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WORKING PAPER NO. 83-72

THE DEMAND FOR HOUSING,  
HOUSEHOLD HEADSHIP RATES AND  
HOUSEHOLD FORMATION IN FRANCE

BY

PIERRE-ANTOINE ULLMO

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THE DEMAND FOR HOUSING, HOUSEHOLD HEADSHIP RATES  
AND HOUSEHOLD FORMATION IN FRANCE

By

Pierre-Antoine Ullmo

Working Paper No. 83-72



## Introduction

The French housing market has experienced many transformations since WW II. The war's destruction and an overall shortage in this long neglected area made the housing problem a national priority. Production's capacity and the financing mechanisms were insufficient or inappropriate. Thus, the Administration worked out a housing policy based on both direct intervention and incentives for the private sector.

Driven by a strong demand and benefiting from these new institutional arrangements, the level of construction went up dramatically. The number of housing starts increased from 68,000 in 1950 to 556,000 in 1973. By the mid-seventies, the basic pent-up demographic demand was almost entirely satisfied. This massive uninterrupted growth reinforced the idea that "construction was to go on, no matter what. . . ."

The cyclical volatility in new home construction, identified in the U.S. as one of the key problems confronting housing policy makers, was largely ignored in France. However, the last several years introduced a major shift in the French conception of the housing market. Construction partly lost its privileged status; most housing starts were privately initiated, as the state tried to reduce and reorient its financial contribution on the mortgage market.

The longtime commitment of the French administration to home-ownership was endangered by recent economic difficulties. The number of housing starts has declined sharply since 1975. As the market seemed to

reach a state of structural disequilibrium, new analyses were conducted to reevaluate our understanding of both supply and demand for housing.

The purpose of this paper, after a short introductory description of the French housing market, is to add to this new understanding. A small short-term model of the housing market will be developed based on works by Jaffee-Rosen (1979) and others implemented in the U.S. It must be clear that an "American" model cannot fully apply to France. Thus, in addition to the statistical approach, this paper should be viewed as an attempt to reemphasize the importance of some basic variables on both sides of the market while departing from the common policy analysis.

Since 1950 the stock of dwellings in France has improved both quantitatively and qualitatively. With 22 million housing units, rising vacancy rates and a large quantity of secondary housing units, this can be considered a mature market.

But a look at history sheds important light on to our understanding of the French housing market. Over 50% of the stock dates back to 1950 or before. As a result, 20% of all units do not fit the minimal standards for comfort. Single-family housing accounts for 51% of the stock. Yet, even though the preference for homeownership is strong among the population, renters still occupy 44% of all units.

The state is a major builder; through its public starts program (HLM), it initiated annually 25% to 30% of all construction activity. Besides this direct intervention in the housing market per se, public intermediaries are key intervenors in the mortgage market. This intervention makes up for the absence of specialized financial institutions

for housing. There are no lending institutions equivalent to "savings and loans," but home mortgage corporations (CPHLM, Credit Foncier) provide special loans with low interest rates for the construction of new housing. These agencies find their resources in the secondary market for the Credit Foncie, and through savings deposits for the CPHLM. Until now there has been a preferential allocation of savings for housing finance. New schemes based on these savings deposits-- collected on a national basis in centralized governmental institutions-- have been devised in recent years to encourage homeownership ("Epargne Logement"). As a whole, public lenders account for 45% of all new mortgage credit.

#### Models of the French Housing Market

In the last five years, the private sector has been predominant in the new construction market. France combines a unique mix of public and private initiatives. It is therefore difficult to speak of a single housing market. There are numerous types of credit at various rates. The dwelling units are priced differently according to the nature of the builder and lender. The very meaning of the market has been lost in these endless attempts to conciliate the multiple facets of the housing sector.

A specification of a model of the French housing market is then likely to face methodological problems. Let us start with a review of the existing literature on the subject in France.

Most of the French housing models are part of larger national models. Their output is investment in residential construction. A



price equation is usually added to the determination of the volume of investment. Surprisingly, these national models (DMS, Metric, Copain, Piti) do not disaggregate by type of structure (multifamily/single-family), but follow a generalized stock-adjustment process. They explain the volume of investment in residential construction through the behavior of three main variables: demographic, income, and credit (cost and availability).

The concept of investment in residential construction is a complex one relying on National Accounting aggregates. Housing starts are only part of the volume of investment. Therefore, only one model, metric, specifies a housing start equation:

$$HS = f(\text{Stock, Permanent Income, Price Subsidies, Down Payment})$$

The final equation separates public and non-public starts. Poor statistical significance makes such an estimation unreliable.

The other three models deal only with the volume of investment, FBCF.

$$\text{DMS; } T = \frac{\text{FBCF}}{S_{-1}} \quad S: \text{ stock}$$

$$T = f(T_{-1}, \text{DEMO, INCOME, CREDIT})$$

$$S = (1-d)S_{-1} + \text{FBCF}_{-1} \quad d: \text{ depreciation rate}$$

$$\text{COPAIN; } \text{FBCF} = f(\text{DEMO, INCOME, LIQUIDITIES}) \\ (M_3)$$

$$\text{PITI; FBCF} = f \left( \text{Permanent INCOME, } \frac{\text{Social Benefits}}{\text{Net Wages}}, \text{DEBT} \right)$$

The credit variable is determined within the model. Focus is put on the demand for mortgage credit. The equation is specified in various ways, including at least some kind of mortgage rate, a loan to value ratio variable and some indicator of monetary policy. The price equations are incomplete or ignored due to data problems; the diversity of prices does not fit with the single aggregate used as a dependent variable. All these models are focused on the demand side of the market. Another national model, POLO, stigmatizes this approach by defining a utility function to proxy the demand for housing.

These models generally show a market in which the volume of construction is a function of a small number of variables, each operated in a simple uncomplicated form. Two main criticisms are raised. The level of aggregation is too high to fully describe the complexity of the market; thus the information gathered is hardly usable for a policy oriented analysis. In addition, supply variables are ignored which makes it difficult to analyze a market in disequilibrium, especially on a quarterly basis.

