

ANALYSIS OF PRICE BEHAVIOR IN SAN FRANCISCO HOUSING MARKETS:  
THE HISTORICAL PATTERN (1958-67) AND PROJECTIONS (1968-75)

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INTRODUCTION

The cost of living in recent years, not unlike other indexes of economic activity, has risen steadily without interruption. Many American households have managed to offset escalating living costs with larger salaries or wages augmented with income from investments and savings. Within the aggregate U.S. economy, however, substantial disparities exist in both incomes and expenses of households. Depending on the geographic region and nature of employment, or retirement status, some families fare much worse than others in terms of a living standard.

In the decade 1958-67, outlays for homeownership, according to the Consumer Price Index, have risen more rapidly than all other items excepting medical care. Moreover, in most family budgets, expenditures for shelter rank a close second to food. It is in this context that market prices of single-family residences will be examined rather intensively. First, some observations will be made of house prices throughout the city and county (conterminous boundaries) of San Francisco. Then, price comparisons will be presented for selected intracity housing markets. Finally the forecasting model constructed to predict house values in San Francisco where unique supply-demand forces prevail will be discussed.

CITY-WIDE HOUSE PRICE MOVEMENTS IN SAN FRANCISCO

Price appreciation in the decade 1958-67. Based on a sample of 5,236 negotiated sales in San Francisco,<sup>2</sup> or an average in excess of 500 transactions for each of the ten years 1958-67, it was learned that single-family dwellings sold for successively higher prices. Between 1958 and 1967 mean market prices of individual residences rose markedly from \$15,383 to \$29,416,

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<sup>2</sup>Derived by drawing a systematic sample (20 percent of the aggregate sales consummated) from the records of the Multiple Listing Service (MLS) of San Francisco.

or an increase of \$14 033 in the ten-year period.

During the period studied, private dwellings in San Francisco registered increases of \$1,559 per year on the average. However, according to Table I,

TABLE I  
MEAN MARKET PRICES AND ANNUAL PRICE CHANGES  
OF SINGLE-FAMILY DWELLINGS  
IN SAN FRANCISCO, 1958-1967

Year	Mean Market Prices	Increase from Previous Year	
		Amount	Percent
1958	\$15,383	\$ ---	---
1959	17,134	1,751	11.4
1960	18,208	1,074	6.3
1961	19,814	1,606	8.8
1962	21,570	1,756	8.9
1963	23,423	1,853	8.6
1964	25,840	2,417	10.3
1965	27,363	1,523	5.9
1966	28,373	1,010	3.7
1967	29,416	1,043	3.7

Source: Based on data gathered and analyzed by the Real Estate Research Program, School of Business, San Francisco State College.

annual price increments ranged from \$1,010 in 1966 to \$2,417 in 1964. Interestingly, the four years 1961-64 accounted for more than half (\$7,632 of the total appreciation (\$14,033) in the 1958-67 period. The price escalation from 6.3 percent in 1960 to 10.3 percent in 1964 was attributable to the persistent demand for houses, together with an abundance of mortgage credit to facilitate execution of realty transactions.<sup>3</sup> Conversely, it should be noted

<sup>3</sup>For documentation of financing house sales in the 1960-64 period, see Leonard P. Vidger, Residential Property in San Francisco: A Study of Price Movements and Trends in Financing, 1960-1964. (Occasional Research Report Number One. San Francisco: Real Estate Research Program, School of Business, San Francisco State College, 1966), pp. 32-40.

that the decline in the availability of real estate credit after 1964 severely curtailed sales of all types of real property.<sup>4</sup> As borne out in Table I, the sharp reduction of mortgage credit curtailed appreciation of houses in San Francisco at a rate of 3.7 percent for both 1966 and 1967.

Annual compound rate of appreciation. A method commonly used to measure the performance of an investment's appreciation or increase in value is to express the increment during the holding interval as an interest rate per period (usually annually) on a compound basis. This quantitative technique is applicable to such asset holdings as growth stocks, unimproved land, antiques, alcoholic beverages, and growing timber where income flows therefrom are sporadic or nil.

Derived from geometric progression, the expressed compound interest rate ( $i$ ) of an increase, or decline, in an asset may be determined by applying the formula  $V_1(1+i)^n = V_2$ .<sup>5</sup> The terms  $V_1$  and  $V_2$  respectively represent the investment's values at the time of acquisition and disposition (or reckoning date). The term  $n$  identifies the number of holding or time periods to be compounded.

