UNITED STATES GOVERNMENT

memorandum

DATE: September 15, 1981

REPLY TO ATTN OF: Steve Brooks

SUBJECT: The Federal Reserve's High-Employment Surplus Estimates

TO: Jim Burnham

I have checked with Darrel Cohen of the Board staff (Government Finance Division, phone number 452-2376) on his estimates for the high-employment surplus. They are shown in the following table along with the Administration's:

High-Employment Budget Surplus or Deficit (-)
(billions of dollars)

	1981:1	1981:2	1981:3	1981:4	1982:1	1982:2	1982:3
Federal	3.9	4.7	-3.9	-13.8	-13.8	-14.8	-62.0
Administration	4.1	10.0	32.9	31.7	38.0	35.5	-1.0

The Board's estimates obviously show a more ominous move toward deficit especially at the end of the fiscal year. They are quite different from the results that Bob Turner and I prepared for you in July. There are three principle factors which account for the differences in the two sets of estimates.

First, the Board staff discounts heavily the revenue estimates contained in the Mid-Session Review. This is especially true for the estimates of personal taxes and contributions for social insurance in the third quarter of this year. Together these two categories of taxes are estimated to grow at a 32.5% annual rate in the Mid-Session estimates. With no major policy changes at work, this seems a bit robust for a "spongy" economy. The Board estimates much more modest growth in revenues in that quarter. This is the basic cause of the almost instantaneous $30 billion divergence between their estimates and ours that occurs in the third quarter of this year.

The second major difference between the two sets of estimates is due to the much higher interest payments resulting from their more pessimistic interest rate forecast. By the end of fiscal 1982. Their interest-outlay estimate is roughly $16 billion higher than the Administration's, according to Cohen. (He was very unwilling to provide precise estimates here given the sensitivity of their interest rate forecasts.)

Finally, they assume programmatic spending differences from the Administration which raise outlays even more. I did not get estimates from Cohen in this area.

To give a feel for the importance of these assumptions, and the impact on the budget of their much-weaker economic forecast, the final table presents their August Green Book estimates for the actual (as opposed to high-employment) NIPA receipts, outlays, and deficit. The basic pessimism is apparent.

Federal Reserve Board Budget Estimates, fiscal 1982
(billions of dollars)

	1981:1	1981:2	1981:3	1981:4	1982:1	1982:2	1982:3
Receipts	620.7	619.5	627.3	630.6	637.0	645.7	625.9
Outlays	664.0	669.4	694.3	713.3	729.3	746.2	774.2
deficit(-)	-43.3	-49.9	-67.0	-82.7	-92.3	-100.5	-148.3

Let me know if I can be of any further help.

cc: DM, MM, CV

EXECUTIVE OFFICE OF THE PRESIDENT

COUNCIL OF ECONOMIC ADVISERS

WASHINGTON, D.C. 20506

June 19, 1981

MEMORANDUM FOR: The Council

FROM: Steve Brooks

SUBJECT: Model Summaries

As my parting shot, I have prepared for my successor and other interested parties simple model summaries for several of the most frequently used macro models (MPS, DRI, Wharton, Evans, and Michigan). An overview of the BEA model, written last year by Al Hirsh of BEA is also attached. The summaries are designed to give a feel for each model's structure. Unfortunately, time and resource constraints have forced me to limit comments on simulation properties or procedures.

There are several warnings:

- With the exception of Michigan, all of the summaries describe models estimated on the pre-1980-revision data. The reestimating of the other models is underway and should be completed soon. My hope and expectation is that with a few notable exceptions the structure (as opposed to coefficient values) is unlikely to change much.

- By contrast, the Chase model is undergoing, by its proprietor's own admission, a major overhaul. This I'm sure is designed to erase the vestiges of M. Evans. In any case, the current equation listings is useless as a guide to it's eventual appearance.

- DRI has recently made available a smaller "long-term" model. It is essentially the existing quarterly model stripped of much of the financial sector and other recursive detail. It's structure is otherwise virtually identical to that described here.

- o Chase will soon be releasing an annual model estimated under Clopper Almon. I have not seen it or heard much about its structure.

- o Finally, the models are continually updated and revised. These summaries are only snapshots of how the models appeared in early-1981. They will be out of date soon.

My biggest disappointment in this exercise was the lack of good documentation on the Claremont model. Summaries of several other major models are also unfortunately absent, Merrill-Lynch, Fair, Citibank and Harris.

The chief complaint from my editorial staff is the lack of a unifying theme. Do not try to read them in one sitting; you will be bored to tears. Instead use them for reference guides as the need arises.

cc: AW, DM, MM, DR

Jim Russell (Treasury)
Bob Kilpatrick (OMB)

MPS MODEL SUMMARY

VARIABLE COUNT

Behavioral equations	Remarks
133	1. Where only one of the federal funds rate, M-1A and non-borrowed reserves is endogenous. The other two are given by renormalizing the money demand/supply relationship. 2. The foreign exchange rate (bilateral ten-country weights) can be determined by one of the following regimes: a) fixed rate b) floating rate c) "dirty" float Each regime uses a different algorithm for calculating the exchange rate.

Identities

175

Total Equations

308 - see above

Exogenous

167

PRINCIPAL DATA SOURCES

NIPA
BLS
Commerce (BEA and other)
Federal Reserve
Flow of Funds
USIT
Monthly Energy Review
Social Security Bulletin
Internal Federal Reserve estimates (e.g. the valve of non-corporate farm land, multilateral weighted foreign money supply, etc.)
Ad-hoc definitions (e.g. production capacity for existing producers' durable equipment, imputed income from the stock of consumer durables, etc.)

FINAL DEMAND BLOCK

A. Consumption

One "life-cycle" equation for total per-capita consumption, a second stock adjustment equation for durable goods expenditure. Total consumption is not NIPA personal consumption expenditures in the MPS model. Instead, the model recognizes that the stock of consumer durables yields a service flow. Consumption is defined as personal consumption expenditures on nondurables and services plus the implicit gross rental on the stock of consumer durables (depreciation plus imputed income).

The main consumption equation has two income terms with separate MPCs: non-transfer disposable income, including imputed income from the stock of durables, and transfer income. A third income term (minor) adjusts the nontransfer-income MPC for the current-period acceleration (-) or deceleration (+) (relative to a four-quarter moving average) of the PCE deflator. There are three separate wealth terms: the value of equity, the value of the stock of housing and consumer durables, and household net worth excluding equity, housing, and consumer durables. The equation also includes two separate adjustments to the income and wealth MPCs to capture life-cycle implications of the age distribution of the population.