A new model--designed recently by a team of researchers for the Ministry of Housing--deals specifically with the housing sector and tries to correct for these methodological imperfections. Three objectives have been assigned:

- forecast the investment in residential construction
- simulate specific policies

--analyze savings' relationship to housing investment

The level of disaggregation in the SABINE Model is very high. Six categories have been specified according to both types of structure and circuits of financing. The diversity of the public sector--as previously described briefly--has led to a refined specification of policy parameters: various kinds of mortgages, interest rates and overall economic indicators. As it is, the model tries to replicate the complicated pattern of the French housing system and appears to be an essential tool for the simulation of new housing policies. The purpose of the model goes beyond housing. One major aspect is to determine the process of allocation of savings to housing; matters like substitutability of investment in real estate to investment in other assets are addressed in detail.

SABINE is a complete, carefully designed model. However, complexity seems to be an obstacle to a clear reading of the market. This complicated structure appears to be mostly designed for policy matters, purposely ignoring basic interactions on the housing market. The large data base required adds some difficulties to the econometric estimation process.

Our research is definitely less ambitious. In the remainder of this paper we will not focus on the specificities of French housing policy but will describe, in an econometric form, basic relationships that are assumed, for the purpose of this paper, to hold in any environment.

The volatility of residential construction has been puzzling economists for a long time. The interest goes beyond the concept of economic fluctuations theoretically approached by Kuznets and others.

Despite the extensive literature, building cycles remain largely unexplained. Maisel and Grebler<sup>1</sup> devoted a great deal of research to the determinants of residential construction. This cautious survey acknowledges the specificity of the housing market:

Because of the durability of houses and because of poor market information, it is frequently assumed that the periods of disequilibrium may be unusually long and may account for some of the major production fluctuations. This failure to achieve equilibrium readily is one of the basic causes of the unique fluctuations in the housing market.

Several variables are used by the economists to address this cyclical pattern problem. They try to cover in a simple form the whole range of interactions existing within the housing market and between this market and the rest of the economy. Intuitive relationships have been designed and tested statistically. Maisel<sup>2</sup> again asserts the fragility of our analysis:

On a priori grounds, ten or a dozen series appear to affect the dependent variable-housing demand. However this cannot be shown by statistical methods since use of any four or five series gives nearly perfect correlation. Yet for analysis or policy, one cannot be sure that these series are more important than the rest.

Housing cycles combine short-run and long-run fluctuations. These separate equilibrium considerations have not been clearly addressed in the literature. Kearl, Rosen and Swan<sup>3</sup> in a recent survey tried a synthetical approach:

. . . [a] view of housing that holds that the long-run stock demand for housing is primarily a function of income, relative prices, the rental rate of housing services, and the size and age structure of the population with monetary policy and the parameters of the mortgage instrument having little, if any, impact on these basic demand factors. However, adjustment of the stock, that is, how quickly equilibrium is approached,

does seem to be strongly influenced by monetary policy and mortgage instruments.

Despite this conciliatory statement, no agreements have been reached on the extent of elasticity of supply or demand either in the short or long term. (See de Leeuw (1971), Muth (1960), and Meltzer (1973).)

The endogeneous or exogeneous nature of the construction cycle itself is subject to discussion depending on the period of time surveyed. Hickman,<sup>4</sup> in his pre-World War II study, concludes the non-existence of the building cycle:

Nothing has become of the building cycle, for it never existed as an independent fluctuation. Thus the long swings in building, if cyclical in nature must be explained by a model incorporating interactions between aggregate economic activity and the housing sector.

Recent years have called this statement into question. Rosen raises the problem of these interactions: "Housing, due to its greater sensitivity to monetary policy changes simply precedes rather than actually counterbalances economy-wide slowdowns and booms." Jaffee and Rosen (1979) see the recent fluctuations in the construction activity departing from the usual cyclical scenario.

The theory is constantly changing. While holding to a certain methodological approach (i.e., extended use of the generalized stock adjustment process), new variables are introduced to account for changes in policy or demographic trends even in the short-term context. No single or uniform econometric specification is widely accepted. The most recent survey of econometric models of the housing sector by Fredland and Macrae (1978) fully covers these transformations.

Besides the confusion reigning among economists to best explain the functioning of the market, a special emphasis had been put on the flexibility of analysis as developed in a short-term model by Jaffee and Rosen<sup>5</sup>:

. . . the model fits a Marshallian demand-supply structure but with some complexity because of the interrelationships of stocks and flows, and the special feature of the single-family and multifamily submarkets.

The demand function for the stock concerns decisions on household formation as the first step and decisions on tenure choice (whether to own or rent) as the second step. The supply function for the stock is based on perpetual inventory principles with the current stock determined as the sum of newly constructed units and the existing stock surviving from the preceding period. The number of vacant units is then defined as the stock minus demand. Rents and house prices are also determined by this stock level, demand-supply balance. Housing starts are determined as the result of decisions on flows. . . . The demand side determines housing starts in the market for single-family units, while the supply side determines starts in the market for multifamily units.

A small model for France will be developed in a similar way. Data constraints will force us to use an annual model from 1960 to 1980 in place of a quarterly model. Household formation and housing starts will be addressed in detail. Because of these same data problems, the mortgage and price equations were not developed at this time.

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#### Demographic Demand for Housing

Demographic variables are said to play an important role in the demand side of the market. Although they do not enter most of the short-term models as it is noticed in Fredland and Macrae (1978), they are often mentioned as a key explanation to the fluctuations in residential

construction. Jaffee and Rosen (1979) and Kearl, Rosen, and Swan (1975) describe on the basic demographic variables concerning the size and age structure of the population. These key components are part of a broader theory on the household formation process. The demand for housing is then determined by the manner in which the population divides up into households. Hickman,<sup>6</sup> in his long-term study of the housing sector in the U.S., gives some historical backing to this theory: "Clearly, an adequate explanation of the major fluctuations in residential construction since the mid-1920s needs to account for the newfound independence of household formation from demographic factors and of housing starts from housefold formation." This cautions statement raises the implication that there is no clear-cut relationship between the standard determinants of supply and demand for housing.

This implies that housing in markets where it is difficult to separate determinants of supply and demand.