Upon substituting values from Table I, the formula appears as  $\$15,383(1+i)^9 = \$29,416$ . After solving for  $i$ , an annual compound appreciation rate of 7.5 percent emerged. Thus, employing this means of evaluation, homeownership in San Francisco can be contrasted with other forms of asset holding on a yield basis.

Analysis of shifts within price classes. That market values of private dwellings in San Francisco increased on the average of \$14,000, or 91.2 percent in the decade 1958-67 is, of itself, impressive. This fact, however, provokes further inquiry as to the availability of single-family dwellings for low- and moderate-income families. For example, what proportion of total house sales were negotiated in various price brackets? Moreover, what would an analysis of the statistic mean house price reveal for each of the ten years?

In answer to the above questions, Table II provides enlightenment. When sales of dwellings were classified into four price categories, pronounced shifts in market values occurred. From a sample of 447 residential dwellings sold in 1958, 42.1 percent exchanged for \$13,999 or less. By 1967, house sales in

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<sup>4</sup>The impact of credit availability and its cost upon the aggregate San Francisco realty market in the 1961-66 period is analyzed by the author in "The Performance and Potential of Noninstitutional Lenders in Financing Urban Real Estate," The Annals of Regional Science, Vol. 1 (December, 1967), 155-161.

<sup>5</sup>An amplification of this mathematical concept can be found in Clifford H. Springer, Robert E. Herlihy, and Robert I. Beggs, Advanced Methods and Models (Volume Two of the Mathematics for Management Series. Homewood, Ill.: Richard D. Irwin, Inc., 1965), pp. 26-35.

this price bracket declined to only 1.7 percent of the total number sold. Whereas more than one-half (51.5 percent) of the sales negotiated during 1958 were in the \$14,000-\$23,999 price group, about 30 percent of the 465 houses sold in 1967 could be included in this price range. The most pronounced change occurred in the \$24,000-\$33,999 price category when the number of such houses sold increased sharply from 5.4 percent in 1958 to 46.8 percent in 1967.

Despite the most prestigious mansions priced at \$34,000 or more, Table II highlights a switch from negligible activity in 1958 to 21.4 percent in 1967. From the above, it can be concluded that private residences in San Francisco for low- to moderate-income families are becoming increasingly difficult to acquire.

TABLE II

MEAN MARKET PRICES OF SINGLE-FAMILY DWELLINGS IN SAN FRANCISCO: PERCENTAGE DISTRIBUTION BY PRICE CLASSES, 1958-1967

Year	Mean Market Price Class				
	\$13,999 and under	\$14,000-\$23,999	\$24,000-\$33,999	\$34,000 and over	All Classes*
	Percentage Distribution				
1958	42.1	51.5	5.4	1.1	100.0
1959	27.6	63.2	7.5	1.8	100.0
1960	18.5	67.9	11.9	1.7	100.0
1961	12.3	68.0	16.5	3.2	100.0
1962	8.8	63.7	21.7	5.8	100.0
1963	6.0	53.4	33.2	7.4	100.0
1964	3.4	41.5	42.6	12.4	100.0
1965	3.0	34.8	42.2	20.0	100.0
1966	1.8	34.3	44.4	19.5	100.0
1967	1.7	30.1	46.8	21.4	100.0

\*Details may not add to totals because of rounding.

Source: Based on data gathered and analyzed by the Real Estate Research Program, School of Business, San Francisco State College.

## CONTRASTING THE PERFORMANCE OF INTRACITY HOUSING MARKETS

Making generalizations about house prices within a particular section of a metropolis is subject to similar shortcomings as imputing a city's housing values from aggregate national or regional housing market information. The most meaningful data for intelligent guidance and decision making are generated from carefully delineated local markets where actual property transactions are negotiated. The analysis below of several submarkets within San Francisco illustrates the fallacy of inferring shelter values from a region, standard metropolitan statistical area (SMSA), urban complex, or major city.

