leads to increases of interest rates and restraint on the interest-rate sensitive sectors in the economy. The effects would be especially pronounced under an assumed regime of non-accommodation by the Federal Reserve, the one most likely to occur in the face of any fiscal stimulus from new policies.

As an example, consider the effects from a program such as the Lugar Proposal, which amounts to a temporary interest subsidy to eligible homebuyers. The interest rate subsidy in this proposal reduces the effective monthly mortgage payment relative to disposable income for buyers of new homes. If the program had also applied to existing homes, a similiar effect also would have occurred. Demand for new single-family homes rises as a result. Given the stock of new existing homes, the increase in the ratio of new homes sold to offered induces a rise in single-family housing starts by builders in order to close the gap between the desired and existing stock of housing. With lags, the existing stock of housing will rise, providing negative feedback on future housing starts.

The demand for mortgage funds increases with the higher sales of new homes and rise in new housing starts, with construction loans and new mortgage commitments provided through the financial system in response to a higher mortgage rate. The suppliers of mortgage funds receive sources from household saving and loan repayments, lending and charging a mortgage rate dependent on the availability and cost of funds. Profit margins on mortgage loans versus other opportunities and the cost of borrowing determine the portfolio supply provided by these intermediaries.

Under this particular policy program, the mortgages corresponding to the new homes sold are assumed to be passed through to private investors—pension funds, trusts, and households—by sales in the secondary market. FNMA also purchases new mortgages. Thus, mortgages outstanding increase through private sector absorption in the secondary market and a pass-through process which depends on supply in response to incentives from higher market mortgage rates.

The allocation decisions of households depend on own and expected real aftertax returns to various assets and liabilities, with the allocation of funds to deposits appearing at banks and financial intermediaries on the liability side. These institutions, in turn, respond to expected returns and allocate funds across loans and investments.

The absorption of the subsidy by GNMA requires financing by this agency in the open market. The resulting increase in the federal budget deficit generates an endogenous response of Treasury issues which impact on key short-term interest rates in the model and the long-term corporate bond market. Rising interest rates in the open market affect consumer spending on durables, housing demand through greater mortgage repayment burdens, business fixed investment, and state and local government construction, tending to cause some offsetting impact to the stimulus from the new housing policy.

The sequence of effects described underscores the effects of affordability on the demand for homes, housing starts, and mortgages. The supply of starts in response to a changing ratio of new homes sold to those offered reflects disequilibrium in the housing market. Quick adjustment of the mortgage rate prevents any major disequilibrium effects in the mortgage market, such as those occurring before 1980, although the model permits quantity constraints to be operative through the supply of new mortgage commitments to housing starts in a regime of sticky mortgage rates. The last type of disequilibrium described earlier is illustrated by the portfolio allocations of households and financial institutions in response to changing own and alternative expected returns on various investments. The effects of increased federal budget deficits on interest rates through a larger volume of Treasury issues also was a characteristic of the Lugar Program, since the subsidy by GNMA requires it to raise funds in the long-term markets.

HOUSING STARTS, EMPLOYMENT, AND MACROECONOMIC IMPACTS
BASE CASE

	1981	1982	1983	1984
Gross Funding For Base Case				
(Billions of Dollars)	NA	NA	NA	NA
Units Subsidized (Millions of Units)	NA	NA	NA	NA
Housing Starts (Millions of Units)	1.340	1.330	1.676	1.950
Housing Sales (Millions of Units)				
Existing	2.352	2.507	3.945	4.790
New	0.437	0.420	0.558	0.685
Affordability				
New Monthly Mortgage Payment as % of Median				
Family Income	23.244	21.618	20.164	18.730
Existing Monthly Mortgage Payment as % of				
Median Family Income	19.744	19.558	18.877	17.650
Unified Budget (Billions of Dollars)				
Receipts	621.609	604.616	673.865	740.943
Outlays	694.189	723.119	789.714	843.020
Surplus or deficit (-)	-72.592	-118.503	-115.848	-102.077
Before feedback (Billions of Dollars)	NA	NA	NA	NA
Unemployment Rate (Percent)	7.625	9.334	8.838	8.035
Nonagricultural Employment (Millions)	91.551	90.831	92.431	95.071
Contract Construction	4.311	4.044	4.016	4.176
Lumber and Products	0.679	0.629	0.682	0.702
Transportation Equipment	1.845	1.723	1.808	1.889
Other	84.065	83.836	85.305	87.661
Mortgage Funds - Outstanding				
(Billions of Dollars)				
Deposit Institutions	1,034.871	1,075.330	1,123.863	1,187.855
FNMA and GNMA	66.510	74.854	83.798	90.811
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.71	16.42	15.34	14.28
New AAA Corporate Bonds	14.17	13.91	12.84	11.56
Prime Rate	18.87	15.31	14.92	13.65
Home Buyer Index of 20 Municipal bonds	11.33	11.86	10.82	9.85
Economic Indicators				
Real GNP (Billions of 1972 Dollars, SA)	1,510.250	1,488.105	1,536.762	1,601.191
CPI - All Urban Consumers (% chg.)	10.338	5.767	6.409	6.615
Personal Income				
(Billions of 1972 Dollars, SA)	1,240.826	1,255.095	1,287.183	1,332.680
Consumer Spending - Durables (1972 Dollars)	139.405	139.758	149.709	160.650
Nonres. Fixed Investment (1972 Dollars)	162.425	151.981	152.833	164.406
Nonfinancial Corporate Bond Issues				
(Current Dollars)	422.471	454.907	485.090	521.323
State and Local Govt. Bonds				
(Current Dollars)	333.845	348.293	369.237	396.808

	1981	1982	1983	1984
Gross Funding for Pessim Case				
(Billions of Dollars)	NA	NA	NA	NA
Units Subsidized (Millions of Units)	NA	NA	NA	NA
Housing Starts (Millions of Units)	1.340	1.162	1.119	1.153
Housing Sales (Millions of Units)				
Existing	2.352	2.401	2.541	3.018
New	0.437	0.375	0.370	0.395
Affordability				
New Monthly Mortgage Payment as % of Median				
Family Income	23.244	22.449	23.684	22.907
Existing Monthly Mortgage Payment as % of				
Median Family Income	19.744	20.073	20.964	20.762
Unified Budget (Billions of Dollars)				
Receipts	621.609	604.601	651.575	709.995
Outlays	694.189	724.039	809.555	884.972
Surplus or deficit (-)	-72.592	-119.438	-157.980	-174.976
Before feedback (Billions of Dollars)	NA	NA	NA	NA
Unemployment Rate (Percent)	7.625	9.296	9.980	10.179
Nonagricultural Employment (Millions)	91.551	90.768	89.678	90.842
Contract Construction	4.311	4.026	3.718	3.574
Lumber and Products	0.679	0.624	0.585	0.536
Transportation Equipment	1.845	1.714	1.609	1.554
Other	84.065	83.806	83.137	84.609
Mortgage Funds - Outstanding				
(Billions of Dollars)				
Deposit Institutions	1,034.871	1,060.778	1,069.041	1,092.418
FNMA and GNMA	66.510	78.921	99.569	112.810
Interest Rates and Money				
Mortgage Rate - Conventional Commitments	16.71	17.10	18.03	17.47
New AAA Corporate Bonds	14.17	14.10	14.88	15.10
Prime Rate	18.87	16.31	18.17	16.99
Bond Buyer Index of 20 Municipal Bonds	11.33	12.29	13.17	13.00
Economic Indicators				
Real GNP (Billions of 1972 Dollars, SA)	1,510.250	1,486.039	1,474.837	1,502.816
CPI - All Urban Consumers (% chg.)	10.338	6.045	7.862	7.358
Personal Income (Billions of 1972				
Dollars, SA)	1,240.826	1,256.814	1,269.155	1,302.830
Consumer Spending = Durables (1972 Dollars)	139.405	139.706	138.922	144.337
Nonres. Fixed Investment (1972 Dollars)	162.425	151.754	131.261	131.787
Nonfinancial Corporate Bond Issues				
(Current Dollars)	422.471	449.551	478.255	493.930
State and Local Govt. Bonds				
(Current Dollars)	333.845	347.160	361.802	381.967

ANALYSIS OF LUGAR MORTGAGE INTEREST SUBSIDY PROPOSAL

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I. ANALYSIS OF LUGAR MORTGAGE INTEREST SUBSIDY PROPOSAL

INTRODUCTION

The analysis in this report discusses and attempts to quantify the impact that passage of the Lugar proposal (formerly S2226, now incorporated in HR5922) might have on housing construction activity. The estimates shown herein are rough measures which represent maximum impacts rather than expected values, given our assumptions about the level of activity which would have occurred in the absence of the subsidies or other special housing stimulus programs. Those base case assumptions are discussed in our regular quarterly report, of which GAO already has a copy.

The analysis of the Lugar bill is complicated by several features of the proposal, including the unusual form of the subsidy, which mandates a growing equity mortgage and requires that the subsidy be repaid if the house is sold or refinanced or ceases to be the principal residence of the borrower. A greater complication is the restriction on maximum income and maximum mortgage amount. The very limited time frame also is a complication.

The primary conclusions of this analysis are:

1. About 25% of current single family home buyers would be eligible for the loans, creating a potential substitution demand of more than 100,000 loans for conventional single family homes.

2. Because mobile home buyers have lower incomes than purchasers of conventional homes, and mobile homes cost less, the potential substition demand among mobile home buyers is quite large, close to 100,000 units.

3. The potential incremental demand for conventional single family homes is likely to be less than 150,000 units.

4. The potential incremental demand for mobile homes is likely to be less than the substitution demand—perhaps 40,000 units.

5. The subsidy program is likely to raise mortgage rates somewhat for nonsubsidized mortgage borrowers and to raise other interest rates by a lesser amount. The rate increases are not likely to completely counteract the stimulus of the subsidies.

These results are very much related to the specific provisions of the Lugar proposal, and are not necessary inherent in the concept of a mortgage subsidy. The differences between the Lugar bill and the House version are discussed in Section II of this report.

Section III Discusses the subsidy from the standpoint of the borrower. Section IV discusses the potential direct impact. Section V discusses indirect impacts. Section VI discusses the possibilities for improving the accuracy of the estimates.

II. COMPARISON OF THE HOUSE AND SENATE VERSIONS

While the basic thrust of the proposal passed by the House is similar to that passed by the Senate, there are some very important differences in the provisions of the two versions.

At this writing (6/6/82), the status of the legislation is as follows:

    1. The House has passed (5/12/82), as an amendment to the Urgent Supplemental Appropriations for fiscal 1982 (HR5922) a measure previously designated as HR6294 providing $1 billion in budget authority to be committed in fiscal 1982.

    2. The Senate has passed (5/27/82), as an amendment to HR5922 the Lugar proposal (previously S2226) providing $5.12 billion to be committed by 11/1/82. Thus, the two amendments will have to be reconciled in the Conference on the appropriations.

    3. The House Committee on Banking, Finance, and Urban Affairs passed (5/17/82), as part of a broader housing measure (HR6296—the Gonzaley bill), a measure nearly identical to the House amendment to HR5922 but providing an additional $3.5 billion to be committed in fiscal 1982. This is scheduled for consideration by the full House in the week of 6/14/82.

Since the two extant House versions are essentially identical, except that one is for fiscal 1982 and the other is for fiscal 1983, we will discuss them as one, except where there are differences.

a. Periods of Coverage

Both versions direct the Secretary of HUD to begin to issue commitments within 30 days after enactment. The Senate version requires that new commitments by HUD cease on 11/1/82. The House version allows HUD to make commitments until 9/30/83.

The Senate version requires that lenders use the commitments within 90 days.

The Senate version provides that if average mortgage closing rates fall below 12 1/2%, HUD should stop making commitments.

b. Types of Home

Both versions clearly include single family conventional homes.

The House includes "individual units in a cooperative or condominium project" while the Senate version says "membership in a cooperative association operating a housing project". Same thing?

For rehabilitated units, the House is very restrictive. HR5922, as passed by the House, makes no provision for rehabilitated units. HR6296 has been amended to include rehabilitated individual units in condo or coops which have never been sold before and which are in a certified historic structure.

The Senate version includes any substantially rehabilitated unit.

For mobile homes, the House restricts loans to multi-wides on owner occupied lots and the loan must be insured "under Section 2 or 203 of the National Housing Act" (VA or FHA). Furthermore, the House requires that no more than 20% of the units for which subsidies are approved may be mobile homes. The Senate version only requires that loans for mobile homes "comply with the regulations issued under section 501 (c) of the Depository Institutions Deregulation and Monetary Control Act of 1980," which means all mobile homes are eligible.

The House also requires that the house meet energy conservation standards.

The House includes homes started up to one year prior to enactment of the subsidy. The Senate covers only homes started after enactment and substantially complete by 1/1/83,.

c. Maximum Mortgage Amount

House allows single family mortgage up to maximum FHA 203(b) amount. This is at least $67,500 and is higher in many areas, with a maximum of $90,000. For Condo loans, House allows FHA234(c) maximum. Senate maximum is $67,500, except in higher cost Section 203(b) areas maximum can be as high as $77,625 (115% of $67,500). In Senate version, if mortgage is above $67,500, subsidy is based on $67,500.

d. Maximum Income

Senate maximum is $30,000, except in high cost areas it may go as high as $37,000. House allows 130% of area median imcome, but subsidy is larger is income is less than 115% of area median. House also allows HUD to make adjustments for smaller or larger families, unusually high or low median, or other factors as determined by the Secretary.

e. Size of Subsidy

Senate will give subsidy to bring payments down to those at mortgage rate 4% below market rate or payments equivalent to 11% mortgage. Subsidy stays in effect 5 years. Borrower's payments increase over that period, however, because additional payments to equity are required.

House version gives greater subsidy if income is no more than 115% of area median. For lower income borrowers, subsidy brings payments down to level of mortgage 6% below market (or 9 1/2% minimum) for 7 years. For borrowers with incomes between 115% and 130% of area median, payments are based on rate 4% below market (or 10% minimum) for 5 years. House does not call for GEM mortgage, but does require borrower to pay at least 25% of income for principal, interest, and mortgage insurance.

f. Recapture

Both versions require subsidy to be paid back upon sale or under certain other circumstance, subject to a maximum recapture.

The Senate calls for recapture upon sale, refinancing of the mortgage, when the property ceases to be the principal residence of the borrower, or upon any other disposition of the property specified in regulations by the Secretary. The maximum recapture is 60% of net equity (down payment plus repayments of principal plus appreciation less lling expense).

The House calls for recapture upon disposition or where the homeowner rents the property for more than a year. Maximum recapture is 50% of net appreciation (appreciation less selling cost less cost of improvements).

g. Geographic Allocation

Senate version requires subsidy commitments to be allocated to states as follows:

(1) 1/3 based on population

(2) 1/3 based on percentage decline in 1 to 4 family housing starts from 1978 to 1981

(3) 1/3 based on number of unemployed in most recent three months

Table 2 shows the allocation of loans, assuming a total of 400,000 loans, under this formula.

The House simply calls for the HUD Secretary to allocate assistance in a manner which assures a reasonable distribution taking into account population, relative decline in building permits, and need for increased housing production.

TABLE 1

MORTGAGE PAYMENTS UNDER LUGAR SUBSIDY PROPOSAL

MARKET MORTGAGE RATE	13.00%	14.00%	15.00%	16.00%	17.00%
SUBSIDIZED RATE	11.00%	11.00%	11.00%	12.00%	13.00%
MARKET RATE	MONTHLY PAYMENTS				
	$747	$800	$854	$908	$962
UNDER SUBSIDY:					
1st Year	$643	$643	$643	$694	$747
2nd Year	685	685	685	737	789
3rd Year	727	727	727	779	831
4th Year	769	769	769	821	873
5th Year	812	812	812	863	915
6th & following	854	854	854	905	958
TOTAL SUBSIDY	$ 6,232	$ 9,418	$12,641	$12,803	$12,939
GEM PAID OFF IN YEAR	17	18	20	19	19
SOLD AFTER 3 YEARS:					
Eff. Rate, No Recapture	11.14%	11.19%	11.23%	12.18%	13.14%
Eff. Rate w/Recapture	$12.68%	13.49%	14.28%	15.22%	16.17%
Outstanding Balance	$65,862	$65,977	$66,070	$66,193	$66,299
Total Subsidy	$ 3,739	5,651	$ 7,584	$ 7,682	$ 7,763
SOLD AFTER 6 YEARS:					
Eff. Rate, No Recapture	11.33%	11.47%	11.60%	12.55%	13.51%
Eff. Rate w/Recapture	12.42%	13.05%	13.67%	14.58%	15.51%
Outstanding Balance	$58,292	$59,077	$59,824	$59,920	$59,965
SOLD AFTER 12 YEARS:					
Eff. Rate, No Recapture	11.77%	12.16%	12.55%	13.47%	14.40%
Eff. Rate w/Recapture	12.15%	12.69%	13.22%	14.11%	14.99%
Outstanding Balance	$33,236	$39,554	$46,333	$45,756	$44,897
SOLD AFTER 18 YEARS:					
Eff. Rate, No Recapture	11.79%	12.27%	12.73%	13.63%	14.54%
Eff. Rate w/Recapture	11.99%	12.50%	13.01%	13.89%	14.76%
Outstanding Balance	$ 0	$ 0	$13,333	$ 8,997	$ 3,414
NEVER SOLD:					
Effective Rate	11.79%	12.27%	12.73%	13.63%	14.54%

All examples based on mortgage of $67,500 with initial payments
based on 30 year amortization schedule.

TABLE 2

ALLOCATION OF LOANS UNDER S2226
ASSUMING TOTAL LOANS = 400 THOUSAND

| | ------ALLOCATION BASED ON----- | | | TOTAL | 1981 | 1978 | 1978 |
	POPU-LATION	PERCENT DECLINE	UNEM-PLOYED	ALLOCATION	STARTS	STARTS	MOBILES
ALABAMA	2.3	3.0	3.1	8.3	13.0	31.6	8.8
ALASKA	0.2	1.5	0.3	2.0	2.9	4.0	0.5
ARIZONA	1.6	2.9	1.3	5.8	19.4	45.7	8.5
ARKANSAS	1.3	2.9	1.5	5.7	7.7	18.8	2.8
CALIFORNIA	14.0	3.0	14.5	31.5	61.0	145.4	23.3
COLORADO	1.7	2.4	1.3	5.4	17.9	34.5	4.9
CONNECTICUT	1.8	2.5	1.5	5.8	5.8	11.7	0.4
DELAWARE	0.3	1.5	0.4	2.2	1.8	2.7	1.3
DIST OF COLUMBIA	0.4	4.1	0.4	4.9	0.1	0.6	0.1
FLORIDA	5.8	1.1	4.5	11.4	74.7	104.0	22.6
GEORGIA	3.2	1.3	2.7	7.2	30.6	42.9	9.2
HAWAII	0.6	2.6	0.3	3.4	2.5	5.0	0.0
IDAHO	0.6	3.8	0.6	5.0	2.5	9.3	3.5
ILLINOIS	6.7	4.1	7.2	17.9	9.9	48.7	5.0
INDIANA	3.2	3.3	4.4	10.9	10.3	29.4	6.3
IOWA	1.7	3.3	1.9	6.9	4.8	14.0	2.2
KANSAS	1.4	2.3	0.8	4.5	8.2	15.0	2.9
KENTUCKY	2.1	3.1	2.3	7.6	10.5	27.1	6.0
LOUISIANA	2.5	1.9	2.4	6.8	15.1	27.4	12.5
MAINE	0.7	2.5	0.6	3.7	3.2	6.2	1.5
MARYLAND	2.5	2.0	2.6	7.1	14.1	22.8	1.3
MASSACHUSETTS	3.4	1.3	3.0	7.7	10.8	15.1	0.7
MICHIGAN	5.4	3.6	8.9	17.9	13.2	45.6	9.5
MINNESOTA	2.4	2.7	2.0	7.1	16.0	35.3	4.0
MISSISSIPPI	1.5	2.4	1.4	5.3	8.0	15.7	4.5
MISSOURI	2.9	3.3	2.9	9.0	14.7	41.1	4.7
MONTANA	0.5	4.0	0.5	5.0	1.0	5.2	3.1
NEBRASKA	0.9	3.1	0.6	4.7	4.0	10.2	1.6
NEVADA	0.5	3.0	0.5	4.0	5.8	14.6	3.5
NEW HAMPSHIRE	0.5	1.8	0.5	2.8	4.0	6.7	1.1
NEW JERSEY	4.3	2.0	4.3	10.6	16.9	27.8	1.0
NEW MEXICO	0.8	2.5	0.6	3.8	5.8	11.2	5.3
NEW YORK	10.3	1.8	8.9	21.1	16.7	26.8	4.0
NORTH CAROLINA	3.5	1.9	3.5	8.9	25.1	42.4	11.8
NORTH DAKOTA	0.4	3.3	0.2	3.9	1.8	4.7	1.5
OHIO	6.3	3.3	7.7	17.4	15.9	46.8	7.3
OKLAHOMA	1.8	1.8	0.9	4.5	19.8	32.3	6.3
OREGON	1.5	3.5	2.1	7.1	9.1	25.6	8.3
PENNSYLVANIA	7.0	2.7	7.7	17.4	22.3	46.8	8.1
RHODE ISLAND	0.6	2.6	0.6	3.7	1.5	3.2	0.1
SOUTH CAROLINA	1.8	2.3	2.1	6.2	12.1	23.0	6.7
SOUTH DAKOTA	0.4	3.1	0.2	3.8	2.3	5.5	1.1
TENNESSEE	2.7	2.9	3.3	8.9	14.9	35.6	5.3
TEXAS	8.4	1.4	5.3	15.1	88.4	127.4	26.7
UTAH	0.9	3.6	0.7	5.2	4.7	16.1	1.9
VERMONT	0.3	0.3	0.3	0.8	2.7	3.0	0.5
VIRGINIA	3.1	2.2	2.7	8.0	23.1	41.5	5.1
WASHINGTON	2.4	3.2	3.2	8.8	14.4	38.2	12.7
WEST VIRGINIA	1.1	2.6	1.2	5.0	3.9	8.3	4.5
WISCONSIN	2.8	3.5	3.0	9.2	8.9	29.0	3.4
WYOMING	0.3	2.5	0.2	3.0	2.1	4.7	2.1

III. THE SUBSIDY FROM THE STANDPOINT OF THE BORROWER

Assuming that a potential homebuyer is eligible for a subsidized loan, there is still a question as to whether the loans are sufficiently attractive to induce someone to seek a loan and buy a house.

The Lugar proposal contains several features which the potential borrower would need to assess:

1. The subsidy is for 5 years and is equal to
   "the difference between the amount of the monthly payment for principal and interest which the mortgagor or borrower is obligated to pay under the mortgage or loan and the monthly payment for principal and interest which the mortgagor or borrower would be obligated to pay if the mortgage or loan were to bear interest at a rate four percentage points less than the rate specified in the mortgage or loan."

(If the market rate is less than 15% the subsidy only brings the payment down to that associated with an 11% loan.)

2. The mortgage must provide for complete amortization over a period not to exceed thirty years.

3. The payments will be equal to those on a fixed rate loan at 4% below market (or 11%) only in the first year. The payments increase in each of the next five years by an annual amount equal to 0.75% of the original mortgage amount. During the second, third, fourth, and fifth years, while the government is still paying the subsidy, the additional payments go to the repayment of principal. In the sixth year, the subsidy will not be paid. The payments will have reached a point close to what they would have been on a standard level payment fixed rate loan at market rate, provided that the subsidy was not limited by the 11% floor. Beginning in the sixth year, the payments would remain constant and would continue until the loan is repaid.

4. Upon sale of the property, or if the loan is refinanced or the property ceases to be the principal residence of the mortgagor, the subsidy is subject to recapture. The mortgagor must repay the amount paid by the government, up to a maximum of 60% of net equity (down payment plus principal payments plus appreciation net of selling expense). Unlike interest expense, this repayment is presumably not tax deductible.

The Growing Equity Mortgage (GEM) aspect—the requirement that increasing payments of principal be made in years 2 through 6—is a relatively new mortgage innovation that has attracted favorable notice from lenders, but whose appeal to borrowers is less certain. Under a GEM, if the initial payments are calculated based on amortization over 30 years, the mortgage will actually be paid off much sooner. This raises a question as to the meaning of the Lugar bill's provision that the maximum term be 30 years. With 30 years used as the basis for calculating the initial payment, the loan will be paid off in the

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20th year if initial market rates are 15% and even sooner if initial market rates are higher*. If the initial market rate is less than 15%, the subsidy is less but the formula for payment increases does not account for this, so that payments soon exceed those required under an unsubsidized market rate loan and the loan will again be paid off in less than 20 years.

The fact that the subsidy is provided for five years and is subject to recapture reduces the effective interest rate reduction compared to a straightforward 4% reduction in the mortgage interest rate. The recapture provision is a significant factor for a borrower who anticipates moving within a few years. For borrowers who do not expect to move or refinance the loan soon, the recapture becomes a trivial consideration. Table 1 shows the effective rate under a variety of assumptions, assuming full recapture on sale and without taking into account tax considerations.

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*Even if the initial payment was calculated based on an assumption of no amortization—equivalent to an infinite term to maturity—the loan would be repaid in less than 30 years. Such an assumption would reduce payments slightly and would increase the amount of the subsidy.

IV. THE DIRECT IMPACTS

There are two basic questions to be answered in order to determine the net short term impact of the subsidies on sales of new homes:

    1. How many subsidized loans will go to home buyers who would have bought homes at this time without the subsidy? (The Substitution Demand)

    2. How many homes will be bought by people who would not have otherwise bought homes at this time? (The Incremental Demand)

The maximum number of loans, determined by the available funds, the average mortgage amount, and the depth of the subsidy is approximately 400,000 loans. Because of the limited time frame, the formula for allocation to states, and normal uncertainties and inefficiencies in the system, the effective maximum will be somewhat less, unless, like an airline which overbooks in order to assure a full plane, HUD were able to make commitments for more than the maximum number of loans. Since such a practice is presumably illegal, and since the time limits for commitments would seem to preclude HUD's recommitting subsidies which are not used by lenders, we would expect the proportion of unused commitments to exceed the 20% experienced with the Emergency Housing Programs of 1974 and 1975*.

If the demand exceeds the available supply of loans, there will have to some type of rationing. The experience of the 1974-75 program suggests that in the absence of specific regulations to the contrary lenders will then give preference to large speculative builders at the expense of small custom builders and self-built homes. There is no obvious reason for thinking such rationing will affect speculative demand more or less than incremental demand, and we intend to assume that the proportion of each of these types of demand which is filled will be the same.

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*Comptroller General's Report to the Congress, "What Was the Effect of the Evergency Housing Programs on Single-Family Housing Construction?" (CED-78-155, November 21, 1978) p. 16. The percentage is incorrectly shown there as 16%.

Maximum Substitution Demand

The maximum substitution demand consists of the number of sales which would occur in the absence of the subsidy in which the mortgage amount is or could be less than the maximum and in which the home buyer meets the income restriction. The income restriction is likely to be the relevant constraint in most cases. Available statistics suggest that less than 25% of the current buyers of conventional single family homes would meet the income restrictions under the Senate version. Since we expect approximately 450,000 single family homes to be started in the second half of 1982 in the absence of the subsidy, this suggest a maximum substitution demand for loans for conventional single family construction of 110,000 units.

The Senate version allows for an unlimited proportion of the loans to go to purchasers of mobile homes. Since the vast majority of mobile home buyers have incomes below $30,000 and very few mobile home loans are for more than $67,500, the potential substitution among the more than 100,000 new mobile homes expected to be sold in the second half of 1982 is substantial-probably 90,000 units. The institutional arrangements for mobile home financing may be less conducive to utilization of the subsidies, however, so that the actual substitution demand for loans relative to the potential substitution may be less for mobile homes than for conventional single family homes. Because the average sales price for new mobile homes (excluding site cost) is only about $20,000,* the dollar amount committed to loans for mobile units would be much smaller than for conventional homes and to the extent that loans go for purchase of mobile homes, the total number of loans which could be subsidized by HUD would be increased.

Substitution demand from condominium units (other than single family units) and substantially rehabilitated units is likely to have a maximum of less than 20,000 loans. In the full year of 1981, 145,000 new multifamily condominium and cooperative units were started. 2/ Because of the longer time between start and completion for multifamily units, 3/ it would be more difficult for multifamily condo units to fit into the time restrictions. Moreover, there is some evidence that condo buyers have higher average incomes than purchasers of conventional homes 4/.

All together, then, the maximum substitution demand under the Senate version is approximately 220,000 (110,000 + 90,000 + 20,000). This does not include substitution of current purchases for future purchases, purchases of new homes for purchases of existing homes, or purchases of new homes started after passage for purchase of new homes started before passage of the subsidy program.

1/ The 1981 average was $19,900 (Bureau of the Census, (Construction Reports: Housing Starts, Feb. 1982, C20-82-2)
2/ Ibid., forthcoming in C20-82-4 or C20-82-5.
3/ Ibid., C20-81-5 indicates that for the period 1971 to 1980 average time between start and completion ranged from 4.8 to 6.9 months for single family, from 5.9 to 8.0 months for 2 to 4 unit structures and from 8.6 to 12.0 months for buildings with 5 or more units.
4/ United States League of Savings Associations, Homeownership: Coping With Inflation (Chicago, 1980)

Incremental Demand

The incremental demand that would be created by the proposed mortgage subsidies is difficult to assess because of the numerous restrictions on eligibility, timing of construction, the recapture provision, and the unknown acceptance of the GEM form.

One measure of the maximum net incremental demand is the number of additional homes which would be sold if mortgage rates were simply to fall by 4%. The RDA model indicates that over the course of a full year this would produce demand for an additional 450,000 single family units plus a substantially smaller number of multifamily condominium and mobile units 1/. With subsidized loans available only for houses started in a period of less than half a year, we can assume a maximum incremental demand of less than 250,000 total units (although the fact that homebuyers know that the subsidy is only available for a limited period could boost demand).