Maisel and Grebler (1963) reassert the fact that in most models, an increase in households raises the level of construction. Jaffee and Rosen<sup>7</sup> revise the theory once again introducing the concept of effective housing demand as opposed to housing needs. This "qualitative" variable adds a new dimension to our understanding of the market's behavior:

" . . . the housing demand no longer depends on gross changes in the population in age of occupying its own dwelling unit but on a number of factors affecting the way the population constitutes itself into households." An international study (Smith, Rosen, Markandya and Ullmo)

investigated this relationship further. Let us summarize the findings for France.

Like most industrialized countries, France is experiencing a slowdown in its population growth. The demographic situation in 1981 was as follows: 803,000 births, 558,000 deaths, 315,000 marriages, and zero net migration. This results in a net annual increase of 245,000 persons (+ 0.5% from 1980) in a total population of 54 million. Although birth rates provide little information for the evolution of housing demand in the next ten-year period, they may have an immediate effect; the continuous decrease in large families (three and more children) will actually generate a new demand for much smaller units.

The knowledge of age distribution of the population is essential to an analysis of the needs for primary housing. Only people over twenty years of age are likely to demand housing on their own. The 20-34 age group includes most of the potential first-time home buyers, while the 35-64 age group has a smaller demand potential. People over sixty-five may generate a new demand as they come to retirement age. We come then to a segmentation of the demand by age groups with the age distribution of the population presenting a picture of the actual and future demand for housing.

The last decade saw a surge in the 20-34 age group with the first effects of the post-World War II baby boom. By 1990, one can legitimately expect that the young adult portion of the population will still be strong as the second baby boom "wave" arrives at home-buying age.



Yet, an aging of the population, already noticeable during the 70s, will accelerate due to declining fertility rates. Projections by the French institute of statistics, INSEE, confirm this trend. The 20-29 age group of major importance for our purpose is said to remain stable at 8,400,000 until 1994 (6,450,000 in 1968, 8,450,000 in 1973) before dropping dramatically to 7,780,000 in the year 2000.

As mentioned earlier, a direct translation from the shifts in the age distribution of the population to the housing demand is theoretically questionable. The "effective housing demand" integrates economic and sociological factors to explain the household formation process. The number of households, then, statistically accounts for the total number of occupied housing units.

In France or in the U.S., one can approach the households' structure through two main types of formation process:

conventional households (family, primarily married or persons related by blood);

nonconventional households (one-person households or unrelated persons living together).

These individual, nonconventional households are an increasingly important part of the housing demand. Therefore, their formation process is essential to our study.

The last published census in France (1975) revealed an unexpected growth of the total number of households between 1968 and 1975: 280,000 per year instead of the 260,000 that had been projected. This surplus is the translation of the surge in nonconventional households.

These primary individual households result from young individuals setting up their own households, delaying marriage and/or living with a person of the opposite sex, from the uncoupling of existing households by divorce, and from the preference of surviving elderly spouses to retain their own independent living quarters. [Jaffee-Rosen]<sup>8</sup>

Data on the evolution of household headship rates in France seems to support this statement on the importance of the uncoupling phenomenon. The headship rate is one of the key elements in modeling the demand for housing.

In the U.S., the headship rate for household type  $i$  and age group  $j$  ( $hh_{ij}$ ) equals the ratio of the number of households of type  $i$  and age group  $j$  to the population in age group  $j$ . (In France, it is defined as the ratio of the number of households of type  $i$  and age group  $j$  to the population of type  $i$  and age group  $j$ .)

Singles under thirty-five years old account for 36% of the new households in the 1968-1975 period. The increase in headship rates has averaged 50% for single females under thirty-five. The number of divorced households went up dramatically in the 15-24 and 25-34 age groups. For the older age groups, stability dominates. Though changes are still to come in some of these categories (divorced, over thirty-five) a maximum in headship rate is likely to have been reached for married households over thirty-five. Interestingly, since 1968 some categories over sixty-five are showing a significant increase (widows).

Divorce plays an important role in these new formation processes. It has increased steadily since 1970; almost 90,000 divorces were recorded in 1980, which was more than 25% of marriages that year. Ten

percent of females divorce before twenty years of age, while the vast majority of divorces is to be found between twenty-one and forty-one years of age for women and between twenty-four and forty-three for men. Twenty-five percent of the divorces involve couples with no children; 32%, couples with one child; and 43%, couples with two or more children.

Divorce is nowadays part of our environment. It is the institutionalization of new behavior that permanently affects housing demand and thus does not limit the "individual household" phenomenon to a temporarily fashionable surge. The tendency of young people to move out of their parents' home is also a new form of institutionalized behavior. One can see in the last ten years a new awareness and a new understanding of economic growth. All want their shares and claim it in more individualistic manners. It is a paradox of this evolution that these individual aspirations went along with a reinforcement of social solidarity through an ever more comprehensive welfare system.

This quest for a more independent way of living on the one hand, coupled with a reinforcement of solidarity with the less-favored groups of our society on the other hand, emphasizes a growing satisfaction of individual needs and desires. Among these needs and desires, housing is certainly one of the priorities.

The economist finds himself increasingly obliged to express in a quantitative way this subjective "evolutionist" theory. Rosen and Jaffee<sup>9</sup> and several French economists have proposed an approach based on economic growth: "The sharp drop in the relative cost of housing unit has, in combination with rising real income, encouraged formation of

primary individual households."

The typical equation of the first block of our model is then the following:

$$h_{ij} = f(Y,R) \quad (1)$$

where

Y = real personal disposable income

R = real cost of housing

These two variables account respectively for the changes in the overall economy and in the housing market. They have been widely used to proxy the affordability and availability of housing. The specification of these two variables varies. We will review them both.

The use of permanent income against disposable income has been debated in many theoretical works. We decided to adopt the latter for short-term convenience and better statistical results. Moreover, the data fit well in our theory. During the last twenty years, the real growth in income has been continuous in France. The average annual increase was 4.5% between 1962 and 1970. It is still 3.3% for the 1970-1975 period. Despite the economic recession, real income has kept growing with the exception of 1980. The income structure has changed. Wages still make 60% of total income but transfer payments account for a growing part of it. Transfer payments amounted to 24.8% of total income in 1970, increasing in 1975 to 28.7%. This increases the income of people who otherwise would have been priced out of the housing market-- i.e., retired people benefiting from higher pensions.