The distributed lags (all second-degree polynomials, with various end-point constraints) are current and 8 quarters for non-transfer income, current and 11 quarters for transfer income, current and 7 quarters for equity wealth, current and

11 quarters for the residual wealth component. The sum of the latter coefficients are constrained to be twice that of equity wealth.

The durables equation is a function of total consumption (+), disposable income (+), population (-), lagged stock of consumer durables (-), the relative price of durables (-) (modified by a crude user-cost term i.e. a 4-quarter average commercial paper rate minus an expected durables inflation term), and real residential construction expenditures (net of brokers' commissions) (+).

Wealth Variables

The stock of housing and the stock of consumer durables are each determined by depreciating the lagged stock and adding to that relevant current period real spending category.

Common stock (equity) is determined by "grossing up" the flow of dividends by the dividend-price ratio. Dividends are here defined as NIPA corporate dividends plus the dividends paid to private pension funds. It is calculated using NIPA dividends as well as flow of funds data.

The dividend-price ratio essentially runs off the real corporate bond rate with other less-important determinants. Total household wealth (current dollars) equals its lagged value plus the sum of (1) the change in housing, durable, and equity wealth; (2) personal savings (MPS definition) and (3) government transfers.

B. Housing

Two key equations: the value of single-family starts and total multi-family housing expenditures both specified in real dollars/real consumption. Note that the multis equation determines value of expenditures, the singles the value of starts.

Singles. The singles equation determines the real dollar value of starts, plus mobile homes, plus additions and alterations, minus the value of subsidized single-family starts all divided by an 8-quarter average of real consumption. It is a function of the lagged dependent variable (hereafter LDV), stock of singles, population, number of households, single family user cost, and single-multi-user cost differential.

Multis. The multis equation determines real dollar value of multi-family construction expenditures minus the value of subsidized multi-family starts minus an adjustment factor for Real Estate Investment Trusts all divided by an 8-quarter average of real consumption. It has determinants similar to those of the singles equation.

Credit Rationing. These two housing equations were estimated only over periods in which there was assumed to be no credit rationing (the non-credit-rationing periods are 1958:3 to 1959:4, 1960:4 to 1966:2, 1967:2 to 1969:1, 1970:2 to 1973:2, and 1975:2 to 1977:4). During the credit-rationing periods, both multis and singles are determined as a fraction of mortgage credit available. Credit is a weighted sum of thrift deposits and other sources of funds including mortgage agency advances. In forecasting, the occurrence of credit-

rationing periods is determined endogenously in the model based on the availability of potential mortgage funds. A forecasting option exists to deactivate the credit-rationing "branch" if desired.

User Costs. The user costs depend on the residential construction deflator (adjusted for site valuation) relative to the (MPS) consumption deflator, mortgage rates, property tax rates adjusted for their federal-tax deductability, an expected housing price inflation (including the housing deflator as well as a rental index).

Additions and alterations, and brokers' commissions are simply spun off housing stock and housing expenditure aggregates.

The two housing equations were estimated using a stacking technique that allowed cross-equation coefficient constraints. These constraints essentially force the sum of the coefficients on population, the number of households, and the user-cost differential to be zero across the two equations. Thus the underlying variables driving housing are total consumption, and the average user-cost values, not demographics.

C. Business Fixed Investment

Two basic expenditure equations, one for producers' durable equipment, one for non-residential structures.

Equipment. A "putty-clay" equipment equation. It is essentially a very long distributed lag on real gross private domestic business product. However this output term enters multiplied by the "equilibrium ratio of producers' durables to output, multiplied by a constant [sic]". This latter term, which captures the value of the desired stock of PDE, equals the product of 0.1 and the ratio of the price of output to the rental price of capital. The elasticity of investment demand with respect to this term has been constrained to 1. (For additional detail see Chirinko and Eisner). The rental price, present value of depreciation allowances, and cost-of-capital terms are conventional. Cost-of-capital includes equity as well as debt finance. This equation will, apparently, be reestimated soon.

Structures. Similar Jorgensonian, neo-classical framework (but putty-putty). Lagged capital stock with a coefficient of -0.2, Rental-price elasticity constrained (through search procedure) to 0.19. This equation will also be reestimated soon.

D. Inventories

Three equations determining real inventory investment: total nondurable, retail durable, and retail nondurable.

Nondurable inventories are determined by the lagged stock, nondurables consumption, the change in nondurables consumption, and service consumption. Retail durable inventories are determined by the lagged stock, durable consumption, and its change. Nonretail durable inventories are determined by the lagged stock, durable consumption (current and lagged), distributed lag on gross private domestic business product less federal purchases other than compensation and structures, and a distributed lag on military prime contract awards.

Farm inventory investment is exogenous.

E. Government

I. Expenditures

Federal. Total purchases are normally exogenous in nominal terms. Real compensation and structures purchases are also exogenous. The endogenous purchases deflators determine total real purchases leaving the remaining real goods and service category as the residual. It is possible, in simulations, to exogenize real purchases. In this case, nominal purchases are endogenous and run off the real categories plus the relevant deflators.

All other federal spending categories are exogenous except the unemployment transfer payments. Note: net interest paid is exogenous. Unemployment transfers consist of exogenous extended benefits (paid to those unemployed 26 weeks or more) plus the endogenous remainder. This latter amount is determined by the number of unemployed, the covered (insured) fraction of the labor force, the maximum weekly benefit, and the fraction of the unemployed who have been unemployed 26 weeks or more.

State and local. State and local purchases are completely endogenous. There are three equations: compensation, construction, and other. Compensation (scaled to total population) is determined by two long distributed lags on MPS consumption and the school-age population. Construction (scaled to a four-quarter moving average of MPS consumption) is determined

by three distributed lags on (1) the ratio of population over 16 to total population, (2) the ratio of real grants-in-aid for highway construction to MPS consumption, and (3) the real municipal bond rate. Other expenditures (scaled to population) run off a time trend and a four-quarter moving average of MPS consumption.

Real S&L transfer payments (deflated by compensation per hour in the private sector and scaled to GNP) are determined by the unemployment rate, time, and federal grants-in-aid (deflated and scaled like the dependent variable). Net subsidies run off of nominal GNP(-) and a distributed lag on "current fund requirements of state and local governments". This latter is the sum of purchases other than structures plus transfers net of social insurance contributions minus 70 percent of grants-in-aid. It is a rough proxy for own-source revenues needed to support operating expenditures. State and local net interest paid is exogenous.