While a reliable estimate of incremental demand for mobile homes from a 4% interest rate decline would require further study, a rough guess would be 40,000 units. Mobile home sales are probably no as interest rate sensitive as conventional homes.

The potential demand is reduced from this maximum by the fact that the subsidy is only for 5 years and is subject to recapture, which, as discussed above, would reduce the effective interest rate reduction from 4% to about 2% in most cases. While the response of demand to changes in mortgage rates is probably nonlinear, we can safely assume that if the maximum incremental demand under a straight drop of 4% is 250,000 units, the maximum incremental demand from a drop of 2% is 125,000 units. The impact of the proposed subsidy, however, should be greater than for an equivalent decline in the effective rate for a level-payment mortgage, because it addresses the cash-flow difficulties presented by level payment mortgages, allowing borrowers to meet lenders' criteria for credit qualification. Taking that factor into account suggests a potential incremental demand which may be greater than 125,000 units but which must be less than the 250,000 unit demand increase from a 4% mortgage rate decline.

1/   Because a drop in mortgage rates would cause many households to shift from multifamily and mobile units to single family, the net incremental demand for these types of housing is reduced. However, we are not prepared at this point to make a specific estimate of such a change in condo and mobile sales because our model does not forecast multifamily condo units separately from multifamily rental and because the impact of a change in mortgage rates understates the effect of the subsidy on mobile home demand since mobile home financing is usually not of the mortgage type.

We still have not accounted for the effect of the income and mortgage amount restrictions. While the proportion of incremental demand which is subject to those constraints is undoubtedly less than the large proportiion of current homebuyers who fail to qualify for subsidies, a substantial fraction of the demand which might otherwise be generated must be eliminated. A very conservative estimate of that fraction would be one-third.

Finally, if we are to compare the incremental demand from the subsidy program with the incremental demand from an overall decline in mortgage rates, we must consider the fact that a straightforward decline in mortgage rates would stimulate existing home sales and sales from the current inventory of new unsold homes. The subsidy program would not stimulate such sales but would in fact depress them. The implications for demand for newly constructed units are not clear, however. One one hand, the favorable rate on newly constructed homes relative to the rate on existing structures would encourage homebuyers to buy more new units. On the other hand, the inability of existing homeowners to sell their old homes, which will be exacerbated, will restrict the ability of existing homeowners to trade up to new homes. Since it is repeat homebuyers, rather than first time buyers, who represent the primary market for new homes, the subsidy program is on balance likely to stimulate new home demand less than a straightforward decline in rates. Putting it another way, we would expect that if the subsidy were freely available (i.e. in unlimited amount) for mortgages for existing homes as well as new homes, the net incremental demand for new homes would be greater than if the subsidized loans were freely available for only new homes.

The exclusion of purchases from the current inventory of unsold new homes is also a knotty analytical problem. If there were many solvent homebuilders ready to begin additional construction on short notice, the restriction of subsidies to houses started after passage of the legislation would clearly maximize the stimulus to new construction. With the building industry on the brink of bankruptcy, however, the devaluation of the inventory which would result from the subsidy program may push more builders over that brink, eliminating their ability to supply more new homes. Moreover, lenders will be reluctant to extend additional credit for construction loans to builders with unsold inventories and currently delinquent loans. Again the subsidy program would seem to be less stimulative for new construction than a general decline in mortgage rates.

In summary, then, we would expect the maximum incremental demand for the subsidized loans to be between 125,000 and 250,000 units if there were no restriction on income or mortgage amount and if subsidies were also available for purchases of existing homes and the inventory of unsold new homes. Taking those factors into account, the incremental demands would appear at first blush to be between 75,000 and 150,000 units.

Although the roughly estimated maximum demand for the subsidized loans of 370,000 (150,000 incremental demand plus 220,000 substitution demand) is less than the estimated 400,000 loans authorized by the Senate version, demand at that level may still be unfilled in many cases because constraints on effective supply discussed above and because of the state allocation formula which makes too much money available in some states and not enough in others.

It is unlikely that the actual demand would reach the maximum even without supply constraints. Even with loan commitments, builders may be reluctant to start more units on speculation that buyers can be found and buyers are probably not prepared to move speedily. The restricted time frame and exclusion of new homes begun before passage are key consideration. A relaxation of those constraints would result in a fuller realization of the potential demand.

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V. INDIRECT IMPACTS

If 100,000 additional loans are provided as a result of the subsidy program over a six month period, this would represent a significant but not overwhelming increase in demand for single family mortgage credit. Assuming an averate loan of $65,000, the additional mortgage demand would be $6.5 billion. In the absence of the subsidy program we would expect mortgage originations for 1 to 4 family homes in the period from 10/1/82 to 4/1/83 to total $66 billion.

The reliance on the private market to provide the mortgage funds, with the government simply paying part of the interest cost, is in contrast to earlier programs such as the Emergency Home Purchase programs of 1974 and 1975 which involved government purchases of mortgages. Thus the proposed program will increase demand for mortgage funds but will not increase supply.

Over the past few years, the mortgage market has become more closely integrated with the general capital markets, so that the supply of funds to specialized mortgage lending institutions such as S&L's is a less critical issue than in the past. Despite those changes, however, increase in mortgage demand will raise mortgage rates somewhat and perhaps decrease availability, with lenders responding to excess demand by tightening loan qualification criteria or limiting loans to long time customers.

The RDA model suggests that the effect on mortgage rates will be relatively small—less than 10 basis points. There may also be some impact on other interest rates, but those impacts are likely to be even less.

VI. METHODOLOGY FOR REFINING ESTIMATES

The estimates of direct impact on new housing demand developed in this analysis dealt with the question of the effect of the income limits and house price limits only in very crude terms. While there is no way to precisely estimate the effect of the various eligibility restrictions on demand, or to anticipate consumer response to provisions like gain some insight by examining how the homebuying tendencies of different income classes and have changed over the past two years. If we can determine which groups have dropped out of the market, we may be better prepared to find ways to bring those households back in.

The Lugar proposal implicitly suggests that the group which has dropped out has been the lower income home seeker, perhaps first time homeowners who cannot qualify for mortgages because of lenders' payment/income criteria but who can reasonably expect future income gains to pay for increasing future payments. There is some evidence and some logic to suggest, however, that it is the more well-heeled current homeowners with low rate mortgages who are the real drop-outs from the new home market. If that is true, the incremental demand from the Lugar proposal may be more limited.

There are several surveys which could provide some insight into this question. The most comprehensive is the Annual Housing Survey conducted by the Census Bureau for HUD. There is a great deal of information from the 1980 Census which is relevant as well. be available for several months and even the relevant 1980 Census data are not available.

Several smaller private surveys are potentially available, including surveys done for the Trust Co., and the National Forest Products Association. The National Association of Home Builders and National Association of Realtors also have some potentially useful material.

In addition to observing the changes in homebuying propensity among different types of households over the past few years, it would be useful to study the longevity of tenure among different groups from the standpoint of the impact of the recapture provision.

ANALYSIS OF ALTERNATIVE STIMULUS PROPOSALS

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This final report restates and expands the analysis presented in two preliminary reports on the likely impacts of various proposals to provide a short-run stimulus to new single family housing construction. The alternative proposals considered are as follows:

1. Temporary Interest Subsidy (the Lugar Plan)
2. Permanent Interest Subsidy (Tandem Plan)
3. Temporary easing of restrictions on Mortgage Subsidy Bonds
4. Mortgage Interest Tax Credit
5. Homebuyer Tax Credit

The specific characteristics of these alternatives were initially specified by GAO. Those initial specifications are reproduced as appendix A of this report.

Since the avowed purpose of these proposals is to stimulate construction, they are evaluated in this report primarily in terms of the number of additional housing units they produce and the cost of the stimulus.

One of the factors which affects the efficiency with which construction is stimulated is the extent to which subsidies would go to people who would have bought new homes at this time anyway. This phenomenon, which we will call the "substitution effect" is likely to be present to some extent under all proposals. We consider only purchases which would have occurred in the same form and at the same time without special incentives, but which are subsidized by the stimulus program, as substitution. Where a home is built now rather than in the future, we do not count that as substitution, nor do we consider a switch from an existing home purchase to a new home purchase or a switch from purchase of an unsold previously-unoccupied unit to purchase of a newly-built unit to be a substitution.

Several proposals include eligibility restrictions based on factors like income, house price, first-time ownership, etc. The imposition of such restrictions may limit the substitution component by making many of those who would have bought anyway ineligible for subsidies. On the other hand, it may limit incremental demand by defining the eligible population so narrowly that there will be few potential buyers, except if the subsidy is very deep. The trick is to set eligibility requirements such that very few of those who would have bought anyway will be eligible but such that many marginal buyers will be eligible and will be attracted by a shallow subsidy.

The direct interest subsidy proposals include specific budget authority. In analyzing the impact of those proposals it is first necessary to estimate whether the demand for such subsidies will be greater or less than the authorized supply. If demand is less than authorized supply, the program may be treated like an entitlement program and the incremental housing activity can be equated to incremental demand. If demand exceeds authorized supply, however, it is difficult to predict how the supply will be distributed. We have assumed here that the supply would be randomly distributed among eligible applicants, so that the same proportions of substitution demand and incremental demand would be filled. In fact, however, because the substitution demand consists of people already in the market, they would probably be first in line and may get a disproportionate share of the supply. Furthermore, because the supply must be distributed through a loan commitment process and some of the commitments may not be taken down, the actual total subsidy may be less than the total authorized. This would be particularly true if no substantial commitment fee is charged and/or if the period for issuing commitments is too short to allow reissuance of unused commitments. In the case of the Emergency Housing Programs of 1974 and 1975, approximately 20% of the commitments went unused.

One aspect of the current slump in demand is the problem that even though some potential homebuyers may wish to purchase homes at this time and find the long-term cost acceptable, the cash flow requirement for level-payment mortgages at current interest rates presents an obstacle. The problem is one of "qualifying" for mortgages based on lenders' maximum payment/income criteria. Even where the lenders are willing to relax their qualification rules, borrowers may consider the cash flow burden too onerous. Based on the widespread use of builder buy-downs which address this cash flow problem, we have predicated our estimates of demand elasticity for programs which affect the mortgage rate only on the level of effective rates, without taking into consideration changes in the payment stream. However, any programs which impedes the use of buy-downs or graduated payment mortgages, such as a Tandem type program, which requires level-payment loans, would be less effective than indicated and any program which further addresses the cash flow problem by encouraging lenders to offer mortgage instruments with reduced initial payments will be more effective. While economic theory may suggest that lenders would offer such new mortgage instruments voluntarily if the demand were present and the risk were manageable, one need only recall the pre-FHA reluctance of lenders to offer long-term mortgages with modest downpayments to realize the potential value of an example set by the government.

The methodology employed here in estimating the impacts and costs of each proposal is really quite simple. For proposals which operate by reducing the financing cost, we begin by determining the reduction in the interest rate.

Where the program calls for a straightforward permanent interest rate reduction, the size of the effective reduction is already known. Where the reduction is more complicated, as in the Lugar plan, we calculate the effective rate (internal rate of return) assuming sale of the house and repayment of the loan after 12 years. For 1983, our econometric model suggests that a decrease in mortgage interest rates of 1% will produce an additional 120 thousand single family housing starts.

Where there are no income limits or other restrictions on eligibility for the subsidy, we assume that everyone who would have bought a house anyway will seek the subsidy. Where such eligibility restrictions exist, we attempt to determine what portion of the substitution demand and what portion of the incremental demand consists of people eligible for the subsidy.

Where there is a budget limit on the total subsidy, and potential, eligible demand is greater than the limit, we assume the subsidy is distributed between substitution and incremental demand proportionately. For example, if in the absence of budget restrictions we would have substitution demand of 300,000 units and incremental demand of 200,000 units, but the budget only allows 400,000 units, then we would estimate substitution as 240,000 units and incremental demand as 160,000 units.

There are a number of simplifications involved in this methodology. We ignore, for example, the difference in the effective subsidy if the recipient sells the house in less or more than 12 years. In general, however, we do not expect these simplifications to have a significant impact on the conclusion.

For cases where the subsidy is subject to budget restrictions, we assume a 1983 budget authority of $5 billion.

Temporary Interest Subsidy

The Lugar plan provides for a reduction in the interest rate for five years, subject to a complex set of eligibility restrictions, recapture provisions, and geographic allocations. In addition, the plan provides for increasing payments after the first year, with the excess going to pay off principal.

The implications of all of these provisioins were discussed in our initial report on the Lugar proposal. The only difference in the current analysis is that the restriction that houses be completed by January 1, 1983 is changed to completion by January 1984. We also consider the effect of eliminating the income restriction.

Of the conventional single family housing units likely to be started over the next year in the absence of a subsidy, about 25% will be purchased by homebuyers meeting the income restrictions. In addition, virtually all purchasers of mobile homes—some 250,000 would qualify. However, although mobile home loans qualify for the subsidy, the system of financing for mobile homes is peculiar, and may not be equipped to take full advantage of the subsidies. Moreover, the average mobile home loan is less than $20,000. Another 35,000 eligible buyers may be found among purchasers of multifamily condominum units.

In the absence of the income restrictions, but with a maximum mortgage amount of $67,000, the number of eligible single family and multifamily condobuyers would be much greater. With the median new single family home selling for about $77,000, we can expect most buyers to find a loan of $67,000 sufficient.

An estimate of potential substitution demand in terms of thousands of loans and billions of dollars of mortgage amount would be as follows:

Potential Substitution Demand

	SF	CONDO	MOBILE	TOTAL
Thousands of Loans:				
Mortgage Limit	500	60	220	780
Income and Mortgage Limits	250	35	200	485
Total Loans ($Billions)				
Mortgage Limit	32.5	3.6	4.2	40.3
Income and Mortgage Limits	15.0	1.9	3.6	20.5
Assumed Avg. Loan Amount ($ Thousands)				
Mortgage Limit	65	60	19	—
Income and Mortgage Limits	60	55	18	—

As we showed in the earlier analysis of the Lugar plan, the effective interest rate reduction, assuming a market mortgage rate of 16% and a sale and recapture after 12 years is approximately 2%. If such a reduction were available to all homebuyers, the incremental production would be as follows:

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Potential Incremental Demand
(Temporary Interest Subsidy)

	SF	CONDO	MOBILE	TOTAL
Thousands of Units:				
No Restrictions	233.5	11.5	4.6	249.6
Mortgage Limit	128.4	6.3	4.5	139.2
Income and Mortgage Limits	81.7	4	4.3	90
Total Loan Amount ($Billions)				
No Restrictions	16.3	.75	.09	17.1
Mortgage Limit	8.3	.38	.085	8.8
Income and Mortgage Limits	4.9	.22	.077	5.2
Avg. Loan ($Thousands)				
No Restrictions	70	65	20	–
Mortgage Limit	65	60	19	–
Income and Mortgage Limits	60	55	18	–

As is clear from these results, we have assumed that a somewhat smaller proportion of marginal buyers would be ineligible for subsidies because of the income or mortgage limits than was true of the existing customers. We assume that many marginal homebuyers have incomes too low for loans at current rates. There is little empirical basis for this assumption, despite the obvious logic. In fact, some anecdotal information suggests that it is the relatively higher-income existing homeowners, rather than lower-income first time buyers, who have dropped out of the market because of higher rates.

While we believe the potential estimated here is reasonable, the uncertainty on this point should be noted.

The total subsidy over five years is equal to 20% (5 years times 4%) of the mortgage amount. Thus, $3 billion in budget authority will subsidize $15 billion worth of mortgages. We have estimated total (substitution + incremental) potential demand at $25.7 billion with the income restriction and $49.1 billion without the income restriction. Using our assumption that available supply will be distributed randomly in case of excess demand, we estimate that 58.4% of potential substitution and incremental demand will be realized under the income restriction case and 30.5% of potential will be realized if income is not a criterion for eligibility. This implies effective incremental demand as follows:

Effective Incremental Demand
(temporary interest rate reduction)

	SF	CONDO	MOBILE	TOTAL
Mortgage Limit Only	39.2	1.9	1.3	42.4
Mortgage and Income Limits	47.8	2.3	2.5	52.6

Permanent Interest Rate Reduction

The essential difference between the Lugar plan and a single family conventional "Tandem Plan" as exemplified by the Brooke-Cranston Act is not the temporary rather than permanent interest rate reduction, the income limits, mortgage limits, or the other restrictions. All of these features, as well as the recapture provision, could be incorporated under either approach. The essential difference lies in the fact that under a Tandem Plan the government promises to purchase the mortgages while under Lugar the government would only pay part of the interest and the lender must raise funds through normal mortgage market channels. This difference creates substantial distinction in terms of the government budget. Whether it makes a difference in terms of impact on housing and mortgage markets depends on the supply of funds to the mortgage market and on what GNMA does with the mortgages it buys.

In 1974-75 when the secondary market for conventional mortgages was less fully developed and the mortgage market was still largely segmented from the overall capital market, the problem with housing was due less to high mortgage rates than to rationing of available mortgage credit. In that context an approach such as Lugar would have been distinctly less effective because funds directed to subsidized borrowers would have come primarily at the expense of other mortgage borrowers attempting to tap the same pool of funds provided largely by thrift institution deposits. Today, with the secondary mortgage market more fully developed and mortgages more directly competitive with other investments, non-price rationing of mortgage credit is less pervasive and the effects of the Lugar and Tandem approaches are likely to be similar. There continues to be some segmentation of the mortgage market, however, which would suggest a Tandem approach would raise mortgage rates for unsubsidized borrowers less and raise interest rates for non-mortgage borrowers (including the Federal government) more.

To the extent to which there is segmentation between the mortgage market and other markets, it can be decomposed into segmentation between the primary and secondary mortgage markets and segmentation between the secondary mortgage market and the general long-term capital market.

Mortgage lenders which have not entered the secondary market as sellers will tend to ration credit somewhat before taking the plunge and beginning to sell mortgages. There were many such lenders among Savings and Loans in 1974, but few today. However, many of the mortgages being made by banks and thrifts today are non-standard loans (balloon payment, GPM's, unusual VRM's, etc.) for which there is no ready secondary market and whose availability may be linked to deposit flows.

The more important remnant of segmentation is between the secondary mortgage market and the general capital market. Mortgages are sold to ultimate investors in two forms: in their raw form or in the form of mortgage-backed securities. Raw mortgages are generally not appropriate investment vehicles for the general market. Only specialized institutions are in a position to assess the risks and handle the administrative burdens. Mortgage-backed securities have found wider acceptance among the general investing public, but such instruments still usually retain some of the peculiarities of mortgages, such as the uncertain maturity. As the market is asked to absorb more mortgage-like instruments, the yield on such instruments will increase somewhat relative to other types of investments.

If GNMA buys mortgages and immediately resells them, the flow to the secondary market may be facilitated and the first element of segmentation avoided, but the increased demand for funds will still be reflected disproportionately in mortgage rates.

If, on the other hand, GNMA holds the mortgages until more felicitous credit conditions develop, the increased credit demand will be reflected less in mortgage rates than in general rates and housing will be stimulated to a greater extent.

These differences between the effects on price and availability of mortgage credit under a Tandem approach and under a Lugar approach are likely to be small, however, compared to the importance of the depth of the subsidy, the eligibility restrictions, etc. For most purposes we can assume that the impacts will be similar.

Given the specific assumption of a permanent interest rate reduction of 4%, if we assume that mortgage rates are at 16% and that GNMA immediately resells the mortgage on the secondary market at a loss, the cost to GNMA for each dollar loaned will be about 21 cents. At a cost of $3 billion, GNMA could buy $14.3 billion worth of mortgages, for about 220,000 homes where the average loan amount is $65,000.

If we assume the same eligibility restrictions as for Lugar, substitution demand, with or without the income restriction, would be about the same. There may be slightly more such potential demand because the terms are more attractive, particularly for someone who anticipates a short tenure and who would thus face early recapture under Lugar. We will assume, however, that potential substitution is identical.

Potential Incremental Demand
(Permanent Interest Rate Reduction)

	SF	CONDO	MOBILE	TOTAL
Thousands of Units				
No Restrictions	472.4	23.8	9.6	505.8
Mortgage Limit	259.8	13.1	9.4	282.3
Income and Mortgage Limits	165.3	8.3	8.9	182.5
Total Loan Amt. ($Billion)				
No Restrictions	33.1	1.5	0.2	34.8
Mortgage Limit	16.9	0.8	0.2	17.9
Income and Mortgage Limits	9.9	0.5	0.2	10.6
Avg. Loans (Thousands)				
No Restrictions	70	65	20	–
Mortgage Limits	65	60	19	–
Income and Mortgage Limits	60	55	18	–

Thus, total potential demand is greater under the Tandem proposal than under Lugar, while authorized supply is slightly less. Only 46.0% of potential, given an income restriction, can be filled. With no income restriction, 24.6% of potential demand can be filled. Assuming the available supply is randomly distributed, net incremental demand is estimated as follows:

	SF	CONDO	MOBILE	TOTAL
Effective Incremental Demand: **(Thousands of Units)**				
Mortgage Limits	63.9	3.2	2.3	69.4
Income and Mortgage Limits	76.0	3.8	4.1	83.9

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Mortgage Revenue Bonds

The use of the tax-exempt state and local bonds offers another avenue by which to inject additional funds into the mortgage market and bypass whatever barriers there are to the free movement of capital into the mortgage market from the broader capital markets. Because of the lower interest rates on tax-exempt securities, the issuing authorities are able to offer mortgages at below market rates. Generally these mortgages are originated and serviced by traditional lenders (banks, thrifts, and mortgage bankers).

There is no direct Federal government expenditure associated with this form of housing stimulus. However, there are a number of costs, including lost Federal tax revenue and increases in the cost of borrowing for other state and local government purposes. Because these costs fall mainly on the Federal government or on other states and localities, the issuers of these bonds think of them as relatively costless and that was one factor in the dramatic growth of such issues prior to passage of the Mortgage Subsidy Bond Act (MSBA).

The primary effect of the MSBA came not from the ceilings it placed on volume of issues ($200 million or 9% of mortgage originations in the state), which would have permitted up to $15 billion in 1981 if fully utilized, but from the Byzantine set of restrictions and regulations, particularly the unrealistically small spread allowed between bond yields and mortgage rates, but including as well the provisions regarding target areas and the need to conform to price and volume limits for which adequate statistical measures do not exist. The fact that the tax exemption might be later called into question if it was found that mortgages were issued which did not meet one or more of the restrictions was a strong deterrent to issuers, underwriters, and potential investors.

Thus, within the context of the MSBA, it is difficult to predict the extent to which a marginal easing of specific quantitative restrictions would stimulate additional issues. Only if the complicated restrictions were concurrently eliminated or simplified would potential issuers respond with dispatch. In estimating the impact of the proposed changes in arbitrage (spread between bond rate and mortgage rate) and in maximum house prices we can only make an assumption about the increase in mortgage volume. There is no meaningful way to estimate that additional volume using econometrics. A reasonable, perhaps even generous, estimate is $2 and 1/2 billion in additional loans over the course of a year.

In addition to the effect of MSBA, new issues of single family mortgage bonds by housing finance agencies have been affected by the decline in the spread between yields on long-term tax-exempt securities and yields on taxable securities. Under current circumstances, mortgages issued with funds from these bonds would carry rates 1% to 2% below rates on equivalent nonsubsidized mortgages.

If in fact the increase in loans is $2.5 billion, that would finance 42,000 mortgages at an average loan amount of $60,000, most of which would be accounted for by substitution demand. Loss to the Treasury would be on the order of $175 million per year, based on a marginal tax rate of 50%.

Mortgage Interest Tax Credit

A mortgage interest tax credit should reduce the return required by investors for investment in mortgages. In general, a credit can be interpreted as reducing the required return on mortgages.

Most mortgages will be ultimately held by institutions eligible for the credit. (Institutions that are eligible will tend to buy mortgages from those that aren't.) Mortgage interest payments are on the order of $100 billion per year. A tax credit equal to 2 and 1/2% of this amount would therefore initially cost up to $2.5 billion per year.

The reduction in mortgage interest rates from such a credit should be more than 2.5/102.5 since the credit would effectively be tax-free income. If we assume a 33% marginal tax rate and a market mortgage interest rate of 16%, the effect of the credit should be to reduce mortgage rates by 60 basis points.

Such a reduction in mortgage rates would stimulate demand for new and existing homes somewhat and would direct additional amounts of investment into mortgages and away from investment in plant and equipment.

The effect of the requirement that 50% of new investments be allocated to mortgages is unpredictable, particularly in the short run while the financial system is adjusting to the new rules. It may be that in order to qualify for the credit on their entire stock of mortgages, lenders will push mortgages more aggressively and the mortgage rate will fall by more than the value of the credit. On the other hand, for many lenders, espescially most commercial banks, it would not be feasible or attractive to put half their new investments into mortgages. For such lenders the required yield on mortgages will not fall at all.

In simulating the impact of the credit, we have assumed a decline in the mortgage rate equal to 3.75% of the unsubsidized rate (e.g., a decline from 16% to 15.4%). This produces an increase of 61,000 single family starts in 1983.

Homebuyer Tax Credit

A homebuyer tax credit would be an incentive to demand, if the credit were realized by the buyer (i.e., was not simply appropriated as windfall profit by the seller through higher prices.) It would be much more stimulative than a drop in prices brought on by market forces, since it would not be taken by buyers as a sign of uncertain future capital gains and it would not represent reduced profitability for builders.

In our econometric models market-induced house price increases are on net a positive factor in housing sales, since while they increase the outlays required of home buyers they kindle expectations of capital gains, provide additional capital to existing homeowners, and represent increased profitability for builders. A modification of the model to separate the market price from the home buyer's cost suggests that a 5% tax credit will increase 1983 single family starts by 70,000 units. The one-time cost in terms of directly lost tax revenues would be on the order of $3.5 billion.

Although all those people who would have bought homes anyway would receive the credit and constitute substitution demand, the net cost per unit of incremental demand would be relatively small, because the subsidy is so much shallower--only an average of $3500 per unit versus about $13,000 (before recapture) under Lugar and about $16,250 for a Tandem plan. Moreover, in addition to producing more units, the tax credit would provide an incentive for most homebuyers to demand larger units.

The cost per incremental unit could be trimmed somewhat by limiting the maximum credit to $4,000. This would lower incremental housing starts somewhat, but the loss in tax revenues will be cut more than proportionately, to $3.2 billion.

Because new homes begun before enactment would not be eligible, such homes would have to be discounted in order to be sold. Such discounting would push some nearly-bankrupt builders over the brink.

A MICRO-SIMULATION ANALYSIS OF OPTIONS INTENDED TO STIMULATE THE PRODUCTION OF RENTAL HOUSING

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Introduction 1/

This paper contains an analysis of current economic problems facing developers of rental housing and estimates of the cost and relative effectiveness of programmatic options proposed by GAO to stimulate rental housing production. The options proposed by GAO can be classified into three general groups or approaches. The first approach would provide either direct or indirect subsidies that would reduce mortgage financing costs. One option designed to reduce financing costs is the Shallow Tandem Program which would enable developers to borrow funds for rental housing projects at significant discounts, which would be initially absorbed by GNMA. Such discounts would then be repaid by borrowers when a project is eventually sold or refinanced. More specifically, monthly payments on these discounted loans would be based on a sufficiently low rate of interest (not lower than 11%) so as to provide for satisfactory debt service coverage from operating revenues from newly developed projects. A balloon payment, large enough to recover the discount absorbed by GNMA at the time of origination plus deferred interest, would be required after 15 years or if projects were sold or refinanced. Because this proposal requires that the initial discount is to be repaid with interest, there may be little or no direct subsidy associated with this proposal.

A second option, designed to reduce financing costs, is the Interest Rate Subsidy or co-called "No Name Coalition" proposal. This proposal is similar to the Shallow Tandem approach; however, it involves an explicit subsidy to developers. Essentially, developers would make first mortgage loans at current interest rates and simultaneously make second mortgage loans equivalent

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1/The views contained in this study are the author's only and
  may not represent the views of Southern Methodist University.

to one-third of interest requirements on the first mortgages. These second mortgages would be made available to developers as long as current interest rates on first liens exceed 14 percent. Interest costs on the second liens would be compounded at the government borrowing rate but would be deferred and become due as a balloon payment after 15 years, or sooner if projects are sold or refinanced. However, balloon payments due on such second liens would not exceed 60 percent of any appreciation in market value in excess of cost for projects developed under this program.

The third option in the reduction of financing costs category is the Tax Exempt Mortgage Bond proposal. This vehicle currently provides below market interest rate financing for rental housing, however it would be modified by allowing an increase in the difference in interest rate spread between interest costs on bonds issued and rates charged on mortgage loans to 1.25 percent from the one percent of bond proceeds currently allowed to state and local housing finance agencies. Ostensibly, increasing this spread would provide an incentive to such agencies to expand activities and to meet requirements associated with increasing the number of bond issues relative to their current use.

The final option in the financing category involves increasing the financial adjustment factor (faf) for Section 8 programs with HUD contract rent commitments, but presently without firm financing commitments. Funding commitments are lacking because of high interest rates, which in turn make for high debt service requirements relative to fair market rents presently allowed by HUD on such projects. Increasing faf would amount to a higher rental subsidy commitment from HUD, thereby, enabling higher debt service commitments to be covered from current operating revenues. This would enable development of more Section 8 projects currently in the HUD approved "pipeline."

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The second general approach to stimulate production in rental housing is to provide for a 10 percent investment tax credit on direct project costs (in excess of land cost) to developers of rental housing. However the Investment Tax Credit proposal would limit these credits to $4,000 per unit constructed. This is the only proposal among the seven considered here that would utilize a subsidy composed of a direct reduction in taxes as an incentive to stimulate production.

