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Commentary

Valuation Implications Of EIFS

By
John A. Kilpatrick

[Editor's Note: John A. Kilpatrick is an analyst with Mundy & Associates, a Seattle-based firm of economic, market and valuation analysts. The firm performs valuation services for litigators in various areas of law. This commentary is an excerpt of a presentation Kilpatrick made at Mealey's Construction Defects Conference in December 2000 on the topic of the value implications for Exterior Insulation Finishing Systems (EIFS), which many also refer to as "synthetic stucco." Copyright 2001 by the author. Replies to this commentary are welcome.]

EIFS — An Overview

Synthetic Stucco, commonly known as EIFS (exterior insulation finishing systems) has been used as a siding material since World War II. EIFS is used on both residential and commercial buildings, and while the product is sold and installed throughout Europe and North America, usage seems to be geographically concentrated in certain areas, particularly in the southeast and in the Pacific Northwest.[1]

While EIFS continues to be sold and installed, usage of EIFS systems for exterior siding is meeting with increasing opposition, as EIFS-clad homes appear to suffer elevated inter-wall moisture levels and a proclivity to structural rot, stemming from leakage around windows, doors, corners, roofs, seams, and other joints. Owners of EIFS-clad properties face significant potential stigma-related value losses stemming from three distinct areas of impairment:

1. Present value of future repair and replacement costs,
2. Present value of future increased maintenance costs, and
3. Marketability impairment.

Background On EIFS

EIFS generally refers to an exterior siding system with four primary components[2]:

1. Expanded polystyrene foam insulation panels which are attached (usually with adhesive) to the intermediate sheathing or other substrate,
2. A base coat that is applied to the insulation panels with a trowel,
3. A fiberglass reinforcing mesh laid over the panels and imbedded in the base coat, and
4. A finish coat applied with a trowel over the fiber mesh.

Components 2, 3, and 4 together are usually about 0.125 to 0.25 inches thick. Beneath the insulation panels is an intermediate sheathing, usually gypsum board, plywood, or oriented strand board (OSB).[3]

EIFS is designed to shed all water, although the EIFS Industry Members Association indicates that the systems are intended to be "water-vapor" permeable.[4] EIFS is often confused with traditional stucco, since the two siding materials have a similar appearance. However, traditional stucco application anticipates water permeation, and uses building paper or other flashing behind the wall surface to carry water down and out of the bottom of the wall. Also, stucco is a Portland Cement-based plaster, troweled directly onto a metal mesh or an underlying masonry wall. In short, despite the similarity of appearance, the two siding systems are significantly different, and the common term "synthetic stucco", often used to describe EIFS, simply adds to the confusion.

EIFS was first developed in Europe in the late 1940's to aid in economically rebuilding the war-torn areas, and European experience has been quite different from that in North America. This results principally from differences in application. In Europe, EIFS is typically applied over an underlying masonry base — the use of EIFS over a stud wall is virtually unknown in Europe. Also, European EIFS installers usually use two base coats, a base primer coat, and thicker insulation boards.

As of 1997, EIFS accounted for between 13 percent and 14 percent of all new commercial construction in the U.S. Residential market penetration nationwide is somewhat lower, standing at about 4 percent of new homes in 1997, although this market penetration varies regionally, from effectively zero in some areas to well over 15 percent in others. In 1995, EIFS was used on about 25,000 to 30,000 new homes nationwide.

Performance Issues With EIFS Siding

The use of EIFS siding assumes that moisture will not penetrate to the substrate. However, in practice, water does penetrate, principally at edges of wall openings (doors, windows, decks, and roof intersections), through jambs and sills of window frames, and through cracks or chips in the siding itself. It appears that even high-quality window frames allow moisture to penetrate the siding, which is then contained between the surface of the EIFS system and the underlying wood, gypsum, or OSB intermediate sheathing and the stud wall. Even a small crack in the EIFS surface, resulting from hail damage or wind-blown debris, provides a moisture entry pathway,[5] and unfortunately there is presently no consensus test method in the U.S. for EIFS impact resistance.[6] The EIFS industry itself admits that if ". . . the likelihood of impact damage is very high, it is probably a good idea not to use EIFS at these locations."[7]

