Center for Real Estate at UNC Charlotte

September 2006

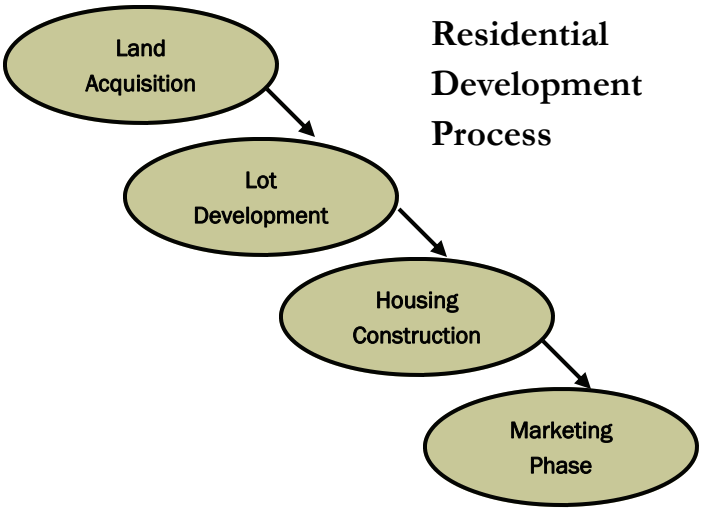
Land Development: Risk, Return and Risk Management

Introduction

The real estate industry has historically high required returns to equity to compensate for the risks involved in residential land and lot development. The financial model constructed for this study finds that these high returns are justified when a land developer does not mitigate risk through the presale of lots to third party homebuilders. However, the model also shows substantially lower equity returns may be appropriate when presales are used to reduce a land developer's risk exposure. Reducing the probability of loan default through the use of presales may also justify a significant reduction in the land developer's cost of debt. The relationships between presales, equity returns, and the cost of debt are examined across a variety of economic environments in the following report.

The Delivery of New Housing

Residential real estate development is a multiphase process involving land development, followed by housing construction, and ending with the marketing of completed sites. The production cycle begins when a land developer purchases a tract of land, receives appropriate regulatory approvals, constructs needed infrastructure over time, and divides the larger parcel into multiple lots (Ball, 2003). The lots are typically sold to third party homebuilders, who complete construction and sell the finished units in the owner-occupied housing market. While each of these phases of the housing industry are interrelated, each stage involves various risks which are allocated between landowners, land developers, and homebuilders.



Residential Development Process

Land Development

Land development is often identified as the riskiest phase of the real estate production process. The developer must acquire land, expend upfront time and money in the regulatory process, and invest in needed infrastructure with uncertain costs before generating any positive cash flows (Svelka, 2004b). Fluctuations in the market price of subdivided lots is another major risk factor. Residential lot prices are primarily driven by market demand and can vary substantially over time. The time required to complete construction exacerbates the range of sale prices and dictates when cash flows are incurred by the developer. Since the value of a subdivision is determined by lot prices and the pace at which the lots are absorbed in the market, changing economic

The authors gratefully acknowledge funding from the National Housing Endowment, the philanthropic arm of the National Association of Home Builders.

conditions, consumer preferences, and increasing competition are all critical concerns (Skolnik and Domingo, 1994). If prices and absorption rates are below expectations the developer is exposed to significant downside risk.

The risks inherent in land development can be directly observed in the return expectations of land developers. Surveys examining return requirements in the land development industry are limited, but Owens (1998) suggests land developers may require returns as much as 30% higher than those of residential homebuilders. A similar survey conducted by Korpacz/PriceWaterhouseCoopers in 2005 found somewhat lower expected returns ranging from 12% to 25%, with a 300 to 600 basis point premium for projects that have not yet received regulatory entitlements. The wide range of returns justifies further examination of the risks involved in the land development process.

Permitting, Development and Marketing Risk

Sevelka (2004a) discusses three types of risk in the land development process: permitting risk, development risk, and marketing risk. These risk categories are summarized in Exhibit 1. Permitting risk involves taking a parcel of land through the regulatory approval process. Rezoning, site approval, subdivision approval, and construction permits all must be obtained before raw land development is allowed to move forward. Developers mitigate permitting risk through the use of conditional purchase agreements, right of first refusal agreements, and option contracts. These methods allow the developer to control land for a modest fee until the potential for development can be determined. The developer can seek rezoning and regulatory approvals, examine existing infrastructure, conduct environmental inspections, estimate development costs, complete market studies, and arrange financing all before committing to the land purchase. The developer can walk away from a project at the minimal cost of the option if government approvals are unattainable or market factors unfavorable.

