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Forward pricing and the housing market: the pre-sales housing system in Taiwan

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Summary

In countries that have experienced rapid economic development the need to establish more efficient markets in which private property can be constructed has induced some innovative solutions. One such solution is the phenomenon of a pre-sales market that can be observed in Taiwan, Korea and more recently in China. Developers sell their property before building is started to acquire financing for the development companies. This paper discusses the process and, by recognizing the analogy between the pre-sales market and forward markets, analyses the implications for developers.

Keywords: Forward pricing, pre-sales markets, Taiwan.

1. Introduction

Real estate is an expensive consumption good but is also an investment good. In countries that have experienced rapid economic development, the need to establish more efficient markets in which private property can be created has induced some innovative solutions. One such solution is the phenomenon of pre-sales markets. This can be observed in Taiwan, Korea and more recently in China. Developers sell their property before building is started to acquire financing for their companies and to reduce the risk of building property that might remain empty.

When the developer has obtained the building permit, he can pre-sell the property to a real estate buyer who will then pay according to the construction schedule. For example a buyer might pay 5% of the house price for the deposit and sign the contract, specifying the date at which the construction starts. The buyer pays 2–3% of the house price at each construction stage.* When the property is completed, the buyer should have completed the down payment (40% of house price is usual in Taiwan), the other 60% is acquired by a mortage on the completed property. From the real estate buyers' viewpoint, they can avoid a large down payment through the pre-sale system. They also can participate in the property design and supervise the construction of the property.

* See Sung, C. (1992) Land Speculators Biggest Problem, *Free China Journal*, 12 May 1992.

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From the speculative buyer's viewpoint, because only 5% of the house price or even less (the deposit may be as little as 1%) is required in cash, the leverage is very high. Pre-sales contracts have therefore proved popular investment vehicles. There is no liability for transaction tax (capital gain) before the property is completed because the property does not yet appear on the official property registration. Since there is a relatively high transaction tax on registered properties, many transactions may be made on the pre-sales property before the property is completed. The pre-sale price will reflect the liability for tax which will be paid by the individual owner when the house is completed.

Because non-physical products are sold in the pre-sale system, the reputation of the real estate developer is important and valuable. There is a lack of security of payment for the buyer if the developer takes the deposits and then walks away from the contract. There may be some inevitable loss because of over-selling or credit faults. Anecdotally it is understood that many court cases are devoted to real estate pre-sale problems.

The pre-sale system, though reasonably efficient for financing property development, has a significant effect on the distribution of risk between developer and buyer.* Under the system, the buyer is asked to bear the business risk of project failure that the developer would otherwise accept. This seems inequitable because the buyer is not in the business of building property. Also as they pay according to the agreed schedule, one might reasonably argue that buyers should be protected from project failure.

Pre-sales investment is the most popular real estate selling systems for new housing in Taiwan. It is one reason why there are highly active corporations in real estate industry and why 80% of home occupiers own their home even when there is a lack of a formal financing system.

The volatility of the market (see Fig. 1) has itself contributed to the interest shown by investors/speculators. Recently the pre-sale market has slightly declined, partly because the formal financial institutions are now more developed (the developers can more easily obtain their development funds), partly because real estate prices have increased greatly. In these circumstances, builders may not sell so many pre-sale houses, because they perceive a loss in opportunity to participate in further increases in house prices. Therefore, a portfolio-based property selling strategy may be used by the developers.† Such a policy might typically involve one-third of property sold in the pre-sale stage, one-third is sold during the construction stage, and the last one-third is sold after completion. Table 1 summarizes the advantages and disadvantages of the pre-sale system.

One characteristic feature of the pre-sale system is its similarity to a forward or futures transaction. The question then arises of whether we can model the price behaviour of pre-sale property by applying the approaches of futures or options to the pre-sale property market? The purpose of the remaining part of this paper is to analyse the pre-sale property pricing model by constructing a model based on forward pricing. The implications of the model for the portfolio decisions of the builder/developer will then be explored.

2. Forward pricing: some basic principles

Explanations of forward pricing usually assume that producers of a commodity might wish to reduce the uncertainty of their revenue by agreeing a price for their produce at the start of

* Pun, A. (1992) Securitization offers cost-free building, *Free China Journal*, 12 May 1992.

† Song, S. (1992) 'Second Wave' land reforms bring hope, *Free China Journal*, 12 May 1992.