Delineating housing markets within San Francisco. To produce reliable, meaningful local housing statistics, selected areas within San Francisco were circumscribed. After careful examination and comparison of such factors as (1) age of residences, (2) number of full rooms, (3) number of bedrooms, (4) geographic features, (5) MLS district boundaries, and (6) range of mean house prices, five submarkets were delineated. The boundaries of these housing markets are superimposed on the accompanying map (Figure 1). Excluded from this study are dwellings situated in the areas labeled Commercial and Financial District and Daly City. The latter lies just outside the political boundaries of San Francisco.

Each of the designated housing market areas possess unique physical, climatic, cultural, ethnic, and economic characteristics which set one apart from the other. Relating and integrating these features with housing statistics on a district basis, although timely, must await further study. Perhaps scholars in other disciplines might be interested in pursuing research related to the housing of San Franciscans.

Price movements in submarkets during 1958-67. An examination of computer output (mean prices) disclosed that the Southeast section of San Francisco contained the lowest priced housing throughout the decade 1958-67. In this housing market, single-family dwellings ranged from \$12,859 in 1958 to \$23,845 during 1967. The Southwest district, the approximate center of which San Francisco State College is located, contained the second lowest priced houses. Ranging from \$15,482, to \$27,692 between 1958 and 1967, individual residences in this submarket also sold considerably below average prices for the entire city. Approximating city-wide property values were houses in the West Central section which consisted of the Parkside and Sunset MLS districts. Reference to Table III discloses that dwellings in this area which on the average sold for \$17,376 during 1958 increased to \$28,784 nine years later.

The Northwest housing market, composed of three MLS districts (Richmond, Western Addition, and the notorious Haight Ashbury), with the exception of 1958 and 1959 reflected the second highest priced dwellings. With typical properties in this section of the city selling for \$16,347 in 1958, average prices increased to \$34,610 for 1967, or more than doubled. The highest price tags were placed on homes located in the Central section made up of the Upper Market and West of Twin Peaks MLS districts. As disclosed

