Anatomy of a Market Crash:
Suburban Housing Supply in California: 1989 - 1994

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Very preliminary. Comments welcome.

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Abstract

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Prices of existing houses peaked in southern California during the second quarter of 1990 and preceded a lengthy recession. This paper examines the response of homebuilders in a master planned community in the suburban Los Angeles region to the end of the boom and the onset and deepening of the recession. There has been little research which has focused at the micro level on builders' responses to changes in market conditions. This paper will employ data from master planned community home builders in Riverside County between 1989 and 1994 to examine the dynamics of the market. This analysis sheds some light on the volatility of housing starts not attributable to price changes in previous studies. For example, builders are found to shift to producing low cost or lower priced housing units presumably in response to changing consumer preferences. This adjustment does not arise from design changes but simply producing more of less expensive product that had already been planned and curtailing production of higher priced houses.

Key words: housing supply, home building, housing prices

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Introduction

The home building process is a critical part of models of housing supply. Dipasqale and Wheaton (1994) define new construction as being driven by the difference between the long run stock of housing and the current stock. The long run stock of housing is an expectational concept and depends for the most part on expectations about urban growth, demographic factors and business conditions, all of which contribute to new housing demand. Expectations about the future demand for urban growth and for new housing can change rapidly. For example, in 1990 in the Los Angeles region there was a sudden and dramatic change in expectations as consumers realized the potential implication of the peace dividend on companies and jobs in Southern California. The purpose of this paper is to explore some of the microeconomic phenomena that relate to adjustments in housing production as such potential impacts on housing demand are absorbed by the marketplace.

Homebuilders and land developers are part of the lengthy process of producing new housing. A land developer acquires raw land after having explored the feasibility of new home development. Depending on the location and the site itself, the process of producing finished lots can be a time consuming and expensive process. Sometimes, homebuilders will involve themselves in the land development process. However, in the 1990s public homebuilders driven by Wall Street's desire for cash flow have eschewed the land development component and have focused on new home production. In the late 1980s, institutional investors representing pension funds and insurance companies as well as some banks and savings and loans were willing to take on more risk over a longer period of time and were willing to do acquisition, development and construction lending. Thus during the last cycle, many homebuilders were involved in the land development process.

Providers of capital and the local zoning regulations impose constraints on the ability of land developers and homebuilders to adjust to changing market conditions. Specifically, the number of lots, their configueration and size is ususally determined early in the land development process. Loans by financial intermediaries are also based on pro forma price estimates and absorption rates which are driven, in part, by the configueration of the subdivision. Thus, there is introduced a rigidity in the nature of a housing development very early in the process. Since the time from the start of the land development process (acquisition of raw land) to sale of finished homes can be extremely lengthy depending primarily on the

length of the entitlement process, there is a reasonable probability that market conditions will change during the development time frame.

Many land developers and homebuilders in California during the early 1990s were faced with this precise problem. Bouyant housing markets in the late 1980s had caused homebuilders and land developers to focus on 'move-up' housing as aging baby boomers reinvested growing equity from previously owned homes in larger family homes. Thus, at this time, subdivision configuerations and lot sizes evolved in response to preferences of the 'move-up' home buyer. In the Los Angeles region, this phenomenon was present even in suburban markets at the periphery of development. Land developers and homebuilders usually incorporate a ratio of capital to land in their analysis of project feasibility. Common in the industry, is the ratio of three to one. That is, the finshed lot price is usually assumed to be about one quarter of the finished house price or three dollars of capital are required for each one dollar of land. An analysis of the basis or rationale for this ratio is not in the current scope of this paper. However, the point is that if consumers preferences shift to less expensive homes, while it is possible to build a smaller house on the same lot to respond to the change in consumer preferences it is not possible to do so and preserve the same profit margins. So, in a changing market place, homebuilders may be loath to change their plans because of the potential impact on profitablity. Note that reconfiguering a subdivision is usually out of the question because of the length of time involved and the likely impact on costs of changes in subdivision infrastructure.

Slow market clearing is usually explained by the process of consumer search. There have been numerous papers exploring the search process and the time that is required for matching when there is product heterogeneity . DiPasquale and Wheaton (1994) provide a disussion of this issue with a number of valuable references. However, the previous discussion suggests that the flow component of the supply side cannot readily respond to significant demand shocks. This may lead to a mismatch between the type of housing being produced and the type of housing currently being demanded.