The final category analyzed, includes two options that would provide direct funding, through either city or state entities, for development of approved rental housing projects. Under the UDAG proposal, developers could obtain grants for up to $10,000 per unit. Subsidies would average $5,000 for the program as a whole, however. All UDAG regulations regarding matching private financing and neighborhood targeting would still apply in establishing whether such grants should be made. The second option in this direct grant approach is referred to as the Dodd proposal. It would provide funds for loans, grants, interest reduction payments and land acquisition grants to be made by state and local housing agencies. Projects selected for subsidies under the latter proposal would be based on a number of considerations including elimination of housing shortages, project cost, neighborhood development and the likelihood of loan repayment.

There are a number of additional characteristics that are common to each of the seven options described above. These include eligibility for project rehabilitation, reservation of 20 percent of units developed or rehabilitated for households with incomes not in excess of 80 percent of median area income and provisions allowing for conversion of residential units from present non-residential uses. Another provision relevant to units produced under the

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tax exempt mortgage and UDAG proposals includes a restriction on conversion of rental units to condominiums for 15 years.

General Considerations Regarding Effectiveness of Program Options

Ideally, each option analyzed in this study should be evaluated in terms of their relative costs and effectiveness. Unfortunately, the effectiveness of each proposal (interpreted in this analysis to mean net additions to the stock of rental housing) is difficult to estimate because of other market considerations which cannot be completely controlled for without using an econometric model of the housing market. Such market influences include indirect substitution effects in financial markets as funds are raised for the proposed subsidy options with government bonds or tax-exempt bonds. As these funds are raised, the cost of mortgage credit is likely to increase, resulting in a decline in unsubsidized rental starts.[1] Direct substitution effects in the housing market may also occur as changes in the supply and demand for privately produced rental housing eventually come about in response to the increase in the production of subsidized housing.[2] Further, subsidy options are also being currently proposed to stimulate production in single-family construction which is usually owner-occupied. The effectiveness of proposals to stimulate rental housing will be highly dependent on the extent of subsidy occurring in the market for owner-occupied housing.[3] It should also be stressed that the low level of rental housing production is part of the present recession which is affecting numerous industries in the U.S. economy. Consequently, programs designed to stimulate production in selective industries, such as housing, may come at the expense of other industries indirectly as interest rates are affected in financial markets and in the market of real goods and services. To

accurately measure the effectiveness of options designed to increase the production of housing, these more general equilibrium influences should be taken in account to the extent possible. Finally, there is likely to be a significant difference in regional effects of the proposed options. Some options are likely to be more effective in some regions of the U.S. than others, hence there may be no "one" effective option suitable for all regions.

Given these observations concerning the measurement of effectiveness, qualitative judgments are made in this study regarding the likelihood of substitution effects and the relative effectiveness of each option. While specific cost estimates are made for each option, no attempt has been made to formally estimate net additions to housing stock either in the short or long run, controlling for the important market effects outlined above. Further, the cost results estimated here are based on current market interest rates, rents, expenses, etc. To the extent that these relationships change, such costs would have to be re-estimated. The user of this study should be aware of these limitations.

Organization of Study

The study first addresses important issues relating to the production (or lack thereof) of unsubsidized rental housing as viewed by both investors and loan underwriters in the present economic environment. Utilizing a microeconomic model of investment behavior, important relationships between developer rates of return after taxes and the adequacy (or lack thereof) of cash flow production from new rental housing projects, considered to be representative of those currently under development, are illustated. Estimates of the same relationships were then made by varying mortage terms to assess how sensitive financial feasibility is to reductions in interest rates. Following

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this exercise, estimates were made of the minimum range of subsidy costs deemed necessary to induce development. This estimate of subsidy cost was then utilized as a "benchmark" or standard against which the cost of each option proposed by GAO was assessed. Estimates of the subsidy cost of each option was then made by incorporating the salient features of each into the simulation model. These estimates were used to make judgments concerning the relative cost of each option and its potential effectiveness as gauged by the likelihood that development of rental housing will result. The final section of the study includes a summary of the costs, incentives and observations on the relative effectiveness of each option in bringing about net additions in the rental housing stock both in the short and long run.

An Assessment of Current Impediments to the Production of Rental Housing

Before evaluating the specific options provided by GAO, current problems relating to financial feasibility of multi-family housing development are examined. These problems can be illustrated with a baseline case representing a hypothetical multi-family housing project.

Cost and expense data for this prototype development were obtained from a non-random sample of various firms currently developing rental housing with tax-exempt mortgage financing. Although these developments are being financed under the tax-exempt program, the construction cost and expense data are thought to be representative of current costs for this type of development, regardless of the type of financing utilized.[4] Exhibit I contains the breakdown of development costs, operating costs, and the federal income-tax treatment of certain costs for the baseline case being analyzed.

Exhibit I

BASELINE CASE COST DATA

Development Costs:

Land	9.6%
Direct Costs	72.0
Soft Costs	7.0
Interest	8.0
Property taxes	.5
Loan fee	3.0
Total development cost	100.0%*

*includes normal profit allowance

Financing:

Permanent mortage loan as % of value	75.0%
Interest rate*	17.0%
Amortization	25 years
Term-to-maturity	15 years

*on permanent and interim loans

Operating data:

Development period	1 year
Normal vacancy	5%
Operating expenses	35% - increasing to 45% over period of analysis
Selling expenses	5.5%
Rent to cost ratio	13.7%
Investment period	16 years

Tax treatment:

Land - capitalized
Direct Costs - capitalized and depreciated over 15 years and 175% of
              straight-line
Soft Costs - 2% expensed, remainder capitalized and amortized over 15 years
Interest and Property Tax - 3% expensed, remainder capitalized and amortized
                    over 8 years
Loan fee - amortized over life of mortgage

Investor tax rate - 50%, capital gains rate - 20%

Project description - Garden apartment development, 150-250 units, average
                  sq. ft. - 750-800 per unit, suburban location in a large
                  metropolitan area

With regard to development costs assumed in the baseline case, it should be pointed out that the proportion of land cost to total cost shown in Exhibit I will vary with the location of a project in any housing market. However, because all of the financing options proposed by GAO require that at least 20% of project occupants earn incomes below 80% of the median household income in a market area, this will tend to preclude new, large scale development in locations where land costs would comprise a significantly higher proportion of total costs. This requirement will result in some conformity in new project developments both in terms of cost and location.[5] Other information shown in the Exhibit relating to financing is based on prevailing rates of interest and a loan to value ratio thought to be representative of what would be available to developers assuming that a project were economically feasible.[6] Operating cost and vacancy data are based on survey data collected nationally for comparable structures.[7]

To examine the problem of financial feasibility, cost data shown in Exhibit I were combined with average market rents prevailing in areas where development is being undertaken. Estimates of rates of return on equity, both before- and after-taxes, and cash flow projections were then made initially assuming financing was obtainable at <u>current market interest rates</u>. A description of the model used in this study to measure return on investment is contained in Appendix A to this report.

Projections were based on three scenarios of inflationary expectations. In each case, rents and property values (adjusted for economic depreciation) were assumed to increase at a rate of 6, 8, or 10 percent.[8] Developer profits were assumed to be the difference between equity invested by the developer and the market value of the developer's equity interest after completion of the project. It was assumed that permanent financing initially represents 75

percent of total development cost. Total development cost was assumed to equal total outlays for land and improvements, plus a normal profit allowance. Alternatively, it was assumed that total outlays for land and improvement plus a normal profit allowance would equal the market value of projects, which then could be sold, syndicated or owned and operated by developers. In the latter event, developers would earn a normal profit on development, which would increase equity invested in projects. Competitive returns would then be earned on that equity.[9]

Simulation results shown in Exhibit II provide important insight into current problems relating to the financial feasibility of rental housing development. Based on average market rents from the small sample of projects for which data was available and the cost breakdowns and other assumptions contained in Exhibit I, it can be seen that assuming current mortgage interest rates of 17% and assuming inflation rates persist in a range from 6% to 10% over the period of analysis, an equity investor would earn an after-tax yield of from 14.7% to 22.8% on equity invested during the period of project ownership.[10] Based on current after-tax returns on tax exempt securities and other fully taxable investments, yields estimated under the 8% and 10% scenarios appear reasonable. However, based on an inflation senario of 6 percent the estimated 14.7% yield does not look attractive relative to yields prevailing at the time of this study.[11] Herein lies the dilemma facing all investors in the current economic environment. Given a 17 percent mortgage interest rate and expectations by producers of possible disinflation, or a decline in the rate of increase in inflation, interest rates would have to fall from current levels before development occurs. On the other hand, if inflation is expected to persist in the 8 to 10 percent range, development would appear to be more

Exhibit II

SIMULATION RESULTS – BASELINE CASE ASSUMPTIONS

Baseline Case	Rate of Inflation	Rate of Return Before-Tax	Rate of Return After-Tax	Years of Negative Cash Flow
	6%	7.4%	14.7%	9
Interest rate = 17%	8	12.5	18.9	6
	10	17.2	22.8	4
	6%	8.7	16.0	8
Interest rate = 16%	8	13.7	20.1	5
	10	18.3	23.8	3
	6%	10.1	17.3	6
Interest rate = 15%	8	15.0	21.2	4
	10	19.5	24.9	3
	6%	11.5	18.6	3
Interest rate = 14%	8	16.3	22.4	2
	10	20.7	26.0	1

feasible. In as much as development activity is depressed, it is partially due to divergent expectations in financial markets as to the direction of inflation, resulting in little if any downward movement in interest rates. This is, ostensibly, the motivation for the subsidy proposals evaluated in this study, that is to reduce the supply cost of rental housing to some threshold where development becomes feasible.

The above problem is further complicated in that even in the 8 and 10 percent inflation scenarios where investment returns look plausible, the imbalance between cash flow and tax shelter in the make-up of investment returns may be contributing to the current feasibility problem faced by developers. For example, in Exhibit II it can be seen that before-tax returns from cash flow are less than after-tax returns. Herein lies an additional problem relating to financial feasibility. At current interest rates, if inflation persists in the range of 8%, or above, projects appear feasible when analyzed on an after-tax basis. However cash flow projections, which lenders analyze very carefully in underwriting decisions, are low. Facing this problem, investors must finance cash deficits for a period of 4-9 years after project completion to realize the longer-term after-tax yields. Because of this problem, lenders must not only assess the economic feasibility of the project to cover debt service, but also must assess the ability of investors to provide additional cash during each operating period.[12] Alternatively, developers could raise more equity relative to debt to reduce debt service. However, this could reduce profitability due to loss of leverage and would require additional syndication services which would increase the cost of raising equity capital and tend to discriminate against small scale development.

The problem just discussed is somewhat unique to real estate investments. The normal case for most investment opportunities is that after-tax yields

tend to be less than before-tax yields.[13] The reasons for the rather unusual
relationship between before-tax and after-tax yields on real estate and the
prolonged period of negative cash flow when compared to other investments are
twofold. First, the Economic Tax Recovery Act of 1981 provided investors in
real estate with significantly higher tax shelters than existed prior to 1981
and provided even more favorable tax treatment of capital gains from apprecia-
tion in property value (from which the largest component of the after-tax re-
turn is derived). Estimates of increased benefits from additional accelerated
depreciation now available on multi-family investments have ranged as high as
40% of benefits available prior to ERTA.[14] Second, the effective reduction in
capital gains tax has increased the process of "conversion" of ordinary income
to capital gain income by investors in the determination of value. This "con-
version" results in investors being very willing to "trade off" cash income
during the early years of the life of an investment property for capital gains
which are later taxed at lower tax rates in achieving their desired yield.[15]
Hence, in some respects, the increase in favorable tax benefits provided to
real estate investors by ERTA, may presently be working against the financial
feasibility of some projects.[16]

To examine the sensitivity of cash flow and mortgage interest rates, sev-
eral more simulation runs were carried out under the same inflation scenarios
but at lower mortgage interest rates. As shown in Exhibit II, as the interest
rate is lowered, both before- and after-tax returns on investment increase and
the number of years that negative cash flows occur declines. However, it
should be noted that the after-tax returns are relatively insensitive to re-
ductions in the mortgage interest rate. Again, this is because of the very
large weight that "tax shelter" components have relative to cash flow in the
determination of the return. The tax shelter components of the return (made

up of accelerated depreciation, development write-offs and capital gains), are relatively insensitive to the mortgage interest rate, hence financial feasibility appears not to be enhanced as significantly as might be expected, as interest rates are reduced.

Finally, one additional point should be made regarding financial feasibility of multi-family projects, that is, the use of conventional, fixed monthly payment patterns in multi-family rental developments. Traditionally, loans on these properties, like single-family properties, have been repaid with constant monthly payments. While some loans may be made with a call, or term, provision that is less than the amortization period, the well known "tilt problem," brought about by inflation and usually associated with traditional single-family mortgage financing, also applies to multi-family properties. This problem manifests itself as shown in Figure 1:
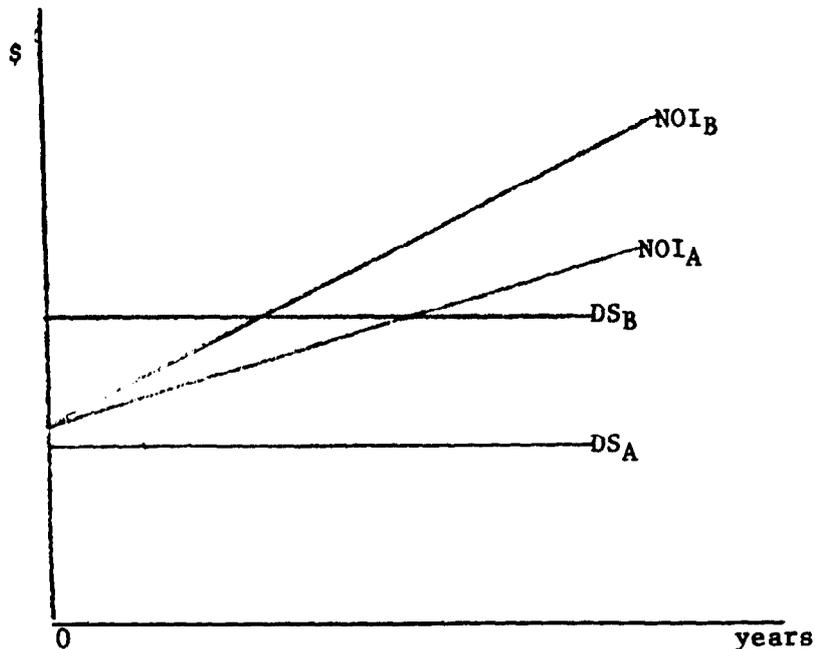
Figure 1

As shown in Figure 1, DS_A represents debt service that would relate to mortgage financing of projects in a stable inflationary environment. This debt

service relates to NOI_A or net operating income (rent less operating expenses) in a way which leaves excess cash flow, or margin of safety $NOI_A - DS_A$ in period o. As inflation expectations increase (as occurred during the latter 1970's), interest rates increase sharply and DS_B increases relative to NOI_B.[17] Assuming constant monthly payments, a deficiency $DS_B - NOI_B$ results in period o, and therefore, the difficulty with financial feasibility. At this point, developers are faced with the option of trying to lower the amount borrowed, thereby reducing debt service as previously pointed out. However, raising more equity reduces the advantage of leverage. Alternative financial instruments utilizing graduated payments, participation in appreciation upon sale, deferred interest with large balloon payments and other modifications are being used to combat the tilt problem. However, there is still a general lack of acceptance of these instruments by lenders and developers of multi-family projects. This is generally thought to be due to a divergence of opinion by developers and lenders regarding the long-run growth in the demand for rental property and/or a divergence in expectations concerning rates of interest and inflation.

In summary, based on current levels of mortgage interest rates, many multi-family projects appear not to be financially feasible in many otherwise viable urban housing markets. This appears to be true even because of uncertainty in expected appreciation in rents and property values and hence in after-tax rates of return. Further, problems relating to the financial feasibility of multi-family projects has also been a partial cause in the reduction in rental housing starts. These problems seem to be related to low cash flow projections on projects for relatively long periods of time. Low cash flows, even in markets that are economically viable, seem to be affected by three influences: the large tax shelter advantages enjoyed by investors, slow

modifications in traditional modes of mortgage financing by lenders and borrowers and a divergence of opinion regarding rates of appreciation and inflation. Further, such cash flows appear to be relatively insensitive to reductions in the mortgage interest rate because of the major role that tax shelter plays in the determination of investment returns.

Incentives and Subsidy Costs Necessary to Induce Development

In the preceding section, the problems relating to satisfying financial feasibility requirements, competitive after-tax return to investors, and divergent expectations regarding inflation and interest rates were highlighted. In this section, estimates of the minimum subsidy cost likely to induce rental housing production are made based on assumptions necessary to satisfy certain conditions regarding financial feasibility and after-tax profitability. To accomplish this, the model used to make the estimates shown in Exhibit II was constrained to require the baseline project produce some positive cash flow in each period of ownership and provide investors with after-tax yields of 15, 17 and 20 percent in equity invested during the period of investment.[18] This simulation was carried out by considering combinations of reductions in the interest rate necessary to produce positive cash flows before-tax, while simultaneously determining the maximum balloon payment possible in the year of sale such that when combined with after-tax cash flows from operating the property, would provide investors with required after-tax yields. An estimate of the subsidy cost necessary to induce development was then determined by taking differences in after-tax cash flows in each operating period and in the year of sale from the latter exercise and results from after-tax cash flows estimated in the baseline case, then discounting the differences to present value by the respective required return on equity. The present value

Exhibit III

ESTIMATES OF SUBSIDY AS A PERCENTAGE OF DEVELOPMENT COST

NEEDED TO INDUCE NEW RENTAL HOUSING DEVELOPMENT

Required after-tax return on equity to investors	Minimum subsidy cost as % of development cost		
	Rate of Inflation: 6%	8%	10%
15%	6%	–	–
17%	9%	2.5%	–
20%	12.7	7.9	1.4%
	Expected value = 4.4%		

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resulting from this procedure represents an estimate of the subsidy cost deemed necessary to induce development. Results of this analysis are shown in Exhibit III.

Results in Exhibit III should be interpreted as the proportion of project cost, given required rates of return after-taxes and given three inflation scenarios, that would provide an adequate incentive for developers to produce rental housing. Hence if a rental unit costs $30,000 to produce, and inflation is expected to be 8 percent for the foreseeable future, and investors demand an after-tax yield of 17 percent, a subsidy of $750 per unit (2.5% x 30,000) would be needed to induce production. Another point to be made here that these estimates of subsidy cost are highly dependent on inflation expectations and assumptions regarding required returns. Because of this, subsidy options that are designed with provisions that are tied to of movements in rents or property values are more likely to be most cost effective. This point will be amplified later in the paper.

Although these estimates are presented as percentages of total development cost, which is analogous to a tax credit or tax-free grant, the subsidy could take many forms that would be equivalent to the percentages shown in the Exhibit. The primary purpose for expressing the subsidy cost in the manner shown is to facilitate comparisons among all options analyzed in the study. No inference should be made that simply because subsidy costs are shown as a percentage of development cost that grants or "up front" subsidies are the preferable approach to providing subsidies to developers. Rather, these percentages can be thought of as targets or ranges of subsidy costs that would make any programmatic options most cost effective, in terms of providing adequate after-tax return to investors and reducing cash flow burdens as viewed by lenders.

Evaluation of Options Proposed by GAO to Stimulate Multi-Family Production:

(1)   Shallow Tandem

One option proposed by GAO as a possible stimulus to multi-family housing production is a financing proposal which would provide for mortgage loans to be originated with debt service based on interest rates as much as 4% below market, but not below 11%. Any interest differential between the rate used to compute debt service and the prevailing market rate of interest (on the discount) would be absorbed by GNMA, then repaid when a project is sold or refinanced.

Ostensibly, this proposal would provide for a level of debt service low enough in the initial operating years of projects to enhance financial feasibility by deferring interest until sale. It should be pointed out that a form of this option is already in use in the development of many office building projects and in a more limited number of multi-family developments in markets where unemployment is below the national average.[19]

To analyze the Shallow Tandem option, two simulation exercises were undertaken. One set of computations were carried out based on the same data utilized to provide estimates of rates of return in Exhibit II.. However, the interest rate was reduced to 13 percent, to represent the maximum allowable discount (4%) that GNMA may absorb. A balloon payment large enough to fully repay the initial discount absorbed by GNMA and to yield 17 percent at maturity was also included in the analysis. Estimates of after-tax rates of return and cash flow patterns were made and are shown in Exhibit IV.

Looking at Exhibit IV, results show that at very low rates of inflation in property values and rents, say in a range of 6 percent or less, projects would provide very low rates of return to investors relative to the baseline case (Panel A) where no government intervention was assumed. Cash flow

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Exhibit IV

A. **Estimates of Rates of Return and Cash
Flow Patterns -- Shallow Tandem Option**

(1) Option	(2) Rate of Appreciation	(3) Return on Investment After-Taxes	(4) Years of Negative Cash Flow
	6%	14.7%	9
Baseline	8	18.9	6
Case	10	22.8	4
	6	11.4	3
Shallow	8	17.3	2
Tandem	10	21.6	1

B. **Estimated Subsidy Provided by Shallow Tandem**

(1) Rate of Inflation	(2) Required Return on Equity (after-tax)	(3) Present Value of Subsidy Provided	(4) Present Value of Subsidy Required to Induce Production	(5) Excess (+) or Deficiency (-)
	15%	- .3%	6.0%	- 6.3%
6%	17	.9	9.0	- 8.1
	20	2.2	12.7	-10.5
	15	- .8	-	- .8
8	17	.6	2.5	- 1.9
	20	2.0	7.9	- 5.9
	15	-1.1	-	- 1.1
10	17	.4	-	+ .4
	20	.9	1.4	- .5
	expected value	.5	expected value	- 3.9

burdens improve significantly because of the lower debt service requirements brought about by the tandem program. However, the deferred interest element of this proposal results in a very large balloon payment requirement in the 15th year. Even though this deferred interest element was assumed to be fully tax deductable in the year of sale,[20] at a 6 percent rate of appreciation in property value, after-tax benefits to investors are not increased relative to the baseline case. Only as the expected rate of inflation approaches the range of 8-10 percent does the rate of return after taxes improve under this option. In the latter cases, profitability increases but is still low relative to the baseline case example under the same inflation scenarios. In short, from the perspective of a developer assessing whether or not to undertake construction of rental housing under this option, it is clear that although the cash flow burden is reduced, profitability is probably less than competitive with other alternatives and would not provide a satisfactory incentive for development.

The value of the subsidy provided to developers under the Shallow Tandem option was estimated by first modifying the basecase variables to include program provisions. The discounted present value of the difference in annual after-tax cash flows from operation and from the sale of the project under basecase and Shallow Tandem assumptions was found at 15, 17 and 20 percent required after-tax rates of return. This procedure provides an estimate of the depth of the subsidy implicit in the Shallow Tandem provisions. These estimates can then be judged relative to the "benchmark" on estimated subsidy deemed necessary to induce development and some idea as to the relative effectiveness of each option can be obtained. Assuming that the estimates of subsidies required to induce development are reasonable, options that are most effective, in the sense of making development feasible, would result in zero

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excess or deficiency in column 5 of Panel B. Values in both columns (4) and (5) are discounted to present value and expressed as a percentage of development cost. Hence results are directly comparable.

A further word on interpretation is needed. Results in column (3) of Panel B in the Exhibit indicate that at expected inflation rates of 6, 8 and 10 percent at a required return of 15 percent, the Shallow Tandem option would provide a negative subsidy, or impose a cost on developers. This result comes about because of the loss of the present value of the tax deduction on mortgage interest which is deferred until the year of sale.[21] This effect is offset as higher rates of inflation are considered, but nonetheless points out a serious flaw with the structure of the program and the risk facing investors should low rates of inflation occur.[22]

In summary, based on results shown in Panel B in Exhibit IV and assuming the benchmark after-tax returns and cash flow requirements established in the preceding section are reasonable estimates of what is necessary to induce development, the Shallow Tandem Option would probably not be an effective program to encourage development.

(2)   The Interest Rate Subsidy Program

This option would enable developers to borrow up to one-third of interest payments made on mortgage loans in the form of a second lien, as long as interest rates on first mortgages exceed 14 percent. This second lien would accrue interest at the government borrowing rate until the project were sold, or refinanced for a period of up to 15 years, whichever occurred first. At that time, a balloon payment would be made composed of the lower of either (1) the unpaid balance on the first lien, plus accrued interest on the second lien, or (2) the unpaid balance on the first lien plus 60 percent of the project's appreciation (defined as selling price in excess of original cost).

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Provisions relating to this option were incorporated in the base case and simulations run under some three scenarios of anticipated inflation used to analyze the Shallow Tandem option. A 17 percent rate of interest was used to compute debt service on the first lien and a 14 percent rate was chosen as the debit rate (government borrowing rate) in computing the balloon payment on the second lien.[23] Results shown in Exhibit V indicate that, based on rents prevailing in areas where development is presently occurring, estimates of return on investment with the Interest Rate Subsidy rise appreciably relative to the base case where it was assumed that financing was undertaken at prevailing rates of interest. Also, positive cash flows occur relatively early in the life of the project, thereby enhancing financial feasibility. However, unlike the Shallow Tandem option previously discussed, there is a more favorable after-tax return on investment and positive cash flows occur even at relatively low rates of anticipated inflation (see the 6% case shown in Panel A). These results occur because of (1) the reduction in debt service due to the reduction in the initial rate of interest and (2) the subsidy which takes the form of a lower balloon payment (based on 60% of appreciation) rather than a payment designed to provide lenders with market yields on mortgages as was the case with the Shallow Tandem. Indeed, balloon payments based on the 60% of appreciation option would be preferable to developers in two of the inflation scenarios, 6% and 8%. In these cases, that payment would always be chosen over the balloon payment required to repay the mortgage balance on the first lien and the balance on the second based on the government borrowing rate. The latter option would be chosen only in the 10% inflation scenario, when 60 percent of appreciation results in a sufficiently large repayment to make it the less desirable choice.

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Exhibit V

A. Estimates of Rates of Return and Cash Flow Patterns -- Interest Rate Subsidy Option

(1) Option	(2) Rate of Inflation	(3) Return on Investment After-Taxes	(4) Years of Negative Cash Flow
	6%	14.7%	9
Baseline	8	18.9	6
Case	10	22.8	4
Interest	6	16.0	0
Rate	8	19.4	0
Subsidy	10	22.6	0

B. Estimated Subsidy Cost -- Interest Rate Subsidy

(1) Rate of Inflation	(2) Required Return on Equity (after-tax)	(3) Present Value of Subsidy Option	(4) Present Value of Subsidy Required to Induce Production	(5) Excess (+) or Deficiency (-)
	15%	5.0%	6.0%	- 1.0%
6%	17	5.1	9.0	- 3.9
	20	5.2	12.7	- 7.5
	15	3.5	-	+ 3.5
8	17	3.9	2.5	+ 1.4
	20	4.2	7.9	- 3.7
	15	1.9	-	+ 1.9
10	17	2.7	-	+ 2.7
	20	3.4	1.4	+ 2.0
	expected value	3.9	expected value	- .5

The present value of the Interest Rate Subsidy option to developers was estimated using the procedure discussed in conjunction with the Shallow Tandem option. Essentially after-tax cash flows from operation and sale of the project per baseline case assumptions were subtracted from after-tax cash flows given the Interest Rate Subsidy option under the three inflation scenarios, and the differences were discounted at the indicated required rates of return on invested equity. Results show that the Interest Rate Subsidy option would provide investors an explicit subsidy that would range from 1.9 to 5.2 percent of development costs (column 3, Panel B). Alternatively, government would have to borrow an amount ranging from 1.9 to 5.2 percent of per unit cost to induce production of rental housing units under this approach. In terms of its effectiveness, at low rates of inflation this option would be somewhat deficient, however this pattern improves as the expected rate of inflation increases. Assuming all scenarios of required rates of return and expected inflation are equally likely, the expected value of the excess or deficiency (column 5) tends very close to zero. Hence, to the extent incentives required to produce rental housing (column 4) are reasonable, this option appears to be relatively effective.

In summary, the Interest Rate Subsidy or "no name" option appears to be superior to the Shallow Tandem option as far as the likelihood of promoting production of multi-family construction is concerned. This is the case because a specific subsidy is being made to reduce both the cash flow burden and increase potential profitability to developers/investors. With the deferred interest, or "recapture" feature, there is some likelihood that subsidy costs would be reduced relative to a fixed interest rate - level payment proposal, which is a favorable attribute of this program.

This program, if implemented, involves a higher subsidy cost than the Shallow Tandem approach. However, some modifications can be made to this option which may make this approach both more cost effective and acceptable to developers. First, assuming that GNMA is used to implement this program, a competitive commitment mechanism, via mortgage bankers or other intermediaries, could be used as opposed to specifying a fixed below-market rate of interest available to all borrowers. By using this approach, developers would bid the highest interest rate possible, while still maintaining project feasibility, thereby reducing subsidy cost. Second, the program should be simplified. It is not necessary to create a second lien and defer interest at the government borrowing rate to induce borrowing by developers. The same outcome can be achieved by designing a program with a reduction in the interest rate and combining graduated payments and/or a deferred interest or "recapture" as a part of the balloon payment. Such a modification would make the program better understood by both developers and lenders.

When market acceptance of this program is considered, it must be pointed out that this program would be in direct competition with existing Tax Exempt Mortgage programs. In markets where development is most likely, it would generally be the case that developers may opt for funds from Tax Exempt programs rather than compete for funds by bidding under an interest subsidy program. This is because the rate of interest offered under the Tax Exempt program, may be lower than what developers could bid under a Mortgage Interest Rate Subsidy program. Hence, the prevailing rate of interest on Tax Exempt Mortgage Bond financing may represent a maximum rate that developers are likely to pay under an Interest Rate Subsidy program. It may be that if a Mortgage Interest Rate Subsidy program were deemed the best option, the Tax Exempt program would have to be modified.