Development risk occurs after a parcel of land has been approved for subdivision. Infrastructure cost overruns, construction delays, unforeseen site problems, and increasing carrying costs all impact a subdivisions financial feasibility. Risk is more difficult to mitigate at this phase because the developer has already acquired the property. Negotiating fixed price bids from infrastructure contractors shifts some of the risk associated with increasing material costs. Conducting thorough environmental and site engineering studies before purchasing the property can also limit the probability of unforeseen delays in the construction process.

Exhibit 1: Risk Mitigation Strategies

Permitting Risk:	Development Risk:	Marketing Risk:
• Conditional purchase agreements	• Fixed price infrastructure contracts	• Phased Development Timing
• Right of first refusal agreements	• Environmental and site engineering studies	• Presales
• Option contracts		

Finally, marketing risk reflects the developer's ability to generate revenue by selling finished lots to homebuilders. Presales and phased development timing are common strategies used to reduce the developer's exposure to downturns in market demand. Developing a single parcel of land in multiple phases over time reduces upfront grading and infrastructure costs. The delivery of finished lots is restricted to meet short term demand, which the developer can predict with relative accuracy. Additional lots are completed as future demand becomes more apparent. Phased development reduces upfront costs, but it also increases carrying costs and may expose the developer to future regulatory delays.

Presales

Presales are another common strategy used to reduce a developer's exposure to a downturn in the market. The process involves the conditional sale of lots through options to third party homebuilders before the subdivision is completed. The premium paid for the option is commonly applied as a reduction in the homebuilder's future exercise price to purchase the lot. Homebuilders are often willing to purchase lots offered in a presale because it provides an opportunity to lock a fixed price in anticipation of increasing land values or increased competition for sites. The presale option is priced such that it rewards the homebuilder for sharing the risk of future

demand volatility. Many developers and their financing institutions find presales an effective method to reduce marketing risk.

Lai, Wong, and Zhou (2004) found presale option contracts are beneficial to a developer because they allow construction to begin while limiting inventory costs, bankruptcy risk, and uncertainty about future demand. Their model shows it is always optimal for a developer to presell units to mitigate price risk. While the model provides an initial analysis of presales as a risk management technique, there are many unanswered questions to be addressed. The model developed for this paper expands the discussion of presales as a risk mitigation strategy and examines their impact in the entire residential development process.

The Model

The model developed for this study uses sophisticated option valuation techniques to examine the impact of presales in the residential land development process. It considers debt financing of land acquisition and construction expenditures, which allows for an estimation of appropriate spreads on debt given a specified level of presales. The model can also be used to calculate appropriate expected returns to equity and the probability of developer default for various levels of presales and debt financing.

Exhibit 2 outlines a set of base case parameters included in the model. They are used to derive initial results for discussion and comparison. The inputs are modified in subsequent model specifications to examine the impact of presales in various economic environments. The model parameters and a summary of the results are discussed in the following sections.

Exhibit 2: Base Case Model Parameters

Parameters Per Annum	Base Case Values
Current market price of a completed lot	$100
Expected lot appreciation per year	7.00%
Completed lot price volatility per year	12.50%
Construction cost to complete the lot for sale	$80
Time required to complete land development	1 year
Exercise price of the builder's option	$105
Estimated percentage of lots presold	0%-100%
Percentage of land purchase price financed	80%
Percentage of construction costs financed	80%
Percentage of lot value received by lender upon developer default	70%
T-bond rate	5%

Defining the Parameters

The current market value of a residential lot before land development begins is normalized to be $100 in order to simplify interpretation of the results. Note that the results shown are applicable for projects of any scale. The risk free rate of return in the market is set at 5% and developed lot values are anticipated to appreciate at an annual rate of 7%.

Volatility in the market price for developed lots is set at 12.5%, which is similar to price volatility observed in the market for completed housing units. The volatility measure means approximately two-thirds of the time lot prices will fall within plus or minus 12.50% of their expected value at the end of the year. The expected value equals the current market price plus the expected appreciation in lot value over the year.

Construction costs for land development are estimated to be $80. The construction cost estimate is equal to 80% of the total completed lot value. This was chosen because raw land values typically represent 20-25% of the completed lot value in the residential development industry. Land development is anticipated to be completed in one year.