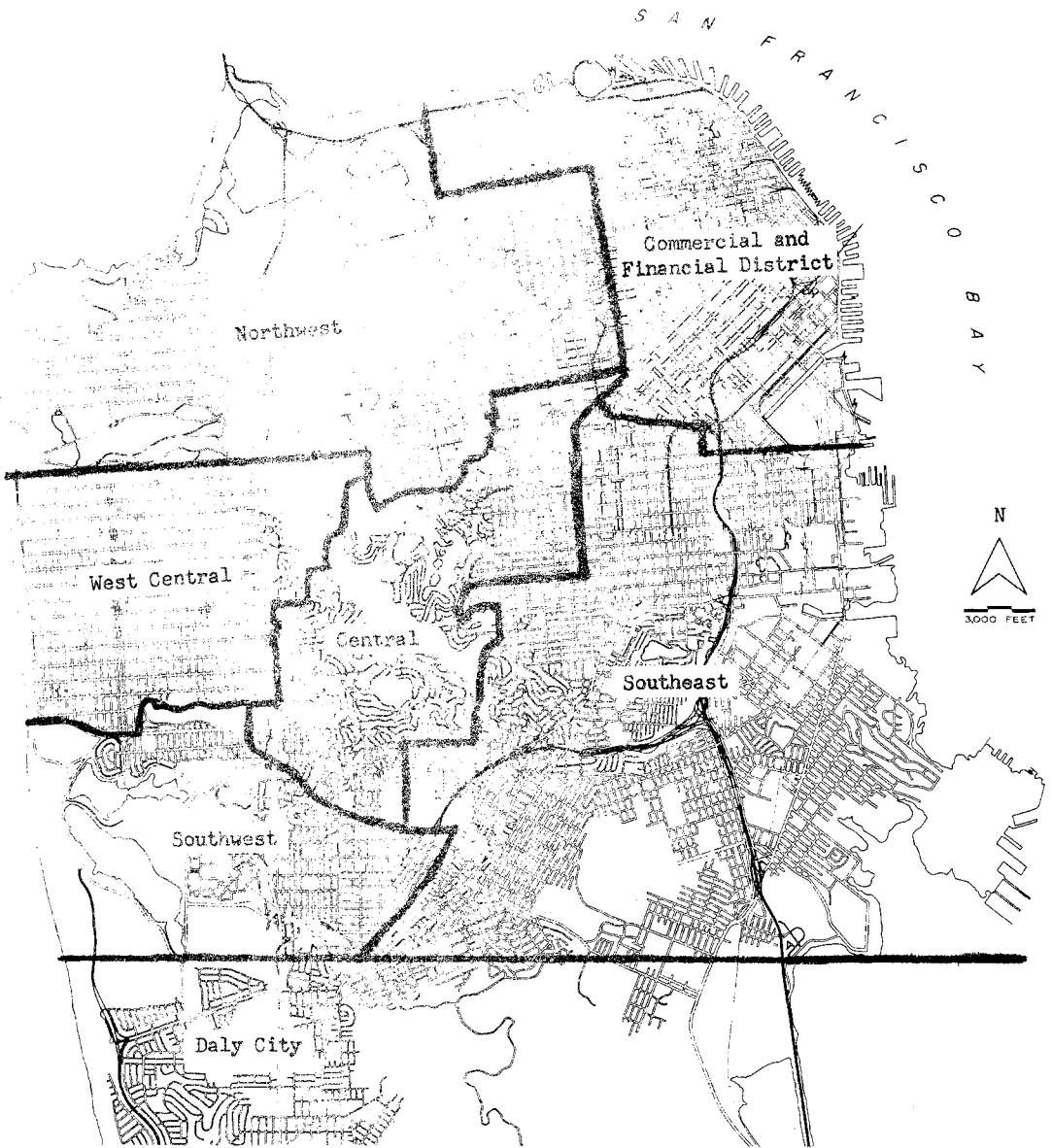


Figure 1. Map of San Francisco Showing Major Housing Market Areas

Source: Area boundaries delineated on map prepared by the San Francisco Department of City Planning.

in Table III, mean prices in this housing market rose spectacularly from \$19,721 to \$37,662 in the decade studied.

TABLE III

MEAN MARKET PRICES OF SINGLE-FAMILY DWELLINGS IN SAN FRANCISCO: COMPARISON BY MAJOR HOUSING MARKET AREAS, 1958 - 1967

Year	Major Housing Market Areas					Over-all San Francisco
	Southeast	Southwest	West Central	Central	Northwest	
1958	\$12,859	\$15,482	\$17,376	\$19,721	\$16,347	\$15,383
1959	14,637	15,474	19,516	21,571	18,466	17,134
1960	15,641	16,552	19,849	23,685	20,961	18,208
1961	16,888	17,960	21,483	23,818	23,532	19,814
1962	18,416	20,049	23,618	27,324	24,107	21,570
1963	20,056	20,821	25,848	27,430	27,271	23,423
1964	21,947	24,854	27,891	29,636	31,323	25,840
1965	23,136	26,672	29,116	33,282	32,561	27,363
1966	22,846	26,391	29,379	34,922	34,000	28,373
1967	23,845	27,692	28,784	37,662	34,610	29,416

Source: Based on data gathered and analyzed by the Real Estate Research Program, School of Business, San Francisco State College.

#### GENERAL CHARACTERISTICS OF THE DECADE 1958-67

The empirical housing data gathered and analyzed for San Francisco in the period 1958-67 were affected by numerous major occurrences. Among the more significant are: (1) two periods of mortgage credit scarcity, (2) two brief intervals of abundant real estate capital, (3) a decade of virtually static population in San Francisco, (4) a rising personal income of San Francisco's residents, (5) upward adjustments of property taxes (resulting from increases in both assessed values and tax rates) levied on San Francisco dwellings, (6) a substantial population growth in counties adjacent to San Francisco, (7) persistent inflation manifested by rises in the local consumer price and building cost indexes, and (8) a negligible number of single-family dwellings constructed in San Francisco.

#### DEVELOPMENT OF A PRICE FORECASTING MODEL

The spectacular price escalation of San Francisco's houses in the period

1958-67 invokes the natural query "Will the past performance continue?" And, if market prices of San Francisco's private residences continue to appreciate similar to the historical record, what values might be predicted for 1975? Moreover, what demographic, economic, financial, and related factors can be identified as influencing the movement of house prices? Finally, how does one explain the phenomenon of rapidly rising home values in a large city whose population is virtually static and at times declining? In the following quantification and model construction, answers to these questions will be sought.