Finally, it should be stressed that the likelihood of substitution of

units produced under an Interest Rate Subsidy program for units that would

have been produced with no interest rate subsidy is high. Given that develop-

ers in markets where the probability of financial feasibility of projects is

the highest are most likely to utilize such a program, then it follows that

the likelihood of substitution will also be greatest. In general, the most

significant effect that one would expect from a program such as this would be in the

timing of new units produced.   With an interest rate subsidy as proposed,

more units would be produced sooner that may have been produced eventually

anyway. Hence, the substitution effect may not be immediate but would take

place over time. The net effect would probably be an increase in production

in the short run, at the expense of the long run, with some net increase in

starts due to a reduction in supply cost.

(3)   Tax Exempt Mortgage Financing

This option would provide for an increase in the arbitrage limit allowed

to housing finance agencies in an attempt to encourage financing of multi-

family starts through financial intermediaries. In many housing markets, this

program is being presently utilized for multi-family rental projects. The

proposed option would ostensibly add to the incentive for housing finance

agencies to promote the use of this method of financing.

At the outset, it should be pointed out that in markets where the likeli-

hood of development of multi-family units is greatest, utilization of this

program would probably dominate both the Shallow Tandem and Interest Rate Sub-

sidy programs if a choice were available among the three. This is because (1)

the Tax Exempt program does not provide for any deferred interest, or "recap-

ture," (2) it significantly reduces the cash flow burden because of the below

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market interest rate available because of the tax exempt status of the bonds, and (3) it enhances the potential after-tax profitability to equity investors because of reduced interest costs.

An evaluation for this option was carried out under the assumption that with the increase in the arbitrage limit, permanent mortgage interest rates available to developers would rise from current levels of 13.5 percent to 13.75 percent, with a 40 year amortization schedule. Financing fees were set equal to 5 percent and it was assumed that mortgage debt would equal 65 percent of project cost.[24] The latter restriction tends to encourage a positive cash flow immediately upon completion of the project. The positive cash flow requirement, in turn, results in positive debt service coverage which is a current underwriting requirement of this program.[25] However, the increase in the arbitrage limit would increase the cost of funds to developers, thereby reducing the present value of the subsidy.

Estimates of profitability and the present value of subsidy provided by the Tax Exempt Mortgage Bond option are shown in Exhibit VI. In Panel A, it can be seen that both profitability and cash flow burden are significantly improved under this option relative to the baseline case and to both the Shallow Tandem and Interest Rate Subsidy options.

The present value of the subsidy provided to developers under this approach are very similar to both what is thought necessary to induce production (Exhibit III) and the Interest Rate Subsidy option. This cost of this option comes about because of the obvious interest rate differential between the fully taxable mortgage interest rate (17%) and the tax exempt interest rate (13 3/4%) assumed in this analysis.[26] However these benefits may not appear to be completely reaped by investors because estimates of returns on investment (Panel A, Exhibit VI) in the inflation and rate of return scenarios shown are

Exhibit VI

A. **Estimates of Rates of Return — Tax Exempt Mortgage Bond Option**

(1) Option	(2) Rate of Inflation	(3) Return on Investment After-Taxes	(4) Years of Negative Cash Flow
	6%	14.7%	9
Baseline	8	18.9	6
Case	10	22.8	4
Tax Exempt	6	16.9	0
Mortgage	8	20.0	0
Bonds	10	23.0	0

B. **Estimated Subsidy Cost — Tax Except Mortgage Bond Option**

(1) Rate of Inflation	(2) Required Return on Equity (after-tax)	(3) Present · Value of Subsidy This Option	(4) Present Value of Subsidy Required to Induce Production	(5) Excess (+) or Deficiency (-)
	15%	5.3%	6.0%	- .7%
6%	17	4.0	9.0	- 5.0
	20	2.4	12.7	-10.3
	15	5.3	-	+ 5.3
8	17	4.0	2.5	+ 1.5
	20	2.4	7.9	- 5.5
	15	5.6	-	+ 5.6
10	17	4.2	-	+ 4.2
	20	2.6	1.4	+ 1.2
	expected value	4.0	expected value	- .4

roughly equivalent to the Interest Rate Subsidy option. The major benefit of

the subsidy cost under this option seems to be in the form of risk reduction

to investors in the bonds. The lower debt ratio (65%) needed to bring about

positive cash flows early in a project's life, thereby reducing default risk,

comes at a significant, and perhaps excessive, cost.[27] Given that traditional

underwriting practices have usually provided mortgage financing at a greater

percentage of value, the risk reduction under this option may be too conserva-

tive. Another negative aspect of this subsidy mechanism is the prospect of

windfall profits, which may occur if high rates of inflation persist and

shortfalls and hence lower participation if disinflation occurs. Unlike the

Interest Subsidy option which has a recapture or participation option that re-

duces the variability in subsidy costs, the Tax Exempt option does not.

As far as increases in rental housing production under this option, it

would probably not result in significantly more than the Interest Rate Subsidy

proposal. This is because profitability appears not to be significantly high-

er under this approach. Hence, this approach will probably not increase pro-

duction relative to the Interest Rate Subsidy option.

One final observation should be made concerning this Tax Exempt Bond Fi-

nancing option, that is, the additional cost to the federal government of

raising funds in the capital market. There is a considerable literature[28]

dealing with the added cost to the federal government of tax-exempt financing

because of tax revenue losses. This additional cost of raising funds has not

been taken into account in column (3) of Panel B. Hence, the percentage of

project cost, which is equivalent to the amount of funds which must be re-

alized by developers to increase production, may underestimate the actual sub-

sidy cost of tax exempt bonds, relative to other subsidy alternatives analyzed

in this study. To the extent that there are additional costs associated with

raising capital, not reflected in this analysis, this would tend to make this approach even less desirable from the standpoint of cost effectiveness.[29]

(4)   Increasing the Financial Allowance Factor (FAF) - Section 8

This option would provide for an increase in the subsidy amount given to developers utilizing tax-exempt mortgage financing in developing Section 8 units.[30] The subsidy would be based on the difference between 90 percent of development costs financed at 8 percent, formally the maximum rate of interest allowed in the determination of rental subsidy payments under Section 8, and 90 percent of cost financed at an interest rate equal to one-half percent below the prevailing tax exempt mortgage bond rate. The maximum rate that HUD would subsidize at the time of this study was 12 1/2 percent.[31] However, the actual borrowing rate facing the developer would be dependent on the interest rate available in the tax exempt mortgage bond market, plus any arbitrage charged by the issuing agency. To keep consistency with the Tax Exempt Mortgage option analyzed earlier, that borrowing rate was assumed to be 13.5 percent. The same underwriting standard involving debt service coverage that was used in the analysis of the Tax Exempt Mortgage Bond option (1.10) was also used in this analysis. This coverage requirement, when computed at 13.5 percent interest, reduces the amount of debt that can be used to approximately 80 percent of cost.[32]

The effect of this subsidy on developer/investor returns was found by modifying the baseline case for this financing subsidy. Total revenue to the developer in this case is equal to some amount of rents, plus a financing subsidy such that when actual debt service and operating costs are paid, both the debt service coverage standard and the 10 percent cash return on equity limitations are met. These modifications were made to the baseline case assuming

that all financing would be based on a 40 year amortization schedule with additional financing fees of 5 percent charged to cover costs associated with bond financing.[33]

Estimates of profitability and cash flow from operating under such a subsidy option is shown in Exhibit VII. As shown in the exhibit, profitability is considerably higher and the cash flow burden is vastly improved relative to the baseline case. However, the subsidy cost of producing units under Section 8 is also very high. As shown in Panel B of the Exhibit, the subsidy cost is broken into two parts, the after-tax cost of the below market interest rate financing and a memo item representing an estimate of the after-tax present value of HUD's contribution to rent for subsidized tenants.

The value of the financing subsidy to the developer under the Section 8 program was calculated by first determining after-tax cash flows earned on a project with a 13.5 percent mortgage interest rate and the proposed subsidy, including the 10 percent profit restriction on current equity. After-tax cash flows from the base case were then subtracted and the difference was discounted to present value at the assumed required rates of return. Results shown in Panel A of Exhibit VII indicate that after-tax returns to Section 8 developers would be quite high, based on the assumptions made in this example. This is true even with profit restrictions, because of the higher leverage ratio (80%) available under this option when compared to others considered in the study. Should this option be considered as part of a production stimulus plan, it may be desirable to make some additional modifications in the structure of the subsidy program to bring investor returns more in to line with market returns. However, it should be pointed out that these estimates may be biased upwards, as the same depreciation factor used under options previously analyzed was also used to estimate property values for Section 8 projects.

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Exhibit VII

A. Estimates of Rates of Return -- Section 8 Option

(1) Option	(2) Rate of Inflation	(3) Return on Investment (After-Taxes)	(4) Years of Negative Cash Flow
	6%	14.7%	9
Baseline	8	18.9	6
Case	10	22.8	4
	6	25.3	0
Section 8	8	27.7	0
	10	30.6	0

B. Estimated Subsidy Cost -- Section 8

(1) Rate of Inflation	(2) Required Return on Equity (after-tax)	(3) Present Value of Subsidy This Option (a)*	(memo)**	(4) Present Value of Subsidy Required to Induce Production	(5) Excess (+) or Deficiency (-)*
6%	15%	13.1	74.6%	6.0%	+ 81.7%
	17	12.5	66.3	9.0	+ 69.8
	20	11.7	56.3	12.7	+ 55.3
8	15	10.2	84.2	-	+ 94.4
	17	10.1	74.3	2.5	+ 81.9
	20	9.8	62.5	7.9	+ 64.4
10	15	8.5	94.3	-	+102.8
	17	8.3	83.0	-	+ 91.3
	20	8.0	69.6	1.4	+ 77.6
expected value		10.2	73.9	expected value	+ 79.9

*Subsidized financing only.

**Rent subsidy per unit occupied by subsidized households.

This depreciation estimate may be too low for Section 8 projects, particularly those with large percentages of subsidized tenants. Such a low estimate would overstate the returns reported in Panel A.

The memo amount shown in Panel B of Exhibit VII, is an estimate of the present value of the rent guarantee, per unit of development, to developers. It was found by discounting the combined rental payments and additional subsidy payments for the faf adjustment to present value by the required rates of return on equity. This amount was then reduced by the present value of the financing subsidy (column 3(a), Panel B) to arrive at the present value of the rent stream that would be used in the determination of the rent subsidy. Seventy-five percent of that amount was assumed to represent the amount that would be received as the rent subsidy by the developer, taking into account the influence of the financing subsidy and profit restrictions in the computations. The rent subsidy, estimated to be 75 percent of market rents in this study is based on average unit costs for the baseline units in this study of $35,000, and prevailing market rents equivalent to 13.7% of that amount. Based on an average monthly contribution per tenant of $96.23, this results in a subsidy of approximately 75% of rent per unit.[34] The memo amount in Panel B then, should be interpreted as the equivalent of an upfront, tax-free grant, expressed as a percentage of development cost, that would be equivalent to a Section 8 rent guarantee for an average subsidized tenant for a period of 15 years.

Obviously a strict comparison of Section 8 subsidy costs with the costs of other approaches cannot be made because of the rent subsidy being provided to tenants likely to occupy Section 8 units. This added cost was not included in the analysis of the other options. If such a comparison were desired, the analysis of the other options would have to include a comparison of the

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marginal benefits realized by tenants of rental housing produced under those options, relative to marginal benefits realized by tenants under Section 8. This comparison is beyond the scope of this study.

When viewed in terms of net additions to the housing stock, however, the Section 8 program, perhaps modified to reduce the subsidy costs, would probably be relatively effective. Programs of this type may be more effective than below interest rate proposals or tax credit proposals in more depressed areas of the country because of the uncertainty of housing demand in these areas. Section 8 and similar programs reduce this uncertainty with rent guarantees. It is also likely that tenants under this program are likely to be very low income households with a low likelihood of migrating to growing regions of the economy, hence this program may not interfere, to any significant extent, with reallocation of employable resources.

Finally, production of rental housing under Section 8 is not as likely to displace rental housing in the private sector, when compared with subsidies involving financing or tax credits. While some subsitution will come about through increases in interest rates as government finances these units, substitution in the real sector, that is, in the supply and demand for rental housing, will probably be far less than would be the cases under other approaches. Hence if an objective of the subsidy options being considered is to increase net additions to housing starts, production under Section 8 has far greater promise to achieve that objective than the other approaches.

(5) Investment Tax Credit (ITC)

This option would provide developers with an investment tax credit equal to 10 percent of development costs (exclusive of land and construction interest costs) not to exceed $4,000 per unit.[35] When such a credit is incorporated into the baseline case, two results become immediately obvious

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(Panel, A, Exhibit VII). First, the cash flow burden is not improved relative to the baseline case because financing under this option would not be affected. Hence, to the extent financial feasibility is an impediment to development, an investment tax credit would not improve the cash flow burden. After-tax profitability increases markedly, however. As shown in column 2 of Panel A in Exhibit VIII, after-tax returns with the ITC option would be higher than those projected for all options previously analyzed. This increase in after-tax profitability comes about because of the "upfront" tax credit which, in turn, increases after-tax profitability while leaving before-tax cash flow relatively unaffected when compared to the base case.

The subsidy cost of this option would be approximately 6.8 percent of total development cost and is invariant to the rate of inflation, as it is equivalent to a lump sum grant. Looking to Panel B of Exhibit VIII, this option appears to be relatively cost effective (see column 5, Panel B). This would be the case assuming that tax credits and interest rate subsidies were equivalent in their impact on investor behavior.

However, this proposal is likely to be less effective than the options previously considered. The reason for this lack of effectiveness is because the ITC merely adds to the "tax shelter" component of investment returns in real estate. As previously discussed, provisions contained in the ERTA of 1981 dramatically increased tax benefits to investors and increased the weight of the tax shelter in investor returns relative to cash flow before tax. An ITC would further exaggerate this effect and may not materially enhance financial feasibility. The latter would improve only through a greater syndication effort that would provide a larger amount of equity capital by selling the additional tax shelter brought about by an ITC to investors, thereby reducing the amount of debt needed to finance a project. This reduced amount of debt

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Exhibit VIII

A. Estimates of Rates of Return and Cash Flow
    Patterns -- Investment Tax Credit Option

(1) Option	(2) Rate of Inflation	(3) Return on Investment (After-Taxes)	(4) Years of Negative Cash Flow
	6%	14.7%	9
Baseline	8	18.9	6
Case	10	22.8	4
Investment	6	19.0	9
Tax	8	23.3	6
Credit	10	27.3	4

B. Estimated Subsidy Costs -- Investment Tax Credit

(1) Rate of Inflation	(2) Required Return on Equity (after-tax)	(3) Present Value of Subsidy This Option	(4) Present Value of Subsidy Required to Induce Production	(5) Excess (+) or Deficiency (-)
	15%	6.9%	6.0%	+ .9%
6%	17	6.8	9.0	- 2.2
	20	6.6	12.7	- 6.1
	15	6.9	-	+ 6.9
8	17	6.8	2.5	+ 4.3
	20	6.6	7.9	- 1.3
	15	6.9	-	+ 6.9
10	17	6.8	-	+ 6.8
	20	6.6	1.4	+ 5.2
	expected value	6.8	expected value	+ 2.4

financing would, in turn, reduce debt service, thereby enhancing financial feasibility.

This circuitous process of enhancing feasibility is likely to be less than effective when compared to one of the more direct interest rate reduction options previously discussed. Further, the cost of raising equity capital via syndication is likely to be more expensive when compared to costs associated with debt financing and the marketing effort associated with syndication may take a longer period of time. Finally, for small to intermediate-sized projects, which are normally not syndicated, this type of subsidy would probably be less effective than a finance-oriented subsidy program.

(6)   The UDAG - Dodd Option

These options are grouped together because the approaches to providing subsidies to rental housing appear very similar. Essentially, the UDAG approach would provide a $5,000 per unit subsidy per rental unit for approved projects. Such projects would have to meet neighborhood targeting and matching-fund requirements that presently exist under the program.

Based on the provisions in these two options, it is very likely that rehabilitation projects would be more likely to receive the larger portion of funding because of the neighborhood targeting criteria, although some new rental housing is likely to come about. The only correspondence that can be made with previous options analyzed would be, in the case of new units, the Investment Tax Credit (ITC) option previously analyzed. However, a rough approximation can be made as to the cost and effectiveness of rehabilitation undertaken should these options be used. This approximation is based on the leverage ratio attained on rental housing under past UDAG programs. That ratio has averaged 4 to 1 in past applications.[36] This would imply that if a $5,000 grant were made for an approved project, such a grant would support

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$20,000 worth of additional debt to be used for rehabilitation in urban markets, assuming the past leverage ratio is indicative of experience under this proposal. Such a 4 to 1 leverage ratio also implies that the $5,000 would comprise a 20 percent participation in the total sum expended on all rehabilitation projects. Considering that the average cost of producing baseline units was approximately $35,000 and only $25,000 worth of rehabilitation is likely to come about per $5,000 grant ($20,000 leverage funds plus the $5,000 grant), to the extent these proposals would be similar to past rehabilitation experience such grants are likely to bring about only 70% of production equivalent to the production of new rental units per dollar of subsidy. Hence one approximation of the cost per unit of development for this option would be 20% ÷ .70 or 28.5% of the cost per unit of equivalent new rental housing represented in the baseline case. While this cost estimate is crude, given the targeting requirements and the fact that rehabilitation work is usually more costly than new construction, it seems reasonable.

As for the effectiveness of such programs, like the Section 8 program, it is likely to be more effective in economically depressed areas where housing for the elderly done by non-profit sponsors or city agencies may be undertaken. These programs do not entail considerable risks to developers and, like the Section 8 program, may be more effective in areas where risks due to the lack of effective demand for housing because high unemployment is present. Also, housing produced under this option is not likely to be as substitutable for housing produced in the private sector because of targeting restrictions. While some substitution will occur for units produced in the private sector through capital market effects, this and the Section 8 option because of the lack of substitution in the real housing sector, have the greatest likelihood

of adding net new units, or rehabilitated equivalents, to the housing stock in the long run. However, these additions would come at a very high cost.

Summary

Exhibit IX provides a summary of results obtained under each of the options proposed as well as qualitative observations concerning the probable effect on financial feasibility and increases in the supply of rental housing.

Needless to say, with the exception of the UDAG/Dodd and Section 8 proposals, the remaining options appear to be very close in subsidy cost. Subsidy cost is defined as the equivalent of a tax-free grant expressed as a percentage of project cost that would have to be given to a developer to induce production. However, given current conditions prevailing in the market for rental housing, these options may not be equivalent in impact because of other considerations that are non-quantifiable, or because the cost associated with the government raising funds for one particular option may not be equal to costs under other options.

Of the first four options listed in Exhibit IX, all of which emphasize an interest rate subsidy, the Interest Rate Subsidy, or "no name" option would appear to have some merit. It appears to be a relatively low cost subsidy that may be effective in simulating production in markets where unemployment is below the national average, and where many projects are at the "threshold" of financial feasibility and profitability. Although its "cost" and "effectiveness" are very close to that shown for the Tax Exempt option, the latter option may cost more to the government because of interest foregone due to the tax exemption. Further, the risk of windfall returns to developers is greater under the Tax Exempt option. This is because there is no "recapture" of deferred interest required, hence at high rates of inflation the possibility of profits in excess of competitive returns exists. However, in terms of

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Exhibit IX

SUMMARY OF SUBSIDY OPTIONS

Option	Expected Value of Subsidy	Expected Value of Subsidy Needed	Excess (+) Deficiency (−)	Qualitative Estimates		
				Improvement in Financial Feasibility	Net Increase in Production	
					Near Term	Intermediate Term
(1) Shallow Tandem	.5%	4.4%	− 3.9%	moderate	moderate	low
(2) Interest Rate Subsidy	3.9	4.4	− .5	good	moderate	low
(3) Tax Exempt Mortgage Bonds	4.0	4.4	− .4	good	moderate	low
(4) Section (8) (faf)	10.2*	4.4	+ 5.8*	good	high	moderate
(5) Investment Tax Credit	6.8	4.4	+ 2.4	low	low	low
(6) UDAG/Dodd	28.5	4.4	+ 24.1	good	high	moderate

*financing subsidy only

additions to the housing stock, both programs would probably add a moderate increase in the production of rental housing in the very short run that would substitute for units produced in the longer run. This is because the interest rate subsidy would have the effect of raising interest rates in capital markets thereby reducing the supply and demand for unsubsidized housing and other goods. Also in real markets, the supply and demand for housing units that would have existed in the absence of the subsidy will reduce the effectiveness of the subsidy as households and producers substitute comparable subsidized for unsubsidized units.

As for the remaining approaches, the Investment Tax Credit proposal would probably do little to improve production as it does little to alleviate the the problem of financial feasibility. The Section 8, UDAG/Dodd proposals would have much more of an impact in depressed markets where the probability of substitution of comparable units is lower. Further, in these markets, options that reduce risk to developers are more likely to be more successful than those providing interest rate reductions. This is because demand for housing in depressed markets is likely to be more uncertain. However, this increase in supply carries a higher cost. In the case of Section 8, subsidy cost estimates are highest, while under the UDAG/Dodd proposal they are somewhat lower because rehabilitation is being done as opposed to new construction. Selection of an appropriate option in the latter two cases lies in the choice of whether (1) new, or rennovated, existing housing is to be provided for households in segments of the market where substitution effects are less likely and (2) whether a combined program of housing production stimulus and a subsidy to low income households is preferable to a housing stimulus program that does not consider the benefits provided to recipients of the housing produced.

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Footnotes

[1] Such a substitution effect may involve projects of different quality and in different locations than projects funded under program subsidies, as developers of all types of housing would face higher interest rates.

[2] This effect would come about because of developers' response to the subsidized units themselves. To the extent developers would have supplied rental housing that would have competed with subsidized projects, there is a direct substitution effect in the real sector.

[3] It is well known that homeowners receive more beneficial tax treatment than renters. To the extent a more beneficial subsidy is given to homeowners as a part of the stimulus package under consideration, the subsidy options chosen for rental housing would be less effective. Such a possibility is _not_ taken into account in this study.

[4] One could argue that the mix of funds utilized, i.e., debt versus equity would change depending on the cost of each. However, the proportional relationship between land and capital improvement, rents and operating expenses, would generally be invariant to financing.

[5] This assumption may not be true in cases where rehabilitation of existing housing is being considered. However, for new, large scale development of modest rental housing in the 750-800 square foot per unit range, this assumption is reasonable. It should also be noted that with the exception of construction interest costs, the proportional cost breakdowns shown in Exhibit I are very similar to breakdowns contained in the 1972 Touche Ross – HUD study on investment in multi-family housing.

[6] There has been a trend towards the use of lower debt ratios in the current financial environment. This trend is probably due to the high real interest rate on mortgage funds and the relative weight of tax shelter in the determination of return on equity capital. Hence, if a "suitable" subsidy option is adopted for rental housing, it is assumed that the debt·to value ratio will tend back toward 75 percent.

[7] See Income and Expense Analysis of Apartments, (Chicago: Institute of Real Estate Management, National Association of Realtors), various issues.

[8] Project appreciation rates and rents were adjusted for economic depreciation. Improvements were assumed to depreciate at a straight-line rate over an expected life of 70 years.

[9] It is difficult to estimate what "normal" development profits would be. Historically, in a more stable economic environment, when projects were completed and sold, it was reasonable to assume that buyers could finance the purchase price (appraised value) with a mortgage loan in a range of 75 percent of value. In this event, developer profits would be equal to the difference between equity invested by developers during development and approximately 25 percent of project value upon completion and sale. Subsequent owners would then earn a market return on equity although in many cases, projects may have been syndicated with the developer retaining a residual equity interest.

In this study, when the mortgage loan to cost ratio is varied under the various options considered, it is assumed that a normal profit is being earned by developers although it is not explicitly known, in most cases. This is believed to be a reasonable assumption, however, as developers would have to earn competitive returns if they are expected to increase production.

[10]After-tax yield is the rate of compound interest that equates all after-tax cash flows realized by investors from operation and sale of projects to equity invested. This rate of interest is also commonly known as the "internal rate of return."

[11]At the time of the study, yields on tax exempt mortgage bonds ranged from 12 to 13%. Adding a reasonable risk and liquidity premium as compensation to equity investors in real estate, yield estimates of 18.9 and 22.8 percent, given inflation scenarios in the 8 to 10 percent range, appear plausible. However a 14.7% yield does not appear attractive relative to prevailing tax exempt yields.

[12]Typically, lenders focus on before-tax cash flows in mortgage underwriting. Even if the baseline project appeared very profitable after taxes, lenders would be reluctant to evaluate the ability of individual investors to contribute additional cash for operation of projects each year, even though a large tax shelter may reduce their tax liability.

[13]For example, after-tax returns on common stocks and bonds would always be less than before-tax returns because interest and dividends are taxable and not "sheltered."

[14]For a detailed examination of the ERTA of 1981 see: W. B. Brueggeman, J. Fisher, J. Stern, "Rental Housing and the Economic Recovery Tax Act of 1981," Public Finance Quarterly, Vol. 10, No. 2, April, 1982, pp. 222-241.

[15]This principle can be easily illustrated. Assume an investment provides a taxable cash return of $50. The investor is in a 50% tax bracket and desires a 10 percent return (after-taxes). The value of such an investment would be $50(1-.50) + 10, or $250. The ratio of cash return to value is $50/$250, or 20%. Assume now that the $50 cash return is tax free, the value would be $50/.10 or $500 and the cash return to value ratio would be reduced to 10% as the tax exemption is capitalized into the price of the investment.

[16]It should be pointed out on the other hand, however, that reductions in tax benefits to investors in rental housing would raise rents and result in greater demand for owner-occupied housing, which is already given tax treatment that is preferential to rental housing.

[17]This effect can come about for two reasons. First, the nature of a fixed payment mortgage is such that as expected inflation rises, it will always rise faster relative to the income stream produced in the real sector. More importantly, however, it can also come about by a divergence in expectations of inflation by lenders who are making fixed commitments for relatively long periods of time and developers who estimate growth in income from projects over the same period.

[18]These rates of return were selected based on tax exempt mortgage bonds which were yielding 12 to 13 percent at the time of the study, plus a 3 to 7 percent risk and liquidity premium. To the extent that the premium between yields on corporate bonds and corporate stock are paralleled in real estate debt and equity markets, the appropriate premium may be closer to 3 percent (see Brueggeman, Fisher and Stern, op cit.). However, it can be argued that the premium between real estate debt and equity investment should be greater due to the non-liquid nature of equity investment. Hence an upper bound of 7 percent was selected in this study. It should also be pointed out that during the 1970's, limited partners in one of JMB Realty Funds earned approximately a 20 percent return on equity after-taxes, based on projections made by that firm for a 50 percent tax bracket investor.

[19]However, in many of these cases, lender participation based on a percentage of the appreciation in project value when sold or refinanced is used in lieu of the deferred interest pattern as proposed in this option. The reason that this modification has come about is to better allocate the risk of project appreciation or depreciation between the lender and borrower.

[20]If deferred interest were tax deductable each year rather than in the year of sale, after-tax returns would be equivalent to results in the baseline case.

[21]Again, if deferred interest was deductable each year, then after-tax returns would tend towards the baseline case result with the same improvement in cash flow burden, however.

[22]It is likely that if a 6 percent rate of inflation persisted, mortgage rates would fall thereby encouraging refinancing. Yields required by investors would also decline.

[23]The prevailing yield on government bonds with 10-15 year maturities was 14 percent at the time of the study.

[24]These assumptions are based on a recent survey of developers using this program to develop rental housing projects.

[25]There are other aspects of this program that were considered in the analysis. For example, when bonds are issued, proceeds are escrowed and earn interest during construction. The estimated cost of the construction loan is included in total development costs to be eventually drawn by the developer. To the extent the deposited funds and interest exceed interim interest payable at tax exempt rates, the developer can benefit. However, this potential benefit is offset by the fact that a debt reserve must be established as a contingency against irregular interest payments on the bonds. These funds earn interest and are eventually distributed to the developer upon sale or when outstanding debt is repaid. Hence the developer may incur an opportunity loss while these funds remain on deposit, because they may earn a lower rate of interest than could be earned elsewhere. These aspects of the program were included in the analysis and were reflected as a reduction in financing fees associated with the bond issue.

[26]The subsidy cost of the tax exempt option was found by computing the difference between 17 percent interest on 75 percent financing and 13.75 interest at 65 percent financing, after taxes, and discounting this difference to present value at the assumed required returns of 15, 17 and 20 percent respectively.

[27]There may be a possibility that a developer could find a second lien to increase the debt to value, or leverage ratio, and increase return on investment. To the extent this is possible, the rate of return estimates presented here are too low.

[28]For a discussion see: George Peterson, Tax Exempt Financing of Housing Investment, Urban Institute, Washington D.C., 1979.

[29]Obviously, the government should choose the least cost alternative for raising funds to fund any of the options analyzed here. From the developer's standpoint the source of funds is irrelevant, only the benefit is of concern. Hence all estimates of subsidy cost made in this study, represent the percentage of development cost that government must raise to provide subsidies to developers. Determining the most cost effective way for government to raise funds for the subsidy is important, but beyond the scope of this study.

[30]Most recent production of Section 8 projects has been done using tax-exempts. This is not the only source of funds that could be utilized. However, given current high levels of interest rates, it has been the most widespread approach.

[31]Per data supplied by GAO and HUD.

[32]This is because the HUD subsidy limit is set at 12 1/2%, while the developer must meet debt service based on 13 1/2% in our example. Because of the debt service coverage, requirement of 1.10, this implies a reduction in the amount available for borrowing by developers.