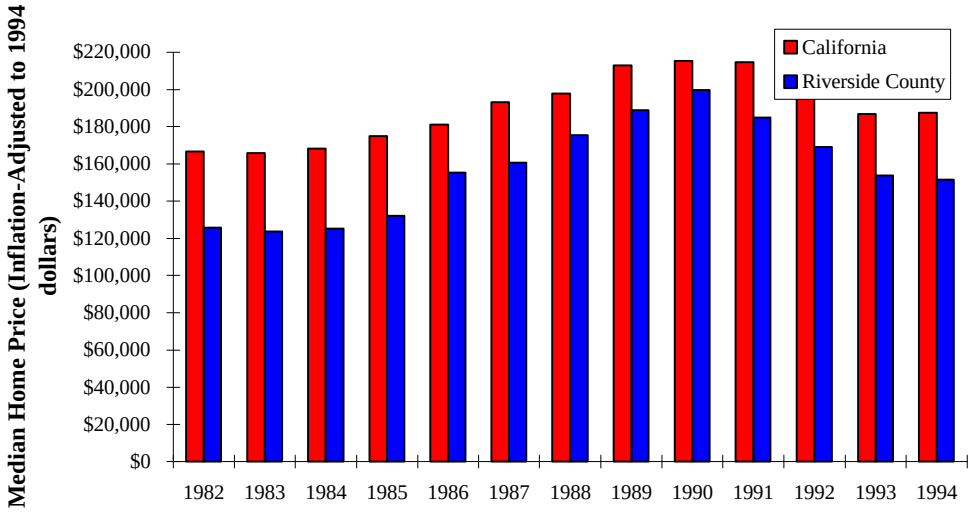
In this paper, we attempt to look at a particular housing submarket and master planned community with the objective of gaining some insight into the impact of rigidities in or constraints on the developer's ability to respond to changing market conditions. Hopefully, this

will provide some new insight into the role of new construction in housing supply and the determination of equilibria in housing markets.

The 'Bust' in Housing in Southern California

Case and Shiller (1994) determine the peak in single family housing prices in Los Angeles County to have occurred during the second quarter of 1990. Between the first quarter of 1985 and the second quarter of 1990, house prices in Los Angeles increased by 102.4%. Prices peaked and immediately began to decline falling about 7% in the subsequent three quarters. While we have not computed a comparable price index for Riverside County which is the focus of our analysis in this paper, Case and Shiller's reported result is consistent with much of the Riverside County data we do examine. For example, Figure 1 charts median home price data for California and for Riverside County. Both of these markets appear to peak in 1990. We also find that within the master planned community we examine in this study, a hedonic price index estimated for home sales peaks in the second quarter of 1990 as well.

Figure 1 - Median New Home Price
Riverside County and California



The Southern California downturn was both sudden and sharp. Table 1 documents the impact of the demand shock on new and existing home sales in Riverside County. The volume of

sales begins to decline before the peak in house prices is reached and the adjustment is much more dramatic with respect to sales of new houses. Specifically, new home sales decline 34% and 47% in 1990 and 1991 respectively. The corresponding drops in sales of existing homes are 18 and 19% respectively. See Figures 2 and 3 for the corresponding graphs.

Table 1 - New and Existing Homes Sales - Riverside County

	New Home Sales	% Diff	Existing Home Sales	% Diff	New and Existing Home Sales
1988	15,396		20,191		35,587
1989	20,638	34	25,420	25	46,058
1990	13,608	(34)	20,923	(18)	34,531
1991	7,146	(47)	16,895	(19)	24,041
1992	6,140	(14)	14,833	(12)	20,973
1993	6,210	1	14,704	(1)	20,914
1994	6,519	5	17,422	18	23,941

Source: Compiled by TRW REDI Property Data.