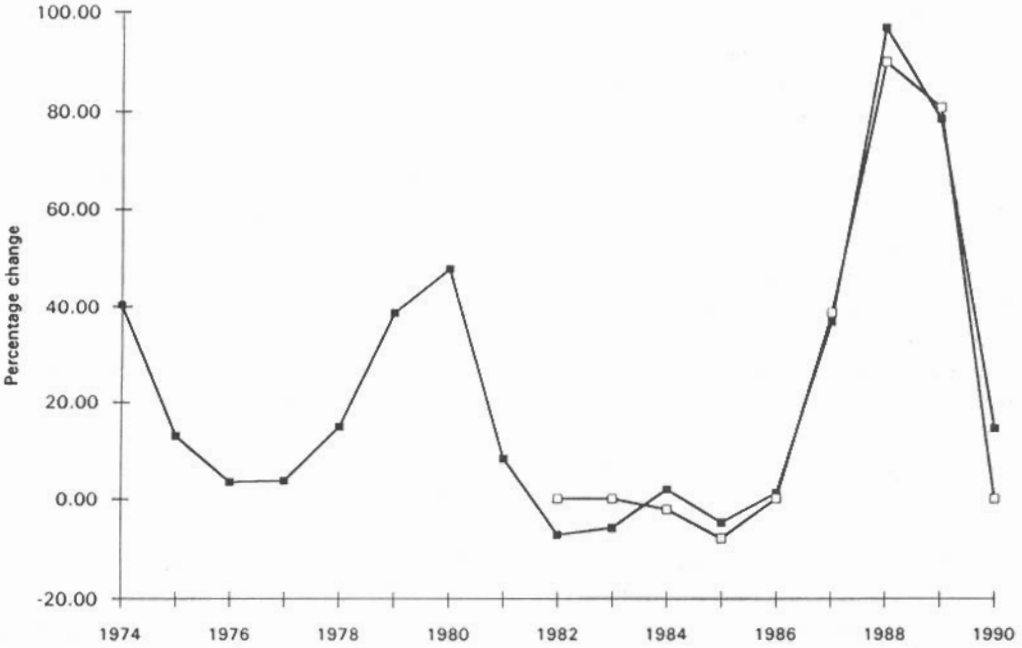

Fig. 1. Pre-sales house prices changes *versus* existing house price changes, 1974–90. (*Source*: Chang and Liu, 1992). —■— = Pre-sales; —□— = Existing houses

Table 1. Advantages and disadvantages of the pre-sale system

	Advantages	Disadvantages
Developer	Finance through buyers. Reduces risk of unsold property.	No opportunity to increase price in bull periods. Interference from buyer at planning buying stage.
Buyer	Staged payments. High leverage. No transaction tax before completion.	Lack of security for deposit. Risk of delay in completion. Risk of default by developer.

the production process (well before the delivery date). Since commodity markets dealing in future deliveries tend to sell only standardized quantities and types of commodities, it may be difficult to sell the precise quantity and quality being produced. Therefore the producers sell a standardized forward or futures contract and once their own product is available, they buy back the forward/future contract and sell their own product on the open market. Prices will usually have changed in the period between the start of the production and the delivery because of general shifts in demand and supply. These changes would be expected to affect not only the prices at which they can sell their own produce but also the price of the forward/future contract. Provided the movement in prices in the forward contract has

matched the price changes of their own product, the producers have effectively reduced the variability in their revenue.

There are two relationships that are commonly analysed in the forward markets. The first is the relationship between the present market price (spot price) of a commodity and the price of the forward contract. This relationship is the 'basis' defined as the futures price minus the spot price. It is recognized that there will usually be some difference depending on the organization of the market and the variability in the quality/location and other characteristics of the product. However, if the basis increases by, say, the forward price increasing relative to the spot price, market investors could buy the product and simultaneously sell the forward contract. They could then store the product until the forward contract matured and deliver it at the agreed price. From this transaction, we can see that the maximum size of the basis is determined by the cost of buying and storing the commodity. We would expect to see the forward price equal to or less than the cost of buying the commodity at the current market price and storing it for the required period. This is the carrying charge relationship.* Normally, if the commodity is storable, we expect to see the forward price above the spot price because of the storage costs. The positive basis is sometimes called normal or contango.†

The second relationship is between the current forward price and the expected spot price at the delivery date. Under assumptions of risk neutrality one might expect the current forward price to be equal to the expected spot price. Keynes (1924) and Hicks (1946) argued that more usually the producers would expect to have to pay for what was effectively an insurance against price uncertainty when they sold their product forward. Therefore the speculators/investors who took the other side of the transaction would expect to earn a premium from their participation. From this it follows that the current forward price should be below the expected spot price, i.e., by buying the forward price, investors would expect to see it increase over the life of the contract. This relationship between forward prices and expected spot prices is called 'Backwardation'.