Various groups of the population are getting a larger share of the total income, thus strengthening their propensity to create their own households. The rate of employment of women between the ages of twenty-five and fifty-four went up 1.2 basis points per year, rising from 44.5% in 1968, to 51.6% in 1974, to 56.3% in 1978. Rosen and Jaffee<sup>10</sup> take this last fact as exemplary of the marginal effect of growth in real income: ". . . the rise in the female labor force participation can partly be attributed to the increased need of single, married, and divorced females to support or help support the housing unit."

Both increase in and better distribution of real income generate a stronger demand for housing. But the durability of this trend depends on the economic environment; the strong increase in unemployment has slowed down this move towards greater affordability of housing, especially harming young people and women--who until now accounted for most of this new unconventional demand.

The Administration tried to act in a countercyclical manner by increasing aids and transfer payments and by promoting a more progressive fiscal policy. But continuous inflation has led to a stringent deflationary policy with lower social benefits. These reductions will adversely affect the demand for housing.

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The determination of the cost of housing indices is more questionable. It is also of crucial importance as some kind of "cost of housing services" variable is present in most of the models.

In the U.S. the most common variable is the rent component of the CPI. Fredland and Macrae<sup>11</sup> summarize the debate around the use of this variable:

. . . the difficulty with the use of this variable, apart from the assumption that it represents the price of a standardized unit, is that it is based primarily on multi-family rentals, while the price required includes the implicit rental-rate on owner-occupied housing as well.

Clearly, the choice of our variable should reflect the tenure structure of the stock. Smith, Rosen and others<sup>12</sup> address the topic in the following way:

. . . the cost of housing services variable should be a measure of the effective housing cost typically faced by each age category, primarily the cost of rental housing in the 15-24 and 25-34 age categories, and a weighted average of rental and homeownership costs in the other age categories. This statement refers directly to the diversity of a market with the tenure choice being very much dependent on the economic characteristics of specific groups of the population. In France, for instance, where the renters occupy slightly over 40% of the units, the percentage varies from 26% for a married couple over sixty-five to 85% for a single female under thirty-five.

The problem of data appears, then, as a major constraint. No cost of homeownership appears in the CPI. The real user cost of homeownership is appropriate but its computation remains theoretical. The variety of prices and financing on the market prevents us from using any

satisfactory general index. The recent model SABINE for the French market disaggregates prices by types of construction. The final setting of the data base due to the lack of information remains, however, still subject to interpolation methods.

The easiest and perhaps best solution will be to use only the rent component of the CPI as a proxy for the cost of housing services. This relies on a strong and so far unproven assumption:

If we assume that over time the real user cost of obtaining equivalent housing services through renting and owning will be equated for the marginal household, then the rental index not only provides a reasonable measure of the variations of the cost of rental housing, but also serves as a reasonable proxy for variations in the cost of homeownership housing services. [Smith, Rosen, others]<sup>13</sup>

Muth<sup>14</sup> deals with this difficulty of using only the rent component of the CPI.

Strictly speaking, available measures of rent (should) refer only to tenant-occupied housing since it is only for this kind of housing that market prices are available. While owner-occupiers are in effect considered here as landlords who sell housing services to themselves as tenants, these imputed rents are not covered by available rent indexes.

The difficulty of using the rent index alone goes beyond its recognized statistical bias. This bias in France is even stronger because of rent control and recent changes in the computation (utilities are now included) that question the consistency of the series. Maisel<sup>15</sup> goes further in this search for a market-oriented index:

Even if the rent indices measured correctly changes in amounts paid, they would not measure movements in income from rental properties. Net income is far more volatile than gross income (rents).

In our analysis of the real cost of housing, we decided to keep two separate specifications. The rent index was used for the age

categories that were predominantly renters, and a homeownership component was used for the age categories that were predominantly homeowners.

A study conducted in France showed that housing accounts for 26.5% of all households' expenditures. In 1979 an average of 1500<sup>FF</sup> was consumed for housing purposes (1000<sup>FF</sup>: implicit rent, taxes; 500<sup>FF</sup>: maintenance). The average rent was 500<sup>FF</sup>. The average monthly mortgage payment was 1000<sup>FF</sup> with a wide range of situations: 10% of households were paying 200<sup>FF</sup> monthly; 10% were paying over 2000<sup>FF</sup>. (All these figures should be revised upwards by 40% in 1982.) As an aggregate index, rents increased in real value up to 1973. The abandonment of a malthusian policy implemented during the wars, the development of social programs and a more flexible rent control have produced higher prices making up for a long-time depression. As the stock increased, fewer controls were kept; in an excess demand situation, rents went up. As the private sector started playing an increasing role, subsidized constructions went down and this led also to higher rents.

Since 1973, the relative cost of renting has been decreasing. By then, the housing scarcity that had hit France for so long had practically disappeared. A crude supply-demand curve could explain this real decline in rents. It will, however, be illusory to speak of a relative excess supply situation.

On the contrary, our homeownership index shows a constant increase peaking up in the last years. As we said earlier, data are hard



to find. Theoretically we should distinguish between multifamily and single-family housing prices. For single-family housing we should consider detached and semi-detached units to account for separate decision processes when the unit is built for a developer or for the household directly. Series start back in 1969; before that date, we used the cost of construction index. The construction cost index excludes builders' profits and overhead charges; it does not include the cost of land. It is usually thought reasonable to assume a linear relationship between prices and construction cost prior to 1968. Since then the divergence is startling. Although the price of land remained stable in percentage of total price, prices have skyrocketed. Developers' margins were high. Financial costs (mainly holding costs of the unsold inventory) accounted in 1979 for 35% of the total cost. In the short term, prices seem to have a limited effect in adjusting to temporary disequilibrium on the market. We tried out several indices. One of them was a weighted average of apartment prices per square foot in Paris and the rest of France. The other one was an average of apartment and single family prices. The weight was based on the number of housing starts by type: single or multifamily, lagged two periods. The last one was the index for semi-detached, single-family units.