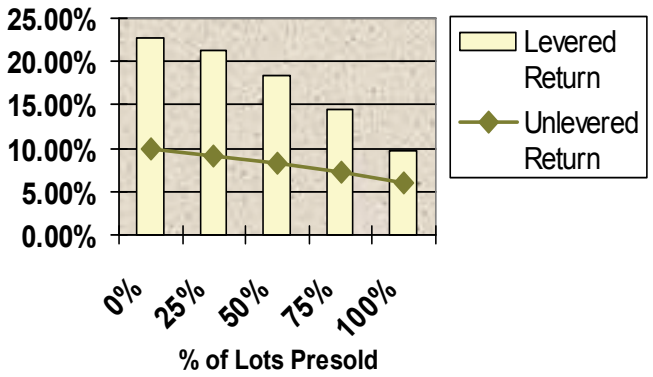
The percentage of lots in the subdivision presold to homebuilders is estimated to range from 0% to 100%. The exercise price of a homebuilder's presale option is equal to the initial lot price increased by the risk free rate of return over the construction period. Debt financing for land acquisition is set at 80% of the land cost less any proceeds received from presale options. Thus, as presales are increased the proceeds received from the option binders act as equity into the project and reduce the amount of debt. The land developer is also assumed to finance 80% of construction costs. In the event of default, the lender is estimated to recover 70% of the property's current value.

Base Case Results

Exhibits 3a and 3b display estimated returns to equity when the base case parameters are input into the model. When no presales are completed the levered expected return to equity equals 22.74%. This return estimate is similar to those reported in developer surveys. However, it is only justified when presales are not used by the land developer to reduce risk. The model shows both levered and unlevered expected returns should fall as the percentage of presales increases. For example, the model predicts an expected levered return of 9.62% when all of the lots in a subdivision are pre-sold. The expected return declines to reflect the shifting of risk from the developer to the homebuilder. The results suggest land development projects with lower projected returns to equity may be feasible when risk can be mitigated through the presale process.

The developer's cost of construction financing should also decrease to reflect the reduction in risk associated with the presale of lots. At the base case parameters, the model estimates the probability of a developer defaulting on a construction loan falls from 3.01% with no presales to .22% when all lots are pre-sold to homebuilders. This lowers the expected default costs to the lender. Additionally, less upfront financing is needed as the number of presales increases because the model assumes the revenues generated from presales are used as an additional equity investment in the property. Exhibits 3c and 3d show these factors should correspond with an estimated 156 basis point decrease in the developer's cost of construction financing as the percentage of lots pre-sold is increased from 0% to 100%.

Exhibit 3a. Expected Returns to Equity



Fluctuations in the Price of Developed Lots

The model was next used to consider the influence of price fluctuations in the market for developed lots. Levered returns are expected to decline for all levels of presales as volatility in the market price increases because the project's lender must take more of the return to compensate for exposure to additional risk. The presale option value (OV) as a percentage of the initial lot value increases with volatility and ranges from 7.94% to 13.02%. Exhibit 3d shows the required spread on debt over the risk free rate more than doubles across all levels of presale when price volatility is increased from

Exhibit 3b. Expected Levered Returns to Equity for Varying Values of Price Volatility

Presales	10% Lot Price Volatility OV=7.94%	12.50% Lot Price Volatility OV=10.52%	15% Lot Price Volatility Ov=13.02%
0%	26.21%	22.74%	17.59%
25%	23.17%	21.21%	18.31%
50%	19.46%	18.40%	16.81%
75%	15.13%	14.52%	13.64%
100%	10.14%	9.62%	8.98%

Exhibit 3c. Spread on Construction Financing (in basis points)

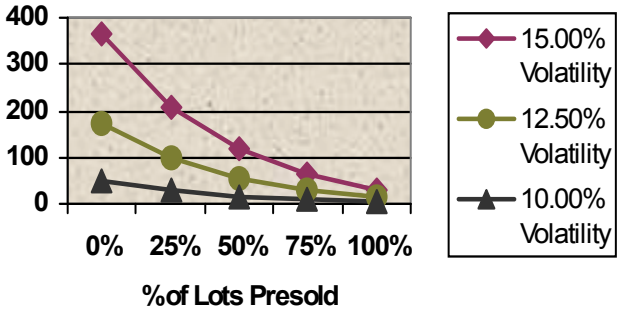


Exhibit 3d. Spread on Construction Financing in Basis Points for Varying Values of Price Volatility