3. Application to the housing pre-sales market

Suppose an individual wishes to buy a house for one of his children who is marrying in 1 year's time. The individual may be concerned because he expects house prices to rise sharply over the next 12 months. He therefore decides to fix the price of the house by agreeing with a developer that a house should be built and completed within 12 months. Having fixed the price, he pays a deposit and during the year pays according to a pre-arranged schedule an amount equal to some proportion of the agreed price of the house. At the end of the year when the house is completed, he pays the balance of the money owing. If the price agreed is, say $100 000, the present value of the cost at the time of agreement will be somewhat more because the debt is settled over, in this example, a 12-month period. With interest rates of 10%, and say eight payments of $5000 paid regularly throughout the year, followed by the capital balance of $60 000, the present value of the cost will be $101 482.

The pre-sales price of $100 000, as will be recognized, is simply the nominal price at which

* One of the clearer elementary explanations of forward/futures trading is given by Francis, J. (1986) *Investments: Analysis and Management*. McGraw-Hill.

† This term is attributed to J.M. Keynes who apparently used it in an article in 1923 (Francis, *op. cit.*).

the forward contract is agreed. Of more relevance, however, is the effective pre-sale price that will be higher than the nominal value because, unlike most normal forward contracts, cash has to be paid in advance. Thus, as discussed above, a nominal contract price of F'(t, T) should be replaced by the effective contract price of F(r, t, T) where r is the borrowing rate, t the date of the pre-sale contract and T the date of delivery. In addition, depending on whether title to the land is transferred and the period over which the pre-sale contract is effective, there will be a tax liability arising from the increase in the value of the land. However, in this analysis we are ignoring the tax liability (see below).

Instead of transacting on the informal forward market, the individual can take a view on the future behaviour of house prices, by entering the market today and buying an existing house. Over the course of the year, there might be servicing problems and wear and tear but overall the house purchased now would rise in value in line with the higher market prices. In this way, the individual might participate in the product or 'spot' market if the forward prices quoted by the developer became too high. However, if he buys the asset, he has to calculate the relevant costs. For example, he must pay interest on the house for the whole year since he has become the owner at the beginning (rather than at the end) of the year. Because the house will no longer be new, it will in buyers' eyes become less valuable than the equivalent new house, implying that he must buy a slightly more expensive house than the one which his young relative intends to occupy. There is therefore a depreciation charge that might vary between 10 and 20% of the value of the house. However, to offset these charges, he may assume that the house may be rented and therefore he may receive an income from it during the year to offset the maintenance and depreciation charges. These costs are the carrying charges and can be used to relate the expected pre-sale price to current prices in the housing market. The carrying charges can therefore be represented as

$$C(r, d, y, t, T)$$

where r = rate of interest
d = depreciation rate on existing house including maintenance costs
y = net rent received during period
t = date of pre-sale
T = date of delivery of pre-sale contract

This analysis based on arbitrage and the carrying costs of forward markets is well developed in the investment literature. See for example, Cox, Ingersoll and Ross (1981), Chang (1985) and Telser (1958). For a more general overview, see Marshall (1989). The process of arbitrage should ensure that the effective pre-sale price should equal the current house price plus the carrying charge or:

$$F(r, t, T) = P_t(1 + C(r, d, y, t, T)) \quad (1)$$

The most elementary question that might be asked is, given current house prices of P_t, what would be the reasonable pre-sales price F_t? The answer depends on the value of the variables given in Equation 1. For various assumed values, we give below in Table 2, the consequent 'fair' or arbitrage pre-sales prices (expressed as premia of the current nominal house price).

The implication of these premia is that if pre-sales prices diverge significantly from the prices shown in Table 2, developers or house buyers can exploit the inefficiency either by trading in pre-sale contracts or by buying existing houses.