[33]The analysis provided here is strictly limited to Section 8 development for families. This analysis can be extended for projects designed for the elderly, however, it is not considered here.

[34]This, of course, assumes that a development comparable to the baseline project and its cost and fair market rent were used as a Section 8 project. To the extent Section 8 projects deviate in cost and rent from baseline assumptions, subsidy costs would increase or decrease accordingly.

[35]Land costs, interim interest and financing fees, and some soft costs were excluded from the development cost category. Also, more reduction in the depreciable basis of assets was assumed in the analysis.

[36]Per data supplied by GAO.

Appendix

The following model was used to estimate required after-tax returns on equity investment in this study. In this framework, cash outflows related to development costs (adjusted for tax considerations relevant to the development phase), after-tax cash flows from annual operating revenues less expenses, and after-tax cash flows from the sale of the property in some future year are discounted by a required after-tax rate of return until equality between inflows and outflows is achieved. More specifically, the after-tax rate of return (K) on equity invested in a real estate income property investment can be determined from:

$$\sum_{i=1}^{d} \frac{(TDC_i - DF_i)}{(1 + K)^i} = \sum_{i=1}^{s} \frac{(R_i - O_i - I_i - P_i) - (R_i - O_i - I_i - D_i - A_i)t_o}{(1 + K)^i}$$

$$+ \frac{V_s - B_s - S_s - G_s t_g - RC_s t_o}{(1 + K)^s} \qquad (1)$$

where: TDC = total development costs (demand price), including land (L) and normal development profit

DF = development financing,

d = end of development period,

s = holding period (years),

R_i = rental income in year i,

O_i = operating expenses, including property taxes, in year i,

I_i = interest on the mortgage paid in year i,

D_i = tax depreciation taken in year i,

A_i = amortization of construction interest and property taxes,

t_o = marginal ordinary income tax rate,

t_g = marginal capital gains tax rate,

P_i = principal portion (amortization) of the loan payment in year i

V_s = estimated value and selling price in year s,

S_s = selling and other transactions costs in year s,

G_s = capital gain, net of selling costs (S_s), resulting from sale in in year s,

RC_s = net excess depreciation (accelerated over straight line) which is recaptured upon sale (if relevant),

B_s = balance of mortgage in year s, and

K = nominal after-tax discount rate on equity investment in a property held for s years.

In the long run, we would expect that the present value of after-tax cash flows, when set equal to the present value of equity invested in the property (construction costs, less development financing), would result in the marginal investor earning a competitive, after-tax rate of return (K) if the property is held for s years.

In this study when analyzing each system, modifications were made to inputs where appropriate and the required rate of return (K) was solved. In estimating the value of subsidies to developers, differences in equation [1] for the baseline case, and equation [1] as modified for each option, were found and the discount rate (K) was specified as either 15, 17 or 20 percent. The discounted values of the differences were then expressed as a percentage of TDC.

THE FOREST PRODUCTS INDUSTRY, 1970-1984: IMPACTS OF DIFFERENT MACROECONOMIC AND HOUSING STARTS ASSUMPTIONS ON THE INDUSTRY

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OBJECTIVES AND ORGANIZATION

The major objective of this report is to examine the impacts on the forest products industry of differing levels of economic activity. In particular, DRI-FORSIM will evaluate the impacts of changes in the levels of housing starts, on wood products demand, supply, prices and employment.

This report is organized into four parts. The first three parts discuss the three forecasts requested by GAO:

- Base Case, using the DRI-Macro Control forecast of 5/24/82;

- Pessimistic alternative, using the DRI-Macro "Stagflation" forecast of 5/25/82; and

- Canadian quota alternative, which utilizes the Control forecast, but holds the Canadian share of U.S. lumber markets to 20%.

The fourth part of this report presents the FORSIM Model's estimate of the sensitivity of wood products demand, supply, prices and employment to specified increases in total, single-family and multifamily housing starts.

All forecasts were performed using the FORSIM Models for the solid wood products industry.

Each of the four parts of the report is organized in a similar manner. A 4-to-6 page write-up summarizing the results of each simulation is followed by Appendices providing detailed tabulation of history and projections for the variables discussed in the report, as well as all other assumptions and results. In each case, Appendix 1 presents the GAO summary report; Appendix 2 presents employment data by state; and Appendix 3 provides full forecast detail reports similar to those carried in the FORSIM Review.

For further information or clarification, please call Bernard Fuller at DRI-Lexington, (617) 861-0165, extension 2516.

PART I

CONTROL FORECAST

A) MACROECONOMIC ENVIRONMENT AND OTHER EXOGENOUS ASSUMPTIONS

The macro assumptions used in the base case simulation of the FORSIM Model were taken from the June 1982 Macro Control forecast (dated 5/24/82). A full write-up of this forecast can be found in the June 1982 DRI Review of the U.S. Economy. A reprint of "Forecast Highlights and Assumptions" from this Review can be found at the end of the text in this section.

Housing Starts

For the forest products industry, the key macroeconomic inputs determining wood products demand are housing starts and the index of industrial production.

Table 1.1

Control Forecast - Housing Starts and the Industrial Production Index

	1982	1983	1984
Housing Starts (Millions)			
Total	1.06	1.37	1.62
Singles	0.67	0.89	1.09
Multis	0.39	0.48	0.53
Industrial Production Index			
(1967=100)	142.3	152.3	162.4

Table 1.1 summarizes the forecast for these variables. The forecast assumes that a recovering economy, stimulated by declining interest rates, will provide for a 28% increase in total housing starts in 1983, and a further 18% climb in 1984. Single-family starts, as a share of the total, are projected to climb from 62.6% in 1982, to 64.5% in 1983, and 67.3% in 1984. Even at 1984 levels, the single-family share of total starts would be well below the 72% to 73% levels of 1977-1978.

The mix of housing starts is particularly important to the forest products industry. The average single-family home uses approximately 9,750 board feet of lumber and 5,700 square feet of plywood, while the average multifamily unit uses 4,100 board

feet of lumber and 3,100 square feet of plywood. Thus, any shift in the housing mix will profoundly impact the consumption of wood products, even though the same total number of housing units may be constructed.

Industrial Production

The DRI forecast projects the index of Industrial Production to average 142 in 1982 (1967=100), a 6% decline from 1981 levels. The index is forecast to climb to 152 in 1983 (a 7% increase over 1982), and to reach 162 in 1984 (a further 7% increase). These increases in the index will result in approximately a 5% increase in total lumber demand, similar increases for plywood, and 6% to 7% for particleboard.

Other Exogenous Assumptions

The volume of wood materials consumed in residential construction also closely relates to the average size of residential units constructed. Single-family units use more lumber and plywood than multifamily units, not only because the average wood usage per square foot of living space is higher for singles than multis (for example, high-rise apartments use steel and concrete, rather than wood), but also because single-family units have more living space, on average, than a multifamily unit. Table 1.2 summarizes history and forecast for average home sizes in the U.S. since 1972.

Table 1.2

Regional Home Sizes
(Thousands of Square Feet)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Single-Family Homes, U.S.	1.61	1.67	1.67	1.68	1.71	1.74	1.76	1.75	1.73	1.68	1.64	1.65	1.69
Northeast	1.57	1.60	1.59	1.60	1.64	1.69	1.76	1.78	1.76	1.70	1.65	1.67	1.71
North Central	1.59	1.64	1.62	1.62	1.65	1.69	1.73	1.70	1.67	1.62	1.58	1.59	1.63
South	1.60	1.72	1.73	1.73	1.76	1.78	1.79	1.77	1.74	1.69	1.64	1.66	1.70
West	1.67	1.69	1.65	1.66	1.71	1.74	1.74	1.73	1.73	1.69	1.67	1.68	1.69
Multi-Family Homes, U.S.	1.04	1.06	1.02	0.96	0.93	0.92	0.92	0.96	0.99	1.01	1.01	1.01	1.02
Northeast	1.05	1.00	1.00	1.05	1.08	0.99	0.94	0.98	0.98	1.00	1.01	1.02	1.02
North Central	1.04	1.01	0.95	0.93	0.90	0.89	0.90	0.93	0.94	0.96	0.97	0.98	0.98
South	1.10	1.13	1.04	0.99	0.94	0.92	0.92	0.98	1.02	1.02	1.03	1.03	1.04
West	0.93	0.97	1.02	0.94	0.92	0.93	0.93	0.95	0.98	0.99	1.00	1.00	1.01

The average size of single-family homes peaked at 1,760 square feet in 1978-1979 before subsequently declining to an estimated 1,680 square feet in 1981. A further decline is projected for 1982, before the overall recovery in housing starts produces an increase in average home sizes in succeeding years. This projection is based upon observed behavior. In the 1970s, the only time home sizes declined was during the 1969-1970 and 1974-1975 housing recessions. Subsequent to these recessions, home sizes climbed, and FORSIM assumes a similar pattern once starts climb in the recovery phase, 1983-1984.

Table 1.2 also presents home sizes by region. The largest homes have been built in the South, although by the end of the 1970s the Northeast had reached southern levels. The smallest units have been built since the mid-1970s, in the North Central region.

Multifamily home sizes peaked during the multifamily housing boom of 1972-1973 when units averaged 1,050 square feet. As multifamily starts collapsed, average sizes bottomed at 920 square feet in 1977-1978, and subsequently recovered to around 1,000 square feet in 1980-1981. The growing share of condominiums and townhouses in the multifamily total has helped to raise the average size of multifamily homes. Multifamily sizes are projected to edge upwards further through 1984.

Lastly, while we have emphasized the impact of changes in the mix of housing starts upon wood consumption, changes in home sizes are also important. As a rule of thumb, an increase or decrease in the average size of the single-family home of 100 square feet will result in an increase or decrease of lumber consumption per unit of 575 board feet, and 340 square feet of plywood. An increase or decrease in each multifamily unit of 100 square feet would produce a shift in lumber consumption per unit of 400 board feet, and 300 square feet of plywood.

Thus, if the 1984 forecast of housing starts of 1.62 million units proves accurate, but average home sizes were 100 square feet smaller than projected for both singles and multis, softwood lumber consumption would be 0.84 billion board feet lower than we project, while softwood plywood consumption would be 0.53 billion square feet lower.

FORECAST HIGHLIGHTS AND ASSUMPTIONS

General Outlook Real GNP declines at a 1.4% rate in the second quarter of 1982. Recovery begins in the summer and is spurred by the July tax cut and increased Social Security benefits. Growth averages 3.3% in the four quarters of 1983 and 4.2% in 1984.

Federal Budget Congress is assumed to enact tax increases of $36 billion in 1983 and $40 billion in 1984, consisting of modification to the leasing provisions of the ERTA, increases in excise taxes, and a 4% surtax on incomes over $35,000. Real defense purchases, down from administration request, rise 6.2% in 1982, 5.1% in 1983, and 6.3% in 1984. The nondefense budget cuts are about half of the Reagan proposals. Real nondefense expenditures rise 4.4% in 1981 and 2.5% in 1982; they fall 2.1% in 1983 and 2.3% in 1984. The unified budget deficit rises from $57.9 billion in fiscal 1981 to $114.4 billion in fiscal 1982, $123.7 billion in fiscal 1983, and $108.9 billion in fiscal 1984.

Monetary Policy Fed policy allows lower interest rates during the remainder of the recession. When a stronger economy in the second half generates higher monetary growth, the Fed tightens modestly, helping to push interest rates somewhat higher in early 1983. Monetary policy remains restrictive through the second half of 1983 and 1984, reducing the upper target limits for M1 growth half a percentage point a year. Monetary growth is held to the upper limits, keeping real interest rates far above historic levels but receding from current levels. The prime is 14½% at year-end, and averages 15% in 1983.

Consumption Consumer spending is weak through the first half of 1982, reflecting the path of disposable income. Tax cuts and lower inflation strengthen consumption beginning in mid-1982. Domestic auto sales begin a recovery in 1982:3. Total auto sales are 8.4 million units in 1982, 9.5 million in 1983, and 10.5 million in 1984. Next year, nonauto durables are up 3.6%, clothing and shoes are up 3.3%, and food is up 1.6%.

Housing	Housing starts average 1.1 million in 1982, 1.4 million in 1983, and 1.6 million in 1984. Mortgage rates average 16.4% this year, 15.3% in 1983, and 14.3% in 1984.

Housing

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Business Investment

Investment is a major casualty of this setback, falling 11.7% from its 1981:3 peak to its 1982:4 trough. Equipment spending begins to recover by 1983:1, but construction declines into 1983:2. Total nonresidential investment growth averages 0.6% in 1983 and 7.6% in 1984; the investment share recovers to 10.4% of GNP by the end of 1984.

Profits

Recession, high interest rates, and a strong dollar lower reported company profits by 9% in 1982. They rise 15% in 1983 and 1984, due to rising sales, operating rates, and productivity.

Prices

A slack economy, weak commodity prices, wage moderation, and a resumption of productivity growth improve the price outlook. Inflation, measured by the GNP deflator, moderates from 9.2% in 1981 to an average 6.4% over the next three years. Wage gains slow from 9.2% last year to an average 7.1% over the forecast horizon.

Energy

Due to oversupply, real oil prices fall in 1982 and 1983. The refiners' acquisition cost of foreign oil decreases 6.7% to $34.60 per barrel this year and average $35.65 next year. The fuel import bill is cut by $15 billion to $67 billion in 1982. Energy demand falls another 1.2% this year, before economic recovery stimulates small increases.

International

After no growth in 1980, the combined industrial output of Canada, Japan, and Western Europe recovers 0.7% this year, 3.6% in 1983, and 3.8% in 1984. With the dollar's appreciation, real exports decline 5.2% this year, but rebound 4.4% in 1983 and 5.8% in 1984. The growth of merchandise imports outpaces export growth, gradually worsening the trade balance. The U.S. current account surplus narrows from $7.6 billion in 1981 to $6.5 billion in 1982; a $1.4 billion decrease in fuel imports prevents further deterioration.

B) WOOD PRODUCTS DEMAND

Appendix A1 contains the results from the base case simulation of the FORSIM Model. This table details the history and forecast of key demand, supply, price and employment variables by product type (softwood lumber, softwood plywood, waferboard/OSB and particleboard). Each of the concepts in Table A1 is briefly discussed below.

Lumber

After peaking in 1978 at 41.3 billion board feet (BBF), U.S. softwood lumber demand collapsed to 31.1 BBF in 1981, a 25% decline. In the base case simulation, 1982 softwood lumber demand is projected to reach 30.0 BBF (3.5% below 1981), before demand climbs to 34.6 BBF in 1983 and 38.2 BBF in 1984.

Much of this recovery will be due to the pick-up in housing starts. In 1978, residential construction demand for softwood lumber amounted to 18.5 BBF (44% of total demand). By 1982, residential construction demand had fallen to 8.8 BBF (29% of total demand), just 48% of the 1978 level. The DRI forecast has softwood lumber demand for residential construction climbing to 13.8 BBF in 1984 and accounting for 36% of total softwood demand. Put another way, while total softwood lumber demand will climb 8.3 BBF between 1982 and 1984, 5.0 BBF (60%) of this growth will be in residential construction.

Plywood

Similar observations can be made about the other wood products. Plywood demand of 15.8 billion square feet (BSF) in 1982 is 22% below 1978 levels, and the residential construction demand share has fallen from 50% in 1977-1978 to 32% in 1982. With demand picking up in 1983 and 1984 and reaching 19.0 BSF in the latter year, residential construction's share will increase to 39%.

Waferboard/Oriented Strandboard (OSB)

Relative newcomers to the structural panel scene, waferboard and oriented strandboard (OSB) have been taking market share from plywood since 1975, and more particularly in the last two years. Previously produced almost entirely in Canada and exported to the U.S., waferboard and OSB production and capacity in the U.S. are growing rapidly as investment decisions made in 1979-1981 bear fruit in 1981-1983. U.S. waferboard/OSB capacity has grown from one mill in 1978 with a capacity of approximately 40 million square feet (3/4-inch basis), to six operating mills with a capacity close to 0.5 billion square feet. An additional six mills are scheduled to start-up in 1982-1983 adding an additional 450 million square feet to capacity.

As waferboard/OSB has lower variable production costs than plywood (due to lower fibre cost), waferboard and OSB will tend to take markets away from plywood. This tendency will be reinforced by the fact that waferboard/OSB mills are located relatively close to markets in the North Central and Northeast regions and have a transportation advantage over plywood coming from the South and West.

With waferboard/OSB capacity growing rapidly, waferboard/OSB consumption has trended upwards and not been subject to recent cyclical patterns. FORSIM estimates that waferboard/OSB demand in 1981 was 0.37 BSF (3/4-inch basis), and will climb to 0.46 BSF in 1982, 0.82 BSF in 1983 and to 1.30 BSF in 1984. Over 50% of this product will be used in residential construction.

Particleboard

After peaking in 1978 at 3.49 billion square feet (BSF, 3/4-inch basis), U.S. particleboard demand declined to 2.99 BSF in 1980 and 1981--a 14% drop. A further decline to 2.85 BSF is projected for 1982 before demand recovers subsequently to reach 3.36 BSF in 1984.

The drop in particleboard demand has been a lot less extreme than for lumber and plywood primarily because particleboard producers do not rely as heavily upon new residential construction as do their counterparts in sawmills and plywood mills. Residential construction accounted for 27% of particleboard demand in 1977-1978 (primarily in flooring and kitchen cabinet applications), or 0.94 BSF. FORSIM estimates residential construction demand for particleboard will be 0.51 BSF in 1982 or 18% of total demand. In the recovery, residential construction demand will climb to 0.71 BSF or 21% of total demand by 1984. Particleboard demand could recover significantly without a recovery in housing construction as long as demand for consumer durables (such as furniture, which uses particleboard) was allowed to climb. Furniture production is the single largest end-use market for particleboard, and this relative strength is projected to continue to climb (i.e., the furniture sector will continue to take an increasing proportion of particleboard production).

C) SOURCES OF SUPPLY

Softwood Lumber

Total U.S. softwood lumber production dropped from 31.0 BBF in 1977 to 22.7 BBF in 1981 and is estimated to drop further to 21.6 BBF in 1982. Over the same period, Canadian production climbed to a peak in 1979 of 18.5 BBF before declining to a strike-curtailed level of 16.3 BBF in 1981. Thus, while U.S. lumber production declined 30% between 1977 and 1982, Canadian production in 1982 will be just 8% below 1979 peak levels, and close to 1977 levels.

Much of the growth in Canadian production has been a direct result of growing U.S. demand for Canadian lumber. U.S. imports of Canadian lumber reached 11.8 BBF in 1978 before dropping to 9.2 BBF in 1981. The Canadian share of the U.S. market in 1978 was 28.7%, and had grown to 29.6% in 1981. With no strike curtailing Canadian production and shipments in 1982, U.S. imports of Canadian lumber are projected to rise to 10.1 BBF in 1982 and the Canadian share will soar to 33.7% (aided in large part by the weak Canadian dollar vis-à-vis its U.S. cousin). Table 1.3 summarizes these data.

Table 1.3

U.S. Softwood Lumber Demand and
Sources of Supply (BBF)

	1978	1979	1980	1981	1982	1983	1984
Total U.S. Demand	41.3	38.7	32.7	31.1	30.0	34.6	38.2
Imports from Canada	11.8	11.1	9.5	9.2	10.1	10.7	11.0
Canadian Share	29%	29%	29%	30%	34%	31%	29%
U.S. Production	30.9	29.9	24.3	22.7	21.6	25.8	28.9
U.S. Exports	1.4	1.7	2.0	1.9	1.8	1.9	2.1
U.S. Production for Domestic Consumption	29.5	28.2	22.3	20.8	19.8	23.9	26.8
U.S. Share	71%	71%	71%	70%	66%	69%	71%

The FORSIM forecast projects the Canadian share to return to the 29% level by 1984, but such a move is dependent either upon some strengthening in the Canadian dollar, or continued higher inflation in Canada relative to the U.S., or some combination of these two factors. Without these developments, Canadian mills would prove to be lower cost producers (in U.S. dollars), than their U.S. counterparts, throughout the forecast interval and would either hold their 1982 projected share or gain further share.

On a regional basis, lumber production declined more drastically in the two western regions of the U.S. than in the South. Between 1977 and 1981 production on the West Coast and in the Inland regions dropped 28% to 29%, while in the South the decline was 25%. These regional differences reflect two factors: (a) the relative strength of the South in the 1981-1982 recession; construction has held up better and continued growth of treating operations have supported southern lumber production; and (b) the higher timber and other manufacturing costs in the West which resulted in earlier losses and cutbacks in western production (see Appendix A1 for more regional details).

Softwood Plywood

U.S. softwood plywood production declined from 20.0 BSF in 1978 to 16.7 BSF in 1981 and to an estimated 16.1 BSF in 1982. By 1984, FORSIM projects production will have climbed to 18.8 BSF. The most dramatic shift in plywood production has been between West and South. Prior to 1964, plywood production did not exist in the South. In 1970, southern production was 3.3 BSF and by 1979 had reached 8.3 BSF. Western production, in the meanwhile, climbed from 11.0 BSF in 1970 to 11.9 BSF in 1977 before declining to 11.3 BSF in 1979 and 8.4 BSF in 1981. In the latter year, southern production was 8.3 BSF, or the same as its 1979 peak. Thus, the southern share of total plywood production had grown from 23% in 1970, to 34% in 1978, 42% in 1979 and 50% in 1981.

FORSIM projects the southern share to hover around that level for the forecast period as southern capacity growth has halted. Capacity will remain approximately at current levels over the forecast interval.

Waferboard/OSB

Approximately half of the non-veneered structural panels consumed in the U.S., such as waferboard and OSB, have originated in Canada in the past three years. As new U.S. mills come on stream, the Canadian share is projected to shrink to around 20% by 1984. However, with continued weakness of the Canadian dollar and if Canadian mills export approximately half of their output to the U.S., as they have done in past years, than the Canadian share would be higher. Nevertheless, higher export volumes from Canada will not necessarily displace U.S. waferboard but would more likely displace U.S. plywood as both Canadian and U.S. waferboard continue to be lower cost products than plywood. Through 1984, most U.S. waferboard/OSB production will remain concentrated in the Northeast and North Central regions.

Particleboard

In 1981, the U.S. West accounted for 42% of U.S. particleboard shipments, while the South and East accounted for the remaining 58%. These shares are held constant over the forecast interval. However, if the West, as a whole, recovers more rapidly from the current downturn than we expect, the western share of total particleboard production would be closer to 44% to 45%.

D) PRICES AND MARGINS

Wood product prices peaked in 1978-1979 and subsequently declined. By 1981, lumber 2X4 prices (listed in Appendix A1) averaged 26% below their 1979 highs, and 1/2-inch sheathing plywood were 14% below their 1978 peak. A further weakening in prices in early 1982 will reduce the average price level for the year for these items by 4% for lumber and by 9% for plywood below 1981 levels. Western plywood prices in particular have demonstrated great weakness this year and reflect the revolutionary changes in the western industry's cost structure, resulting from the precipitous fall in timber prices. Thus, given weak demand, a lower cost structure has led to a decline in price levels to an equivalent extent.

FORSIM estimates that at estimated 1982 price levels even the most efficient producers (the minimum variable cost producers) are operating at, or below, break-even on variable costs. The recovery in demand will result in price increases in 1983 (but still to levels below those reached in 1978-1979) before reaching a record level in 1984. Consequently, the industry would move into a profitable position after mid-1983 and would be able to recoup losses generated in the past three years in the subsequent 18 months.

E) EMPLOYMENT IMPACTS

Full details of employment levels by state are to be found in Appendix A2. After peaking in 1978-1979, employment by 1981 had declined to a level 20% below 1978 peaks in the West, and to 8% below the 1979 peak in the South. FORSIM projects further declines in 1982 (6% to 7% below 1981 levels), before recovering in 1983 and 1984. By 1984, FORSIM projects SIC24 employment in the West of 234,000 to be still 8% below 1978 levels, while southern employment will have climbed 3% above 1979 levels to 319,000. Recovery will be strongest in the western states of Oregon and Washington, and the western share of SIC24 employment will rise from 41.4% to 42.8% of the total between 1982 and 1984.

APPENDIX A-1

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Table 1

Forest Products Industry Summary Report, 1970-1981

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
MACROECONOMIC INDICATORS												
HOUSING STARTS(SAAR)												
TOTAL STARTS	1.43	2.04	2.36	2.04	1.33	1.16	1.54	1.96	2.00	1.72	1.30	1.10
SINGLE-FAMILY STARTS	0.81	1.15	1.31	1.13	0.88	0.89	1.17	1.44	1.42	1.17	0.85	0.71
MULTIFAMILY STARTS	0.62	0.89	1.05	0.91	0.45	0.27	0.37	0.52	0.58	0.55	0.44	0.39
INDUSTRIAL PRODUCTION INDEX(SAAR)	107.8	109.6	119.7	129.7	129.3	117.8	130.4	138.1	146.1	152.5	147.0	150.9
WOOD PRODUCTS DEMAND												
TOTAL U.S. LUMBER DEMAND(BBF)	31.19	36.11	39.57	38.43	32.31	30.30	35.33	39.79	41.29	38.72	32.65	31.10
RESIDENTIAL CONSTRUCTION DEMAND	11.30	16.17	18.98	17.18	12.01	10.92	14.58	18.35	18.51	15.84	10.95	9.40
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.36	0.44	0.48	0.44	0.37	0.36	0.41	0.46	0.44	0.40	0.33	0.30
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	13.73	16.90	18.47	18.18	16.26	15.90	17.91	19.54	20.30	19.36	16.87	16.47
RESIDENTIAL CONSTRUCTION DEMAND	5.53	8.46	10.05	9.40	7.12	6.08	7.82	9.92	10.18	8.77	6.37	5.56
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.40	0.50	0.54	0.52	0.43	0.38	0.43	0.50	0.50	0.45	0.38	0.34
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	--	0.00	--	--	--	0.13	0.15	0.25	0.28	0.29	0.32	0.37
RESIDENTIAL CONSTRUCTION DEMAND	--	0.00	--	--	--	0.13	0.14	0.23	0.26	0.24	0.21	0.21
RESIDENTIAL CONSTRUCTION DEMAND	--	--	--	--	--	0.97	0.96	0.93	0.92	0.83	0.65	0.56
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	1.62	2.21	2.97	3.42	3.05	2.72	3.09	3.32	3.49	3.38	2.99	2.99
RESIDENTIAL CONSTRUCTION DEMAND	0.45	0.73	1.03	1.09	0.76	0.59	0.75	0.91	0.94	0.84	0.60	0.56
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.28	0.33	0.35	0.32	0.25	0.22	0.24	0.27	0.27	0.25	0.20	0.19
WOOD PRODUCTS SUPPLY												
LUMBER PRODUCTION(BBF)												
U.S. TOTAL	27.11	29.43	30.87	31.29	27.19	25.71	29.34	30.99	30.90	29.88	24.34	22.71
U.S. WEST COAST	7.49	8.21	8.85	8.96	7.66	7.20	8.29	8.86	8.78	8.43	6.82	6.34
U.S. INLAND REGION	9.57	10.28	10.59	10.66	9.15	8.84	9.92	10.37	10.15	9.74	7.90	7.38
U.S. SOUTH	6.70	7.54	7.82	7.91	6.82	6.48	7.51	8.11	8.22	7.97	6.50	6.06
U.S. MINOR REGIONS	3.34	3.40	3.61	3.76	3.52	3.16	3.63	3.64	3.75	3.73	3.15	2.91
CANADA - TOTAL	10.79	12.28	13.44	14.94	13.00	11.15	14.84	17.23	18.40	18.52	18.24	16.28
- BRITISH COLUMBIA	7.65	8.93	9.50	10.42	8.74	7.45	10.66	12.04	12.54	12.51	11.98	10.42
- EAST OF THE ROCKIES	3.14	3.34	3.94	4.52	4.27	3.71	4.19	5.19	5.85	6.00	6.26	5.86

Table 1 (Continued)

Forest Products Industry Summary Report, 1970-1981

	Annual											
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
U.S. IMPORTS OF CANADIAN LUMBER	5.77	7.25	8.98	9.00	6.81	5.71	7.95	10.38	11.83	11.12	9.54	9.21
PLYWOOD PRODUCTION(BSF, 3/8-INCH)												
TOTAL U.S.	14.34	16.64	18.32	18.30	15.88	16.05	18.44	19.38	19.97	19.65	16.33	16.73
U.S. WEST	11.02	12.22	13.01	12.75	10.77	10.36	11.62	11.93	10.43	11.30	8.91	8.43
U.S. SOUTH	3.32	4.42	5.32	5.55	5.11	5.69	6.81	7.44	6.77	8.31	7.40	8.30
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)												
U.S. MILLS	--	--	--	--	--	0.10	0.10	0.13	0.15	0.14	0.15	0.20
IMPORTS FROM CANADA	--	--	--	--	--	0.03	0.04	0.12	0.13	0.15	0.17	0.17
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)												
TOTAL U.S.	1.66	2.31	3.01	3.43	2.99	2.43	3.08	3.45	3.60	3.25	2.83	2.83
U.S. WEST	0.70	0.97	1.27	1.44	1.26	1.02	1.29	1.45	1.51	1.37	1.19	1.19
U.S. MILLS IN SOUTH & EAST	0.96	1.34	1.75	1.99	1.73	1.41	1.79	2.00	2.09	1.89	1.64	1.64

KEY PRICES AND MARGINS

PRODUCT PRICES($/MBF OR $MSF)												
FIR-LARCH 2X4,K.D.	84	108	138	173	136	144	169	202	238	251	201	181
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	77	104	122	167	137	139	179	212	240	263	207	182
SOUTHERN PINE 2X4,K.D.(WEST)	--	--	143	176	128	127	172	211	222	252	211	202
WESTERN 1/2-INCH CDX, 4/5-PLY	78	89	130	134	121	131	167	206	225	215	207	200
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	71	83	119	121	111	115	154	199	213	195	195	175
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	93	87	91	104	121	97	103	127	175	157	178	177