Published reports of EIFS problems in the U.S. date at least to a study funded by the Massachusetts Executive Office of Communities and Development in 1985. The study analyzed 17 public buildings with EIFS systems used as a siding material. Every one of the buildings had cracks in the surface sufficient to allow water penetration and internal substrate damage. Problems were uniform across all four EIFS system manufactures in the study.[8]

HUD then commissioned a study of 50 commercial, institutional, and multi-family buildings with EIFS system siding in Missouri, Massachusetts, and Illinois. The EIFS systems

had been supplied by eight different manufacturers. The HUD study found that 73 percent of all buildings, and 10 out of 11 buildings over 8 years old had cracks sufficient to allow water penetration. Further, 52 percent of the buildings had sealant failures, and seven of the 11 buildings over eight years old had elevated moisture levels in the substrate. The HUD report recommended against the use of some types of gypsum as a substrate in adhesively fastened systems, increasing the thickness of the base coat, applying the base coat in two layers, and independent, third-party inspections of buildings using EIFS systems. The HUD report also concluded that EIFS manufacturers do not have the staff or procedures needed to ensure proper installation of their products. Subsequently, HUD issued a bulletin prohibiting the use of gypsum substrate in EIFS systems.[9,10]

Published data on residential damage date at least to reports from New Hanover County in North Carolina, where homeowners began complaining to building officials about structural damage in the early 1990s. Inspections in 1994 and 1995 found that 30 out of 32 houses had moisture problems. The houses were spread out over four different subdivisions, involved different contractors and several different manufacturers. Subsequent inspections of 209 EIFS system houses in the area found structural damage caused by water penetration in the majority of them. Apparently, any spot where the plane of the EIFS panel met an opening or another part of the structure was a leak zone. The North Carolina Chapter of the American Institute of Architects cited that 68 percent of these houses had improper or no caulking at key joints.[11]

Unfortunately, underlying moisture damage may not be evident from the surface. In homes inspected in New Hanover County, the surface often appeared intact, but the underlying wood commonly showed moisture readings of 50 percent or more.[12] According to the National Association of Homebuilders (NAHB), serious decay occurs when the moisture content of wood exceeds the fiber saturation point of 30 percent.[13]

One major EIFS system manufacturer, United States Gypsum Company, recently conducted an investigation of 30 homes in New Hanover County clad with EIFS systems manufactured by that company. They found elevated moisture levels in all homes, and ceased supplying EIFS systems without a moisture drainage system. Their new product has a drainage plane, flashing, and weep-hole details designed to vent the wall cavity. The EIFS Industry Members Association disagrees with U.S. Gypsum, and states that quality construction is the key issue.[14]

A further problem stemming from EIFS systems was revealed when Hurricane Opal hit the Florida panhandle in October, 1995. EIFS had been a common siding in that part of the country on condominiums, offices, and other buildings with metal studs. The Insurance Institute for Property Loss Reduction (IIPLR) noted that the failure rate of EIFS siding to withstand wind pressure was more extensive than those of other types of wall sidings. To quote,

> "The Predominant reason for EIFS failures appeared to be water damage to the gypsum sheathing. In many instances of damage, both the EIFS and gypsum sheathing had been blown off, leaving only the metal studs. Many studs were rusted, indicating prolonged water infiltration had saturated — thereby weakening — the gypsum sheathing. The water-damaged sheathing provided little support against wind-induced forces, and weakened portions of EIFS often fell from the metal studs during passage of Opal."[15]

The Southern Building Code Congress International, Inc. (SBCCI) also noted the relatively large number of EIFS-related failures in hurricanes, in their study of Hurricane Erin (August, 1995). They found that vinyl siding and EIFS were ". . . by far the most damaged systems" and question whether or not EIFS had been installed and tested in accordance with wind-load requirements. The authors of the study again surveyed the area after Hurricane Opal, and validated their previous findings.[16]

The problems with EIFS are not limited to the southeast, or even to the United States. The City of Vancouver, British Columbia, has reviewed EIFS use for several years, and began officially questioning EIFS use in 1992.[17] Since 1996, Vancouver has required rainscreen or drainage pathways to evacuate moisture from EIFS systems. Vancouver also requires an independent inspection of the installation of site-troweled EIFS installation, although it does not require such inspection of pre-fabricated panels surfaced with EIFS coating.[18] Since March, 1996, the North Carolina Building Code Council has required similar drains on wood-framed houses sided with EIFS systems in that state.