To a large extent, these carrying charges are known at the time of pre-sale and this suggests

Table 2. Carrying charge premia for pre-sales prices

Interest rate (%)	Depreciation (%)	Rental yield (%)	Contract period	Effective premium (%)	Nominal* premium (%)
5	10	5	1	10.0	8.9
5	10	5	2	15.2	12.9
5	15	5	1	15.0	13.9
5	15	5	2	25.9	23.6
8	10	5	1	13.1	11.3
8	10	5	2	18.5	14.8
8	15	5	1	18.3	16.5
8	15	5	2	29.6	25.9
10	10	5	1	15.3	12.9
10	10	5	2	20.7	16.0
10	15	5	1	20.5	18.2
10	15	5	2	31.9	27.2
12	10	5	1	17.3	14.6
12	10	5	2	22.9	17.2
12	15	5	1	22.7	19.9
12	15	5	2	34.3	28.6

that the arbitrage-based forward price of the house can be identified. However, we can go further by exploring the implications of this for the builder/developer. In short we need to answer the question, 'If the builder/developer wishes to sell his output, what is the optimal proportion of pre-sales and as a corollary, how much of his output should he sell on the 'spot' market, i.e., only after the houses are ready for occupancy?'

Let us first consider a builder planning at time t to develop n houses for occupancy at time T. Without loss of generality we can characterize this problem as estimating the expected profit from a portfolio that consists of the proportion w pre-sold and the proportion $(1-w)$ held until completion and sold on the spot market.

$$\pi = (F_t + \tilde{\phi}_T)w + \tilde{P}_T(1-w) \tag{2}$$

His revenue (π) will be given by

where ϕ_T = the basis = $P_T - F_T$
P_t = the spot price at time t
F_t = the Pre-sales price at time t

and the tilde represents the value of the variable that is unknown at time t.

The builder's problem is to find some trade-off between maximizing his revenue and minimizing his risk. We can express this in the form

$$\max\ U = E(\pi) - \lambda\sigma^2(\pi) \tag{3}$$

where λ = indicator of risk aversion. The larger the value of λ, the more concerned the builder will be about the variability of his revenue. When $\lambda = 0$, the builder will simply wish to maximize his expected revenue. We can solve the expression (3) to find w.

$$w = \frac{\frac{1}{2\lambda}\left[F_t + E(\phi_T) - E(P_T)\right] + \sigma^2(P_T) - \mathrm{cov}(P_T, \phi_T)}{\left[\sigma(P_T) - \sigma(\phi_T)\right]^2} \tag{4}$$

where σ^2 = variance.

Expression 4 reveals the optimal proportion of presales houses that a developer should offer from his 'portfolio' of production. We can see that as the expected spot price at the end of the contract period increases, the amount sold in the pre-sales market declines. Similarly, as the variability of the spot price increases relative to the variability of the basis (ϕ), the amount pre-sold will increase. (The variance of the spot price appears in both the numerator and the denominator, the value of w is less than one, therefore an increase in both parts of expression (4) will lead to a rise in w.)

Expression 4 requires a forecast of future house prices. This might be derived from analysis of current trends in the housing market. It could on the other hand be derived from the behaviour of the forward (pre-sales) market. We have seen from Expression 1 that the forward and current spot price are related. However, we have not yet considered the relationship between the future 'spot' price and today's forward price. This is the type of relationship considered by investors in futures markets using the terminology of backwardation and contango. See Rockwell (1983), Working (1967) and Huang (1989).

Consider what would occur if investors expected house prices to rise sharply in a year's time. Investors could simply buy existing houses and hold on to them for 12 months. Alternatively, they could buy pre-sales contracts. By the arbitrage arguments either action will cause both the forward price and the current spot price to rise. The forward price might move first (because the market is relatively liquid), driving the spot price upwards.

It is argued that the forward price fixed today for contract delivery at the end of the year will be a biased forecast of the spot price less the expected basis at the end of the year because it ignores the risk aversion of those investors who have to take on the risk that the builders want to hedge away. Thus we include a risk premium θ that is positive and just sufficient to compensate investors for the risk they bear. This leads us to the following relationship,

$$F_t = E(P_T) - E(\phi_T) - \theta_t \tag{5}$$

Normally, we would expect in the forward market that the expected basis at maturity would be zero. In this case, however, because a 1-year-old house is not worth the same as a brand new house, the expected basis will be positive. This leads to the result that today's pre-sale price will be lower than the price expected in the spot market at the end of the contract period. We can substitute for $E(P_t)$ in Expression 4 and note that the covariance term of (P_T, θ_T) will generally be sufficiently low to ignore. We thus arrive at

$$w = \frac{\sigma^2(P_T) - \frac{\theta_t}{2\lambda}}{\sigma^2(P_T) + \sigma^2(\phi_T)} \tag{6}$$