Identifying influential variables. Land economists and regional scientists are cognizant of the fact that a myriad of factors and forces affect property values. Some influences are discernible and measurable, others are obscure and evasive. To identify and quantify various demographic, economic, governmental, and financial influences upon housing values in San Francisco, simple correlation analysis was pursued rather extensively.<sup>6</sup> In calculating correlation coefficients, the degree of interrelationship (positive, negative, or neutral) between numerous variables was measured. Thus, to the extent that future projections were available for highly correlated variables, these could be considered as possible predictors.

Variables selected for scrutiny were confined to the local economy, i. e., the city and county of San Francisco, contiguous counties, and the San Francisco-Oakland SMSA. The twelve variables, in addition to the dependent variable (mean house prices), are described in Table IV. It will be noted that the calculated correlation coefficients (values of  $r$ ) range from negative to positive. In numerous instances, values approached the interger 1 thereby signifying a high degree of correlation. Of particular interest, population of San Francisco ( $X_1$ ) which has vacillated considerably in the last decade and effective buying income per household ( $X_9$ ) yielded low correlations. However, when house prices were compared with aggregate population of the local SMSA ( $X_6$ ) and personal income of the city's residents ( $X_8$ ), both traditionally regarded as strong demand factors, these independent variables influenced house prices greatly. Interestingly, housing values have been impervious to upward revisions in assessed valuations and repeated increases in property tax rates. This immunity is reflected in the high  $r$  value of .935 calculated for variable  $X_3$  in the matrix table.

Other revealing and, in some cases, quizzical relationships emerge from a scrutiny of Table IV. Obviously, caution should be exercised in generalizing about and relying heavily on certain dominating factors which may be illusory in analyzing urban housing markets. Influential independent variables, such as demography in this study, can differ greatly between cities within an urban complex.

Implementing the forecasting model. Drawing upon the results reported

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<sup>6</sup>Using an electronic computer (IBM 1620, Model I with 40K memory) programmed to perform the requisite statistical calculations.



TABLE IV

CORRELATION COEFFICIENT MATRIX OF TWELVE SELECTED VARIABLES RELATED TO MARKET PRICES OF SINGLE-FAMILY DWELLINGS IN SAN FRANCISCO, 1958-1967

Variables X <sub>1</sub> to X <sub>13</sub> :	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.000												
2	.999	1.000											
3	.935	.959	1.000										
4	.218	.197	.086	1.000									
5	.996	1.000	.952	.203	1.000								
6	.998	1.000	.949	.215	.999	1.000							
7	.923	.943	.950	.090	.928	.932	1.000						
8	.978	.990	.961	.143	.981	.983	.980	1.000					
9	.566	.566	.519	-.079	.560	.562	.587	.557	1.000				
10	.888	.911	.866	.076	.904	.898	.906	.920	.678	1.000			
11	.980	.995	.969	.128	.988	.987	.970	.996	.592	.934	1.000		
12	.994	1.000	.955	.226	.999	.999	.932	.982	.559	.906	.989	1.000	
13	.965	.976	.941	.145	.966	.969	.975	.988	.620	.940	.988	.968	1.000

Description of Variables and Sources of Data

X<sub>1</sub> = Mean prices of single-family dwellings in San Francisco. (See Table I)

X<sub>2</sub> = Time expressed in calendar years.

X<sub>3</sub> = Real property tax rates (dollars per \$100 of assessed valuation) in San Francisco. (Assessor, City and County of San Francisco.)

X<sub>4</sub> = City and county of San Francisco.

X<sub>5</sub> = Both Marin and San Mateo counties.

X<sub>6</sub> = San Francisco-Oakland SMSA (five counties).

X<sub>7</sub> = Boeckh building cost index numbers (1926-29 = 100) for frame residences in San Francisco. (American Appraisal Company)

X<sub>8</sub> = Total personal income (in millions of dollars) in San Francisco. (Estimates by Bank of America N. T. & S. A.)

X<sub>9</sub> = Effective buying income. } Per household in San Francisco.

X<sub>10</sub> = Retail sales } (Estimated by Sales Management, Inc.)

X<sub>11</sub> = Housing item

X<sub>12</sub> = Rent item.

X<sub>13</sub> = Homeownership item

} Consumer price index numbers (1957-59 = 100) for San Francisco-Oakland (SMSA. (U. S. Bureau of Labor Statistics.)