TABLE 1

## REGRESSION RESULTS: HOUSEHOLD HEADSHIP RATES (AGGREGATED)

|         | Constant          | $R_{-1}$       | Y              | Public Housing | $\bar{R}^2$ | DW   |
|---------|-------------------|----------------|----------------|----------------|-------------|------|
| 15 - 24 | -14.16<br>(4.59)  | -.15<br>(.42)  | 1.13<br>(3.04) |                | .96         | .86  |
| 25 - 34 | -11.33<br>(68.91) | -.33<br>(8.76) | .97<br>(38.48) |                | .99         | 2.26 |
| 35 - 64 | -5.14<br>(38.41)  | -.29<br>(9.48) | .35<br>(16.65) |                | .95         | 1.64 |
| 65 +    | -2.23<br>(10.68)  | -.28<br>(3.73) | .06<br>(1.51)  | .02<br>(.62)   | .76         | 1.76 |

Estimation Period: 1961-1980

Bracketed values are the absolute value of the t- statistic

$\bar{R}^2$  refers to the untransformed regressions

DW is the Darbin-Watson statistic

TABLE 2

## REGRESSION RESULTS: HOUSEHOLD HEADSHIP\* RATES

|         | Constant        | Lagged<br>Dependent<br>(hh <sub>-1</sub> ) | R <sub>-1</sub> | Y             | $\bar{R}^2$ | DW   |
|---------|-----------------|--|-----------------|---------------|-------------|------|
| 15 - 24 | -2.95<br>(2.09) | .91<br>(12.82)                             | .31<br>(3.73)   | .1<br>(.7)    | .986        | 2.09 |
| 25 - 34 | -9.17<br>(4.83) | .15<br>(.9)                                | -.27<br>(3.87)  | .78<br>(4.81) | .986        | 2.26 |
| 35 - 64 | -3.2<br>(4.51)  | .34<br>(2.12)                              | -.20<br>(3.83)  | .21<br>(4.77) | .961        | 1.84 |
| 65 +    | -1.31<br>(4.7)  | .24<br>(1.8)                               | -.21<br>(5.39)  | .02<br>(1.24) | .903        | 2.2  |

Estimation Period: 1961-1980

\*The head of household is single

TABLE 3

## REGRESSION RESULTS: HOUSEHOLD HEADSHIP\* RATES

|         | Constant        | Lagged<br>Dependent<br>(hh <sub>-1</sub> ) | R <sub>-1</sub> | Y             | $\bar{R}^2$ | DW   |
|---------|-----------------|--|-----------------|---------------|-------------|------|
| 15 - 24 | -3.4<br>(.87)   | .82<br>(4.9)                               | .32<br>(.7)     | .13<br>(.3)   | .985        | 1.59 |
| 25 - 34 | -1.43<br>(1.36) | .67<br>(3.12)                              | -.038<br>(.71)  | .12<br>(1.3)  | .978        | 1.99 |
| 35 - 64 | -1.13<br>(3.46) | .17<br>(.77)                               | .037<br>(1.7)   | .02<br>(1.39) | .956        | 1.89 |
| 65 +    | -.008<br>(.04)  | .96<br>(7.69)                              | -.076<br>(2.78) | .03<br>(2.37) | .889        | 1.62 |

Estimation Period: 1961-1980

\*The head of household is married

TABLE 4

## REGRESSION RESULTS: HOUSEHOLD HEADSHIP\* RATES

|         | Constant       | Lagged<br>Dependent<br>(hh <sub>-1</sub> ) | R <sub>-1</sub>   | Y             | R <sup>2</sup> | DW   |
|---------|----------------|--|-------------------|---------------|----------------|------|
| 15 - 24 | -9.4<br>(1.82) | .77<br>(5.48)                              | .40<br>(1.91)     | .54<br>(1.14) | .992           | 2.39 |
| 25 - 34 | -8.7<br>(3.7)  | .7<br>(8.25)                               | .27<br>(3.62)     | .56<br>(2.87) | .997           | 1.93 |
| 35 - 64 | -1.54<br>(3.5) | .37<br>(1.92)                              | -.05845<br>(1.02) | .016<br>(.62) | .965           | 1.84 |
| 65 +    | -.13<br>(.7)   | .86<br>(5.09)                              | -.01819<br>(.37)  | .0035<br>(.1) | .955           | 1.95 |

Estimation Period: 1961-1980

\*The head of household is divorced or widowed

### Econometric Results

Equation (1) in log-linear form was empirically estimated with annual data using OLS estimation from 1960 to 1980. The headship age specific categories examined were 15-24, 25-34, 35-64, and over 65. To overcome the problem of positive serially correlated residuals, we ran autoregressive transformations using the Cochrane-Orcutt search procedure.

Headship rates were specified two ways: once as an aggregate number by age group; second, by taking separate values for each type of household (single, married, divorced or widowed) in a particular age group.

The regression results seem to meet our expectations, while providing interesting insights for certain age groups. The general equations, run for aggregate headship rates by age group perform well. Income has a positive sign in all four equations with significant t's. The income elasticity was highest in the youngest age group. The cost of housing variable has a negative sign statistically significant except in the 15-24 age group. When you disaggregate by types of households, the results are more difficult to interpret.

The income effect is well specified in the equations. For the single households, the short-run elasticity of headship rates to income is positive and ranges from .8 to .1. Over thirty-five, the elasticity decreases as people get more stable sources of income. The decrease occurs more rapidly for married households.

The real cost of housing is significant in the single households equation. Contrary to theoretical expectations, the regressions show a positive correlation in the 15-24 category. Markandya<sup>16</sup> tried an explanation:

Both the private and the public rental housing markets are in excess demand at the current prices and so changes are unlikely to reveal anything about the demand for households. Where there is rationing, household formation will probably be influenced by the relative market power of different groups in the private sector and by the relative social priorities accorded to them in the public sector.

This supply constraint will be discussed further in the next pages. Let us say that the youngest households have a tendency to be priced out of the market. Cheap public housing is not available anymore with the decrease in the number of starts. The priority of the Administration is clearly based on homeownership, focusing therefore on older categories. They are thus likely to respond positively to any increase in price as a way to "clear the market." Once again, the structural preference of young people to form a household on their own is reasserted.

The availability of public housing has a significant influence on the headship rate for the elderly in France. The income and price elasticity are also relatively important for this last category. This affects their behavior before retirement as more and more money will be put aside for the future. The new demand of these households cannot then be studied without considering the evolution in the system of pension benefits.