Figure 2 - New Home Sales - Riverside County

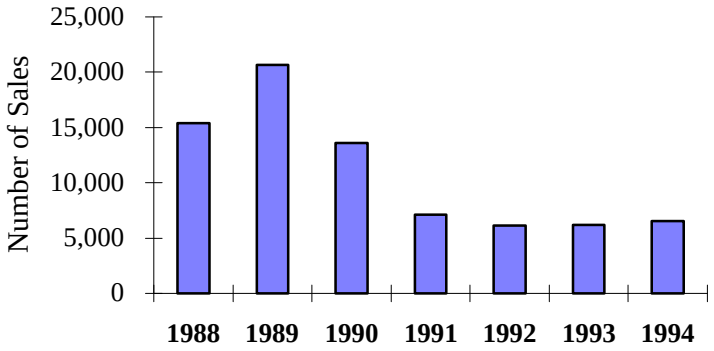
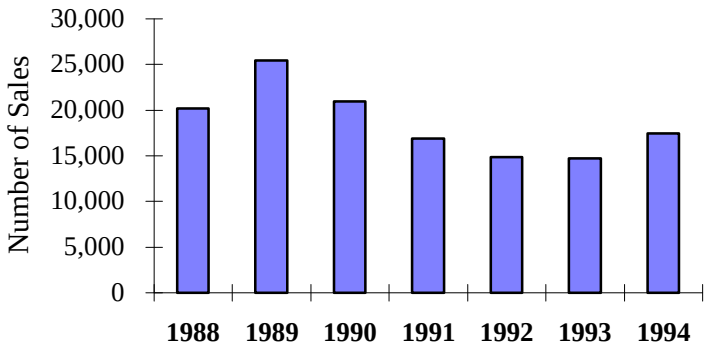


Figure 3 - Existing Home Sales - Riverside County



Riverside County is east of Los Angeles County and Orange County, the two most populous counties in the five county area that comprises the Los Angeles region.[1] Riverside County and its northern neighbor, San Bernardino County ar often grouped together to form the Riverside - San Bernardino Metropolitan Statistical Area (MSA). San Diego County lies to the south of Riverside County. The city of Riverside is the largest and most well known center in the county which has grown rapidly over the last two decades as a consequence of the demands for increasing quantities of industrial and commercial space for areospace, defence as well as manufacturing and wholesale distribution. The Interstate 91 and 15 corridors have developed rapidly over the same time frame. The population of Riverside County increased from 983,880 in 1988 to 1,328, 300 in 1993 which implied a compound annual growth rate of 6.2%. Relatively low housing costs (roughly half the median per square foot price of Los Angeles and Orange County houses) encouraged population growth and fueled the demand for housing. Builders responded as land was relatively easy to acquire and entitle. Also, investors (insurance companies, banks and savings and loans) were eager to finance land development and housing construction. The population growth rate, however, declined in each of the years from 1988 to 1993. In the first two years, reflecting the reduced competitivenes of California because of high housing prices and high business costs and in the latter period reflecting the effects of the recession.

During the early 1990s, the peace dividend and related cutbacks in aerospsace and defense spending had a dramatic effect on the California economy. The extent of the impact was not fully anticipated as most analysts believed that the Southern California economy was well diversified and thus insulated from problems in individual sectors. However, this proved not to be the case and the cutbacks in the above sectors along with consolidation in the financial services sector combined to create the deepest recession in California in 40 years. With one exeception between 1989 and the end of 1993 California forecasters continued to project a number for statewide housing units that would be authorized by building permits that **exceeded** that which actually ended up being issued.[2] The one bright light in the Inland Empire during this time frame was the growth of employment in wholesale trade which arose from the evolution of Riverside County as one of several major distribution centers in the county. Thus the county became home to numerous 400,000 square foot 'big box' distribution facilities for virtually every type of major retailer and wholesaler.

The Riverside County Housing Market and California Oals

Riverside County is at the periphery of the Los Angeles region and as is well known, there should be a strong relationship between the desired stock of housing and land prices and housing values at the periphery. If the desired stock of housing declines consistent with a demand shock such as occurred in 1990 in Southern California, land prices and housing values should fall across the board. Coincidently, some land at the periphery that would have supported new development prior to the demand shock might now be best left undeveloped. A problem, of course, arises with properties in the process of being developed. A compounding factor is the difficulty of interpreting in real time the future direction of the business cycle and housing demand. We have already noted the difficulty professional forecasters experienced wrestling with this problem in the early 1990s.

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[1] The five counties include Los Angeles, Orange, Ventura, San Bernardino and Riverside Counties.
[2] This data is included in the Real Estate Research Council of Southern California *Real Estate and Construction Report.* The forecasters included the Bank of America, the Construction Industry Research Board, the Federal Home Loan Bank of San Francisco, First Interstate Bank, Security Pacific National Bank, the UCLA Business Forecasting Project and Wells Fargo Bank.