Maryland Commercial Insurance Company, one of the nation's largest construction liability carriers, has announced that it will no longer cover homebuilders who install EIFS systems.[19] Lawsuits are presently pending against EIFS manufacturers in several states, including a class-action suit in North Carolina. One of the N.C. EIFS defendants, Senergy, Inc, has separately offered to settle by contributing $20 million to a repair fund for N.C. residences, leaving eight other defendants as of this writing.[20]

Problems with EIFS-clad residences have been profiled on the NBC-TV show "Dateline." That program cited the National Association of Homebuilders statement that EIFS-clad homes are:

> ". . . incompatible with the existing wood frame construction methods in the United States."

Indeed, according to the NAHB, as cited on Dateline, moisture intrusion will occur even when EIFS is properly applied according to industry standards.[21]

The specific implication for valuation is that EIFS-clad homes may suffer diminution in value as a result of the EIFS-siding, irrespective of the manifestation or appearance of physical damages to the structure.

Evaluation Of EIFS By The Appraisal Profession

As a result of extensive discussion within the Appraisal industry, the profession now encourages appraisers to recognize the difference between traditional stucco and EIFS. This was stimulated in large part by Kilpatrick, Brown, and Rogers (1999) seminal article in the Appraisal Journal,[22] which was followed by documentation — available on the Appraisal Institute's web site — which allows appraisers to evaluate the differences between various stucco-like products.[23] To quote from the Institute's official on-line appraisal glossary:

> "EIFS
> Exterior insulation and finish system; see synthetic plaster on rigid insulation.

> SYNTHETIC PLASTER ON RIGID INSULATION
> An exterior wall insulation and finish system (EIFS) consisting of rigid insulation board, reinforcing mesh and a synthetic plaster or stucco coating. Some common trade names are: Dryvit, Insul-Crete, R-wall, Powerwall, and Sure-wall, to name a few."

Clearly, the profession has come to recognize the difference between EIFS and traditional stucco. For example, the Relocation Appraisers and Consultants organization has recently begun publicizing the EIFS problem to their members.[24] The Marshall Valuation Service, long respected in the appraisal industry for providing reliable reproduction cost data, now differentiates between synthetic stucco and traditional stucco.[25]

Valuation Of Property Clad With EIFS

Arens (1997) demonstrates a basic valuation model for the analysis of defective properties:[26]

Before Condition = After Condition + Diminution In Value

In the case of EIFS-clad properties, the diminution in value includes three categories of impairment: cost-to-cure, cost of maintenance, and stigma. Estimation of costs in the first category may often be beyond the scope of the appraisal process. To quote from the Appraisal Standards Board's commentary on Advisory Opinion No.9:[27]

> "An appraiser is a trained and experienced observer of real estate, but recognizing, detecting, or measuring contamination is often beyond the scope of the appraiser's expertise. . . Remediation and compliance cost estimation involves knowledge and experience beyond that of most appraisers."

Thus, the appraiser may often be in the position of relying on external expert opinion, such as contractor estimates or engineering studies, to determine the cost-to-cure.

Remediation of an EIFS problem can fall into two categories: repair or replacement. However, either the simple repair of limited damage to an EIFS-clad structure to like-new condition or even the complete replacement of EIFS with another siding material brings two additional categories of costs: enhanced on-going maintenance and impaired marketability. Both of these categories of costs are also present in new EIFS-clad construction once the market fully knows and understand the EIFS-related problems.