II. Taxes

Federal. Personal taxes are the sum of endogenous individual taxes (NIPA) and exogenous estate and gift taxes. Individual taxes are equal to an exogenous rate multiplied by the taxable income base. The latter is based on Statistics of Income concepts and is determined by the interaction of total personal income per capita and the nominal dollar value of the federal exemption. Note: this equation might be improved by using wage and salary income per employed person (instead of personal income per capita) as one of the important terms generating taxable income.

Corporate taxes are the product of an exogenous rate and taxable corporate profits. Federal Reserve system profits are then added, and the product of the effective investment tax credit and producers' durable equipment investment subtracted to calculate total corporate tax liabilities.

Social insurance contributions are in five pieces: employee OASDHI, employer OASDHI, self-employed OASDHI, unemployment insurance, and other. The last component is exogenous. The OASDHI equations are essentially statutory rates interacting with the relevant wage bases and the maximum taxable wage. Unemployment insurance is determined by the exogenous rate, covered fraction of the labor force, maximum taxable wage, plus the movement in labor income relative to the taxable wage maximum.

Federal indirect business taxes are the sum of exogenous customs duties, exogenous windfall profits taxes, and endogenous other taxes. The latter is determined by an effective federal excise rate and NIPA personal consumption expenditures.

State and local. Personal taxes are determined by personal income per capita and a distributed lag on operating expenditures (defined above) (+).

Corporate taxes are driven by the operating expenditures variable, corporate profits (with an elasticity of 1.0), and a series of seasonal dummies.

Social insurance taxes are run off of state and local compensation.

Indirect business taxes are determined by a distributed lags on operating expenditures, NIPA consumption, and the nominal value of the housing stock. The equation is scaled to population.

F. Foreign Sector

The MPS model has, by far, the most complete treatment of international commodity and capital flows of the major macro models.

Exports. Exports of real commodities (BOP basis) are divided into endogenous non-agricultural and exogenous agricultural exports. The former is determined by distributed lags on foreign activity (multilateral-weighted foreign GNP) and relative prices. This relative price term is equal to the ratio of exchange-rate-adjusted foreign CPI to the price of private, non-farm, non-household business output (net of federal indirect taxes) adjusted for tariffs. The activity or income elasticity is 1.07, the price elasticity is .67. These real commodity exports are multiplied by relevant deflators (see the price section below) to calculate nominal BOP commodity exports.

Exports of service and investment income (BOP basis) consist of five parts: U.S. military sales (exogenous); travel, transportation and service exports; investment income receipts from fees, royalties and direct investments abroad; income receipts from nondirect private assets abroad; and income receipts on U.S. government holdings of foreign assets (exogenous).

Travel, transportation, and service exports are determined by trend foreign GNP, the sum of merchandise exports and imports, and an exchange-rate-adjusted relative price term.

Receipts from fees, royalties, and direct investment abroad is run off of the product of the corporate bond rate and U.S. non-official holdings of foreign assets (from the flow of funds).

Receipts from nondirect private assets abroad is determined by this same product as well as the product of the holdings and the sum of the commercial paper and the CD interest rates.

NIPA-basis exports of goods and services are equal to BOP exports multiplied by an exogenous adjustment factor.

Imports. There are two categories of real commodity imports (BOP basis): petroleum imports and non-petroleum imports. Petroleum imports are determined as a residual between total domestic petroleum demand and total domestic petroleum production (see Energy section below). Non-petroleum merchandise imports (BOP) are a function of lagged inventory investment, a foreign BFI index (to capture "foreign supply ability"), distributed lags on real GNP and relative prices, and, finally, a term reflecting relative foreign-U.S. capacity pressures (-). This latter variable is the ratio of two measures of capacity tightness. The numerator is foreign GNP relative to trend. The denominator is U.S. gross private domestic business output relative to its production capacity. If U.S. utilization is tight, imports will be increased and vice versa.

These two real commodity imports are multiplied by relevant deflators to calculate nominal merchandise imports (BOP).

Service imports consist of travel, transportation, and service imports; direct defense expenditures (exogenous); fees and royalties; income on nondirect private foreign holdings of U.S. assets; and income payments on U.S. government liabilities of foreigners (exogenous).

Travel, transportation and service imports are determined by a distributed lag on GNP (elasticity of 1.06), relative prices, and the sum of merchandise exports and imports.

Income payments on private foreign holdings of domestic assets is determined by three distributed lags: the CD rate multiplying foreign deposits (broadly defined), the corporate bond rate multiplying foreign holdings of corporate bonds, and the commercial paper rate multiplying miscellaneous other foreign holdings.

Fees, royalties, and direct investment income run off a distributed lag on the dividend-price ratio multiplying non-official foreign holdings of U.S. assets.

NIPA-basis imports of goods and services are equal to the BOP concept multiplied by an exogenous factor.

International Capital Stocks and Flows. There are two categories for U.S. holdings of foreign assets: official and non-official. Non-official holdings are determined directly (i.e. the behavioral equation determines the stock). Official holdings on the other hand are determined in the exchange-rate block.

Non-official holdings (scaled to the sum of NIPA exports and imports) are a function of U.S.-foreign interest rate differentials, the exchange rate, the change in the exchange rate, the forward exchange premium, relative prices, and NIPA net exports.

There are similar categories for foreign holdings of U.S. assets. The foreign official holdings of U.S. assets are, as above, determined in the exchange rate block.

The total non-official holdings depend on interest rate differentials, the forward exchange rate premium, changes in the exchange rate, changes in the value of common stock, and NIPA net exports. The total holdings is then split among five asset types with the proper adding-up constraints. These assets types are: corporate equities; time deposits; large CDs, banker acceptances, and open-market paper; corporate bonds; demand deposits; miscellaneous net financial assets (net of foreign bank loans). The common determinants of the share equations are total trade, real interest rates, and the yield on equity.

Foreign Activity. The principal foreign activity variables are GDP, prices (CPI, WPI, and GDP deflator), interest rates, and money demand. Foreign GDP is essentially a reduced form monetarist equation driven by the real money supply, U.S. exports divided by U.S. imports, and time.