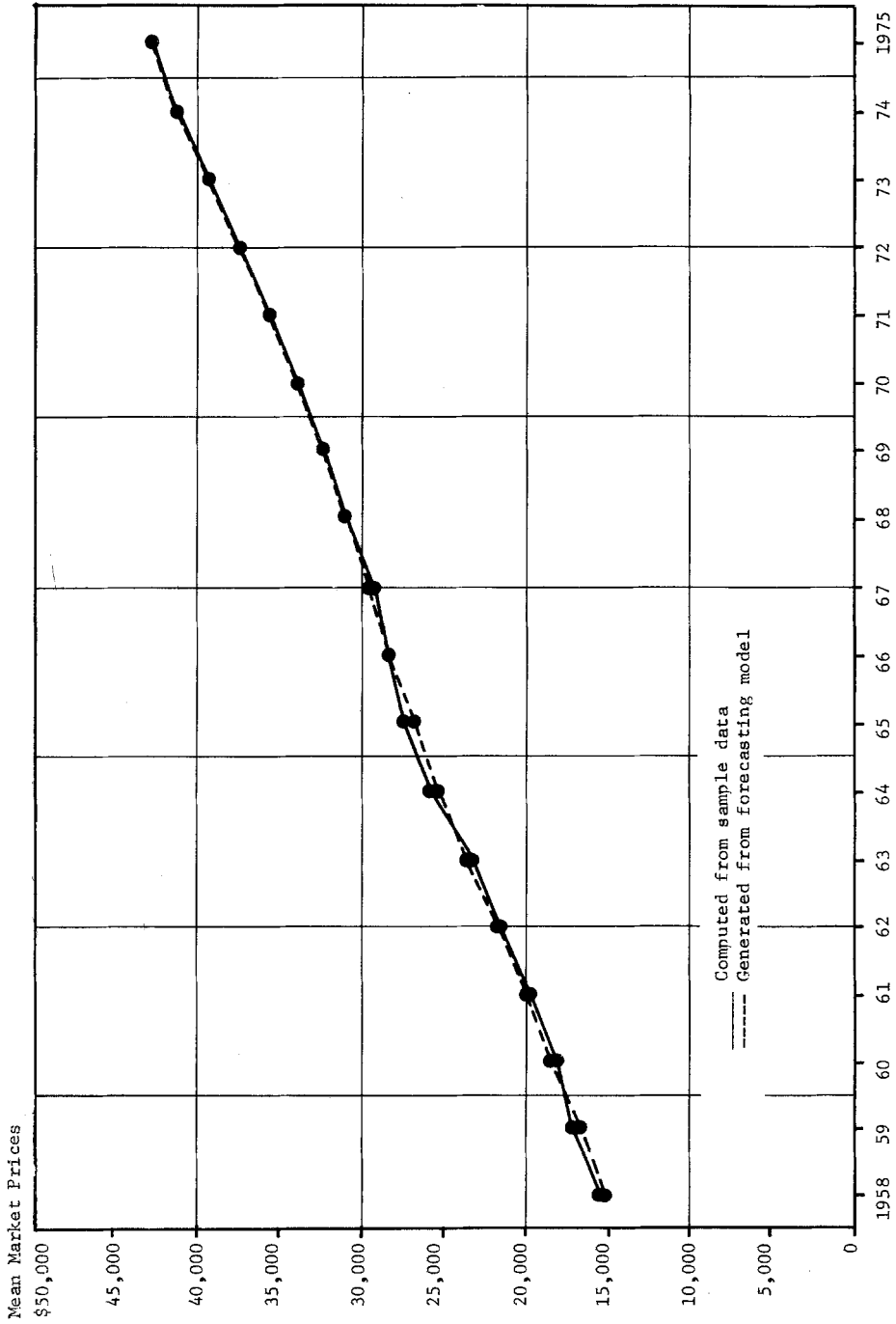


Figure 2. City-Wide Mean Market Prices of Single-Family Dwellings in San Francisco: Actual for 1958-1967 and Predicted for 1968-1975  
Sources of original data: Refer to Tables I and IV.