EIFS is not alone in requiring on-going, perpetual maintenance, but different types of siding require different levels of maintenance. For example, various masonry products (e.g. — true stucco, brick, block, and stone) require little or no ongoing maintenance, and the siding often outlives the economic life of the rest of the structure. Other types of siding, such as wood lap, require perpetual maintenance in the form of painting, caulking, and replacement of rotten wood. Deferral of these maintenance items is reflected at various junctures in all three of the traditional (e.g. — first generation) approaches to value typically used by appraisers (cost, sales comparison, income capitalization).

However, it is apparent that a brand new EIFS-clad structure will require intense ongoing maintenance over and above that typically found with other siding materials. Most common ongoing maintenance concerns include periodic moisture testing, intense caulking (at least once or twice per year), and continuous monitoring of sealant problems on window jambs and door thresholds. Most homeowners are unable or unwilling to do these chores themselves, and will need to contract this out to an appropriate professional.

Stigma, as commonly considered in Appraisal literature,[28] concerns the value impact of the public perception of impairment. In short, even a property with no actual cost-to-cure, but a public perception of a deficiency, will suffer a value diminution. For income producing properties, this is often best measured by an increase in the capitalization rate. Hence, while appraisal practice is replete with examples of capitalizing future costs into present value, such as the cost to maintain a historic façade easement, those future costs are usually discounted at market cap rates. An impaired property, with a negative public perception, should be capitalized at a different rate. The impact of the different rate is stigma.

To illustrate the appraisal implications, assume a residence with $4,000 in EIFS-related repair costs.[29] Once restored to "as new" condition, the structure will require $1,000 per year of extraordinary ongoing maintenance costs. Assuming an appropriate market cap rate of 10 percent, the actual reduction in value for a contaminated property ($\mathbf{V}_c$) would be:

$$V_c = \$2{,}000 + \frac{\$1{,}000}{0.10} = \$12{,}000$$

Note that the present value of the ongoing maintenance is significantly greater than the current repair costs. Also, this model does not take into account the impact of stigma on property value. Stigma is a real factor, an in a non-quantitative sense, the market perceives the value loss of stigmatized properties, and transaction prices are reduced accordingly.[30] Mundy (1992) shows that in addition to costs to cure a problem, stigma imposes market behavior costs such as:[31]

- Diminished rents
- Increased vacancy losses
- Higher ongoing expenses
- Increased capitalization rate

The general model for valuing an impaired income producing property ($\mathbf{V}_c$) over a valuation horizon of t years can be shown as:

$$V_c = \sum_{t=1}^{n} \frac{NOI_t - Costs_t}{(1+i_c)^t}$$

While the value of a similar, unimpaired property would be:

$$V_u = \sum_{t=1}^{n} \frac{NOI_t}{(1+i_u)^t}$$

Note the different cap rates. The uncontaminated cash flow is capitalized at i_u while the contaminated property is valued at the somewhat higher rate of i_c. To illustrate, assume two otherwise similar properties, Property C being EIFS-clad and Property U sided with some other material. Both properties are fully rented at market rates (and identical NOI = $100,000) and will be for the foreseeable future. However, the EIFS-clad structure will require $10,000 in repairs in Year No.1 and an ongoing enhanced maintenance of $2,000 per year. Analysis of the market indicates that unimpaired properties are capitalized at 10 percent, while impaired properties carry a 12 percent cap rate. The problem is to isolate the EIFS-related value impact on Property C.

To accomplish this, it is necessary to take the difference between the two preceding equations. Assuming a cost-to-cure in Year No.1, a perpetual NOI, and a perpetual increased maintenance cost:

$$V_{difference} = \frac{NOI}{i_u} - \frac{NOI}{i_c} + \frac{Costs}{1+i_c} + \frac{maintenance}{i_c}$$

$$= \frac{100,000}{.10} - \frac{100,000}{.12} + \frac{10,000}{1+.12} + \frac{2,000}{.12}$$

$$\approx \$192,000$$

The first two terms in this equation are the loss in value resulting from stigma alone. Even in a fully-cured, no-maintenance world, the stigma loss would be $166,667, which is a quantified measure of the market's reaction to potential future problems associated with this property. Note also that the uncontaminated property value (V_u) is $1,000,000. Thus, this relatively "minor" EIFS impairment, given the constraints of this model, result in a value loss of nearly 20 percent. This model helps explains the economically significant market reactions noted in many areas to EIFS-clad properties.