The foreign interest rate is a function of the foreign money supply, U.S. interest rates, and U.S.-foreign activity variables. (The equation looks suspiciously like a renormalized money demand equation). Foreign money demand is determined by real GNP and interest rates. Foreign prices are a function of U.S. prices, the world price of oil, and foreign money.

This entire foreign-activity sector, which on the surface, seems under identified, is designed to respond, in a plausible way, to changes in domestic U.S. activity. Apparently it performs this task relatively well. Nevertheless as a sub-model of foreign activity it is very weak.

Exchange Rates. The exchange rate block determines an exchange rate forward premium and (depending on the exchange rate regime) either the exchange rate itself or net official reserve flows. The exchange rate is determined under a floating regime while the reserve flow is determined under a fixed or "dirty" float regime.

The exchange rate forward premium depends on U.S.-foreign interest rate differentials, and distributed lags

in recent exchange rate movements and NIPA nominal net exports.

The exchange rate itself depends on net trade and capital flows under floating regimes. Under a fixed regime it is given and net official reserve flow is determined based on the net trade and private capital flows at the given exchange rate. A dirty float allows non-zero changes in official reserve assets as well as exchange rate movements.

EMPLOYMENT/LABOR FORCE/OUTPUT/PRODUCTIVITY

Employment

The unemployment rate is the residual of this sector. The key labor demand variable is non-farm business employee hours (an unpublished BLS series). There are two alternative equations for hours, one of which is selected by a solution option.

The first hours equation (which is used most often) is an inverted Cobb-Douglas production function which determines hours relative to output of non-farm business less housing output, household output, and output attributable to proprietors. The right-hand side variables of this equation are a capacity utilization variable, time, the change in the output measure, labor force participation, and the average capital-output ratio for the existing stock of producers' durable equipment. This latter term is designed to capture the interaction of the "putty-clay" features of the producers' durable capital stock with the demand for labor. Because of the "putty-clay" structure, labor demand depends on the average capital output ratio for the existing capital stock, not on the desired or optimal ratio for new investment. For no change in the average capital-output ratio, an increase in output will be reflected after several quarters predominantly in an increased demand for labor (in hours).

Note that the wage rate is not explicitly in the desired capital-output ratio. But the price of output is and it is a

relatively simple mark-up over labor costs. Thus increases in wages will raise the desired capital-output ratio. Increases in the rental cost will lower it. Note also that in this equation the capital stock is only PDE, not the total capital stock.

The second hours equation is scaled to a slightly different output term. It is determined similarly but without the capital-output term. Neither equation performs especially well over recent years. There is a separate equation for non-farm proprietors' hours. It essentially runs off of proprietors' income.

Total employment (scaled to the hours determined above) depends on an LDV, time, the changes in hours, and labor force participation rate. Proprietors' employment is similarly driven by the proprietors' hours. Government employment is calculated from the government compensation and exogenous "indexes" of compensation per worker.

Labor force participation (which is free of all "supply-side" influences) is run off of demographic variables and employment ratios.

Outputs

GNP is determined by the usual summation. Gross private domestic business product is determined by subtracting government output (compensation), rest-of-world output (exogenous) and income originating in households. The latter is run off of total consumption and a demographic-mix variable. Output from non-farm owner-occupied housing is driven by the stock of single family housing units and a time trend.

Farm output is exogenous.

Productivity/Prices/Wages

There is no separate productivity variable in the model. Whenever a productivity-like term is needed, it is defined as the reciprocal of the hours equation's left-hand side, that is the non-farm business output divided by non-farm business employee hours.

The basic price equation determines the non-farm business deflator (excluding energy prices and excise taxes) as a mark-up over unit labor costs. The mark-up depends on capacity utilization, the unemployment rate, and exchange-rate adjusted foreign prices. Compensation and productivity are entered as separate distributed lags. Coefficients sums are constrained to 1.0 and -1.0 respectively. The compensation lag has 8 terms, productivity 16 terms.

Energy prices are then "added" to this deflator to get a non-farm business, fixed-weight deflator, excluding excise taxes. This variable plus a complicated constrained relative-price block then determine the relative prices of the key GNP price deflators. In general, the model determines an overall deflator and then the pieces. Therefore a change to one deflator is offset by changes to all others leaving the overall price level unchanged. (A solution option will allow changes in individual deflators to affect the overall price level.)

Other minor price indexes are spun off recursively as needed.

Wages

The basic wage equation determines compensation (defined within the model as total non-farm labor income divided by non-farm employee hours) from a Phillips curve relationship. Key determinants are the unemployment rate, consumption-price changes, and payroll tax and minimum wage influences. There are no other wage variables within the model. The price term coefficients sum to .94. Roughly 50% of this price adjustment occurs within one year. The remaining 50% takes a total of 12 quarters.

ENERGY LINKAGES

Total primary energy demand (oil, coal, and natural gas) in BTUs is determined by real GNP (instantaneous elasticity of 1) and a 31-quarter distributed lag on relative prices (elasticity of -0.3). This, together with exogenous production of natural gas and coal and exogenous domestic petroleum output, determines petroleum imports. All energy prices are exogenous.

INCOME SIDE

Corporate profits (NIA) are the residual on the income side. The wage bill is derived from the hour-compensation identity.

There are the usual conventionally-defined "charges" against GNP. Capital consumption (CCA) depends on the replacement value of the capital stock plus the housing stock. Book CCA is an exogenous fraction of NIA CCA. Separate equations (with very simple structures) determine rental income, interest income, Federal Reserve profits, and proprietors' income (farm and non-farm are separated).

Corporate IVA is based on changes in prices and the stock of inventories. Corporate dividends are run off of after-tax profits.

FINANCIAL SECTOR

The key money demand equation determines demand deposits (scaled to nominal GNP) as a function of the Federal Funds rate and distributed lags on the T-bill rate, the commercial paper rate and real GNP. The equation is estimated through the second quarter of 1974 to avoid the recent shift periods. Dummies adjust for drift since the end of the estimation period. Currency is run off of NIA consumption, the T-bill rate, and an LDV.

The key money supply equation determine the ratio of free reserves to "adjusted net demand deposits". This latter variable is determined by an identity which scales up required reserves on demand deposits by an effective reserve requirement. It is not the same as demand deposits in the key money demand equation. This deposit variable includes (among other things) government deposits subject to reserve requirements, which are not part of the "money demand" aggregate.