PRICE/COST MARGINS												
FIR-LARCH 2X4	1.02	1.26	1.52	1.78	1.23	1.15	1.28	1.42	1.53	1.52	1.15	0.98
DOUGLAS-FIR 2X4, GREEN	1.04	1.34	1.48	1.85	1.40	1.26	1.49	1.63	1.69	1.74	1.30	1.10
SOUTHERN PINE 2X4	--	--	1.53	1.79	1.25	1.14	1.42	1.59	1.53	1.58	1.23	1.11
WESTERN 1/2-INCH CDX PLYWOOD	1.05	1.16	1.58	1.51	1.19	1.12	1.30	1.47	1.47	1.28	1.12	1.07
WESTERN 3/4-INCH PARTICLEBOARD	1.22	1.12	1.16	1.29	1.42	1.06	1.06	1.26	1.65	1.30	1.25	1.14

Table 1 (Continued)

Forest Products Industry Summary Report, 1970–1981

EMPLOYMENT IN SIC24(THOUSANDS)

Annual

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
WESTERN U.S.	--	--	232.4	243.0	229.2	207.0	228.5	244.8	254.3	253.2	218.8	204.8
SOUTHERN U.S.	--	--	300.5	313.5	298.3	247.9	272.6	288.5	302.9	309.8	289.4	285.5

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Table 2

Forest Products Industry Summary Report--Projections

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
MACROECONOMIC INDICATORS												
HOUSING STARTS(SAAR)												
TOTAL STARTS	0.93	0.91	1.12	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79
SINGLE-FAMILY STARTS	0.57	0.58	0.72	0.82	0.79	0.85	0.94	0.98	0.95	1.04	1.13	1.22
MULTIFAMILY STARTS	0.36	0.33	0.41	0.48	0.47	0.48	0.49	0.50	0.50	0.52	0.55	0.57
INDUSTRIAL PRODUCTION INDEX(SAAR)	140.6	140.9	142.6	145.1	147.6	150.8	154.2	156.6	158.4	161.1	163.7	166.5
WOOD PRODUCTS DEMAND												
TOTAL U.S. LUMBER DEMAND(BBF)	6.47	7.40	8.00	8.08	7.44	8.79	9.32	9.07	8.21	9.80	10.28	9.95
RESIDENTIAL CONSTRUCTION DEMAND	1.48	2.15	2.60	2.60	2.10	3.09	3.48	3.14	2.43	3.63	4.04	3.70
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.23	0.29	0.32	0.32	0.28	0.35	0.37	0.35	0.30	0.37	0.39	0.37
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	3.33	3.92	4.29	4.27	3.79	4.55	4.82	4.59	3.97	4.86	5.17	4.96
RESIDENTIAL CONSTRUCTION DEMAND	0.87	1.22	1.50	1.51	1.21	1.70	1.93	1.74	1.32	1.94	2.22	2.07
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.26	0.31	0.35	0.35	0.32	0.37	0.40	0.38	0.33	0.40	0.43	0.42
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.08	0.10	0.14	0.15	0.14	0.20	0.24	0.25	0.22	0.32	0.38	0.38
RESIDENTIAL CONSTRUCTION DEMAND	0.04	0.05	0.07	0.08	0.07	0.12	0.15	0.15	0.12	0.20	0.24	0.23
RESIDENTIAL CONSTRUCTION DEMAND	0.47	0.52	0.52	0.52	0.51	0.59	0.60	0.58	0.55	0.62	0.62	0.60
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	0.64	0.71	0.74	0.74	0.71	0.78	0.82	0.81	0.77	0.83	0.89	0.88
RESIDENTIAL CONSTRUCTION DEMAND	0.10	0.12	0.14	0.15	0.13	0.16	0.17	0.17	0.15	0.17	0.19	0.19
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.15	0.18	0.19	0.20	0.19	0.20	0.21	0.21	0.19	0.21	0.22	0.22
WOOD PRODUCTS SUPPLY												
LUMBER PRODUCTION(BBF)												
U.S. TOTAL	4.77	5.42	5.66	5.79	6.13	6.49	6.59	6.53	6.88	7.28	7.39	7.31
U.S. WEST COAST	1.34	1.46	1.53	1.64	1.73	1.74	1.77	1.84	1.94	1.95	1.98	2.06
U.S. INLAND REGION	1.57	1.71	1.80	1.93	2.04	2.06	2.09	2.17	2.29	2.30	2.34	2.43
U.S. SOUTH	1.29	1.41	1.48	1.59	1.68	1.70	1.72	1.79	1.89	1.91	1.94	2.02
U.S. MINOR REGIONS	0.69	0.73	0.73	0.76	0.84	0.86	0.87	0.87	0.93	0.96	0.97	0.96
CANADA - TOTAL	4.29	4.34	4.18	4.31	4.82	4.65	4.41	4.54	5.08	4.85	4.56	4.68
- BRITISH COLUMBIA	2.62	2.74	2.52	2.68	2.99	2.96	2.65	2.82	3.15	3.07	2.73	2.89
- EAST OF THE ROCKIES	1.67	1.60	1.66	1.63	1.83	1.70	1.75	1.72	1.94	1.78	1.83	1.80

Table 2 (Continued)

Forest Products Industry Summary Report--Projections

	Annual		
	1982	1983	1984

MACROECONOMIC INDICATORS

HOUSING STARTS(SAAR)			
TOTAL STARTS	1.07	1.37	1.42
SINGLE-FAMILY STARTS	0.67	0.88	1.09
MULTIFAMILY STARTS	0.39	0.48	0.83
INDUSTRIAL PRODUCTION INDEX(SAAR)	142.3	152.3	162.4

WOOD PRODUCTS DEMAND

TOTAL U.S. LUMBER DEMAND(BBF)	29.96	34.62	38.24
RESIDENTIAL CONSTRUCTION DEMAND	8.82	11.81	13.00
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.29	0.34	0.36
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	15.82	17.75	18.97
RESIDENTIAL CONSTRUCTION DEMAND	5.10	6.57	7.54
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.32	0.37	0.39
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.46	0.82	1.30
RESIDENTIAL CONSTRUCTION DEMAND	0.24	0.48	0.79
RESIDENTIAL CONSTRUCTION DEMAND	0.51	0.57	0.60
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	2.85	3.11	3.36
RESIDENTIAL CONSTRUCTION DEMAND	0.51	0.63	0.71
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.18	0.20	0.21

WOOD PRODUCTS SUPPLY

LUMBER PRODUCTION(BBF)			
U.S. TOTAL	21.64	25.75	28.85
U.S. WEST COAST	5.97	7.07	7.93
U.S. INLAND REGION	7.01	8.36	9.36
U.S. SOUTH	5.76	6.89	7.75
U.S. MINOR REGIONS	2.90	3.43	3.82
CANADA - TOTAL	17.12	18.42	19.18
- BRITISH COLUMBIA	10.55	11.42	11.83
- EAST OF THE ROCKIES	6.57	7.00	7.35

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Table 2 (Continued)

Forest Products Industry Summary Report--Projections

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
U.S. IMPORTS OF CANADIAN LUMBER	2.24	2.62	2.79	2.46	2.49	2.96	2.78	2.46	2.58	3.03	2.82	2.53
PLYWOOD PRODUCTION(BSF. 3/8-INCH)												
TOTAL U.S.	3.65	3.83	4.24	4.40	4.61	4.44	4.38	4.47	4.65	4.64	4.68	4.81
U.S. WEST	1.82	1.95	2.15	2.23	2.34	2.25	2.22	2.26	2.36	2.35	2.37	2.45
U.S. SOUTH	1.81	1.88	2.09	2.17	2.28	2.19	2.16	2.20	2.29	2.28	2.30	2.37
WAFERBOARD/OSB SHIPMENTS(BSF. 3/4-INCH)												
U.S. MILLS	0.05	0.07	0.10	0.11	0.10	0.16	0.19	0.20	0.19	0.26	0.30	0.30
IMPORTS FROM CANADA	0.03	0.03	0.03	0.04	0.03	0.04	0.05	0.04	0.03	0.06	0.08	0.08
PARTICLEBOARD SHIPMENTS(BSF. 3/4-INCH)												
TOTAL U.S.	0.71	0.75	0.70	0.73	0.77	0.85	0.79	0.79	0.81	0.86	0.83	0.85
U.S. WEST	0.24	0.32	0.29	0.31	0.32	0.36	0.33	0.33	0.34	0.36	0.35	0.36
U.S. MILLS IN SOUTH & EAST	0.33	0.44	0.41	0.43	0.45	0.49	0.46	0.46	0.47	0.50	0.48	0.49

KEY PRICES AND MARGINS

PRODUCT PRICES($/MBF OR $MSF)

	I	II	III	IV	I	II	III	IV	I	II	III	IV
FIR-LARCH 2X4,K.D.	158	167	178	183	208	215	240	254	286	296	327	341
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	154	164	184	185	205	221	241	248	275	291	317	324
SOUTHERN PINE 2X4,K.D.(WEST)	195	206	201	202	221	225	242	256	290	300	324	343
WESTERN 1/2-INCH CDX, 4/5-PLY	178	164	180	181	196	214	227	230	241	262	287	299
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	160	158	174	163	175	197	216	211	218	246	278	280
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	191	197	196	198	211	234	240	235	246	260	270	277

PRICE/COST MARGINS

	I	II	III	IV	I	II	III	IV	I	II	III	IV
FIR-LARCH 2X4	0.87	0.93	0.98	1.00	1.12	1.12	1.21	1.24	1.38	1.38	1.48	1.51
DOUGLAS-FIR 2X4, GREEN	0.96	0.98	1.12	1.14	1.26	1.30	1.38	1.39	1.52	1.57	1.67	1.66
SOUTHERN PINE 2X4	1.10	1.16	1.14	1.14	1.25	1.25	1.31	1.35	1.49	1.50	1.57	1.60
WESTERN 1/2-INCH CDX PLYWOOD	1.03	0.95	1.03	1.04	1.13	1.19	1.25	1.24	1.28	1.36	1.45	1.48
WESTERN 3/4-INCH PARTICLEBOARD	1.19	1.20	1.18	1.18	1.25	1.37	1.39	1.34	1.37	1.43	1.46	1.46

Table 2 (Continued)

Forest Products Industry Summary Report--Projections

	Annual		
	1982	1983	1984
U.S. IMPORTS OF CANADIAN LUMBER	10.11	10.70	10.96
PLYWOOD PRODUCTION(BSF, 3/8-INCH)			
TOTAL U.S.	16.12	17.90	18.78
U.S. WEST	8.15	9.07	9.53
U.S. SOUTH	7.95	8.83	9.24
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)			
U.S. MILLS	0.34	0.66	1.05
IMPORTS FROM CANADA	0.13	0.17	0.25
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)			
TOTAL U.S.	2.90	3.20	3.35
U.S. WEST	1.16	1.34	1.41
U.S. MILLS IN SOUTH & EAST	1.60	1.86	1.94
KEY PRICES AND MARGINS			
PRODUCT PRICES($/MBF OR $MSF)			
FIR-LARCH 2X4,K.D.	171	230	313
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	172	229	302
SOUTHERN PINE 2X4,K.D. (WEST)	201	236	314
WESTERN 1/2-INCH CDX, 4/5-PLY	176	217	272
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	164	200	255
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	196	230	263
PRICE/COST MARGINS			
FIR-LARCH 2X4	0.95	1.17	1.44
DOUGLAS-FIR 2X4, GREEN	1.05	1.33	1.60
SOUTHERN PINE 2X4	1.14	1.29	1.54
WESTERN 1/2-INCH CDX PLYWOOD	1.01	1.20	1.39
WESTERN 3/4-INCH PARTICLEBOARD	1.19	1.34	1.43

Table 2 (Continued)

Forest Products Industry Summary Report--Projections

EMPLOYMENT IN SIC24(THOUSANDS)

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
WESTERN U.S.	182.0	184.3	191.8	203.4	212.5	213.7	216.2	223.4	230.4	230.6	233.3	241.1
SOUTHERN U.S.	265.2	261.9	267.2	279.8	291.9	298.0	301.7	306.8	313.0	316.2	319.9	326.2

Table 2 (Continued)

Forest Products Industry Summary Report--Projections

EMPLOYMENT IN SIC24(THOUSANDS)

	Annual		
	1982	1983	1984
WESTERN U.S.	190.4	216.5	233.9
SOUTHERN U.S.	268.5	299.6	318.8

PART II

PESSIM FORECAST

A) MACROECONOMIC ENVIRONMENT AND
OTHER EXOGENOUS ASSUMPTIONS

The Pessim alternative simulation of the FORSIM Model was based upon the DRI-Macro "Stagflation" scenario of May 25, 1982. We quote the DRI Review of the U.S. Economy, June 1982, for a brief summary of this projection:

"...The principal alternative calls for continued stagflation, with inflation and interest rates higher than in the forecast and real activity consequently substantially lower. Under this scenario, unemployment stays above 9.4% throughout the forecast interval, and profits in 1983 would rise by less than 5%. A probability of .20 is attached to this scenario." (Page 15)

and,

"Risks for the housing sector are sizeable and continue to stem largely from uncertainties in the financial markets. A return to tight control over the monetary aggregates by the Federal Reserve certainly would limit the housing recovery from that depicted in the Control forecast. Whether Chairman Volcker sees the need to tighten up dramatically will hinge largely on the inflation outlook. The high inflation scenario, STAGFLATION052582, assumes that interest rates will decline less in the near term and rise more sharply in 1983, as the Federal Reserve tightens in response to the lack of a fundamental inflation improvement. This tightening will take its toll on housing, causing starts to average 565,000 units below the Control forecast over the next two yers." (Housing, Pages 1.43-1.44)

Table 2.1

Housing Starts and Home Sizes Compared

		1982	1983	1984
Total Starts	-Base Case	1.07	1.37	1.62
(Millions)	-Pessim	0.91	0.90	0.96
Single-Family Starts	-Base Case	0.67	0.89	1.09
(Millions)	-Pessim	0.58	0.58	0.62
Multifamily Starts	-Base Case	0.39	0.48	0.53
(Millions)	-Pessim	0.33	0.32	0.34
Ratio of Single-Family Starts				
To The Total	-Base Case	0.63	0.65	0.67
	-Pessim	0.64	0.64	0.65
Average Size of Single-				
Family Homes (Sq. Ft.)	-Base Case	1,640	1,650	1,690
	-Pessim	1,620	1,560	1,575

The Pessim alternative posits housing starts 15% lower in 1982, 34% lower in 1983 and 41% lower in 1984 than the Control or Base Case forecast. In addition, the ratio of single-family to total starts would be lower in the Pessim alternative (reducing wood consumption per new housing unit below Control levels), and the average size of single-family homes would continue to decline through 1983. Consequently, the average size of a single-family house is projected to be 115 square feet smaller in the Pessim case than in the Control projection. (See the discussion about the impact of changes in home sizes on wood demand in Part I(A) of this report.)

B) WOOD PRODUCTS DEMAND

Details of the Pessim forecast are to be found in Appendix B1 (Summary Report), and in greater detail in the tables located in Appendix B3. Table 2.2 summarizes the key differences between demand in the Control and Pessim forecasts. Demand in each year for each product would remain below Control levels; the recovery in demand between 1982 and 1984 would be significantly weaker then in the Control forecast.

Table 2.2

Wood Products Demand Compared

		1982	1983	1984
Lumber (BBF)	-Base Case	30.0	34.6	38.2
	-Pessim	28.3	29.1	30.6
Plywood (BSF)	-Base Case	15.8	17.8	19.0
	-Pessim	14.8	15.2	15.5
Waferboard/OSB (BSF)	-Base Case	0.46	0.82	1.30
	-Pessim	0.41	0.65	0.95
Particleboard (BSF)	-Base Case	2.85	3.11	3.36
	-Pessim	2.73	2.72	2.78

Thus, lumber demand in 1982 in the Pessim alternative would be 28.3 BBF (6% below Control) and would only climb to 30.6 BBF in 1984 (20% below Control). A similar pattern emerges with plywood, waferboard/OSB, and particleboard demand; i.e., slower growth and lower levels of demand.

C) SOURCES OF SUPPLY

With U.S. wood product consumption significantly lower in the Pessim projection than in Control, U.S. production levels of lumber, plywood and panels are also naturally lower. U.S. lumber production would remain lower than in the Control projection over the forecast interval, and by 1984 would be 21% below Control levels. Each of the major U.S. regions would experience a similar reduction in production (of around 21% by 1984). In part, this loss of U.S. lumber production will be due to higher Canadian share of U.S. lumber markets as well as lower levels of economic activity. In the tighter market, lower cost Canadian producers would enjoy a competitive edge over U.S. producers and would tend to gain share (all

other factors remaining constant). FORSIM projects that the Canadian share of U.S. markets would be above Control levels by 1 to 2 percentage points (see Table 2.3).

		1982	1983	1984
Table 2.3				
Lumber Sources of Supply Compared				
U.S. Production	-Base Case	21.6	25.8	28.9
	-Pessim	20.3	20.7	22.8
U.S. Imports of	-Base Case	10.1	10.7	11.0
Canadian Lumber	-Pessim	9.9	9.7	9.5
Canadian Share	-Base Case	34%	31%	29%
	-Pessim	35%	33%	31%

Similar impacts are to be noted for the three other major wood products (see Table 2.4). By 1984, production and shipments would be approximately 17% to 18% below Control levels.

		1982	1983	1984
Table 2.4				
Panelboard Sources of Supply Compared				
Plywood Production	-Base Case	16.1	17.9	18.8
	-Pessim	15.0	15.6	15.4
Waferboard/OSB	-Base Case	0.34	0.66	1.05
(U.S. Production)	-Pessim	0.31	0.57	0.87
Particleboard Shipments	-Base Case	2.90	3.20	3.35
	-Pessim	2.74	2.69	2.74

D) PRICES AND MARGINS

Table 2.5 summarizes the differences between the Control and Pessim forecasts for the price of one lumber item and of one plywood item. Product prices are projected to be 30% below Control levels in 1984. Margins, even for the most efficient producers, will remain very weak through 1983 before starting to improve late in 1984. Compared with the Control forecast, 1984 margins will be 40 points lower (e.g., 1.10 instead of 1.54 for lumber, and 1.01 instead of 1.39 for plywood). Consequently, the wood products industry would remain unprofitable through the middle of 1984.

		1982	1983	1984

Table 2.5

Product Prices and Margins Compared

		1982	1983	1984
Price Southern Pine (SYP) 2X4	–Base Case	201	236	314
	–Pessim	191	183	217
Price Western 1/2-Inch CDX	–Base Case	176	217	272
	–Pessim	162	168	195
Price/Cost Margin SYP 2X4	–Base Case	1.14	1.29	1.54
	–Pessim	1.08	1.01	1.10
Price/Cost Margin Western 1/2-Inch CDX	–Base Case	1.01	1.20	1.39
	–Pessim	0.94	0.95	1.01

E) EMPLOYMENT

With demand substantially weaker than in the Control forecast, employment levels only recover marginally and remain substantially below Control levels through 1984. Table 2.6 compares the two scenarios. By 1984 employment would be 11% to 12% below Control levels and would have recovered only to those levels recorded in 1980 (i.e., well below the 1978 peak).

Table 2.6

Employment Impacts Compared

		1982	1983	1984
Western Region	–Base Case	190	217	234
	–Pessim	186	195	207
South	–Base Case	269	300	319
	–Pessim	264	272	283

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APPENDIX B-1

Table 1

Forest Products Industry Summary Report—Projections
(Pessim Case)

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
MACROECONOMIC INDICATORS												
HOUSING STARTS(SAAR)												
TOTAL STARTS	0.93	0.89	0.92	0.91	0.88	0.87	0.94	0.93	0.92	0.92	0.96	1.04
SINGLE-FAMILY STARTS	0.57	0.58	0.59	0.59	0.57	0.56	0.60	0.59	0.59	0.59	0.62	0.67
MULTIFAMILY STARTS	0.36	0.32	0.33	0.32	0.31	0.31	0.34	0.34	0.33	0.33	0.34	0.37
INDUSTRIAL PRODUCTION INDEX(SAAR)	140.6	141.3	142.2	142.5	138.6	138.3	141.3	141.9	140.0	141.7	145.2	149.1
WOOD PRODUCTS DEMAND												
TOTAL U.S. LUMBER DEMAND(BBF)	6.47	7.21	7.39	7.19	6.60	7.48	7.60	7.36	6.84	7.83	7.97	7.91
RESIDENTIAL CONSTRUCTION DEMAND	1.48	2.12	2.23	1.93	1.46	1.97	2.14	1.88	1.47	2.03	2.17	2.00
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.23	0.29	0.30	0.27	0.22	0.26	0.28	0.26	0.21	0.26	0.27	0.25
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	3.33	3.74	3.91	3.78	3.40	3.97	4.02	3.81	3.41	3.99	4.06	4.00
RESIDENTIAL CONSTRUCTION DEMAND	0.87	1.20	1.29	1.12	0.85	1.11	1.22	1.08	0.83	1.11	1.22	1.15
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.26	0.32	0.33	0.30	0.25	0.28	0.30	0.28	0.24	0.28	0.30	0.29
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.08	0.10	0.12	0.12	0.11	0.16	0.19	0.18	0.17	0.22	0.26	0.27
RESIDENTIAL CONSTRUCTION DEMAND	0.04	0.05	0.06	0.06	0.05	0.07	0.09	0.09	0.07	0.11	0.13	0.12
RESIDENTIAL CONSTRUCTION DEMAND	0.47	0.54	0.52	0.47	0.42	0.47	0.48	0.47	0.43	0.48	0.48	0.46
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	0.64	0.70	0.70	0.69	0.63	0.69	0.70	0.67	0.63	0.69	0.72	0.72
RESIDENTIAL CONSTRUCTION DEMAND	0.10	0.12	0.13	0.12	0.10	0.11	0.11	0.10	0.09	0.10	0.11	0.10
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.15	0.18	0.19	0.18	0.16	0.15	0.16	0.16	0.14	0.14	0.15	0.14
WOOD PRODUCTS SUPPLY												
LUMBER PRODUCTION(BBF)												
U.S. TOTAL	4.77	5.33	5.24	4.93	5.05	5.32	5.26	5.09	5.48	5.85	5.80	5.70
U.S. WEST COAST	1.34	1.44	1.42	1.40	1.42	1.43	1.41	1.43	1.54	1.57	1.56	1.60
U.S. INLAND REGION	1.57	1.69	1.67	1.65	1.67	1.69	1.67	1.70	1.82	1.85	1.84	1.89
U.S. SOUTH	1.29	1.39	1.37	1.36	1.37	1.39	1.38	1.40	1.50	1.53	1.52	1.56
U.S. MINOR REGIONS	0.69	0.71	0.65	0.63	0.70	0.70	0.68	0.68	0.76	0.77	0.75	0.77
CANADA - TOTAL	4.29	4.32	4.12	4.18	4.62	4.41	4.14	4.24	4.74	4.50	4.18	4.27
- BRITISH COLUMBIA	2.62	2.73	2.47	2.58	2.83	2.75	2.45	2.59	2.87	2.78	2.43	2.56
- EAST OF THE ROCKIES	1.67	1.59	1.65	1.60	1.79	1.66	1.70	1.66	1.87	1.72	1.75	1.71

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Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Pessim Case)

	Annual		
	1982	1983	1984

MACROECONOMIC INDICATORS

	1982	1983	1984
HOUSING STARTS(SAAR)			
TOTAL STARTS	0.91	0.90	0.96
SINGLE-FAMILY STARTS	0.58	0.58	0.62
MULTIFAMILY STARTS	0.33	0.32	0.34
INDUSTRIAL PRODUCTION INDEX(SAAR)	141.7	140.0	144.0

WOOD PRODUCTS DEMAND

	1982	1983	1984
TOTAL U.S. LUMBER DEMAND(BBF)	28.25	29.05	30.56
RESIDENTIAL CONSTRUCTION DEMAND	7.76	7.45	7.67
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.27	0.26	0.25
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	14.76	15.21	15.46
RESIDENTIAL CONSTRUCTION DEMAND	4.49	4.26	4.31
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.30	0.28	0.28
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.41	0.64	0.92
RESIDENTIAL CONSTRUCTION DEMAND	0.21	0.30	0.43
RESIDENTIAL CONSTRUCTION DEMAND	0.50	0.46	0.46
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	2.73	2.70	2.77
RESIDENTIAL CONSTRUCTION DEMAND	0.48	0.42	0.40
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.17	0.16	0.15

WOOD PRODUCTS SUPPLY

	1982	1983	1984
LUMBER PRODUCTION(BBF)			
U.S. TOTAL	20.27	20.71	22.83
U.S. WEST COAST	5.60	5.70	6.27
U.S. INLAND REGION	6.58	6.73	7.40
U.S. SOUTH	5.40	5.53	6.11
U.S. MINOR REGIONS	2.68	2.75	3.05
CANADA - TOTAL	16.92	17.41	17.68
- BRITISH COLUMBIA	10.39	10.61	10.63
- EAST OF THE ROCKIES	6.52	6.80	7.05

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Pessim Case)

	1982 I	1982 II	1982 III	1982 IV	1983 I	1983 II	1983 III	1983 IV	1984 I	1984 II	1984 III	1984 IV
U.S. IMPORTS OF CANADIAN LUMBER	2.24	2.60	2.74	2.34	2.31	2.71	2.51	2.18	2.26	2.66	2.43	2.13
PLYWOOD PRODUCTION(BSF, 3/8-INCH)												
TOTAL U.S.	3.65	3.71	3.87	3.81	4.07	3.95	3.76	3.78	3.98	3.89	3.70	3.85
U.S. WEST	1.86	1.89	1.97	1.93	2.06	2.00	1.91	1.93	2.03	1.99	1.89	1.98
U.S. SOUTH	1.79	1.82	1.91	1.88	2.00	1.94	1.85	1.85	1.95	1.90	1.80	1.88
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)												
U.S. MILLS	0.05	0.07	0.09	0.10	0.09	0.13	0.17	0.17	0.16	0.21	0.24	0.24
IMPORTS FROM CANADA	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)												
TOTAL U.S.	0.71	0.73	0.65	0.66	0.67	0.73	0.66	0.64	0.66	0.71	0.68	0.69
U.S. WEST	0.30	0.31	0.27	0.28	0.28	0.30	0.28	0.27	0.28	0.30	0.28	0.29
U.S. MILLS IN SOUTH & EAST	0.41	0.42	0.37	0.38	0.39	0.42	0.38	0.37	0.38	0.41	0.39	0.40

KEY PRICES AND MARGINS

PRODUCT PRICES($/MBF OR $MSF)

	1982 I	1982 II	1982 III	1982 IV	1983 I	1983 II	1983 III	1983 IV	1984 I	1984 II	1984 III	1984 IV
FIR-LARCH 2X4,K.D.	158	165	167	161	177	175	188	192	217	218	233	241
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	154	163	170	157	166	173	185	182	202	210	226	226
SOUTHERN PINE 2X4,K.D.(WEST)	195	203	189	175	184	178	184	186	211	210	219	227
WESTERN 1/2-INCH CDX, 4/5-PLY	178	159	161	151	159	170	173	170	183	191	200	207
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	160	153	153	133	140	152	159	151	162	173	185	187
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	191	193	188	184	186	186	189	185	192	194	199	200

PRICE/COST MARGINS

	1982 I	1982 II	1982 III	1982 IV	1983 I	1983 II	1983 III	1983 IV	1984 I	1984 II	1984 III	1984 IV
FIR-LARCH 2X4	0.87	0.91	0.92	0.88	0.95	0.91	0.94	0.94	1.04	1.00	1.04	1.05
DOUGLAS-FIR 2X1, GREEN	0.96	0.97	1.04	0.99	1.04	1.03	1.08	1.04	1.12	1.14	1.19	1.16
SOUTHERN PINE 2X4	1.10	1.15	1.07	0.99	1.04	0.99	1.00	1.00	1.12	1.08	1.10	1.11
WESTERN 1/2-INCH CDX PLYWOOD	1.03	0.93	0.93	0.89	0.95	0.96	0.97	0.93	0.98	1.00	1.02	1.02
WESTERN 3/4-INCH PARTICLEBOARD	1.19	1.18	1.13	1.10	1.10	1.09	1.09	1.05	1.07	1.06	1.07	1.06

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Pessim Case)

	Annual		
	1982	1983	1984
U.S. IMPORTS OF CANADIAN LUMBER	9.92	9.71	9.48
PLYWOOD PRODUCTION(BSF, 3/8-INCH)			
TOTAL U.S.	15.04	15.55	15.42
U.S. WEST	7.65	7.90	7.89
U.S. SOUTH	7.39	7.65	7.53
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)			
U.S. MILLS	0.31	0.56	0.86
IMPORTS FROM CANADA	0.10	0.07	0.07
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)			
TOTAL U.S.	2.74	2.69	2.74
U.S. WEST	1.15	1.13	1.15
U.S. MILLS IN SOUTH & EAST	1.59	1.56	1.59
KEY PRICES AND MARGINS			
PRODUCT PRICES($/MBF OR $MSF)			
FIR LARCH 2X4,K.D.	163	183	227
DOUGLAS FIR 2X1,GREEN(PORTLAND)	161	177	216
SOUTHERN PINE 2X4,K D.(WEST)	191	183	217
WESTERN 1/2-INCH CDX, 4/5-PLY	162	168	195
SOUTHERN 1/2 INCH CDX, 3 PLY(WEST)	150	151	177
WESTERN 3/4 INCH INDUSTRIAL PARTICLEBOARD	199	186	196
PRICE/COST MARGINS			
FIR LARCH 2X4	0.89	0.93	1.03
DOUGLAS FIR 2X1, GREEN	0.99	1.05	1.15
SOUTHERN PINE 2X4	1.08	1.01	1.10
WESTERN 1/2-INCH CDX PLYWOOD	0.94	0.95	1.01
WESTERN 3/4-INCH PARTICLEBOARD	1.15	1.08	1.07

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Pessim Case)

EMPLOYMENT IN SIC24(THOUSANDS)

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
WESTERN U.S.	182.0	183.1	186.2	190.1	193.1	192.2	192.3	196.4	202.6	203.9	205.1	211.1
SOUTHERN U.S.	265.2	260.6	261.1	264.9	268.2	268.5	267.9	269.3	273.6	276.4	278.4	283.1

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Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Pessim Case)

EMPLOYMENT IN SIC24(THOUSANDS)

	Annual		
	1982	1983	1984
WESTERN U.S.	185.4	193.5	205.7
SOUTHERN U.S.	262.9	268.5	277.9

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PART III

CANADIAN QUOTA ALTERNATIVE

A) INTRODUCTION

FORSIM's third alternative for GAO assumed the imposition of a quota on Canadian lumber imports equal to 20% of U.S. lumber demand (rather than the forecast levels of 29% to 33%). This simulation utilized the macroeconomic exogenous assumptions in the Base Case (see Part I for a discussion of these assumptions) and restricted Canadian lumber shipments to the U.S., thus disrupting the sources of supply outlined in the Base Case.