Last, a lagged dependent variable was added as an independent variable to account for the speed of adjustment in the demand. This

autoregressive process gives expected outcomes. Coefficients average .65 for the married categories; i.e., half the adjustment takes place in a year and a half. Single households are more sensitive to economic variables; the coefficient of .35 for the 35-64 age group indicates that half the adjustment takes place in .65 of a year.

At this point of our study, Hickman's<sup>17</sup> statement on fluctuations in residential construction should be referred to once again: ". . . [the] model [should] account for economic as well as demographic determinants of household formation and provides an explanation of the marked deviations of housing starts from household formation." Supply constraints that we identified in the previous pages are part of these "market deviations." Though there is "no extreme cyclical volatility" in the new home construction market in France, cycles exist and their importance has grown recently. A complete set of governmental devices prevents the activity from oscillating too sharply. But as the housing market matured in the mid-seventies, signs of a structural disequilibrium became more evident.

During the 1960s and up to 1972, the growth in residential construction was multifamily induced. The industry was restructuring and public starts were determinant to sustain the activity--they account during this period for about 35% of new residential construction. The seventies provided no clear reading of the market. The growth from 1972 to mid-1974 was followed by a brutal recession. After a slight recovery in the first months of 1976, activity as measured by housing starts, declined again. Between 1972 and 1980, the number of housing starts went



down from 555,000 to 400,000. This decline must be approached carefully. The number of multifamily housing starts went down dramatically following a massive drop in public construction. The construction of residential single-family units made up for part of this decrease. Private capital proved to be more unstable. The number of units started responded more closely to general economic indicators (income, GNP, etc.); i.e., declines in single-family construction in 1975 and 1980 are coincident with slowdown in the overall economy. The disaggregation by type of units will be our starting point to address the problem of cyclicity in the French housing market.

. . . single-family housing starts are determined by demand in the model because the majority of single-family units are now custom-built, self-built or directly contracted in some other manner. . . . multifamily housing starts are determined by supply in the model, reflecting the profit opportunities of developer-construction firms. Demand factors influence multifamily housing starts through stock level forces, whereby potential renters signal their demand by bidding up rents and eliminating vacant units. [Rosen-Jaffee]<sup>18</sup>

A credit variable will enter both equations. As stated earlier in the paper, most of the literature in residential construction suggests that variations in monetary policy tend to destabilize the housing sector. Maisel<sup>19</sup> points it out clearly: ". . . no matter how housing problems are defined, the credit variable has almost invariably been singled out as the key to the solution."

The great dependence of the housing sector on external funds makes it very sensitive to any capital rationing. The availability of mortgage credit is an important short-run constraint. It has led the Administration to take measures to ensure a constant flow of funds

towards the housing market. In France, two public-related institutions account for 45% of all mortgage credit. The efficiency of this voluntaristic policy has been extensively discussed. Meltzer and Arcellus<sup>20</sup> found "no evidence that the demand for or supply of housing increases with changes in the stock or flow of mortgage credit." Figures on France tend to endorse this finding. Since 1977, the construction activity in volume declined while the amount of credit kept increasing. French economists concluded to the absence of a relationship in the long-term between the two variables. Kearl and Rosen<sup>21</sup> attempted a conciliatory statement: ". . . it is unlikely that few if any of the researchers who found evidence of credit rationing would argue that the availability of mortgage credit would have a substantial impact on the long-run equilibrium size of the housing stock."

As said earlier, France has a complicated mortgage market with both public and private actors. We decided to ignore these specifications by using the total flow of mortgage credit for the single-family equation. It translates immediately into the demand for funds by households.

For the multifamily sector, we had to deal with the specifications of the building process. Changing financial conditions influence the builder not only through changes in expected demand, but also through variations in the availability of construction loans. This will be best approached by variations in the monetary policy. Therefore, we used a monetary base indicator as our credit variable.

The credit aspect also enters our model through a cost variable [Friend<sup>22</sup>] emphasizing the interest rate effect "reflecting a greater interest elasticity of housing demand than of demand generally." Once again, two separate variables are introduced for single and multifamily purposes.

The single-family cost variable is an index of mortgage rates as they apply to loans issued by a quasi-public mortgage corporation: Credit Foncier. We assumed this type of loan best proxies the overall conditions on the market. Though this agency has some kind of public guarantee, it is closely related to the market, as it is bidding for funds on the bond's market. The maturity of the mortgage lies within the range of maturities in effect on other loans at about mid-point.

The cost of construction loans for the multifamily equation was tied to the prime rate as a consequence of the greater sensitivity of the multifamily sector to variations in the monetary policy.

Both equations will incorporate an income variable as a way to measure the income elasticity of demand. No theoretical agreement has been reached on this point. De Leeuw<sup>23</sup> concluded that for renters, the income elasticity of housing expenditures is between .8 and .1. Maisel and Grebler<sup>24</sup> claimed that the grouping of data has led to an upward bias in the estimation of the income elasticity of demand, concluding that the elasticity is in the .62-.70 range.

Public starts are also present in both equations. They have a major influence on overall construction. Price indicators were indirectly specified as a deflator for both income and credit variables.

A "profitability" variable was added to the multifamily equation following Hickman<sup>25</sup>: ". . . the number of new housing starts depends on the expected profitability of building and selling a new house or apartment building to owner-occupants or landlords."

The ideal variable according to Jaffee and Rosen (1979), would compare the discounted value of anticipated net rental income with the construction cost. Unfortunately no such data are available. Therefore we used the ratio of rent component of the CPI to construction cost.

A last variable would measure the demand effect. We have to be careful when specifying this variable. Grebler and Maisel<sup>26</sup> claimed that "the observed correlation between income, credit, prices, and construction starts in the time-series models may well be accounted for, at least in part, by movements in vacant units in contrast to actual shifts in basic demand for housing. Increased construction associated with a shift in an economic variable may reflect the building up of inventories and not a change in final demand."