Free reserves are determined by an LDV, the T-bill rate, the discount-T-bill rate differential, the change in unborrowed reserves, the change in commercial loans, and the change in required reserves on both time and demand deposits that results from a change in reserve requirements. The determinants, specified in dollar terms, are all scaled to the "adjusted demand deposit" variable.

The money demand equation determines the Federal Funds rate when either money or reserves are the exogenously chosen policy variables, otherwise it determines demand deposits.

Other checkable deposits are exogenous.

Overnight RPs are determined by GNP and the commercial loan rate.

Term Structure

The T-bill rate runs off of the Federal Funds rate and the change in commercial loans (scaled to total deposits). (Note that in this equation both the Fed Funds and T-bill rates are defined as annualized, properly-compounded rates, not the typical "bank discount", or "market yield" basis).

The commercial paper rate is run off the T-bill rate. The CD rate is run off of demand for CDs, (scaled to GNP), the T-bill rate, and the commercial paper rate. Note that the CD rate was estimated as a demand-for-CDs equation and then renormalized. The supply of CDs essentially runs off of growth in commercial loans net of other deposit growth.

Money market mutual fund rate is driven by the commercial paper and CD rates.

Long-term interest rates, 5- and 10-year governments, are determined by current and past T-bill and inflation rates; the corporate bond rate is driven by current and past commerical paper rates and inflation. The municipal bond rate is determined by the corporate bond rate.

There are two Aaa utility rates, one for "newly issued," one for "recently offered". The former is run off of the commercial paper rate and inflation, the latter is determined similarly but with an additional corporate cash flow term. Neither of these interact with the rest of the model.

Commercial Loans

The commercial loan rate is determined by demand for loans, the corporate bond rate and the commercial paper rate.

The demand for loans is determined by three separate activity variables: inventory investment, producers' durable equipment investment, and the change in GNP net of these two investment categories. In addition, commercial loans are driven by the T-bill-commercial-loan interest differential multiplied by non-farm, non-housing private business output.

Mortgage Market

The mortgage rate is driven predominantly by the commercial bond rate and to a much lesser extent by the total stock of mortgages, mortgage repayments, and outstanding mortgage commitments. The latter three variables are each scaled to the value of the housing stock.

The model has separate mini-sectors describing mortgage activity at mutual savings banks, savings and loans, life insurance companies, and commercial banks. Each sector more or less contains the following: Mortgage commitments are driven by mortgage interest rate, deposits, mortgage repayments,

and the outstanding stock of mortgages. Gross mortgage flows (defined as the change in the stock of mortgages plus the repayments) are determined from deposits, repayments (with a cofficient significantly different from unity), government advances, the outstanding stock, and finally, commitments. Repayments depend on the outstanding stock, mortgage interest rates, and lagged gross flows. The outstanding stock of mortgages is determined by identity. These mortgage activity variables do not feed back into the rest of the model in any significant way.

Time Deposits

The various time deposit rates (at banks and thrifts) are very complicated term structure relationships interacting with legal maxima.

Small time and savings deposits plus money market mutual funds (scaled to household wealth net of equities) is determined in aggregate as a function of interest differentials, saving flows, and the share of household wealth in equities. This aggregate is then split among its pieces by simple equations which depend on interest rates and rate differentials.

DRI MODEL SUMMARY

Variable Count

1184

Equations

961

Identities

492

Behavioral

469

Remarks

There actually are 1022 equations but that total includes some double counting. This is because of algorithms used to distribute a) the statistical discrepancy and b) to force the industry employments to add to a total given by the implied identity among output, hours, and employment. The variables which are affected by these distribution algorithms have two concepts. The first is the value of the variable before allocation of the residual. The second is the value after allocation of the residual. Obviously, the two concepts are equal only if the residual is zero. Both concepts are carried around during solution. However, if the variable is

used as a determinant in some other equation then the before-allocation concept is used not the after-allocation concept. This is done to reduce the number of iterations required to solve the model. The data presented in tables and simulation output, on the other hand, are the after-allocation concept. The before-allocation conepts can be printed and inspected. They all have "TEMP@" as a prefix. Thus, for corporate profits before tax the after-allocation variable is called ZB. The before-allocation variable is called TEMP@ZB).

Final Demands

A. Consumption

There are a total of 14 behavioral consumption equations: 3 for durable goods (motor vehicles and parts, furniture, and other), 5 for nondurable goods (food, clothing, fuel, gas, and other), and 6 for services (electricity, gas, other household operations, housing, transportation, and other services). The basic formulation has consumption a function of disposable income, permanent disposable income (which is from an "adaptive" process on disposable income with the current quarter's actual disposable income receiving a weight of 0.1), and relative prices. (After-tax) interest rates, demographic variables, and wealth or asset stocks are also used occasionally. For instance, wealth (flow of funds, household net worth), is used in the other-durables and in the furniture equations. The stock of houses affects furniture consumption (it is also used as the prime determinant of housing services and household operation). The lagged stock of registered cars captures the adjustment process in the motor vehicles equation. The relative price terms do not utilize any cross-equation coefficient constraints.

The prime commercial-loan rate (net of Federal personal taxes) helps explain furniture consumption. Oddly this is the only place it appears.

The Michigan consumer confidence index is used liberally in equations throughout this sector (furniture, motor vehicles,

fuel, household operations and other services) it is relatively important, and changing it is an easy way to alter consumption.

Wealth and Asset Stocks

Household net worth is derived from the financial sector, about which more later. The housing stock and car registrations come from simple accounting schemes that apply current period flows to depreciated stocks from last period. The depreciation or scrappage rate for cars is endogenous and depends on cyclical variables and car operation costs.

B. Housing

Single and multi-family starts are the two principal housing-sector equations. Singles depend on mortgage commitments, the lagged stock, demographic variables, inventory of unsold houses, the price of new homes, and mortgage rates. Multis depend on the lagged stock, mortgage commitments, demographics, and HUD subsidies. There is a separate equation for mobile home shipments.

Total residential structures investment is determined from a "filter equation" based on current and past starts and mobile home shipments.

There is a separate equation for housing equipment.

C. Business Fixed Investment

DRI has separate equations for structures and equipment. They both follow a similar, Jorgenson framework with output and rental price measures interacting reflecting the desired capital stock (see Chirinko and Eisner). Cash flow influences (based on the endogenous nonfinancial corporate flow of funds) are also present. The lagged stock of equipment or structures is modified by capacity utilization. Pollution abatement requirements are also captured in the equipment equation.

There are several recursive equations for the pieces of nonresidential construction put-in-place.