Implementing a quota on Canadian lumber imports into the U.S. will affect the distribution of market shares in other international markets. In the FORSIM Model these changes in foreign markets are exogenous. More specifically, U.S. exports to Canada and other countries are exogenous, and Canadian exports to the U.K. and other overseas countries are also exogenous. To account for the impact of the U.S. quota on these international markets we assumed that Canadian producers would prove to be substantially more competitive in both Canadian domestic and in overseas markets. Consequently, we reduced U.S. exports to Canada and other countries by 50% from the Control levels. Meanwhile, Canadian overseas exports were raised by equivalent volumes.

This simulation was run from the third quarter of 1982 through the end of 1984. During this short run period, total U.S. lumber demand remained essentially unchanged from Base Case levels. In this simulation the reduction in Canadian imports is immediately reflected in higher lumber prices, higher U.S. lumber production, and higher employment in the U.S., as U.S. mills fill the supply void left by reduced imports. The long run implications of an import quota are not evident in this short run scenario. Some of the impacts from the continued implementation of this trade policy would be:

.   reduced U.S. lumber demand as material substitution took place;

.   higher timber prices as a result of higher product prices and faster depletion of domestic timber reserves;

.   increased investment in new capacity;

.   increased competition in international markets; and

.   some attrition of Canadian production capacity.

None of these long run impacts are fully illustrated in this simulation.

B) SOURCES OF SUPPLY

The FORSIM Model was run from the third quarter of 1982 through the end of 1984 with a Canadian quota set at 20% of U.S. demand. The quota had immediate and significant impacts on U.S. lumber production. FORSIM estimates U.S. production would be 1.2 BBF higher in 1982, 2.7 BBF in 1983 and 2.0 BBF in 1984 if the quota was imposed (see Table 3.1). Canadian production would be lower despite offsetting increases in overseas exports.

Table 3.1

Lumber Sources of Supply Compared

		1982	1983	1984
Total U.S. Production	-Base Case	21.6	25.8	28.9
	-Canadian Quota	22.8	28.5	30.9
Canadian Production	-Base Case	17.1	18.4	19.2
	-Canadian Quota	15.7	16.0	17.1
U.S. Imports of Canadian Lumber	-Base Case	10.1	10.7	11.0
	-Canadian Quota	8.1	6.9	7.7
Canadian Share	-Base Case	34%	31%	29%
	-Canadian Quota	27%	20%	20%

Canadian shipments of lumber to the U.S. would be 2.0 BBF lower in 1982, 3.8 BBF lower in 1983 and 3.3 BBF lower in 1984. The drop in Canadian lumber imports is greater than the increase in U.S. production for two reasons: (i) the loss of U.S. overseas export markets allows U.S. production to be channeled into the U.S. that would otherwise have gone overseas; and (ii) mill and dealer inventories would be reduced to lower levels to meet higher consumption.

On a regional basis, production levels would be 10% above Base Case levels in 1983 in each region (see Table 3.2). However, by 1984 the U.S. West Coast would show greater increases in production over the Base Case than the Inland and South. This reflects the greater slack currently prevailing in the West which will allow for a larger pick-up in production in any recovery.

Table 3.2

Lumber Production By Region Compared

		1982	1983	1984
U.S. West Coast	-Base Case	6.0	7.1	7.9
	-Canadian Quota	6.3	7.8	8.5
U.S. Inland	-Base Case	7.0	8.4	9.4
	-Canadian Quota	7.4	9.3	10.0
U.S. South	-Base Case	5.8	6.9	7.8
	-Canadian Quota	6.1	7.6	8.3
U.S. Minor Regions	-Base Case	2.9	3.4	3.8
	-Canadian Quota	3.1	3.8	4.1

C) PRICES, MARGINS AND INFLATIONARY IMPACTS

With Canadian competition curbed, higher demand on U.S. mills (new orders) results in higher production, higher unfilled order/mill stock ratios (a measure of industry tightness) and consequently higher prices. FORSIM did not simulate the impacts on timber stumpage prices of the higher demand for timber by U.S. mills. Thus, the prices shown in Appendices C1 and C3 reflect no cost-push (which can be expected if a 20% quota on Canadian lumber was to be imposed), but merely demonstrate the impact of shifting demand-supply conditions.

Table 3.3 summarizes some of the price differences between the Control and the alternative forecasts. Lumber prices would be 10% to 12% higher in 1983 in the alternative forecast than in Control, due purely to changing the demand-supply balance. Similarly, prices would be 7% to 8% higher in 1984. FORSIM emphasizes that when the full impacts on stumpage prices of higher U.S. mill demand for timber are translated into lumber variable costs, product prices would be 15% to 20% higher than in Control.

Demand/supply conditions determine lumber price-cost margins. Given the increased demand placed on U.S. mills and lower lumber production in North America, price/cost margins are substantially higher in this simulation than in the Control forecast (see Table 3.3).

Table 3.3

Prices and Margins Compared

		1982	1983	1984
PRICES				
Fir-Larch 2X4	-Base Case	171	230	313
	-Canadian Quota	177	253	335
Southern Pine 2X4	-Base Case	201	236	314
	-Canadian Quota	208	261	338
Douglas-Fir 2X4 (Green)	-Base Case	172	229	302
	-Canadian Quota	179	256	328
MARGINS				
Fir-Larch 2X4	-Base Case	0.95	1.17	1.44
	-Canadian Quota	0.98	1.28	1.53
Southern Pine 2X4	-Base Case	1.14	1.29	1.54
	-Canadian Quota	1.17	1.42	1.66
Douglas-Fir 2X4 (Green)	-Base Case	1.05	1.33	1.60
	-Canadian Quota	1.09	1.49	1.75

The full impacts of a 20% quota on Canadian lumber imports would not be felt until 1985 and 1986. Under the simulation presented above, U.S. mills by 1984 will be operating at close to their capacity of 33.7 BBF. In this scenario the production/capacity ratio in 1984 for U.S. mills is 0.92 even though housing starts are running at just 1.62 million. If housing recovers to higher levels (1.8 million starts in 1985), and other end-use markets show a healthy recovery, then product prices would escalate rapidly and have major inflationary impacts on the construction industry and other sectors of the U.S. economy.

D) EMPLOYMENT

A major positive benefit of the Canadian quota would be on employment in SIC24. FORSIM estimates that by 1983 total employment in SIC24 would be 5% or 23,500 higher if the Canadian share of U.S. lumber demand was held to 20% (Table 3.4). As would be expected, the gain in western employment would outpace that for the South, particularly in 1983, and Oregon and Washington in particular would register strong gains. Full state-by-state details are to be found in Appendix C2.

Table 3.4

SIC24 Employment Impacts Compared

		1982	1983	1984
Western Region	-Base Case	190.4	216.5	233.9
	-Canadian Quota	193.2	227.3	241.6
South	-Base Case	268.5	299.6	318.8
	-Canadian Quota	270.8	312.3	328.7
Total	-Base Case	458.9	516.1	552.7
	-Canadian Quota	464.0	539.6	570.3

E) SUMMARY

An import quota has different impacts on economic welfare at different levels of U.S. consumption (reflecting different points in the economic cycle). When U.S. markets are weak, Canadian lumber shipments can be argued to be a burden to U.S. producers. The imposition of the quota would increase U.S. producer's market share and result in higher profitability and employment. However, in tight markets, the lack of Canadian wood during cyclical peaks would prove to be a burden on consumers in terms of higher prices, higher general inflation, and supply shortages. The costs and benefits of such a quota at different points in the cycle are reflected to a limited extent in this simulation. Lastly, imposing a quota in recessionary periods, and removing it in strong periods, would not produce a steady supply of lumber over all periods and is not a viable long run alternative. For obvious reasons, Canadian producers would not invest in an industry where markets were clearly endangered by legislative action. Consequently supply at peak periods would not be available from Canada, supply shortages would develop and prices would climb rapidly.

The quota would provide positive benefits for:

- U.S. lumber producers;

- U.S. timber owners;

- U.S. mill and forest employees (increased employment opportunities).

Offsetting these benefits would be:

- higher product and timber prices;

- shortages in peak or strong markets;

- higher inflation;

- international repercussions for free trade policies.

APPENDIX C-1

Table 1

Forest Products Industry Summary Report—Projections
(Quota Case)

	1982 I	II	III	IV	1983 I	II	III	IV	1984 I	II	III	IV
MACROECONOMIC INDICATORS												
HOUSING STARTS(SAAR)												
TOTAL STARTS	0.93	0.91	1.12	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79
SINGLE-FAMILY STARTS	0.57	0.58	0.72	0.82	0.79	0.85	0.94	0.98	0.95	1.04	1.13	1.22
MULTIFAMILY STARTS	0.36	0.33	0.41	0.48	0.47	0.48	0.49	0.50	0.50	0.52	0.55	0.57
INDUSTRIAL PRODUCTION INDEX(SAAR)	140.6	140.9	142.6	145.1	147.6	150.8	154.2	156.6	158.4	161.1	163.7	166.5
WOOD PRODUCTS DEMAND												
TOTAL U.S. LUMBER DEMAND(BBF)	6.47	7.40	8.00	8.08	7.44	8.79	9.31	9.06	8.19	9.76	10.23	9.89
RESIDENTIAL CONSTRUCTION DEMAND	1.48	2.15	2.60	2.60	2.10	3.09	3.48	3.13	2.42	3.61	4.02	3.67
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.23	0.29	0.32	0.32	0.28	0.35	0.37	0.35	0.30	0.37	0.39	0.37
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	3.33	3.92	4.29	4.27	3.79	4.55	4.82	4.59	3.97	4.86	5.17	4.96
RESIDENTIAL CONSTRUCTION DEMAND	0.87	1.22	1.50	1.51	1.21	1.70	1.93	1.74	1.32	1.94	2.22	2.07
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.26	0.31	0.35	0.35	0.32	0.37	0.40	0.38	0.33	0.40	0.43	0.42
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.08	0.10	0.14	0.15	0.14	0.20	0.24	0.25	0.22	0.32	0.38	0.38
RESIDENTIAL CONSTRUCTION DEMAND	0.04	0.05	0.07	0.08	0.07	0.12	0.15	0.15	0.12	0.20	0.24	0.23
RESIDENTIAL CONSTRUCTION DEMAND	0.47	0.52	0.52	0.52	0.51	0.59	0.60	0.58	0.55	0.62	0.62	0.60
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	0.64	0.71	0.74	0.74	0.71	0.78	0.82	0.81	0.77	0.83	0.89	0.88
RESIDENTIAL CONSTRUCTION DEMAND	0.10	0.12	0.14	0.15	0.13	0.16	0.17	0.17	0.15	0.17	0.19	0.19
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.15	0.18	0.19	0.20	0.19	0.20	0.21	0.21	0.19	0.21	0.22	0.22
WOOD PRODUCTS SUPPLY												
LUMBER PRODUCTION(BBF)												
U.S. TOTAL	4.77	5.42	6.08	6.48	6.89	7.32	7.27	7.03	7.44	7.91	7.87	7.64
U.S. WEST COAST	1.34	1.46	1.63	1.83	1.94	1.96	1.95	1.98	2.10	2.12	2.12	2.16
U.S. INLAND REGION	1.57	1.71	1.92	2.16	2.29	2.32	2.31	2.34	2.47	2.50	2.49	2.54
U.S. SOUTH	1.29	1.41	1.58	1.78	1.89	1.91	1.90	1.93	2.05	2.07	2.07	2.11
U.S. MINOR REGIONS	0.69	0.73	0.82	0.85	0.94	0.97	0.95	0.92	1.00	1.05	1.02	0.99
CANADA - TOTAL	4.29	4.34	3.29	3.79	4.21	3.81	3.80	4.19	4.48	4.11	4.10	4.42
BRITISH COLUMBIA	2.62	2.74	1.85	2.26	2.48	2.27	2.19	2.54	2.65	2.47	2.37	2.69
EAST OF THE ROCKIES	1.67	1.60	1.44	1.53	1.73	1.54	1.62	1.65	1.83	1.65	1.73	1.74

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Quota Case)

	Annual		
	1982	1983	1984

MACROECONOMIC INDICATORS

HOUSING STARTS(SAAR)

TOTAL STARTS	1.07	1.37	1.62
SINGLE-FAMILY STARTS	0.67	0.89	1.09
MULTIFAMILY STARTS	0.39	0.48	0.53
INDUSTRIAL PRODUCTION INDEX(SAAR)	142.3	152.3	162.4

WOOD PRODUCTS DEMAND

TOTAL U.S. LUMBER DEMAND(BBF)	29.96	34.59	38.07
RESIDENTIAL CONSTRUCTION DEMAND	8.82	11.80	13.72
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.29	0.34	0.36
TOTAL PLYWOOD DEMAND(BSF, 3/8-INCH)	15.82	17.75	18.97
RESIDENTIAL CONSTRUCTION DEMAND	5.10	6.57	7.54
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.32	0.37	0.39
WAFERBOARD/OSB DEMAND(BSF, 3/4-INCH)	0.46	0.82	1.30
RESIDENTIAL CONSTRUCTION DEMAND	0.24	0.48	0.79
RESIDENTIAL CONSTRUCTION DEMAND	0.51	0.57	0.60
PARTICLEBOARD DEMAND(BSF, 3/4-INCH)	2.85	3.11	3.36
RESIDENTIAL CONSTRUCTION DEMAND	0.51	0.63	0.71
RESIDENTIAL CONSTRUCTION DEMAND SHARE	0.18	0.20	0.21

WOOD PRODUCTS SUPPLY

LUMBER PRODUCTION(BBF)

U.S. TOTAL	22.75	28.51	30.86
U.S. WEST COAST	6.26	7.84	8.49
U.S. INLAND REGION	7.36	9.26	10.01
U.S. SOUTH	6.05	7.63	8.30
U.S. MINOR REGIONS	3.08	3.78	4.06
CANADA TOTAL	15.71	16.01	17.11
- BRITISH COLUMBIA	9.47	9.47	10.17
- EAST OF THE ROCKIES	6.25	6.54	6.95

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Quota Case)

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
U.S. IMPORTS OF CANADIAN LUMBER	2.24	2.62	1.60	1.62	1.50	1.76	1.87	1.81	1.65	1.95	2.05	2.02
PLYWOOD PRODUCTION(BSF, 3/8-INCH)												
TOTAL U.S.	3.65	3.83	4.24	4.40	4.61	4.44	4.38	4.47	4.65	4.64	4.68	4.81
U.S. WEST	1.82	1.95	2.15	2.23	2.34	2.25	2.22	2.26	2.36	2.35	2.37	2.45
U.S. SOUTH	1.81	1.88	2.09	2.17	2.28	2.19	2.16	2.20	2.29	2.28	2.30	2.37
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)												
U.S. MILLS	0.05	0.07	0.10	0.11	0.10	0.16	0.19	0.20	0.19	0.26	0.30	0.30
IMPORTS FROM CANADA	0.03	0.03	0.03	0.04	0.03	0.04	0.05	0.04	0.03	0.06	0.08	0.08
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)												
TOTAL U.S.	0.71	0.75	0.70	0.73	0.77	0.85	0.79	0.79	0.81	0.86	0.83	0.85
U.S. WEST	0.24	0.32	0.29	0.31	0.32	0.36	0.33	0.33	0.34	0.36	0.35	0.36
U.S. MILLS IN SOUTH & EAST	0.33	0.44	0.41	0.43	0.45	0.49	0.46	0.46	0.47	0.50	0.48	0.49
KEY PRICES AND MARGINS												
PRODUCT PRICES($/MBF OR $MSF)												
FIR-LARCH 2X4,K.D.	158	167	178	206	226	241	268	275	302	324	355	360
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	154	164	184	209	227	253	274	272	294	325	349	346
SOUTHERN PINE 2X4,K.D.(WEST)	195	206	202	228	242	253	271	277	306	330	353	362
WESTERN 1/2-INCH CDX, 4/5-PLY	178	164	180	181	196	214	227	230	241	262	287	299
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	160	158	174	163	175	197	216	211	218	246	278	280
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	191	197	196	198	211	234	240	235	246	260	270	277
PRICE/COST MARGINS												
FIR-LARCH 2X4	0.87	0.93	0.99	1.13	1.21	1.24	1.34	1.34	1.45	1.51	1.60	1.58
DOUGLAS-FIR 2X4, GREEN	0.96	0.98	1.12	1.29	1.39	1.49	1.57	1.52	1.62	1.75	1.83	1.78
SOUTHERN PINE 2X4	1.10	1.16	1.15	1.29	1.36	1.40	1.46	1.46	1.58	1.65	1.70	1.69
WESTERN 1/2-INCH CDX PLYWOOD	1.03	0.95	1.03	1.04	1.13	1.19	1.25	1.24	1.28	1.36	1.45	1.48
WESTERN 3/4-INCH PARTICLEBOARD	1.19	1.20	1.18	1.18	1.25	1.37	1.39	1.34	1.37	1.43	1.46	1.46

Forest Products Industry Summary Report—Projections
(Quota Case)

	Annual		
	1982	1983	1984
U.S. IMPORTS OF CANADIAN LUMBER	8.08	6.94	7.67
PLYWOOD PRODUCTION(BSF, 3/8-INCH)			
TOTAL U.S.	16.12	17.90	18.78
U.S. WEST	8.15	9.07	9.53
U.S. SOUTH	7.95	8.83	9.24
WAFERBOARD/OSB SHIPMENTS(BSF, 3/4-INCH)			
U.S. MILLS	0.34	0.66	1.05
IMPORTS FROM CANADA	0.13	0.17	0.25
PARTICLEBOARD SHIPMENTS(BSF, 3/4-INCH)			
TOTAL U.S.	2.90	3.20	3.35
U.S. WEST	1.16	1.34	1.41
U.S. MILLS IN SOUTH & EAST	1.60	1.86	1.94

KEY PRICES AND MARGINS

PRODUCT PRICES($/MBF OR $MSF)

FIR-LARCH 2X4,K.D.	177	253	335
DOUGLAS-FIR 2X4,GREEN(PORTLAND)	178	256	328
SOUTHERN PINE 2X4,K.D.(WEST)	208	261	338
WESTERN 1/2-INCH CDX, 4/5-PLY	176	217	272
SOUTHERN 1/2-INCH CDX, 3-PLY(WEST)	164	200	255
WESTERN 3/4-INCH INDUSTRIAL PARTICLEBOARD	196	230	263

PRICE/COST MARGINS

FIR-LARCH 2X4	0.98	1.28	1.53
DOUGLAS-FIR 2X4, GREEN	1.09	1.49	1.75
SOUTHERN PINE 2X4	1.17	1.42	1.66
WESTERN 1/2-INCH CDX PLYWOOD	1.01	1.20	1.39
WESTERN 3/4-INCH PARTICLEBOARD	1.19	1.34	1.43

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Quota Case)

EMPLOYMENT IN SIC24(THOUSANDS)

	1982				1983				1984			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
WESTERN U.S.	182.0	184.3	195.1	211.5	223.5	225.7	227.4	232.7	239.0	239.2	240.9	247.1
SOUTHERN U.S.	265.2	261.9	269.6	286.6	302.7	311.6	315.6	319.2	324.2	326.7	329.5	334.5

Table 1 (Continued)

Forest Products Industry Summary Report—Projections
(Quota Case)

EMPLOYMENT IN SIC24(THOUSANDS)

	Annual		
	1982	1983	1984
WESTERN U.S.	193.2	227.3	241.6
SOUTHERN U.S.	270.8	312.3	328.7

INTRODUCTION

Part IV of the FORSIM report details the impacts on wood products demand, supply, prices and employment of changes in housing starts levels. Holding all other exogenous inputs constant, the FORSIM Model was simulated with increases of 50, 100, 150 and 200 thousand starts (both single- and multifamily) using the Control or Base Case as the foundation for each projection. In addition, eight additional simulations were run, of which four reflected changes just in single-family starts, and the other four reflected changes just in multifamily starts. The changes in each of single-family and multifamily start levels were the same as those used in the first four simulations.

Using these simulations, GAO will be able to interpolate the impacts on wood products demand, supply, prices and employment of changes in housing starts of between zero and 200,000 units resulting from legislated stimulus or recovery programs. In addition, GAO will be able to interpolate these impacts from the single-family and multifamily only simulations if the mix of single- and multifamily starts differs from the Control assumptions.

The following write-up highlights key points in the twelve simulations. Appendices D1-D3 provide full comparative detail. Appendix D1 summarizes the results of increases in both single- and multifamily starts combined of 50, 100, 150 and 200 units, 1982:4 through 1984; Appendix D2 summarizes the results of increases in just single-family starts over the same interval; while Appendix D3 summarizes the impacts of increasing just multifamily starts. The increases in single-family and multifamily starts detailed in Appendices D2 and D3 are the same as in Appendix D1 and reflect the ratio of single-family to total starts defined in the Control forecast. This ratio was 62.6% in 1982, 64.5% in 1983 and 67.3% in 1984. Thus, the results detailed in Appendix D2 show the impacts on demand, etc., of increases in 1984, for example, of single-family starts of 67.3% of each of 50, 100, 150 and 200 thousand starts (i.e., 33,650; 67,300; 100,950; 184,600 single-family units).

In Appendix D3, the reciprocal applies. Impacts are measured for 1984, for example, for 32.7% (the multifamily share) of each increase of total starts of 50, 100, 150 and 200 thousand units. The same methodology applies for both 1982 and 1983, using the appropriate ratios of either single-family or multifamily starts, to the total, for each year. To reiterate, the changes in each of the single-family only simulations and of the multifamily only simulations, sum to the changes made to total starts in the first four simulations detailed above.

A) SOFTWOOD LUMBER--TOTAL STARTS SENSITIVITY

Table 4.1 summarizes some key impacts of changes in total housing starts on demand, production, prices and employment in SIC24. Full details for the impacts of total starts are to be found in Appendix D1.

For each increment of 50,000 housing starts (single- and multifamily), softwood lumber demand will increase by 380 million board feet. Thus, an extra 200,000 starts would result in 1.51 billion board feet higher lumber demand.

Table 4.1

Softwood Lumber Demand, Supply and Price Sensitivity to
Changes in Total Housing Start Levels

	1982	1983	1984
Total Demand (BBF)			
Base Case	29.96	34.62	38.24
+50,000 (SAAR)	30.02	35.01	38.62
+100,000 (SAAR)	30.09	35.41	39.00
+150,000 (SAAR)	30.16	35.80	39.37
+200,000 (SAAR)	30.23	36.19	39.75
Total U.S. Production (BBF)			
Base Case	21.64	25.75	28.85
+50,000 (SAAR)	21.68	26.09	29.12
+100,000 (SAAR)	21.73	26.42	29.38
+150,000 (SAAR)	21.77	26.75	29.64
+200,000 (SAAR)	21.81	27.07	29.89
Price Southern Pine 2X4			
Base Case	201	236	314
+50,000 (SAAR)	202	241	320
+100,000 (SAAR)	202	245	325
+150,000 (SAAR)	202	250	331
+200,000 (SAAR)	202	254	337
Employment (000s)			
Base Case	459	516	553
+50,000 (SAAR)	459	520	556
+100,000 (SAAR)	459	523	559
+150,000 (SAAR)	460	526	562
+200,00 (SAAR)	460	529	565

About two-thirds of this demand increment would be met by U.S. producers (the remainder coming from Canada). Thus, an additional 200,000 starts would lead to a 1.04 billion board feet increase in U.S. lumber production in 1984.

Higher demand would result in higher product prices and margins. FORSIM estimates that with 200,000 additional units in 1984, Southern Yellow Pine 2X4 prices, for example, would be 7% above Control levels.

Lastly, the stimulus to lumber and panel demand would produce beneficial improvements in employment levels. Each 50,000 units would result in an increase in approximately 3,000 people employed in SIC24. Thus, an extra 200,000 starts would, in 1984, result in 12,000 extra jobs in SIC24.

B) SOFTWOOD LUMBER—SINGLE-FAMILY STARTS SENSITIVITY

Table 4.2 summarizes the impacts for changes to demand, etc., to single-family housing starts only. The table indicates the change in total starts (e.g., 50,000, etc.) and the share which is accounted for by single-family starts. Thus, where total starts are up 200,000 units (for example), single-family starts account for approximately two-thirds of the total (134,600 units), and would lead to 1.25 billion board feet higher demand. Appendix D2 provides full details of the impacts of changes in just single-family starts.

Table 4.2

Softwood Lumber Demand, Supply and Price Sensitivity to Changes in Single-Family Housing Start Levels

	1982	1983	1984
Total Demand (BBF)			
Base Case	29.96	34.62	38.24
+50,000 (SAAR)	30.02	34.94	38.55
+100,000 (SAAR)	30.08	35.25	38.86
+150,000 (SAAR)	30.14	35.57	39.18
+200,000 (SAAR)	30.20	35.89	39.49
Total U.S. Production (BBF)			
Base Case	21.64	25.75	28.85
+50,000 (SAAR)	21.68	26.02	29.07
+100,000 (SAAR)	21.71	26.29	29.29
+150,000 (SAAR)	21.75	26.56	29.50
+200,000 (SAAR)	21.78	26.83	29.71
Price Southern Pine 2X4			
Base Case	201	236	314
+50,000 (SAAR)	202	240	319
+100,000 (SAAR)	202	243	323
+150,000 (SAAR)	202	247	328
+200,000 (SAAR)	202	251	333
Employment (000s)			
Base Case	459	516	553
+50,000 (SAAR)	459	519	555
+100,000 (SAAR)	459	522	558
+150,000 (SAAR)	460	524	560
+200,00 (SAAR)	460	527	562

Note: The single-family share of total housing starts increments was assumed to be:

62.6% in 1982
64.5% in 1983
67.3% in 1984.

To determine the SAAR increments for single-family starts, multiply the share by the level; e.g., in 1984, the share is 67.3%, and assuming an increment in total starts of 200,000 units, the single-family increment = 67.3% of 200,000 = 134,600 single-family units.

The key points of Table 4.2 are as follows:

- Each increase in single-family starts of 33,500 (out of a 50,000 total), produces an extra 310 million board feet of demand.

- Total U.S. production increases in increments of 220 million board feet per 33,500 single-family starts; Canada supplies the difference between the increase in demand and the increase in U.S. production.

- In 1984, Southern Pine 2X4 prices would be 6% higher if an additional 134,000 single-family detached houses were started.

- Employment in SIC24 will grow approximately 2,000 persons for each increment of 33,500 single-family units.

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C) SOFTWOOD LUMBER--MULTIFAMILY STARTS SENSITIVITY

Table 4.3 duplicates the outline for Table 4.2 discussed above, but for multifamily units. Thus, the table shows increases in total starts of 50, 100, 150 and 200 thousand units of which approximately one-third are multifamily starts. The impacts on demand, production, prices and employment illustrate just the change in the number of multifamily units only. Appendix D3 provides full forecast detail for the changes in multifamily starts. The changes detailed in Tables 4.2 and 4.3 will sum to the total changes in Table 4.1.

The key points of Table 4.3 are as follows:

. Each 16,500 additional multifamily units results in increments of lumber demand of 70 million board feet. Note: multifamily units are smaller and less wood intensive (per square foot of unit size) than single-family units--see Part I of this report.

Table 4.3

Softwood Lumber Demand, Supply and Price Sensitivity to Changes in Multifamily Housing Start Levels

	1982	1983	1984
Total Demand (BBF)			
Base Case	29.96	34.62	38.24
+50,000 (SAAR)	29.96	34.69	38.31
+100,000 (SAAR)	29.97	34.77	38.38
+150,000 (SAAR)	29.98	34.84	38.45
+200,000 (SAAR)	29.98	34.92	38.51
Total U.S. Production (BBF)			
Base Case	21.64	25.75	28.85
+50,000 (SAAR)	21.65	25.81	28.90
+100,000 (SAAR)	21.65	25.88	28.95
+150,000 (SAAR)	21.66	25.94	28.99
+200,000 (SAAR)	21.67	26.01	29.04
Price Southern Pine 2X4			
Base Case	201	236	314
+50,000 (SAAR)	201	237	315
+100,000 (SAAR)	201	238	316
+150,000 (SAAR)	201	239	317
+200,000 (SAAR)	202	239	318
Employment (000s)			
Base Case	459	516	553
+50,000 (SAAR)	459	517	553
+100,000 (SAAR)	459	517	554
+150,000 (SAAR)	459	518	554
+200,00 (SAAR)	459	519	555

Note: The multifamily share of total housing starts increments was assumed to be:

37.4% in 1982
35.5% in 1983
32.7% in 1984.