California Oaks is a large master planned community located in the City of Murietta on Interstate 15 at the southern edge of Riverside County roughly 85 miles southeast of the Los Angeles Civic Center and 60 miles north of downtown San Diego. Interstate 15 is a recently completed north-south artery that provides a link between the Inland Empire and San Diego County and Mexico to the south and the State of Utah to the north. The only other major north -south linkages lie to the west in Orange and Los Angeles Counties and are congested with commuter and business traffic consistent with the higher population densities to the west. The completion of Interstate 15 was a necessary precurser to the evolution of the Inland empire as a distribution center for the southwestern US.

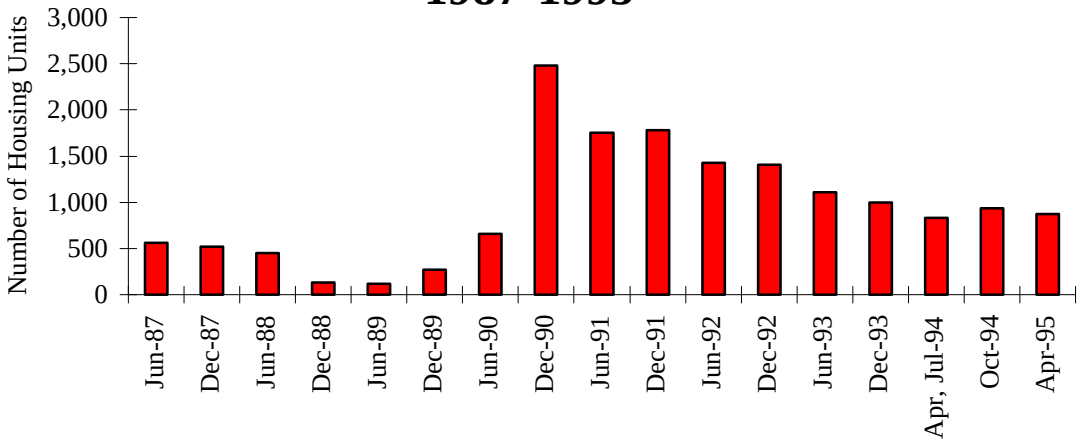
Table 2 - Sale of Existing Houses and New Houses: Riverside County and California Oaks

	Existing House Sales	Detached Houses Sales	Share Annual	Detached Cal Oaks Sales	Share Annual	
89Q1		3769		357		
89Q2		1723		386		
89Q3		3527		264		
89Q4	25420	1264	40.45%	134	4.49%	
90Q1		1651		159		
90Q2		1303		156		
90Q3		727		142		
90Q4	20923	616	20.54%	24	2.29%	
91Q1		1085		113		
91Q2		1189		87		
91Q3		691		35		
91Q4	16895	679	21.56%	51	1.69%	
92Q1		1004		80		
92Q2		859		46		
92Q3		994		51		
92Q4	14833	517	22.75%	15	1.29%	
93Q1		1068		31		
93Q2		1019		36		
93Q3		886		36		
93Q4	14704	849	25.99%	20	0.84%	
94Q1		1024		25		
94Q2		1183		38		
94Q3		726		19		
94Q4	17422	641	20.51%	41	0.71%	

Source: The Meyers Group

Table 2 illustrates the downturn in production of existing houses in Riverside County and new houses in Riverside County and in the California Oaks community. What is clear is the dramatic downturn in activity in the existing home market and the even more dramatic downturn in the number of sales of new houses. Coincident with the downturn in sales volume is an increase in the inventory of completed but unsold housing units. This is illustrated in Figure 4. The inventory begins to rise as prices peak during the first half of 1990 and then rises dramtically during the second half of 1990 (these data are reported semi-annually).

Figure 4 - New Detached Unsold Housing Completed Construction Riverside County 1987-1995



Theory

Previous attempts at modeling housing supply have tended to use national data and focus on the long run relationship between price and housing starts. Topel and Rosen (1988), DiPasquale and Wheaton (1994), Mayer and Somerville (1996) and Blackley (1995) are recent examples. Goodman (1987) has focused on the impact of weather on housing starts. Suburbanization, land use and zoning has received attention but the focus has been the process of conversion of

rural to urban land and the implications for land pricing. See early papers by Wheaton (1982) and several papers by Capozza and various co-authors.