The DRI model has the largest rental-price-to-investment multipliers of the major models.

There are separate equations for the two-digit plant and equipment investment by industry. The real categories were generated by DRI from made-up deflators. These equations try to follow a structure similar to the two macro-investment equations. Industry prices are captured by the most relevant WPI, outputs are captured by the industrial production measures. The industry investment equations are more or less independent of the macro equations. They do not perform very well at all.

D. Inventory Investment

The four behavioral equations for real inventory change are wholesale trade, retail trade, manufacturing, and other. Farm inventory change is exogenous. The equations are generally driven by lagged stocks plus current and lagged sales concepts. For instance, in the manufacturing and other categories, the sales concept is total final sales less housing services and government compensation. For the trade categories, the sales variables is total consumption less housing services.

Manufacturing inventory changes also depends on the current level of manufacturing production relative to sales, military prime contract awards, and "vendor performance". This latter variable is the percent of purchasing agents experiencing slower deliveries. It captures the scramble for inventories that followed the bottlenecks of 1973-74. It is used here and throughout the price block.

The two trade inventory change equations are also influenced by car sales, the domestic/foreign car sale mix, consumer confidence, and capacity utilization.

E. Government

Federal purchases are typically exogenous in nominal terms. However, by changing a simulation "lever," they can be specified in real terms. The deflator is always endogenous. The only endogenous components of Federal expenditures are net interest paid and transfer payments.

The net interest paid equation is scaled to the outstanding stock of debt so that the equation is essentially modeling the effective interest rate on the outstanding debt. This rate is a function of its value last period plus this period's Treasury bill level.

The transfer equation consists of two parts, exogenous "high-employment" (St. Louis Fed definition) transfers plus an endogenous piece which is a function of the number of unemployed persons in excess of full employment.

State and local (S&L) purchases are endogenous and driven by a permanent-income term (a weighted moving average of real GNP) to reflect the increasing demand for services at higher levels of income, federal grants-in-aid, demographics (especially the school-age mix of the population), and operating deficits to capture the budget constraints on S&L expenditures. There is a separate and independent equation for construction expenditures which does not affect the total.

S&L transfers are determined by the unemployment rate, population, and personal income. All other expenditures categories, including net interest paid, are exogenous.

Federal receipts are all endogenous. Personal taxes are the product of taxable personal income and an endogenous personal tax rate. The rate is basically determined by taxable income per employed worker, thus capturing the progressivity of individual taxes.

Corporate taxes are the product of an exogenous rate and book profits. From this is subtracted the product of an effective investment tax credit and producers' durable equipment investment. Federal indirect taxes consist of two pieces, an exogenous windfall-profits-tax piece and all other. The "other" category is driven by the consumption, sales, and import categories on which Federal indirect taxes are levied. Note that the windfall tax variable is subtracted dollar-for-dollar from corporate profits, thus it is completely borne by corporations. Federal social insurance contributions are the product of an exogenous effective rate and wages and salaries.

State and local personal taxes are the product of an endogenous rate and the tax base. The rate is a function of the base and a variable reflecting the state of budget tightness. S&L corporate taxes are the product of an exogenous

rate and book profits. S&L indirect taxes have two pieces, property taxes and other. The property tax price is essentially a time trend. The nominal value of the housing stock is a determinant. The other piece runs off consumption, car registrations, and operating surpluses. S&L social insurance contributions are driven by S&L compensation.

F. Foreign

There are six equations for merchandise end-use categories of exports (agriculture, industrial supplies, capital goods other than autos, autos, consumer goods excluding autos and food, and military goods and reexports). They are driven by activity variables and relative prices. The activity variables are the exogenous production indexes for Japan, Canada, and OECD Europe. The foreign price is captured by the world wholesale price index. "Other" exports capture the remainder of NIA exports (principally service-type flows) and it is structured similarly.

There are seven categories of merchandise imports (agriculture, supplies and materials excluding fuel, fuel, capital goods excluding autos, autos, consumer goods excluding food and autos, and all other merchandise imports). With the exception of fuel imports these equations are all similarly structured and run off of U.S. domestic demands and relative prices. Fuel imports are determined endogenously as a function of overall demands for oil-based energy, domestic production of oil, and the price of energy.

Other imports (services, etc.) are determined by relative prices and the volume of trade.

There are numerous exogenous adjustment factors to derive NIA-, BOP-, or census-based aggregates for trade and deficits.

The exchange rate, which is key in determining relative prices, is a function of the NIA net export balance and oil imports.

Unemployment, Employment, and Labor Force

Total household employment is the residual. The unemployment rate is determined by Okun's law. The labor force is a function of demographic factors, personal taxes (including social insurance taxes), wage rates, and unemployment rates. Specific unemployment rates for various demographic groups are spun off the overall unemployment rate.

Aggregate hours are determined from the implied identity between total business output and productivity. The typical DRI variable for business output used here and elsewhere is GNP less housing services less government compensation. Average hours of production workers are driven by total hours and capacity utilization.

Establishment employment is determined independently at the two-digit level. These are simple equations driven by specific aggregate demand and industrial production categories. Consistency is enforced between the total of establishment employment (given by adding up the industry pieces) and the implied total employment that is given by total hours and average weekly hours. If the two totals differ then there is a simple algorithm for distributing the residual between the two into the various industry employment categories.

Output and Production

There are no separate relationships determining output by sector. However, there are 40 or 50 (I lost count) separate equations determining the Federal Reserve Board's industrial production indexes. Each is are driven by the final demand rector and other industrial production indexes as filtered through the 1972 I-O matrix. The best that can be said about this very extensive sub-sector is that there appear to be a number of industrial production indexes that do not do too badly.

Productivity, Wages, and Prices

A. Productivity

The DRI productivity variable is very closely linked to their concept of potential GNP. Indeed the actual equation determines the ratio of actual productivity to an implied "potential" productivity. This latter term is defined as DRI potential GNP divided by labor input at full employment. Capacity utilization captures the cycle. Relative energy prices also influence this productivity ratio. The upshot is that any change in potential that does not also change potential labor input will change productivity with an elasticity of 1.0.

B. Potential GNP

DRI uses its own concept of potential GNP. It is based on a simple Cobb-Douglas production function with 4 inputs, labor, capital, energy, and the research and development capital stock. The energy input is total energy use so that paradoxically conservation efforts will lower potential. The equation also has time trends to capture recent patterns of productivity.