Market Prices Versus Market Value

It is generally — and not always correctly — assumed that market prices are reflective of market value. In fact, the appraisal profession recognizes that a determination of market value assumes a very specific set of conditions which are not always reflected in transaction prices. To quote from The Appraisal of Real Estate, 11th ed.:

Market Value ". . . is the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby: (1) buyer and seller are typically motivated; (2) both parties are well informed or well advised; (3) a reasonable time is allowed for exposure in the open market; (4) payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and (5) the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale."[32]

This is often referred to as the *Federal Definition* and is compatible with the definition of market value cited in The Dictionary of Real Estate Appraisal[33].

Fundamental to the issue are two points:

1. To what extent do market prices fully capture all available knowledge?
2. Even if all information is "available", to what extent are buyers and sellers able to make market value decisions.

Empirically, the two questions merge into one. If market prices can be shown to deviate from true value due to information inefficiency, then apparently the market is not working efficiently. However, theoretically, there are two separate and distinct issues at work. First, real estate theory and a broad body of empirical study demonstrates quite conclusively that buyers and sellers are unable to fully absorb available knowledge.

However, there is a second strand of literature which has only recently begun appearing in the real estate literature. Fundamental to the market decision making process is the concept of rational expectations — that is, the concept that market participants fully discount whatever information they have in formulating prices. However, there is a growing body of both theory and empirical study which shows that real estate market participants operate myopically, and that this departure from rational expectations is particularly noticeable during market cycles.

Assume, for illustrative purposes, three states of the market:

1. All sellers are fully informed.
2. Some buyers being fully informed, others not.
3. No buyers are fully informed.

State number one, coupled with rational expectations, would be a sufficient condition for prices fully reflecting knowledge. Some real estate economists would admit that this first "state of being" does not exist in this market, but that this condition is not "necessary" — that efficient prices can result without this condition.

In the economics literature, condition number one is referred to as "strong-form" efficiency. It is highly restrictive, and to quote Gatzlaff and Tirtiroglu (1995), ". . . suggesting that even insider information is reflected in current prices."[34] However, Grossman and Stiglitz (1980), in their seminal paper on the subject, show that such efficiency is impossible since costless information is both a sufficient and necessary condition for prices to fully reflect all available information.[35] Hence, in an efficient market, at any point-in-time, a tautology exists whereby prices fully reflect information (Grossman and Stiglitz, 1976)[36] but then at the next instant, more information comes in which updates prices instantly. However, since even in capital markets, information is not costless, markets cannot be strong-form efficient and hence at any point in time, prices do not fully reflect all available information.

Theory aside, substantial empirical evidence has been amassed on the inefficiency of real estate markets. The following is a brief summary of some of the salient articles from the 1990's. Note that there is a substantial body of research on the issue prior to

the 1990's. Indeed, as soon as the seminal articles on market efficiency were published in the securities field, the housing economics portion of academia began examining housing prices in the context of market efficiency.

- Gatzlaff (1995) finds serial dependency and autocorrelation in after-tax excess returns from housing markets.[37]
- Tirtiroglu and Clapp (1994) find that spatial barriers (in their case, the Connecticut River) reduces the diffusion of information.[38]
- Clapp and Giaccotto (1994) find that predictable local economic variables allow for predictability in housing prices (Note: price predictability is evidence of market inefficiency).[39]
- Kim and Suh (1993) use empirical evidence from the Korean and Japanese real estate markets to show that housing prices are predictable. (Note: price predictability is evidence of market inefficiency).[40]
- Tirtiroglu (1992) finds that movements in house values in one town are correlated with lagged movements in prices in a neighboring town (Note: lagged correlation is evidence of market inefficiency).[42]
- Gyourko and Voith (1992) use time-series, cross-sectional data on the median price of existing home sales and finds temporal persistence in price trends.[43]

Another argument put forth is that market prices are set only by the highest bids, and therefore market prices are reflective of the knowledge of the bidder (assumed here to be superior to that of the typical seller). This is simply wrong. Securities markets indeed function that way, but at equilibrium, securities markets are fully-clearing markets.