Few papers have focused on the how builders respond to market dynamics at the micro level. For example, Sirmans et al. (1995) explore the extent to which risk associated with 'first-in' buyers is priced. Gunterman (1997) explores the impact on probability of development of the type of land purchaser and local economic factors. In this study we want to examine the response at the micro level to demand shocks in order to gain insight into aggregated responses.

Structural models of the housing market employing the stock-flow approach can be summarized as follows:

$$D(X_1, P, U, R) = S \quad (1)$$

$$S = C(X_2, P) - S \quad (2)$$

$$U = (i + t_p)(1 - t_y) - E(P/P) \quad (3)$$

Equation (1) estimates demand which is a function of a vector of demographic variables along with permanent income (X_1), the real price of housing P, the annual user cost of housing U, and the alternative cost of renting R. S which is the housing stock can be measured in units or dollars ($) leading to some changes in estimation and interpretation of results. The stock-flow model assumes that markets clear quickly. Thus, price levels are determined as a function of the existing stock, demand instruments and other factors in the user cost equation (e.g., mortgage rates and price expectations). Supply follows the differential Equation (2) where the stock increases by the amount of new construction C which depends on factor costs X_2 and housing prices P and depreciates at rate . User costs employ the after tax cost of debt and property taxes $(i + t_p)$ and $(1 - t_y)$, respectively, and capture the impact of the expectation of price appreciation E (P/P).

This type of analysis (with some variation) is undertaken by DiPasquale and Wheaton (1994), Blackley (1995) and Topel and Rosen (1998). The various authors conclude that the housing market has a somewhat predictable cycle with positive serial correlation. Prices appear not to be a sufficient statistic for equilibrium and the relationship between construction and the factor markets is not well understood.

Since, price changes are insufficient to explain short run swings in single family construction it has been argued that interest rates and other variables besides price that reflect the state of the housing market are more important. At the local level, these variables may include time-on-market, change in regional employment and the real cost of short term construction financing. While theoretically important in the long run, empirical research has been unable to show a consistent relationship with materials costs and land prices.

At the micro level, we would expect the individual builder's share of supply to be a function of their relative pricing, attributes of their product, the stage of their project (how close to being built out) and the size of their project (larger projects should build their relative share if otherwise competitive). Since our data will allow us to monitor individual builders and projects during the downturn, we anticipate a great deal of insight will be provided into their competitive responses to a changing market condition. Equation (4) is a first cut at the aggregate supply function which is similar to that estimated by DiPasquale and Wheaton (Equation (2)). Equation (5) is the proposed form of the individual builder supply equation.

$$C_{it} = + \text{PRICE}_t + \text{STFIN}_t + \text{EMP}_t + \text{TIME}_t + \qquad (4)$$

$$C_{it} = * + * \text{AVPR}_{it} + \text{PDIFF}_{it} + \text{PROJSZ}_{it} + \text{LOTSZ}_{it} + \text{LENGTH}_{it} + \text{TOTSUPP}_T + \text{TIME}_T + * \qquad (5)$$

Variable Definitions

$PRICE_t$ = Price of typical housing unit in period t (derived from hedonic or repeat sale index)
$STFIN_t$ = Cost of short term financing (90 day t-bond rate)
EMP_t = Change in regional employment (Riverside County)
$TIME_t$ = Average time on market
$AVPR_{it}$ = Builder's average price in time period t
$PDIFF_{it}$ = Builder's price relative to rest of market (difference between builder's price and index price – hedonic index computed for California Oaks project from transactions data)
$PROJSZ_{it}$ = Number of units in project
$LOTSZ_{it}$ = size in square feet of lots in project
$LENGTH_{it}$ = Number of weeks project has been selling
$TOTSUPP_t$ = New supply in Riverside County at time t
$TIME_t$ = Time period (1989Q1=1 and 1994Q2=22)

Individual builder supply should vary dramatically depending on the type of product or price range (e.g., entry level or move-up housing). Most observers argued that the market for move-up

housing (particularly in the periphery) deteriorated much more than did the market for entry level housing. In fact, one of the tactics we expect to see builders employ is to change the type of product by reducing size and amenities as they recognize that the market is softening. Those builders who are able to be more flexible and are better positioned with respect to their product should capture greater market share as prices fall.

We plan, in a future draft, to look closely at profit maximizing behavior of the individual builder in both favorable and adverse market conditions in order to see if other available data and empirical constructs will shed further light on builder behavior. To illustrate, builders in financial difficulty may behave in ways that appear irrational as a consequence of their contractual relationship with lenders. In particular, builders:

i) often draw overhead from development and construction loans;
ii) recognize that the development option may have value even though there may be zero or negative nominal equity; and
iii) may have the option of putting the property to the bank.