Presales	10% Lot Price Volatility	12.50% Lot Price Volatility	15% Lot Price Volatility
0%	51	171	364
25%	29	98	209
50%	16	54	117
75%	8	29	63
100%	4	15	32

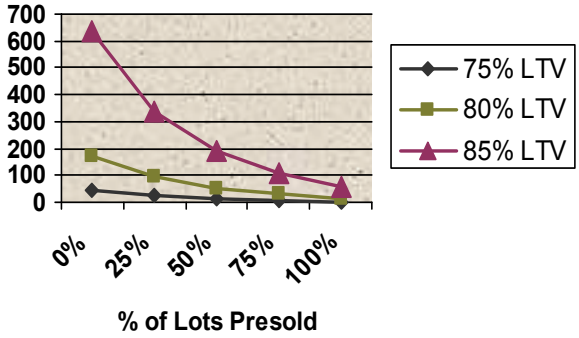
Debt Financing

The amount of leverage used in a land development project also influences expected returns to equity, the cost of debt, and the probability of developer default. These effects were examined by varying the amount of debt used in land acquisition and lot development from 75%-85%, while holding all other model parameters constant at the base case values. Exhibits 4a through 4d display the results.

As debt financing is increased from 80% to 85%, the required spread on debt more than doubles across all levels of presales to reflect an increasing probability of default and the expected cost of default. As with increasing price volatility, the growing spread on debt depresses expected levered returns as potential default costs increase the interest rate on the debt returns and decrease the return to equity. Clearly this level of financing is and should be avoided for all but the least risky deals. Exhibit 4a shows the decrease in expected returns is dramatic when no presales are used to mitigate default risk, but becomes less severe as the percentage of the lots pre-sold increases. The model also shows lowering leverage from 80% to 75% reduces the cost of debt dramatically and maintains expected levered returns.

The large risk premium required by lenders when debt levels exceed 80% loan-to-value helps explain the use of mezzanine financing in the land development industry. This form of debt bridges the gap between the amount primary mortgage lenders are willing to provide at a competitive rate and the equity investment in the project. Because mezzanine financing is structured with its collateral being the equity owners' interest in the ownership entity instead of the property itself, this can effectively reduce defaults on the senior debt and reduces the effective cost of debt as the amount of leverage increases.

4b. Spread on Construction Financing for Various Debt Levels (in basis points)



4c. Spread on Construction Financing in Basis Points for Various Debt Levels

Presales	75% LTV	80% LTV	85% LTV
0%	44	171	625
25%	24	98	340
50%	12	54	192
75%	6	29	107
100%	3	15	58

4a. Expected Levered Returns for Various Debt Levels

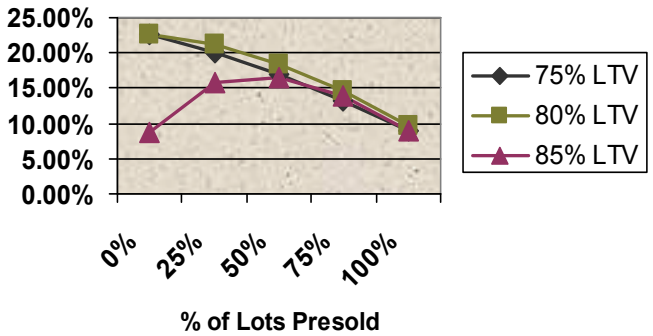
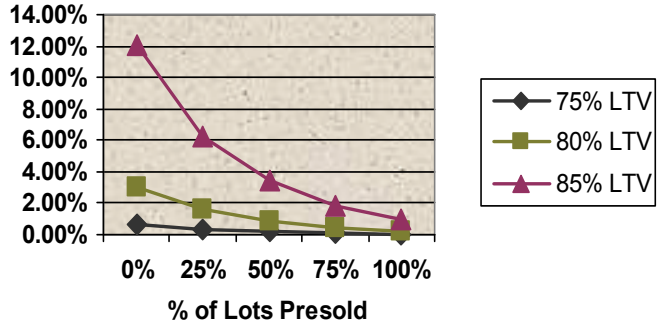