C. Wages

The wage equation is a relatively straightforward Phillip's curve determining average hourly earnings. It is driven by the inverse of the unemployment rate, two price terms (one a four-quarter change, the other reflecting a much longer lag). The minimum wage is also present.

Compensation is run off average hourly earnings and the ratio of employers' social insurance and other labor income to total compensation.

D. Prices

DRI uses what it refers to as a "stage-of-processing" price model, in which raw material prices feed through to wholesale prices and then into final demand deflators.

Wholesale Prices. The WPI block is built up on a commodity-groupings basis. All of the major commodities are treated. Each runs off of other WPIs, demand variables, (including, in particular, the "vendor performance" variable, described below. The weights for the WPIs in each equation are determined -- it is said --from an old I-O matrix. I will wager that there is no one at DRI to tell exactly how the weights were created (that was certainly the case when I was there). Indirect business taxes and unit labor costs (the ratio of compensation to an eight-quarter average of productivity) are also included in each of the WPIs.

The stage-of-processing PPI's (finished, intermediate, and crude) are derived by identity from the individual commodity pieces.

Final demand deflators. Each of the deflators is built up from a mix of WPIs, unit labor costs, and special factors as needed. Vendor performance appears in several. Consumer confidence appears in one!

Vendor performance. This variable is extremely important in the price block. Indeed, operating on it is the easiest

and simplest way to alter the inflation outlook over the short run. It is essentially a function of the acceleration in certain final demands for goods and in inventory investment. Export demand, foreign industrial production, and various consumption and investment demands are also determinants.

Energy Linkages

Total energy demand is determined by population, activity, and relative-price measures. The activity variables consist of the energy-intensive consumption categories (see below), and manufacturing industrial production. The energy price lags only go back five quarters and the sum of coefficients is only -.07. With domestic production more or less given exogenously, total demand generates demand for imports of oil.

There are separate energy prices for coal, gas, fuels, electric power, crude petroleum, and refined petroleum. Each has a separate influence on the deflators for relevant pieces of energy consumption. Reduced consumption in these categories is reflected directly in the total demand for energy. Thus the elasticity mentioned above is deceptively low and does not capture the full effects on demand of changes in the relative price of energy.

Income Side

The income side is fully determined so that, in effect, the statistical discrepancy is the residual. However, during the solution, the difference between GNP on the income side and GNP on the demand side (which is measured by the variable NIARESID), is allocated by portions to several key income categories. Users should endeavor to keep NIARESID relatively small by adjusting income categories directly. Changing corporate profits (&TEMP@ZB) or productivity (&JQ%MHNF) are the two most effective ways of doing this.

The conventional charges against GNP are all endogenous. The noncorporate CCA runs off of the nominal value of the housing stock. The corporate piece, instead of running off of a capital stock, actually consists of a vintage accounting scheme that separately tracks investment levels back eleven years for equipment and twenty-four years for structures. (I kid you not). The purpose of this is to enable the model to track the impact on book and NIPA depreciation adjustments from a shortening in asset lives for tax purposes. All of the detail, along with the appropriate price information, and depreciation rates is necessary to get the accounting straight. I am not persuaded that it works well enough to justify the complexity and detail. Note that there is an associated model in an "EPS Workspace" that must be solved to perform some necessary side calculations if you are

planning to use this depreciation sector to model alternative depreciation proposals. The alternative to using the workspace for these calculations is to call OTA and get the details on changes in tax lives, rental price measures, and depreciation from them.

The distribution of national income.

The profits equation determines book profits. However, the left-hand side during estimation is corporate profits with capital consumption adjustment but without inventory valuation adjustment (IVA). It is a function of the level and the change in output (revenues) modified by the price of output relative to unit labor costs. Capacity utilization also affects profit margins positively. Since the equation is expected to track the inventory profits there is a complicated term capturing the change in a weighted-average WPI. In addition, the IVA also enters separately with a coefficient of -0.17.

Wages and salaries are separated into private and government pieces. The latter is the product of an exogenous ratio and total government purchases. The former is estimated from the implied identity between aggregate hours and average hourly earnings.

Proprietors' income is separated into an exogenous farm piece and a nonfarm piece that is driven by corporate profits, relative prices, and capacity utilization.

Net interest is essentially a function of the commercial paper rate. Rental income depends on the consumption of housing services, mortgage rates, and the relative price of household operation.

Other labor income is spun off of hourly earnings and employer social insurance taxes.

Dividends are a function of after-tax corporate profits.

Financial Sector

The basic money-demand equation determines the demand-deposit portion of M1-A. It is essentially a Goldfeld-type equation with the long-run price elasticity almost constrained to 1.0. The competing asset yields are the T-bill rate, the weighted-average time deposit rate, and money-market fund rates.

The currency-to-consumption ratio depends on short-term interest rates and a long distributed lag on real GNP.

The money supply block basically consists of three equations, the T-bill equation, the Fed funds equation, and the borrowed reserves equation. The T-bill equation depends on unborrowed reserves plus currency, the ratio of free reserves to total reserves, real output, government debt, other short rates, and inflation. The Fed funds rate depends on short rates the free-to-total reserve ratio, loan demand, and Fed borrowings. The borrowings equation depends on alternative rates (including the discount rate) and free reserves.

Other checkable deposits are exogenous.

There is a relatively extensive commercial bank sub-sector that determines loans, CDs, the prime-commercial loan and CD rates. Real-side activity, corporate finance needs, and interest rates drive the loan demand. Loans

drive CDs. The rates are determined in modified term structure equations using other key short-term rates.

This sub-sector is tied fairly closely with the non-financial corporate flow of funds sector (NFC). The NFC attempts to model the portfolio decisions of firms. Unfortunately, it is very detailed. Although, many of the equations are specified as shares of net worth, the structures of each are so different that it is unlikely that the typical adding-up constraints are maintained. When something has gone crazy in a simulation nine times out of ten it is in this sector. The principal links to the rest of the financial sector and to real activity are corporate cash flow and debt service costs.

There is also a very detailed flow of funds sector, which attempts to capture the portfolio decisions of households. The same sort of criticisms apply here. The principal links to the real side are through household net worth and net financial assets. These are the principal wealth variable used in the consumption equations.

The model includes a mortgage sub-sector that determines activity by four types of mortgage lenders, mutual savings banks, savings and loans, life insurance companies, and commercial banks. Deposit flows and mortgage yields are the principal determinants. This sector feeds into housing construction. A short memo describing one key facet of the sector can be found in Appendix A.