Vacancy rates, therefore, enter the specification as a disequilibrium component. The feedback loop to household formation can easily be seen through the following identity:

$$VR = 1 - OS$$

VR: Vacancy Rate

OS: Occupied Stock

We avoid using both variables, for colinearity problems might have occurred.

$$FSMFALL = f(\text{PUBSTARTS}, \text{INCOME}, M_1, \text{PRIME}, \text{VACANCY}, \text{PROFIT})$$

$$FSSFAL = f(\text{PUBSTARTS}, \text{INCOME}, \text{MORTGAGE}, \text{RATE}, \text{VACANCY})$$

Econometric Results

Both equations were statistically significant at the 5% level. To correct for heteroscedasticity, we used the Cochrane-Orcutt procedure. Various lag structures were tested. The vacancy rate variable was used in a polynomial distributed lag model (three-period lag, second degree polynomial). The profit variable was lagged two periods. These two specifications suggest that these factors are taken into account early in the planning period. All variables were entered in log-linear form so that the coefficients can be directly read in terms of elasticity.

$$\begin{aligned}
 \text{FSMFALL} = & -15.1 + 1.05 (\text{PUBSTARTS}) + 2.18 \left( \frac{\text{RENT}}{\text{CONSTRUCTION COST}} \right) - .23 (\text{PRIME}) \\
 & (3.3) \quad (5.8) \quad (5.07) \quad (-2.45) \\
 & -.82 (\text{VAC}) \quad -1.09 (\text{VAC})_{-1} \quad -.82 (\text{VAC})_{-2} \\
 & (-4.14) \quad (-4.14) \quad (-4.14) \\
 & +.86 \left( \frac{M_1}{\text{PIB}} \right)_{-2} + .55 Y \\
 & (2.77) \quad (1.99)
 \end{aligned}$$

$$P = -.23$$

$$DW(0) = 2.13$$

$$R^2 = .962$$

$$\text{Percentage Standard Error} = 6.46$$

$$\begin{aligned} \text{FSSFAL} = & 10.54 & - .37 \text{ (PUBSTARTS)} & - .14 \text{ (RATE)} \\ & (8.2) & (-7.6) & (-2.5) \\ & & & \\ & +.26 \text{ (VAC)} & +.35 \text{ (VAC)}_{-1} & +.26 \text{ (VAC)}_{-2} \\ & (1.6) & (1.6) & (1.6) \\ & & & \\ & +.28 \text{ (MORTGAGE)} & +.35 \text{ (Y)} & \\ & (2.4) & (2.3) & \end{aligned}$$

$$P = -.23$$

$$DW(0) = 1.94$$

$$R^2 = .989$$

$$\text{Percentage Standard Error} = 6.9$$

As expected, the public starts variable has a positive coefficient in the multifamily equation and a negative one in the single-family. Public starts are mostly multifamily. In terms of policy analysis, these results emphasize the fragility of the industry. The construction activity remains very sensitive to public subsidies. But these subsidies adversely affect the single-family sector (because of a substitution effect) where most of the private developers are to be found. A recent reform focused on the housing finance system rather than on direct public construction as a way to reinforce homeownership. Our results roughly suggest that public starts add to the disequilibrium of the housing market by generating wide fluctuations in both multi- and single-family sectors.

Credit variables have positive coefficients. In the single-family equation, the elasticity is low, questioning the long-term effect of availability of mortgages on housing demand. For the multifamily

part, the correlation is much stronger. Multifamily starts are, as expected, dependent on basic monetary options. The interest rate elasticities are low in both equations Meltzer<sup>27</sup> noticed that "attempts to measure the elasticity of housing demand with respect to interest rates have often found the interest elasticity to be relatively low." Signs are negative and both variables are in nominal terms to reflect some kind of monthly payments.

The income elasticity is .35 for single-family starts and .55 for multifamily starts. This is low compared to studies made in the U.S. It might be due to our compilation of data, but might also account for a smaller cyclicalilty of the French housing market.

The multifamily equation is supply oriented. Profit margins are a primary force. The elasticity is 2.18 and reasserts the sensitivity of the multifamily construction to basic economic considerations.

The vacancy rate variable is also of major importance for determining the number of multifamily starts. The sign is negative as we would expect of a market in disequilibrium. The results are more difficult to interpret for the single-family equation where we get a positive sign. We did not disaggregate the vacancies by types of structure: "the owner-type vacancies under normal circumstances should be relatively small. The rental market has a considerably large volume of normal vacancies." [Maisel]<sup>28</sup>.

If we ignore the computation problems (cf. de Leeuw, (1971) on risk of measurement errors in interpolating estimates), we are still likely to have overestimated the vacancies in the single-family market.

Moreover, as de Leeuw states it, "much of the variation in vacancy rates reflects differences in "normal" vacancy rates rather than different degree of market tightness." Assuming these difficulties can be overcome, a positive sign would signify that the single-family housing sector is in a permanent excess supply and/or does not fit in our stock adjustment process theory. Relatively low elasticities could confirm this specificity. Further regional approach is clearly needed at this point.

Individual equations were simulated on an ex post basis as a first step to real forecasting. Single-equation dynamic simulations are used; each equation is simulated by itself, taking other data as exogenous, but with dynamic feedback through any lagged dependent variables. Estimated relationships for single-family housing starts hold quite well except for the year 1977. The major reform of housing finance taking effect at that time might be a cause for this distortion. The multifamily equation gives more unstable results, proving once again the sensitivity of this kind of construction to economic environment.

The model overstates the cyclicity of the market, adding turning points that do not exist in reality. This problem derives directly from our methodological approach. We simplified the structure of the market, defining basic supply-demand relationships and ignoring many aspects of policy intervention. These measures have a stabilizing effect in the short term. The residuals in our simulation may account for this stabilizing effect. It is interesting to notice that the largest residuals occur in recession years where the public intervention is likely to be the most important.