The second term in the numerator of this expression now contains two elements; the first (θ) determined by the risk premium demanded by the investors buying pre-sales house, the second (2λ), indicating the risk aversion of builders. Given the interest in the pre-sales market by private individuals, we doubt that the risk premium is significantly different from zero and therefore the expression can be further simplified. In addition, our estimates of the variances

are based on observations of the pre-sales prices and basis only. Because we assume that the covariance between the spot prices and the basis is low enough to ignore, it will be seen that the optimal proportion of houses pre-sold can be given by the variances of the pre-sales prices and basis in the following form

$$w = \frac{\sigma^2(F_T) - \sigma^2(\phi_T)}{\sigma^2(F_T)} \tag{7}$$

We have estimated the variance of the pre-sales prices for the 1988–90 period as 0.09 per year and the basis variance at 0.044 per year. Based on the model, we therefore estimate the optimal proportion pre-sold to 51% or about half the builders' output. However, the variability of the basis during this period was abnormally high. Had the variance of the basis been as low as it reportedly was during the early 1980s, the optimal proportion pre-sold would correspondingly have been higher. This would have been consistent with the usual practice prevalent during the earlier period of pre-selling most of the houses built.

To refer again to Table 2, it is interesting to note that the carrying costs, given the interest rates for the 1988–90 period would have been effectively about 20–30% depending on the length of the contract period. This corresponds to the value shown in Table 3, of 36% premium for pre-sales prices observed. The difference between new houses and the pre-sales prices would not have been so great because the values shown in Table 3 refer to the average

Table 3. Real estate prices in Taipei, Taiwan 1988–90. Prices in NT$'0,000/ping (1 ping = 3.3 m^2)

	1988.01–1989.01	1989.02–1989.09	1989.10–1990.05	1990.06–	Average
Pre-sales prices (F)	20.32	22.39	27.50	18.48	22.26
Existing prices (P)	15.40	15.78	17.96	17.71	16.38
F/P ratio (listed)	1.32	1.42	1.53	1.04	1.36
F/P ratio (traded)	1.25	1.35	1.37	1.06	1.28

Source: Chang and Farr (1992).

prices of all existing houses. The actual divergence would almost certainly not have been sufficient to warrant arbitrage trading but might have been considered by builders sceptical of the market implications. The proportion sold forward might therefore have been higher because it would have shown that builders were taking a view of the future price behaviour in the market. If they felt that the pre-sales price was higher than that warranted by current spot prices, it would have been reasonable to sell more pre-sales in order to realize the market inconsistency. Thus we emphasize that the formula given in Equation 7 provides the optimal proportion of pre-sales given the objective of minimizing risk and without an independent forecast of future prices.

4. Discussion and further research

There are three issues that require further discussion, all of which concern the sensitivity of the inferences that can be made from our analysis. The first is the estimation of the variances

and covariances in Equations 4 to 7. The simplifications made rested on the assumption that the covariances between pre-sales prices and spot prices were essentially zero. However, this implies that buyers considering two houses, one new, the other 'second hand' would not change their relative preferences for them in different states of the market. On reflection it seems to us likely that as house prices rise, creating a feeling of euphoria and 'boom' that buyers' preferences for the new house will be less pronounced than in times when the housing market is depressed. This implies that the basis would decline as spot prices increased. This association of the basis with the state of the market would imply a negative covariance between the pre-sales price and the basis. Reference to Equation 6 reveals that a negative covariance would appear in both the numerator and the denominator. Given that the expression must necessarily be positive and less than one in its present form, the appearance of negative covariances in both elements of the fraction will lead to a reduction in the number of houses being pre-sold.

The second reservation we have about the results is the assumption about the risk premium demanded by investors to participate in the pre-sales market. The attitude of individuals might well be influenced by the state of the market. Just as the basis would effectively widen as the housing market was seen to be depressed, it is possible that individuals would have less inclination to speculate in pre-sales housing. From Equation 6, it would follow that the optimal weight in pre-sales would decline. In effect, the premium on pre-sales would decline and holding houses back for sale on the spot market would prove preferable. Against this view is that, the risk premium demanded by the buyers of pre-sales houses might be increasing at the same time as the risk aversion factor of the builders (λ). If these two parameters shifted in the same direction, they would compensate for each other and the optimal proportion of pre-sales would remain fairly stable.