APPENDIX A

UNITED STATES GOVERNMENT

memorandum

DATE: September 11, 1980

REPLY TO ATTN OF: Steve Brooks

SUBJECT: Yield spreads, disintermediation, and housing starts

TO: Charlie Schultze and Steve Goldfeld

Following our conversation yesterday, I have run some simple experiments on the DRI model which attempt to evaluate the role of the "yield-spread/disintermediation" terms in determining housing starts.

In the DRI model, the basic linkage of the housing sector is as follows:

Deposit flows----→ mortgage commitments----→ starts.

Mortgage interest rates affect both commitments and starts. The higher are mortgage rates the higher will be commitments for a given level of deposits; the higher are mortgage rates the lower will be the level of starts for a given level of mortgage commitments. On balance, mortgage rates are much less important than deposit flows in determining housing starts. Deposit flows are determined by wealth, income, and interest rate differentials; it is this latter term on which the following exercises focus.

There are three key deposit types in the model, those of mutual savings banks (MSBs), savings and loans (S&Ls) and commercial banks (CBs). The rates on each are determined by the interplay between the behavioral "free market" equivalent (FME) rates and the maximum legal rate for each deposit type. In essence, the rates will be equal to the maximum when the FME exceeds the maximum; otherwise the rates are equal to the FME. Now assuming that the models do not correctly handle the growing competitiveness of thrifts and their aggressive selling of deposits, it is these terms that must be altered. What I have done is arbitrarily set the rate maxima to levels that will not bind and varied the FME to test the sensitivity of deposit flows (and thus starts) to alternative yield differentials.

The correct, "steady-state" yield differential is not an unambiguous number. (Nor does it have an unambiguous sign.) Table 1 (kindness of PDQ) shows yield differentials of various deposit types in August. The MMCs generally show a differential of around 86 basis points; the passbook accounts show much larger differentials. The time deposit rates the models use are weighted averages of the rates on the institutions' various deposits.

But even if we could correctly calculate the equilibrium yield differential, there remain problems. The biggest of which is the assumed unwillingness of mortgage lenders to commit as large fractions of their MMC deposits as their passbook deposits. Since the models basically focus on one aggregate deposit type per institution, they are clearly unable to model this resistance to lending their "hot" money long.

Table 2 shows the results from three scenarios. Each with a different ex ante FME-T-bill rate differential (200 basis points, 100 basis points, and no yield differential). Note that the resulting yield differentials are often quite different due to the altered economic activity -- these are full-model solutions. The first-round troika simulation results are also displayed. As can be seen, the alternative scenarios show a more bouyant housing forecast than the first-round troika simulation which did not alter either the legal maxima or the FMEs. The level of starts in the fourth quarter of 1981 range from 1.603 million under a 200 basis point spread to 1.850 million with no ex ante yield differential.

Table 1

Deposit Yields at Savings Institutions Paying Maximum Allowable Rates Relative to Yields on U.S. Government Securities of Similar Maturity
(percent per annum)

As of August 28, 1980

	Yield Available 1/ On Accounts at:				Yields on U.S. 2/ Government Securities Investment Basis		Deposit Yields Less U.S. Govt. Security Yields at:	
	Commercial Banks		Thrift Institutions				Commercial Banks	Thrift Institutions
Savings	5.47	(5.25)	5.73	(5.50)	10.02	(1 month)	-4.55	-4.29
Six-Month MMC	10.93 3/	(10.50)	10.93 3/	(10.50)	11.79	(6 months)	-0.86	-0.86
Time Accounts maturing in:								
90 days to 1 year	6.00	(5.75)	6.27	(6.00)	11.18	(3 months)	-5.18	-4.91
1 to 2-1/2 years	6.27	(6.00)	6.81	(6.50)	11.54	(1 year)	-5.27	-4.73
2-1/2 to 4 years 4/	10.67	(10.00)	10.95	(10.25)	11.74	(3 years)	-1.07	-0.79
4 to 6 years 4/	10.67	(10.00)	10.95	(10.25)	11.92	(5 years)	-1.25	-0.97
6 to 8 years 4/	10.67	(10.00)	10.95	(10.25)	11.91	(7 years)	-1.24	-0.96
8 years or more 4/	10.67	(10.00)	10.95	(10.25)	11.90	(8 years) e/	-1.23	-0.95

1/ Yields corresponding to current regulatory ceilings assuming daily compounding of interest on the basis of a 365-day year, excepting the money market certificate. Numbers in parentheses are nominal ceilings.

2/ Maturities associated with U.S. Government securities yields are shown in parentheses. Yields for 1-, 3-, and 6-month Treasury bills have been compounded to reflect returns that would be realized by reinvestment for a 1-year period at current rates.

3/ Yields corresponding to current regulatory ceilings assuming semi-annual compounding.

4/ Effective Jan. 1, 1980, these ceiling rates will be determined by the average 2-1/2 year Treasury yield curve rate. For the five business days ending August 18, 1980, this rate was 10.25 percent.

e/ Estimated.

Table 2

Housing Starts and Interest Rates
(fourth quarter of indicated year)

	1980	1981	1982
Scenario 1 (200 basis point spread)			
T-bill rate (%)	9.26	10.34	11.23
Time deposit rates (%):			
Mutuals	7.44	8.33	9.25
S&Ls	7.83	8.77	9.69
CBs	7.15	8.05	9.15
Starts (millions)	1.298	1.603	1.856
Scenario 2 (100 basis point spread)			
T-bill rate (%)	9.36	10.52	12.12
Time deposit rates (%)			
Mutuals	8.44	9.33	10.25
S&Ls	8.83	9.77	10.69
CBs	8.15	8.05	10.15
Starts (millions)	1.297	1.745	1.966
Scenario 3 (no spread)			
T-bill rate (%)	9.47	10.87	15.93
Time deposit rates (%)			
Mutuals	9.44	10.33	11.25
S&Ls	9.83	10.77	11.69
CBs	9.15	10.05	11.15
Starts (millions)	1.291	1.850	1.931
First-Round Troika Simulation (no change in FMEs or legal maximum)			
T-bill rate (%)	9.26	10.25	11.25
Time deposit rates (%)			
Mutual	6.75	6.85	7.01
S&Ls	7.77	8.01	8.08
CBs	7.43	7.74	7.86
Starts (millions)	1.309	1.552	1.727