To determine the SAAR increments for multifamily starts, multiply the share by the level; e.g., 32.7% of 200,000 = 65,400 multifamily units.

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- Each 16,500 additional multifamily units will result in an increase in U.S. softwood lumber production of 50 million board feet.

- With minimal increases in demand, prices would only be marginally higher.

- Similarly, employment impacts will be minor (an extra 66,000 multifamily units would result in an additional 2,000 persons employed in SIC24 in 1984).

D) CONCLUSION

The pattern for the panel products is similar to that for softwood lumber. Plywood and waferboard are very sensitive to changes in single-family start levels; particleboard, on the other hand, is not as responsive to changes in housing starts. Particleboard demand is linked closely to furniture demand, and while increases in furniture demand normally follow closely on improvements in housing markets, this impact was not simulated by the FORSIM Model.

Each of the three appendices detail impact results in the following order:

- Wood Products Demand

- Lumber Supply

- Panel and Reconstituted Wood Products Supply

- Prices and Margins

- Employment in SIC24

From these tables the reader can extract impacts by product and by housing sector. In each case, the impact of changes in single-family starts for outweighs the impacts from changes in multifamily starts.

Clearly, any reduction in the single-family share of total starts will lead to lower overall wood products demand, production and employment than with the Base Case housing mix. Thus, if a policy is to be developed where the intention is to stimulate recovery in the forest products, and other construction materials supplying industries, stimulus of the detached single-family home sector would have the most beneficial and immediate impacts on those industries. If the stimulus proved to be broad and applied to all of housing, both single- and multifamily units, and if the stimulus to multifamily construction was disproportionate, than the positive impacts for the forest products industry would be minimized.

APPENDIX D-1

Table 1

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Wood Products Demand)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984

MACROECONOMIC POLICY INDICATOR: TOTAL HOUSING STARTS

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE CASE	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79	1.07	1.37	1.62
ADDITIONAL STARTS, ANNUAL RATE												
FIFTY THOUSAND (+50,000)	1.34	1.31	1.38	1.47	1.53	1.49	1.61	1.73	1.84	1.08	1.42	1.67
ONE HUNDRED THOUSAND (+100,000)	1.39	1.36	1.43	1.52	1.58	1.54	1.66	1.78	1.89	1.09	1.47	1.72
ONE HUNDRED FIFTY THOUSAND (+150,000)	1.44	1.41	1.48	1.57	1.63	1.59	1.71	1.83	1.94	1.10	1.52	1.77
TWO HUNDRED THOUSAND (+200,000)	1.49	1.46	1.53	1.62	1.68	1.64	1.76	1.88	1.99	1.12	1.57	1.82

WOOD PRODUCTS DEMAND

TOTAL U.S. LUMBER DEMAND (BBF)

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	8.08	7.44	8.79	9.32	9.07	8.21	9.80	10.28	9.95	29.96	34.62	38.24
+50,000	8.15	7.52	8.90	9.43	9.17	8.28	9.91	10.39	10.04	30.02	35.01	38.62
+100,000	8.22	7.59	9.00	9.55	9.27	8.36	10.01	10.50	10.13	30.09	35.41	39.00
+150,000	8.29	7.66	9.11	9.66	9.37	8.43	10.12	10.61	10.22	30.16	35.80	39.37
+200,000	8.35	7.73	9.22	9.78	9.46	8.51	10.22	10.71	10.31	30.23	36.19	39.75

RESIDENTIAL CONSTRUCTION LUMBER DEMAND (BBF)

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	2.60	2.10	3.09	3.48	3.14	2.43	3.63	4.04	3.70	8.82	11.81	13.80
+50,000	2.67	2.17	3.20	3.60	3.24	2.51	3.73	4.15	3.79	8.89	12.20	14.19
+100,000	2.73	2.25	3.30	3.71	3.33	2.58	3.84	4.26	3.89	8.96	12.60	14.57
+150,000	2.80	2.32	3.41	3.83	3.43	2.66	3.95	4.37	3.98	9.03	12.99	14.96
+200,000	2.87	2.39	3.52	3.94	3.53	2.73	4.05	4.48	4.07	9.09	13.39	15.34

TOTAL PLYWOOD DEMAND (BSF, 3/8-INCH)

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	4.27	3.79	4.55	4.82	4.59	3.97	4.86	5.17	4.96	15.82	17.75	18.97
+50,000	4.31	3.83	4.61	4.88	4.64	4.01	4.91	5.22	5.01	15.86	17.97	19.16
+100,000	4.35	3.88	4.67	4.94	4.68	4.04	4.96	5.28	5.06	15.90	18.18	19.34
+150,000	4.39	3.92	4.73	5.01	4.73	4.07	5.00	5.33	5.10	15.94	18.39	19.51
+200,000	4.43	3.96	4.79	5.07	4.78	4.11	5.05	5.38	5.15	15.98	18.60	19.68

Table 1 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Wood Products Demand)

RESIDENTIAL CONSTRUCTION PLYWOOD DEMAND (BSF. 3/8-INCH)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	1.51	1.21	1.70	1.93	1.74	1.32	1.94	2.22	2.07	5.10	6.57	7.54
+50,000	1.55	1.25	1.76	1.99	1.79	1.36	1.99	2.28	2.12	5.14	6.79	7.75
+100,000	1.59	1.29	1.82	2.05	1.84	1.40	2.05	2.34	2.17	5.17	7.01	7.96
+150,000	1.63	1.34	1.88	2.12	1.89	1.44	2.10	2.39	2.22	5.21	7.23	8.15
+200,000	1.67	1.38	1.94	2.18	1.94	1.47	2.15	2.45	2.28	5.25	7.44	8.35

Table 1 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Wood Products Demand)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984

TOTAL WAFERBOARD/OSB DEMAND (BSF. 3/4-INCH)

BASE	0.15	0.14	0.20	0.24	0.25	0.22	0.32	0.38	0.38	0.46	0.82	1.30
+50,000	0.15	0.14	0.20	0.25	0.25	0.22	0.32	0.39	0.39	0.47	0.84	1.33
+100,000	0.15	0.14	0.20	0.25	0.26	0.23	0.33	0.40	0.40	0.47	0.86	1.35
+150,000	0.15	0.14	0.21	0.26	0.26	0.23	0.33	0.40	0.40	0.47	0.87	1.37
+200,000	0.16	0.15	0.21	0.26	0.27	0.24	0.34	0.41	0.41	0.47	0.89	1.40

RESIDENTIAL CONSTRUCTION WAFERBOARD/OSB DEMAND (BSF. 3/4-INCH)

BASE	0.08	0.07	0.12	0.15	0.15	0.12	0.20	0.24	0.23	0.24	0.48	0.79
+50,000	0.08	0.07	0.12	0.15	0.15	0.12	0.20	0.24	0.24	0.24	0.49	0.81
+100,000	0.08	0.07	0.12	0.16	0.15	0.13	0.21	0.25	0.25	0.24	0.51	0.83
+150,000	0.08	0.08	0.13	0.16	0.16	0.13	0.22	0.26	0.25	0.24	0.52	0.86
+200,000	0.09	0.08	0.13	0.17	0.16	0.14	0.22	0.27	0.26	0.25	0.54	0.88

TOTAL PARTICLEBOARD DEMAND (BSF. 3/4-INCH)

BASE	0.74	0.71	0.78	0.82	0.81	0.77	0.83	0.39	0.88	2.85	3.11	3.36
+50,000	0.75	0.71	0.78	0.82	0.81	0.77	0.84	0.89	0.88	2.85	3.12	3.37
+100,000	0.75	0.71	0.79	0.82	0.81	0.77	0.84	0.89	0.89	2.85	3.13	3.39
+150,000	0.75	0.71	0.79	0.82	0.82	0.77	0.84	0.89	0.89	2.85	3.14	3.40
+200,000	0.75	0.72	0.79	0.83	0.82	0.78	0.84	0.90	0.89	2.85	3.16	3.41

RESIDENTIAL CONSTRUCTION PARTICLEBOARD DEMAND (BSF. 3/4-INCH)

BASE	0.15	0.13	0.16	0.17	0.17	0.15	0.17	0.19	0.19	0.51	0.63	0.71
+50,000	0.15	0.14	0.16	0.18	0.17	0.15	0.18	0.20	0.19	0.51	0.64	0.72
+100,000	0.15	0.14	0.16	0.18	0.17	0.15	0.18	0.20	0.20	0.51	0.65	0.73
+150,000	0.15	0.14	0.16	0.18	0.18	0.16	0.18	0.20	0.20	0.52	0.66	0.74
+200,000	0.15	0.14	0.17	0.18	0.18	0.16	0.18	0.21	0.20	0.52	0.67	0.75

Table 2

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Lumber Supply)

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984

MACROECONOMIC POLICY INDICATOR: TOTAL HOUSING STARTS

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984
BASE CASE	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79	1.07	1.37	1.62
ADDITIONAL STARTS, ANNUAL RATE												
FIFTY THOUSAND (+50,000)	1.34	1.31	1.38	1.47	1.53	1.49	1.61	1.73	1.84	1.08	1.42	1.67
ONE HUNDRED THOUSAND (+100,000)	1.39	1.36	1.43	1.52	1.58	1.54	1.66	1.78	1.89	1.09	1.47	1.72
ONE HUNDRED FIFTY THOUSAND (+150,000)	1.44	1.41	1.48	1.57	1.63	1.59	1.71	1.83	1.94	1.10	1.52	1.77
TWO HUNDRED THOUSAND (+200,000)	1.49	1.46	1.53	1.62	1.68	1.64	1.76	1.88	1.99	1.12	1.57	1.82

LUMBER SUPPLY

LUMBER PRODUCTION (BBF)

U.S. TOTAL

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984
BASE	5.79	6.13	6.49	6.59	6.53	6.88	7.28	7.39	7.31	21.64	25.75	28.85
+50,000	5.84	6.22	6.59	6.67	6.61	6.95	7.34	7.45	7.37	21.68	26.09	29.12
+100,000	5.88	6.31	6.68	6.76	6.68	7.02	7.41	7.52	7.43	21.73	26.42	29.38
+150,000	5.92	6.39	6.77	6.84	6.75	7.09	7.48	7.58	7.49	21.77	26.75	29.64
+200,000	5.97	6.48	6.86	6.92	6.82	7.15	7.54	7.64	7.55	21.81	27.07	29.89

U.S. WEST COAST

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984
BASE	1.64	1.73	1.74	1.77	1.84	1.94	1.95	1.98	2.06	5.97	7.07	7.93
+50,000	1.65	1.75	1.77	1.79	1.86	1.96	1.97	2.00	2.08	5.98	7.17	8.00
+100,000	1.66	1.78	1.79	1.81	1.88	1.98	1.99	2.02	2.10	5.99	7.26	8.08
+150,000	1.67	1.80	1.82	1.83	1.90	2.00	2.00	2.03	2.11	6.00	7.35	8.15
+200,000	1.69	1.83	1.84	1.85	1.92	2.02	2.02	2.05	2.13	6.01	7.44	8.22

U.S. INLAND REGION

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984
BASE	1.93	2.04	2.06	2.09	2.17	2.29	2.30	2.34	2.43	7.01	8.36	9.36
+50,000	1.94	2.07	2.09	2.12	2.20	2.31	2.33	2.36	2.45	7.02	8.47	9.45
+100,000	1.96	2.10	2.12	2.14	2.22	2.34	2.35	2.38	2.47	7.04	8.58	9.53
+150,000	1.97	2.13	2.15	2.17	2.25	2.36	2.37	2.40	2.49	7.05	8.69	9.61
+200,000	1.99	2.16	2.18	2.19	2.27	2.38	2.39	2.42	2.51	7.07	8.79	9.70

Table 2 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Lumber Supply)

U.S. SOUTH

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	1.59	1.68	1.70	1.72	1.79	1.89	1.91	1.94	2.02	5.76	6.89	7.75
+50,000	1.60	1.70	1.72	1.74	1.81	1.91	1.92	1.95	2.03	5.77	6.98	7.82
+100,000	1.61	1.73	1.75	1.77	1.83	1.93	1.94	1.97	2.05	5.78	7.07	7.90
+150,000	1.62	1.75	1.77	1.79	1.85	1.95	1.96	1.99	2.07	5.79	7.16	7.97
+200,000	1.63	1.77	1.79	1.81	1.87	1.97	1.98	2.01	2.08	5.80	7.25	8.04

Table 2 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Lumber Supply)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
U.S. MINOR REGIONS												
BASE	0.76	0.84	0.86	0.87	0.87	0.93	0.96	0.97	0.96	2.90	3.43	3.82
+50,000	0.77	0.85	0.87	0.88	0.88	0.93	0.97	0.98	0.97	2.91	3.47	3.85
+100,000	0.77	0.86	0.88	0.89	0.89	0.94	0.98	0.98	0.98	2.92	3.51	3.88
+150,000	0.78	0.87	0.89	0.90	0.90	0.95	0.99	0.99	0.98	2.92	3.55	3.91
+200,000	0.79	0.88	0.90	0.91	0.91	0.96	1.00	1.00	0.99	2.93	3.59	3.95
CANADA - TOTAL												
BASE	4.31	4.82	4.65	4.41	4.54	5.08	4.85	4.56	4.68	17.12	18.42	19.18
+50,000	4.31	4.84	4.67	4.43	4.56	5.11	4.87	4.58	4.70	17.12	18.51	19.26
+100,000	4.31	4.86	4.70	4.46	4.59	5.13	4.89	4.60	4.73	17.13	18.60	19.35
+150,000	4.32	4.87	4.73	4.48	4.61	5.15	4.92	4.63	4.75	17.13	18.69	19.44
+200,000	4.32	4.89	4.75	4.51	4.63	5.17	4.94	4.65	4.77	17.13	18.78	19.53
CANADA - BRITISH COLUMBIA												
BASE	2.68	2.99	2.96	2.65	2.82	3.15	3.07	2.73	2.89	10.55	11.42	11.83
+50,000	2.68	3.00	2.98	2.67	2.84	3.16	3.09	2.74	2.91	10.55	11.49	11.90
+100,000	2.68	3.02	3.00	2.69	2.86	3.18	3.11	2.76	2.92	10.56	11.57	11.98
+150,000	2.69	3.03	3.02	2.72	2.88	3.20	3.13	2.78	2.94	10.56	11.64	12.05
+200,000	2.69	3.05	3.04	2.74	2.90	3.22	3.15	2.80	2.96	10.56	11.72	12.12
CANADA - EAST OF THE ROCKIES												
BASE	1.63	1.83	1.70	1.75	1.72	1.94	1.78	1.83	1.80	6.57	7.00	7.35
+50,000	1.63	1.84	1.70	1.76	1.72	1.94	1.78	1.84	1.80	6.57	7.01	7.36
+100,000	1.63	1.84	1.70	1.76	1.73	1.95	1.79	1.84	1.80	6.57	7.03	7.38
+150,000	1.63	1.84	1.71	1.77	1.73	1.95	1.79	1.85	1.81	6.57	7.05	7.39
+200,000	1.63	1.85	1.71	1.77	1.73	1.95	1.79	1.85	1.81	6.57	7.06	7.41
U.S. IMPORTS OF CANADIAN LUMBER												
BASE	2.46	2.49	2.96	2.78	2.46	2.58	3.03	2.82	2.53	10.11	10.70	10.96
+50,000	2.46	2.51	2.98	2.81	2.48	2.60	3.06	2.84	2.55	10.11	10.78	11.05
+100,000	2.47	2.52	3.01	2.83	2.50	2.62	3.08	2.86	2.58	10.11	10.87	11.13
+150,000	2.47	2.54	3.03	2.86	2.53	2.64	3.10	2.89	2.60	10.12	10.96	11.22
+200,000	2.47	2.55	3.06	2.89	2.55	2.66	3.12	2.91	2.62	10.12	11.05	11.31

Table 3

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Plywood and Reconstituted Wood Products Supply)

	1982 IV	1983 I	II	III	IV	1984 I	II	III	IV	Annual 1982	1983	1984
MACROECONOMIC POLICY INDICATOR: TOTAL HOUSING STARTS												
BASE CASE	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79	1.07	1.37	1.62
ADDITIONAL STARTS, ANNUAL RATE												
FIFTY THOUSAND (+50,000)	1.34	1.31	1.38	1.47	1.53	1.49	1.61	1.73	1.84	1.08	1.42	1.67
ONE HUNDRED THOUSAND (+100,000)	1.39	1.36	1.43	1.52	1.58	1.54	1.66	1.78	1.89	1.09	1.47	1.72
ONE HUNDRED FIFTY THOUSAND (+150,000)	1.44	1.41	1.48	1.57	1.63	1.59	1.71	1.83	1.94	1.10	1.52	1.77
TWO HUNDRED THOUSAND (+200,000)	1.49	1.46	1.53	1.62	1.68	1.64	1.76	1.88	1.99	1.12	1.57	1.82
PLYWOOD AND RECONSTITUTED WOOD PRODUCTS SUPPLY												
PLYWOOD PRODUCTION (BSF, 3/8 INCH)												
U.S. TOTAL												
BASE	4.40	4.61	4.44	4.38	4.47	4.65	4.64	4.68	4.81	16.12	17.90	18.78
+50,000	4.44	4.68	4.49	4.42	4.51	4.69	4.68	4.72	4.86	16.16	18.09	18.94
+100,000	4.49	4.74	4.53	4.46	4.54	4.73	4.72	4.76	4.90	16.21	18.28	19.11
+150,000	4.47	4.75	4.60	4.54	4.61	4.78	4.76	4.81	4.95	16.19	18.50	19.30
+200,000	4.50	4.80	4.65	4.59	4.66	4.82	4.80	4.85	4.99	16.22	18.69	19.47
U.S. WEST												
BASE	2.23	2.34	2.25	2.22	2.26	2.36	2.35	2.37	2.45	8.15	9.07	9.53
+50,000	2.25	2.37	2.27	2.24	2.28	2.38	2.37	2.39	2.47	8.18	9.16	9.61
+100,000	2.27	2.40	2.30	2.26	2.30	2.40	2.39	2.42	2.49	8.20	9.26	9.69
+150,000	2.27	2.41	2.33	2.30	2.34	2.42	2.42	2.44	2.51	8.19	9.37	9.79
+200,000	2.28	2.43	2.35	2.32	2.36	2.44	2.43	2.46	2.53	8.21	9.46	9.87
U.S. SOUTH												
BASE	2.17	2.28	2.19	2.16	2.20	2.29	2.28	2.30	2.37	7.95	8.83	9.24
+50,000	2.19	2.31	2.21	2.18	2.22	2.31	2.31	2.32	2.39	7.97	8.93	9.33
+100,000	2.22	2.34	2.24	2.20	2.24	2.33	2.33	2.35	2.41	8.00	9.02	9.41
+150,000	2.21	2.35	2.27	2.24	2.28	2.36	2.35	2.37	2.44	7.99	9.13	9.51
+200,000	2.22	2.37	2.29	2.27	2.30	2.38	2.37	2.39	2.46	8.00	9.23	9.60

Table 3 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Plywood and Reconstituted Wood Products Supply)

WAFERBOARD/OSB SHIPMENTS (BSF, 3/4-INCH)

U.S. MILLS

	1982	1983					1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	0.11	0.10	0.16	0.19	0.20	0.19	0.26	0.30	0.30	0.34	0.66	1.05
+50,000	0.11	0.10	0.16	0.20	0.21	0.19	0.26	0.31	0.31	0.34	0.67	1.06
+100,000	0.12	0.11	0.16	0.20	0.21	0.19	0.26	0.31	0.31	0.34	0.67	1.07
+150,000	0.12	0.11	0.16	0.20	0.21	0.19	0.27	0.32	0.31	0.34	0.68	1.08
+200,000	0.12	0.11	0.16	0.21	0.21	0.19	0.27	0.32	0.32	0.34	0.69	1.10

Table 3 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Plywood and Reconstituted Wood Products Supply)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984

IMPORTS FROM CANADA

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	0.04	0.03	0.04	0.05	0.04	0.03	0.06	0.08	0.08	0.13	0.17	0.25
+50,000	0.04	0.03	0.04	0.05	0.05	0.04	0.06	0.08	0.08	0.13	0.18	0.26
+100,000	0.04	0.04	0.04	0.05	0.05	0.04	0.07	0.08	0.09	0.13	0.18	0.28
+150,000	0.04	0.04	0.05	0.06	0.05	0.04	0.07	0.09	0.09	0.13	0.19	0.29
+200,000	0.04	0.04	0.05	0.06	0.05	0.04	0.07	0.09	0.09	0.13	0.20	0.30

PARTICLEBOARD SHIPMENTS (BSF, 3/4-INCH)

U.S. TOTAL

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	0.73	0.77	0.85	0.79	0.79	0.81	0.86	0.83	0.85	2.90	3.20	3.35
+50,000	0.74	0.78	0.85	0.79	0.79	0.81	0.86	0.83	0.85	2.90	3.21	3.36
+100,000	0.74	0.78	0.86	0.80	0.80	0.82	0.86	0.84	0.85	2.90	3.23	3.37
+150,000	0.74	0.78	0.86	0.80	0.80	0.82	0.87	0.84	0.86	2.90	3.24	3.38
+200,000	0.74	0.78	0.86	0.81	0.80	0.82	0.87	0.84	0.86	2.90	3.26	3.39

U.S. WEST

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	0.31	0.32	0.36	0.33	0.33	0.34	0.36	0.35	0.36	1.16	1.34	1.41
+50,000	0.31	0.33	0.36	0.33	0.33	0.34	0.36	0.35	0.36	1.16	1.35	1.41
+100,000	0.31	0.33	0.36	0.33	0.33	0.34	0.36	0.35	0.36	1.16	1.36	1.42
+150,000	0.31	0.33	0.36	0.34	0.34	0.34	0.36	0.35	0.36	1.16	1.36	1.42
+200,000	0.31	0.33	0.36	0.34	0.34	0.34	0.36	0.35	0.36	1.16	1.37	1.42

'U.S. SOUTH AND EAST

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	0.43	0.45	0.49	0.46	0.46	0.47	0.50	0.48	0.49	1.60	1.86	1.94
+50,000	0.43	0.45	0.50	0.46	0.46	0.47	0.50	0.48	0.49	1.60	1.86	1.95
+100,000	0.43	0.45	0.50	0.46	0.46	0.47	0.50	0.49	0.50	1.60	1.87	1.95
+150,000	0.43	0.45	0.50	0.46	0.46	0.47	0.50	0.49	0.50	1.60	1.88	1.96
+200,000	0.43	0.46	0.50	0.47	0.47	0.48	0.50	0.49	0.50	1.60	1.89	1.97

Table 4

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Key Wood Products Prices and Margins)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984

MACROECONOMIC POLICY INDICATOR: TOTAL HOUSING STARTS

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE CASE	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79	1.07	1.37	1.62

ADDITIONAL STARTS, ANNUAL RATE

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
FIFTY THOUSAND (+50,000)	1.34	1.31	1.38	1.47	1.53	1.49	1.61	1.73	1.84	1.08	1.42	1.67
ONE HUNDRED THOUSAND (+100,000)	1.39	1.36	1.43	1.52	1.58	1.54	1.66	1.78	1.89	1.09	1.47	1.72
ONE HUNDRED FIFTY THOUSAND (+150,000)	1.44	1.41	1.48	1.57	1.63	1.59	1.71	1.83	1.94	1.10	1.52	1.77
TWO HUNDRED THOUSAND (+200,000)	1.49	1.46	1.53	1.62	1.68	1.64	1.76	1.88	1.99	1.12	1.57	1.82

KEY WOOD PRODUCTS PRICES AND MARGINS

PRODUCT PRICES ($/MBF OR $/MSF)

FIR-LARCH 2X4, K.D.

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	183	208	215	240	254	286	296	327	341	171	230	313
+50,000	184	211	219	245	259	292	302	334	348	172	234	319
+100,000	185	214	223	250	264	297	308	340	354	172	238	325
+150,000	186	217	227	255	269	302	314	347	361	172	242	331
+200,000	187	220	232	259	274	308	321	354	367	172	246	337

SOUTHERN PINE 2X4, K.D. (WEST)

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	202	221	225	242	256	290	300	324	343	201	236	314
+50,000	203	225	230	247	260	294	305	330	349	202	241	320
+100,000	204	229	234	252	265	299	311	336	355	202	245	325
+150,000	205	232	239	257	270	304	317	342	360	202	250	331
+200,000	207	236	244	262	275	310	323	348	366	202	254	337

WESTERN 1/2-INCH CDX, 4/5-PLY

	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
BASE	181	196	214	227	230	241	262	287	299	176	217	272
+50,000	182	198	218	233	235	246	268	293	305	176	221	278
+100,000	183	201	223	238	241	252	273	299	312	176	226	284
+150,000	184	203	226	244	247	258	280	307	319	177	230	291
+200,000	186	206	231	250	253	264	286	314	327	177	235	298

Table 4 (Continued)

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Key Wood Products Prices and Margins)

	1982	1983				1984				Annual		
	IV	I	II	III	IV	I	II	III	IV	1982	1983	1984
PRICE/COST MARGINS												
FIR-LARCH 2X4, K.D.												
BASE	1.00	1.12	1.12	1.21	1.24	1.38	1.38	1.48	1.51	0.95	1.17	1.44
+50,000	1.01	1.14	1.14	1.23	1.27	1.40	1.41	1.51	1.53	0.95	1.19	1.46
+100,000	1.01	1.15	1.16	1.25	1.29	1.43	1.43	1.54	1.56	0.95	1.21	1.49
+150,000	1.02	1.17	1.18	1.27	1.31	1.45	1.46	1.57	1.59	0.95	1.23	1.52
+200,000	1.02	1.19	1.20	1.30	1.34	1.48	1.49	1.59	1.62	0.95	1.25	1.54
SOUTHERN PINE 2X4, K.D. (WEST)												
BASE	1.14	1.25	1.25	1.31	1.35	1.49	1.50	1.57	1.60	1.14	1.29	1.54
+50,000	1.15	1.27	1.27	1.33	1.37	1.52	1.52	1.60	1.63	1.14	1.31	1.57
+100,000	1.15	1.29	1.30	1.36	1.40	1.55	1.55	1.62	1.66	1.14	1.34	1.60
+150,000	1.16	1.31	1.33	1.39	1.43	1.57	1.58	1.65	1.69	1.14	1.36	1.62
+200,000	1.17	1.33	1.35	1.41	1.45	1.60	1.61	1.68	1.72	1.14	1.39	1.65
WESTERN 1/2-INCH CDX, 4/5-PLY												
BASE	1.04	1.13	1.19	1.25	1.24	1.28	1.36	1.45	1.48	1.01	1.20	1.39
+50,000	1.05	1.15	1.21	1.28	1.27	1.31	1.39	1.48	1.51	1.02	1.23	1.42
+100,000	1.06	1.17	1.24	1.31	1.30	1.34	1.42	1.51	1.54	1.02	1.25	1.45
+150,000	1.06	1.17	1.26	1.34	1.33	1.37	1.45	1.55	1.58	1.02	1.28	1.49
+200,000	1.07	1.19	1.28	1.37	1.37	1.40	1.48	1.58	1.61	1.02	1.30	1.52

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Table 5

Forest Products Industry Sensitivity to Changes in Total Private Housing Starts
(Wood Products Employment--SIC24)

	1982 IV	1983 I	1983 II	1983 III	1983 IV	1984 I	1984 II	1984 III	1984 IV	Annual 1982	Annual 1983	Annual 1984
MACROECONOMIC POLICY INDICATOR: TOTAL HOUSING STARTS												
BASE CASE	1.29	1.26	1.33	1.42	1.48	1.44	1.56	1.68	1.79	1.07	1.37	1.62
ADDITIONAL STARTS, ANNUAL RATE												
FIFTY THOUSAND (+50,000)	1.34	1.31	1.38	1.47	1.53	1.49	1.61	1.73	1.84	1.08	1.42	1.67
ONE HUNDRED THOUSAND (+100,000)	1.39	1.36	1.43	1.52	1.58	1.54	1.66	1.78	1.89	1.09	1.47	1.72
ONE HUNDRED FIFTY THOUSAND (+150,000)	1.44	1.41	1.48	1.57	1.63	1.59	1.71	1.83	1.94	1.10	1.52	1.77
TWO HUNDRED THOUSAND (+200,000)	1.49	1.46	1.53	1.62	1.68	1.64	1.76	1.88	1.99	1.12	1.57	1.82
EMPLOYMENT IN SIC 24 (THOUSANDS OF PERSONS)												
WESTERN U.S.												
BASE	203.4	212.5	213.7	216.2	223.4	230.4	230.6	233.3	241.1	190.4	216.5	233.9
+50,000	203.9	213.8	215.3	217.8	224.9	231.8	231.8	234.4	242.2	190.5	218.0	235.1
+100,000	204.5	215.1	216.9	219.4	226.4	233.1	233.0	235.5	243.3	190.6	219.4	236.2
+150,000	204.8	216.1	218.4	221.0	228.0	234.5	234.2	236.6	244.3	190.7	220.9	237.4
+200,000	205.3	217.3	219.9	222.5	229.4	235.9	235.4	237.7	245.4	190.8	222.3	238.6
SOUTHERN U.S.												
BASE	279.8	291.9	298.0	301.7	306.8	313.0	316.2	319.9	326.2	268.5	299.6	318.8
+50,000	280.3	293.3	300.0	304.0	309.1	315.1	318.0	321.6	327.8	268.7	301.6	320.6
+100,000	280.8	294.6	301.9	306.3	311.3	317.1	319.8	323.2	329.4	268.8	303.5	322.4
+150,000	281.1	295.5	303.6	308.5	313.8	319.4	321.8	325.0	331.0	268.8	305.3	324.3
+200,000	281.5	296.7	305.4	310.7	316.0	321.5	323.7	326.7	332.6	268.9	307.2	326.1

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