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TABLE 5

## ECONOMICAL AND SOCIOLOGICAL FACTORS INFLUENCING THE HOUSEHOLD FORMATION PROCESS

|      | Real Income per Capita<br>French Francs 1970 | Real Income per Household<br>French Francs 1970 | Divorces | Real<br>Rent | Women's<br>Participation<br>Rate (%) |
|------|--|---|----------|--------------|--------------------------------------|
| 1962 | 8,095  | 25,807  | 30,600   | 77.4         | 36.1                                 |
| 1968 | 10,058                                       | 31,515  | 36,100   | 103.5        | 36.2                                 |
| 1975 | 13,920                                       | 41,321  | 61,200   | 98.4         | 40.8                                 |
| 1980 | 15,510                                       | 43,984  | 90,000   | 95.9         | 43.4                                 |
|      |  |   |          |              | (100 = 1970)                         |

TABLE 6

SINGLE-FAMILY HOUSING STARTS (THOUSANDS)

|      | Actual | Simulated | Residual |
|------|--------|-----------|----------|
| 1963 | 143    | 141       | 2        |
| 1964 | 141    | 144       | - 3      |
| 1965 | 139    | 131       | 8        |
| 1966 | 132    | 138       | - 6      |
| 1967 | 143    | 145       | - 2      |
| 1968 | 166    | 167       | - 1      |
| 1969 | 192    | 184       | + 8      |
| 1970 | 180    | 183       | - 3      |
| 1971 | 202    | 201       | + 1      |
| 1972 | 239    | 237       | + 2      |
| 1973 | 246    | 244       | + 2      |
| 1974 | 247    | 251       | - 4      |
| 1975 | 238    | 246       | - 8      |
| 1976 | 255    | 256       | - 1      |
| 1977 | 273    | 253       | +20      |
| 1978 | 278    | 278       | 0        |
| 1979 | 281    | 283       | - 2      |
| 1980 | 266    | 279       | -13      |

MULTIFAMILY HOUSING STARTS (THOUSANDS)

|      |     |     |     |
|------|-----|-----|-----|
| 1963 | 235 | 233 | 2   |
| 1964 | 288 | 304 | -16 |
| 1965 | 306 | 301 | + 5 |
| 1966 | 293 | 273 | +20 |
| 1967 | 293 | 307 | -14 |
| 1968 | 269 | 285 | -16 |
| 1969 | 308 | 290 | +18 |
| 1970 | 302 | 302 | 0   |
| 1971 | 315 | 309 | + 6 |
| 1972 | 316 | 328 | -12 |
| 1973 | 310 | 332 | -22 |
| 1974 | 302 | 267 | 35  |
| 1975 | 278 | 289 | -11 |
| 1976 | 239 | 237 | 2   |
| 1977 | 202 | 188 | 14  |
| 1978 | 162 | 158 | 4   |
| 1979 | 149 | 158 | - 9 |
| 1980 | 134 | 142 | - 8 |

### Conclusion

The paper has developed a small model of the housing sector of the French economy. The theoretical structure involves both housing demand--as we incorporate demographic, relative price and mortgage availability factors--and housing supply as multifamily starts are determined as a function of profit incentives for the construction industry.

Our approach is similar to the one used in many models of the American housing market as we distinguish stock level and flow level decision making. The fact our equations performed quite well (especially for the housing starts) is interesting for our general knowledge of housing economics.

The concept of the housing market is not easily approached by the economic theory. We discussed the numerous disagreements among housing economists. Moreover, there is a strong tendency in the literature to consider the whole range of interactions existing between the housing market and the rest of the economy. This ambitious scheme makes many models hardly usable for sectorial analysis.

Even though the housing market is an intricate notion--and its behavior remains for a part unexplained--there are some basic features. Our study reasserts the importance of mortgage cost and availability in the short term. It also emphasizes long-term trends leading to a new structural demand for housing.

The French and American markets have, then, similar characteristics. The same problems are occurring in the two countries. A cyclical activity in the construction industry adds to the availability problem.

High interest rates have created an affordability crisis. The French market, though tightly administered, has been unable to solve these problems. This raises further questions. Are the availability and affordability problems structural features of the market? Is the government able to correct for it without endangering the major economic equilibriums?

All these questions are left unanswered by the econometric analysis, as if housing could not be studied like any other goods. When the theory reaches this limit, it is time for us to come back to the real nature of housing considered as a right, with all the social and political implications this approach bears.

FOOTNOTES

<sup>1</sup>Leo Grebler and Sherman Maisel, "Determinants of Residential Construction: A Review of Present Knowledge," in Impacts of Monetary Policy, Daniel B. Suits et al., prepared for the Commission on Money and Credit (Prentice and Hall, 1963), pp. 475-620.

<sup>2</sup>Ibid.

<sup>3</sup>James Kearl, Kenneth Rosen and Craig Swan, "Relationships Between the Mortgage Instruments, the Demand for Housing and Mortgage Credit: a Review of Empirical Studies," in New Mortgage Designs for Stable Housing in an Inflationary Environment, eds. Franco Modigliani and Donald Lessard, Conference Series 14, (Federal Reserve Bank of Boston, 1975): 93-109.

<sup>4</sup>Bert Hickman, "What Became of the Building Cycle?" in Nations and Households in Economic Growth, Essays in Honor of Moses Abramovitz, eds. Paul A. David and Melvin W. Reder, (Academic Press, 1974), pp. 291-314.

<sup>5</sup>Dwight Jaffee and Kenneth Rosen, "Mortgage Credit Availability and Residential Construction," Brookings Papers on Economic Activity 2, (1979): pp. 333-386.

<sup>6</sup>Hickman.

<sup>7</sup>Jaffee and Rosen.

<sup>8</sup>Ibid.

<sup>9</sup>Ibid.

<sup>10</sup>Ibid.

<sup>11</sup>J. Eric Fredland and C. Duncan Macrae, "Econometric Models of the Housing Sector, A Policy Oriented Survey," the Urban Institute, 1978.

<sup>12</sup>Lawrence Smith, Kenneth Rosen, Anil Markandya, and Pierre-Antoine Ullmo, "The Demand for Housing, Household Headship Rates, and Household Formation: An International Analysis," Center for Real Estate and Urban Economics Working Paper 82-55, Berkeley, 1982.

<sup>13</sup>Ibid.

<sup>14</sup>Richard Muth, "The Demand for Non-Farm Housing," in The Demand for Durable Goods, ed. Arnold C. Harberger, (University of Chicago Press, 1960), pp. 27-96.

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- 24 Grebler and Maisel.
- 25 Hickman.
- 26 Grebler and Maisel.
- 27 Meltzer and Arcellus.
- 28 Grebler and Maisel.
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