The third reservation we have about this analysis is that we have not explicitly discussed the economic cycle of the real estate sector.* Real estate prices in Taiwan fluctuated greatly during the 1988–90 period. Four sub-periods were identified by Chang and Farr (1992). The pre-sales and existing real estate prices are shown in Table 3 and Figure 2.

We can see that pre-sales prices fluctuated to a greater extent than existing houses.

Given the gearing available on the investment in pre-sales prices, such a result is of course to be expected. The differences between pre-sales prices and existing house prices are smaller towards the bottom end of the real estate cycle (1990.10). The peak of the real estate cycle was at the beginning of the period illustrated (1988.1). From this date on, the cycle was in a downward phase (in terms of land acquisition, building starts, sales rates, etc.). However, real estate prices continued to rise well after the cycle was in decline. These sample figures suggest that the differences (basis) between pre-sales and existing house prices are not constant. The basis therefore might depend not only on the known costs but also on the state of the real estate cycle.

As shown in Chang and Lai (1990), the cyclical behaviour of the real estate sector influences other variables. In particular, the reporting of prices is affected as the difference between offer prices and transaction prices changes. As shown in Table 3, the behaviour of pre-sales prices might be seen as an indicator of demand for housing and therefore influence the actions and decisions of developers/builders. This analysis would improve investment decisions in the pre-sales and the spot market. However, such an exercise lies well outside the scope of the present paper.

* The effective price is estimated to be higher than the nominal price because of the deposits paid by the buyer on the pre-sales contract.

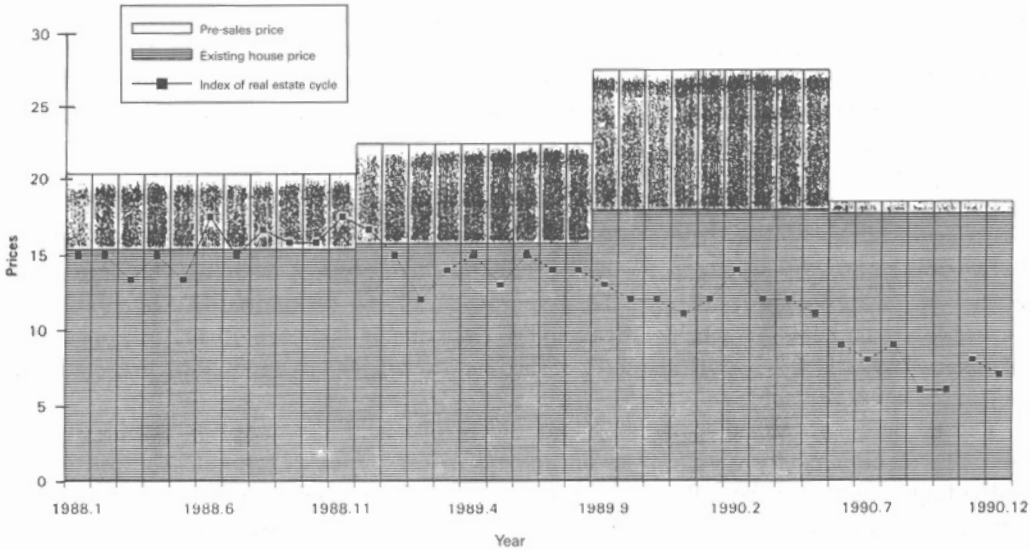

Fig. 2. Index of real estate cycle and house prices (pre-sales and existing). (*Source*: Chang and Farr, 1992).

5. Conclusions

In this paper, we have examined the phenomenon of the market in pre-sales houses. Although our discussion has referred to Taiwan, similar markets exist in other developing countries. The issues are important because they highlight a pragmatic solution to inefficiency in the market for housing finance. They also provide academic researchers with an interesting study of the operation of a forward market and this has been the emphasis taken in the above analysis.

The lack of comprehensive data precludes the possibility of drawing strong conclusions about the application of forward markets and pricing to the pre-sales market in Taiwan or elsewhere. However, even with the available data, it has been shown that the ideas introduced in this paper illuminate the choices facing the developers in deciding the proportion of their production that should be pre-sold. The application of the carrying cost concept is relatively easy for market participants who will be clearly aware of the scale of costs involved in buying and 'storing' existing houses.

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