in Table IV, a price predicting model was constructed. Using multiple regression analysis,<sup>7</sup> the model's equation was formulated as follows:

$$X_{1c} = a + b_2X_2 + b_6X_6$$

In the above equation,  $X_{1c}$  represents the calculated annual mean house prices. The symbols  $X_2$  and  $X_6$  designate the independent variables time in calendar years and population of the San Francisco-Oakland SMSA. According to Table IV, these variables reflected the highest correlation coefficients, or  $r$  values of .999 and .998, respectively, for the decade 1958-67. When quantities for the constants  $a$ ,  $b_2$ , and  $b_6$  in the above equation were calculated, the following forecasting model was produced.

$$X_{1c} = (-38.49) + (-0.56)X_2 + (34.0)X_6$$

Using empirical data for the decade 1958-67, simulation of the model generated results which closely resembled the mean market prices of houses calculated from the sample data. (Refer to Figure 2.) A standard error of estimate of only \$336 in relation to yearly mean house prices resulted. A variation of this small magnitude reflects the model's potential predictive value.

Viewing the model's accuracy from another standpoint, it may be inferred that rising house values were largely attributable to the two independent variables selected. The high value of .9979 calculated for the coefficient of multiple correlation supports this conclusion. Stated differently, 99.8 percent of the market price variations were explained by the two independent variables inserted in the model.

Naturally, the forecasting accuracy of the above model is contingent upon the continued behavior of certain events which characterized the decade 1958-67. The emergence of new developments or the failure of some influential factors to reappear should not, however, impair the model's predictive capability as long as the aggregate impact is not altered significantly.

#### SUMMARY AND CONCLUDING REMARKS

This study statistically documents the spectacular rise in value of San Francisco's residential dwellings during the decade 1958-67. Irrespective of the section of the city analyzed, with its kaleidoscopic characteristics (cultural, ethnic, demographic, economic, physical, and political), the market value of single-family dwellings escalated unrelentingly. The rate of appreciation, however, varied widely between housing submarkets. Expressed in terms of an index (1958=100) for the period 1958-67, the rise was nearly 191 city-wide

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<sup>7</sup>An excellent explanation of this statistical concept appears in Mordecai Ezekiel and Karl A. Fox, Methods of Correlation and Regression Analysis: Linear and Curvilinear (New York: John Wiley & Sons, Inc., 1959), pp.170-187.

and ranged from a high of 211.7 in the Northwest area to a low of 165.7 in the West Central market. Ceteris paribus, the model constructed herein forecasts that the typical house in San Francisco will command a price of \$ in 1975. Should this prediction be realized, housing values in the Golden Gate City will nearly triple (277.6 vs. 100 on a 1958 base) within eighteen years.

Fulfillment of these prognostications,<sup>8</sup> however, will depend somewhat upon the recurrence of various past events,<sup>8</sup> provided their aggregate behavior is no less dynamic or turbulent than previously experienced. The use and publicity given forecasts of this nature, however, can affect predicted outcomes. For example, when house buyers, building contractors, money lenders, businessmen, and the general public overreact and make speculative decisions, projections can become outdated rapidly. To keep forecasts from becoming obsolete necessitates new information inputs as developments occur and timely revision of previous predictions. Thus, users of housing market forecasts should be cautioned that their atypical behavior can alter anticipated results.

Rapidly appreciating shelter values such as those disclosed in this study do not necessarily guarantee San Francisco residents greater affluence by virtue of homeownership. Granted their equities in real property have escalated markedly and this trend promises to continue. Not to be overlooked, however, are rising real property taxes and building (including repair and maintenance) costs.<sup>9</sup> Uncontrolled, these factors in concert could offset appreciation of house values.<sup>10</sup> Moreover, upon terminating homeownership comes payment of a capital gains tax--unless through some avoidance device this levy can be postponed. Enchanting as rapid price escalation of San Francisco's houses may be, there is much for property owners--present and prospective --to weight carefully.

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<sup>8</sup>Such as vacillations in the mortgage credit market, inflationary pressures, rising labor and material costs, decline in San Francisco's population, a very limited supply of land allocated for individual homes, to name a few.

<sup>9</sup>It will be recalled that these factors correlated highly with house prices in San Francisco (Refer to Table IV.)

<sup>10</sup>This prospect is not so disheartening when reminded that other asset holdings (dollar savings, life insurance, fixed-income investments, etc.) do not reckon the erosion of purchasing power.

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