Exhibit 4d. Probability of Developer Default

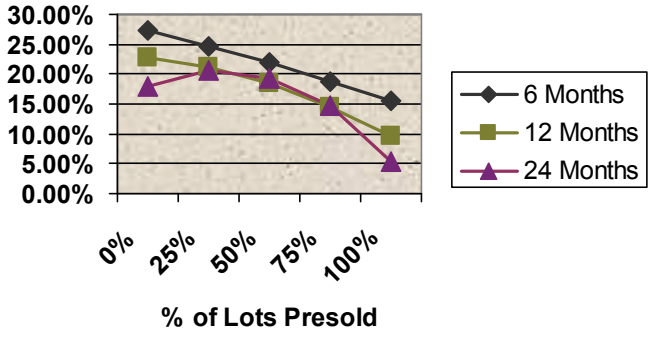


Construction Timing

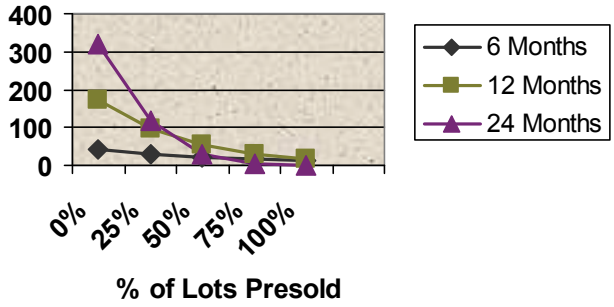
The time required to complete the construction phase of land development is another variable that has significant implications for a project. Exhibits 5a through 5d show the results generated by the model after varying construction timing and holding all other variables constant. The option value as a percentage of the lot value increases with construction time and ranges from 3.89% to 31.22%. Increasing the time necessary to complete a project amplifies the variance of completed lot values, which in turn increases the probability of a low lot price and eventual developer default. When construction timing is expected to increase from 12 to 24 months the probability of developer default jumps from 3.01% to 9.87% when no presales are conducted. Exhibit 5b and 5c show this results in a 148 basis point increase in the required spread on construction financing. The spread on debt decreases substantially as presales increase because risk is shared with third party homebuilders.

Homebuilders and land developers are affected differently as construction timing increases. The developers' returns are depressed due to additional debt service costs. The decrease can be mitigated to a degree through presales. A homebuilder's probability of exercising a presale option increases from 82.65% to 99.21% as construction time is increased from one year to two years. This occurs because anticipated appreciation in the market price of developed lots overcomes the increase in price volatility.

5a. Expected Levered Returns at Varying Construction Time



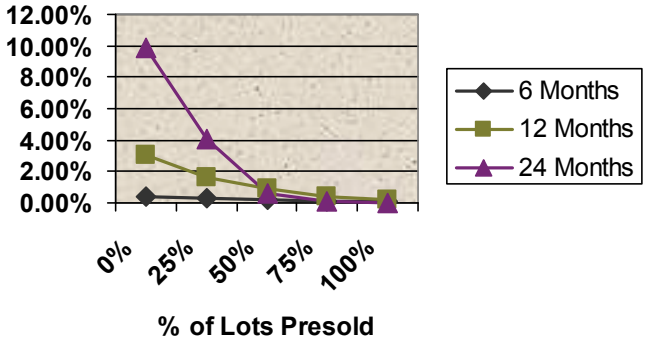
5b. Spread on Construction Financing at Varying Construction Time (in basis points)



5c. Spread on Construction Financing in Basis Points for Varying Construction Time

Presales	6 Months OV=3.89%	12 Months OV=10.52%	24 Months OV=31.22%
0%	44	171	319
25%	31	98	117
50%	22	54	28
75%	16	29	6
100%	11	15	1