These three factors may cause construction to continue even in the face of market conditions in which absorption of product is unlikely.

When a demand shock is imposed on a market we would expect to see a rapid increase or decrease in sales volume followed by a consequent increase or decrease in price levels. The type of sale is likely to change also, as consumers adjust their preferences to the new market environment. The changes in preferences and the new set of opportunities and constraints will change the number and mix of market participants. In the existing housing market, The heterogeneity of the existing housing stock should permit relatively more transactions to occur in a slower market than would be the case in the market for new houses where there is less heterogeniety. This is similar to the argument made by Dale-Johnson and Hamilton (1998) where it is argued that the heterogeneity of buyers in the MLS market causes sellers to prefer to multiple list when market conditions are slow as measured by the volume of sales, the length of the listing period and the discount between listing and selling price. Thus we would expect inventory build-up in new housing markets and greater reduction in sales volume in new housing markets than in existing housing markets. This appears to be consistent with what we observe in Figures 2 and 3.

The Data and Analysis

The data employed in this study include quarterely observations of project sales within a masterplanned community within Riverside County. To provide a context, during the second quarter of 1990, the peak of the housing market as measured by price, there were over 50 active master planned communities in Riverside County. Total sales for the quarter was 1368 units, of which the subject of our study, California Oaks generated 156 sales or slightly over 10% of the countywide sales. Riverside County includes the Palm Springs area, thus a significant portion of the communities are leisure/golf course oriented developments for retirees and for vacation use as second homes. The Meyers Group, a private consulting firm in the Southern California region collect this data primarily to assist builders, developers, consultants, appraisers and lenders in theor analysis and decision making.

The data set includes the project name and the builder, the community in which the project is located, the number of units sold in the quarter, the total units sold to date and the weekly sales rate. Within each masterplanned community, it is typical for numerous builders to be active. From the master planned community developer's standpoint, this increases the breadth of product, the intensity of the marketing effort and, likely, the rapidity of absorption of the product. For example, during the second quarter of 1990, 13 separate builders were working on 18 different projects within California Oaks. The data set also includes the price range of the houses within each project, their size range, average selling price and lot size. Usually, the lot size is the same for each home within a project and the price range reflects variation consistent with built square footage of different models within the project and premiums for lots with views or other unique features. Typically, within a project, the built square footage will not vary among the alternative models less than about 10% nor more than about 35%. Since the lot size is fixed, that detemines from a physical and economic perspective the range of sizes and consequent costs that will be feasible.

Since the builders do not report actual sales prices for houses which sell, we collect that data from Dataquick, Inc. another private firm which reports sales and attribute information on individual home sales for both new and existing housing markets.

Table 3 – Regression results.

	Dependent Variable is Qsupp			
	Full Population 1989Q1 to 1994Q2	**Prior to 1990Q3**	**Subsequent to 1990Q2**	**Subsequent to 1992Q4**
Constant	-4.99 -1.70	10.23 1.03	-4.39 -2.15	-17.31 -2.33
Length	-0.02 -3.15	-0.05 -1.21	-0.02 -4.48	-0.02 -2.77
Time	-0.11 -1.06	-4.16 -4.34	0.07 0.89	0.85 2.77
Lotsz	0.001 3.06	0.002 2.08	0.0009 3.59	0.0009 2.04
Totsupp	0.005 9.59	0.0008 0.51	0.005 3.89	0.002 0.38
Pdiff	-4.59E-05 -4.06	-2.44E-05 -0.62	-5.25E-05 -7.14	-5.04E-05 -3.29
Projsz	0.01 2.82	0.03 2.45	0.006 2.72	0.01 2.40
Adj R-Squared	0.28	0.20	0.16	0.31
F- Stat	42.97	8.81	16.23	8.80
D-W Statistic	1.80	1.98	2.04	1.92