5d. Probability of Developer Default at Varying Construction Time

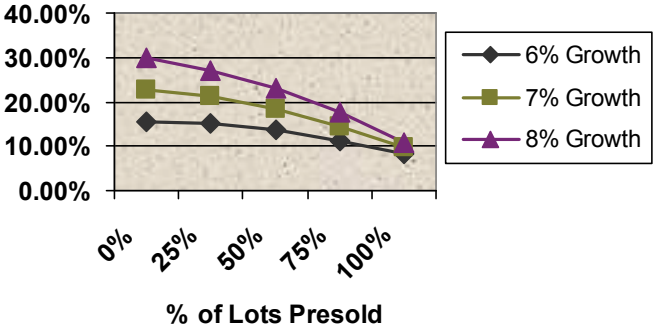


Lot Price Appreciation

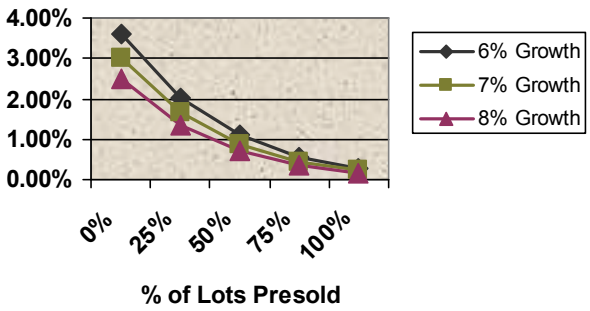
Exhibits 6a and 6b display the results of varying the appreciation rate of developed lots. The estimated return on levered equity is 15.40% when no lots are pre-sold and prices are anticipated to appreciate by 6% annually. The estimated return jumps to 29.78% when the annual appreciation rate is increased to 8%. Presales reduce the range of return estimates because they limit the land developer's risk exposure. For example, the expected return falls to 8.12% when all lots are pre-sold and the anticipated annual lot appreciation rate is 6%.

As would be expected, Exhibits 6b and 6c show the developer's probability of default decreases as the lot price appreciation rate increases. The probability of the homebuilder exercising the presale option increases because the risk of very low property prices is mitigated. Since the appreciation rate does not affect debt pricing, (increased appreciation presumes increased risk) spreads remain the same in the base case and are therefore not shown in Exhibit 6.

6a. Expected Return on Levered Equity for Varying Values of Expected Growth Rate in Lot Price



6b. Probability of Developer Default



6c. Probability of Builder Exercising Option and Developer Default for Varying Values of Expected Growth in Lot Prices

	6% Growth OV=10.52%	7% Growth OV=10.52%	8% Growth OV=10.52%
	Probability of Builder Exercise		
	80.53%	82.65%	84.63%
Presales	Probability of Developer Default		
0%	3.60%	3.01%	2.50%
25%	2.01%	1.65%	1.35%
50%	1.09%	.88%	.71%
75%	.56%	.45%	.35%
100%	.28%	.22%	.17%

Conclusions

The financial model constructed for this report shows presales are an effective way to reduce the risk involved in residential land development. The results suggest developers may be justified in pursuing projects with substantially lower expected returns to equity when a large number of lots can be sold before development commences. Additionally, presales may support a considerable reduction in the cost of construction financing. The risk of developer default is greatly reduced in economic environments where the market price for residential lots is anticipated to fluctuate or the time required for development is uncertain. Presales also reduce default risk dramatically for highly leveraged projects and should reduce the land developer's cost of debt financing. All of these factors should be considered by both land developers and lenders when evaluating the feasibility of a proposed project.

Contacts:

Richard Buttimer
Belk College of Business Administration
University of North Carolina Charlotte
Charlotte, North Carolina 28223-0001
(704) 687-6219
buttimer@email.uncc.edu

Steven P. Clark
Belk College of Business Administration
University of North Carolina Charlotte
Charlotte, North Carolina 28223-0001
(704) 687-6220
spclark@email.uncc.edu

Steven H. Ott
Belk College of Business Administration
University of North Carolina Charlotte
Charlotte, North Carolina 28223-0001
(704) 687-2744
Shott@email.uncc.edu

Dustin C. Read
Ph.D. Program in Public Policy
University of North Carolina Charlotte
Charlotte, North Carolina 28223-0001
(704) 779-5086
dcread@uncc.edu

References

Ball, Michael. "Markets and the Structure of the Housebuilding Industry: An International Perspective." *Urban Studies*. 2003. 40:5-6. 897-916.

Buttimer, Richard, Steven P. Clark and Steven H. Ott. An academic version of "Land Development: Risk, Return, and Risk Mangement." Center for Real Estate at UNC Charlotte Working Paper. September 2006.

Korpacz/Price Waterhouse Coopers. "Korpacz Real Estate Investor Survey". Fourth Quarter 2005.

Lai, Rose Neng, Ko Wang and Yuqing Zhou. "Sale before Completion of Development: Pricing and Strategy". Real Estate Economics. 2004. 32:2. 329-357.

Owens, Robert W. "Subdivision Development: Bridging Theory and Practice." *The Appraisal Journal*. July 1998. 274-281.

Skolnick, Martin A and Carla M. Domingo. "Supply and Demand Considerations in Residential Subdivision Analysis". *The Appraisal Journal*. January 1994. 62:1. 57-63.

Svelka, Tony. "Subdivision Development: Risk, Profit, and Developer Surveys". *The Appraisal Journal*. Summer 2004. 242-252.

Svelka, Tony. "When is Subdivision the Highest and Best Use?" *Canadian Appra*iser. Spring 2004. 39-45.