Table 3 presents the results of several estimations of the model presented in Equation (5) above. The model in column one in Table 4 includes all of the information about every California Oaks project from 1989Q1 through to 1994Q2. The results are consistent with our intution, the longer a project has been marketed, the less new supply is produced by the builder. The coefficient on length is negative and significant. During the 1989 to 1994 time frame, more time passage, in general, leads to the provision of less supply. Although the sign of the coefficient on TIME is negative, it is not significant. The larger the lotsize, all else being equal, more product will be supplied. The coefficient on LOTSZ is positive and significant. Individual builder production is correlated with marketwide production. The sign on TOTSUPP is positive and significant. Builders produce more lower priced houses and less higher priced houses if the average price of a builder's product is compared to the estimated current price of the average unit produced over the period. PDIFF has a negative sign and is

significant. PDIFF is the difference between the average price of a builder's product and the estimated price of the average unit produced in California Oaks over the five year time frame of the analysis. The latter estimate is derived using a hedonic model. The larger the project, the larger the amount of product the builder will put on stream at any given time. The sign on PROJSZ is positive and significant.

Since market conditions change significantly over the time period in question, identical models were estimated for the period up to and including 1990Q2, for the period after 1990Q2 and for the last six quarters, 1993Q1 through to 1994Q2. Each of these estimations yields some insight into the dynamics of the marketplace. The first estimation captures the period prior to the peak of the cycle. Here, the length of the marketing period is less important probably because virtually all product is selling and no inventories are being created. Thus the coefficicent on LENGTH still has the same sign but is not significant. During this period, as the market peaks, the volume of production is negatively correlated with the passage of time. The coefficient on the variable TIME has a negative sign and is significant. LOTSZ remains important but the coefficient on TOTSUPP is insignificant suggesting that project level production and marketing is being governed by factors other than overall market conditions. We presume that TOTSUPP is a reasonable proxy for overall market conditions. PROJSZ remains important in the model. Perhaps most important, the coefficient on the variable PDIFF is negative as expected but **not** significant. As we will see, this confirms the notion that entry level houses were the preferred product in the deteriorating market that occurred later. In this time frame, up to and including the peak, the relative price appears to have no impact on the level of production.

For the period subsequent to the peak of the cycle, passage of time becomes less important and the length of the marketing period takes on more importance. The coefficient on TIME is positve but insignificant. As we will see, as the market recovers, the passage of time begins to have a positive impact on production. The length of the marketing period, however, reduces the level of production. Thus, the coefficient on LENGTH is negative and significant. LOTSZ remains important. The coefficient on the variable TOTSUPP, a proxy for market conditions, is now positive and significant. The coefficient on PDIFF is now negative and signficant indicating the deteriorating market for trade-up home and the drop in production levels in that market segment. PROJSZ remains important.

For the last part of the time frame, after 1992Q4, the beginnings of a recovery are evident. As noted previously, the coefficent on TIME is now positive and significant. The more time passes, the more individual builders will put in production. The interpretation of the remaining variables is straight forward.

Conclusions

The purpose of this paper is to undertake a micro analysis of builder responses to the downturn in residential housing markets in Southern California just prior to, during and after the peak in the hsouing market during the second quarter of 1990. While there has been much analysis of aggregated data, there has been relatively limited examination of data at the submarket and builder level. We examine project level activity of builders within a large master planned community in the Temecula Valley in southern Riverside County during this period to gain some insight.

Before the peak in the market we find that builders were not biased toward the production of affordable or move-up housing. We find that after the downturn, builders reoriented their production to relatively lower priced houses, presumably in reponse to changing patterns of demand. One must choose the desriptive term carefully as it is likely that builders were simply able to sell more of their less expensive product that had already been planned. The production of more expensive product that had been entitled and was part of existing projects (and anticipated when the subdivisions were mapped) was simply curtailed.

In general, builders involved with larger projects will build more product during a given period than builders of smaller projects. The longer the marketing period, the less production will take place presumably reflecting the builder's response to a poorly conceived project or, more likely, its completion. All other things being equal, builders of projects with larger lots will build more units in each period perhaps responding to consumer preferences for the size of the lot.

Our preliminary results suggest that there is much to learn from a more careful examination of individual builder behavior and housing supply in local submarkets. We intend to undertake supply estimations at the regional level for Riverside County (employing Equation (4)) and

augment our database with local information on employment, construction costs, and interest rates in order to estimate a regional version of Equation (4) that will allow us to provide a context for the results of our current estimations in Table 3. Also, we plan to formalize an analysis of the profit maximizing (or loss minimizing) behavior of builders faced with the set of choices they experienced in California in the early 1990s. We hope to relate this modelling exercise to further analysis of our micro dataset.

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