For example, on the New York Stock Exchange, all trades are executed through a specialist, who is analogous to a real estate listing broker in a very practical sense. If you want to buy one hundred shares of IBM (or ten thousand, for that matter), eventually that trade must pass through the hands of the specialist trader. At any given point in time, there are bids (analogous to real estate "offers") and there are "asked" prices (analogous to listings). In volatile markets (as most are now-a-days) it is not uncommon for bid prices to come in above asked prices. To use real estate analogies, it is not uncommon for buyers to offer to pay at prices higher than sellers are offering to sell! Hence, the specialist must "clear" those markets before equilibrium can be restored.

Of course, the analogy can be stretched only so far. In the real estate market, prices are set in combination with terms. For example, the traditional single family listing is at a price "all cash" or cash equivalent. However, the majority of offers come in "subject to financing." A prudent seller may — and quite often does — accept a lower offer without conditions rather than a higher offer with conditions.

Additionally, all markets — both real estate and security — have what are commonly and kindly referred to as "noise traders." These fall under the old adage, "a fool and his money are soon parted." Part of the challenge in securities market research is separating out the background "noise" trades so that the trades which are indicative of knowledgeable traders can be analyzed for indications of true market value. The single family

residential market in particular is subject to substantial "noise" trading. Indeed, in the absence of a brokerage function, single family markets would probably break down as a result of lack of indication of true value.

To fully appreciate this, it is necessary to consider the issue of "rational expectations", a cornerstone of financial economics theory. Clayton (1996) specifically addresses the application of rational expectations in real estate prices.[44] Rational expectations (at the core of market efficiency) states that the market discounts what it knows about the future and captures that *ex-ante* expectation into current prices. Clayton (1996) shows that there is no reason to believe that rational expectations is at work in real estate markets, and to the extent that rational expectations fails, prices are not indicative of value.

Pre-Clayton (1996) there is ample current empirical evidence that housing prices do not behave fully within the rational expectations model. Shiller (1989)[45] first posed the question, can market fundamentals alone explain house price dynamics? That same year, Mankiw and Weiel (1989) explored the question with an empirical study of U.S. house prices, and found a "myopic" expectations model did a better job than a rational expectations model.

However, Clayton (1996) explored house price volatility in Vancouver, BC, from 1979 to 1991. He found that a rational expectations model did not fully explain prices during periods of price change. He concludes that prices do indeed deviate from fundamental values during cyclic periods.[46]

Which leads to the issue of temporal information diffusion, which is a practical problem in all asset classes, but Dolde and Tirtiroglu (1997) present empirical evidence showing that it is a particular problem in real estate. In securities markets, for example, temporal information diffusion problems results in heteroskedasticity, according to Engle and Ng (1993)[47], and which in turn results in problems with ordinary least squares regression models. However, the news temporal diffusion problem probably traces its roots to a study done by Clapp, Dolde, and Tirtiroglu (1995), in which they use data from neighboring towns to show the temporal (and spatial) issues associated with news diffusion. Earlier empirical studies in the real estate literature, most notably by Case and Shiller (1989, 1990)[48,49] and Tirtiroglu (1991, 1992)[50,51] detected the same effect, but lay the blame on irrational feedback trading.

Dolde and Tirtiroglu (1997) use two very large data sets: 1) a very large data set of quarterly housing price indices for several areas in Connecticut, and 2) a large data set of housing indices near San Francisco. Both data sets comprise hedonic indices estimated on more than a decade of the full sample of all usable transactions. To quote from their conclusions, "A distinction is made between temporal information diffusion from a town's recent history and spatial and temporal diffusion from neighboring towns. Theoretical consideration of: (1) purely local Tiebout effects; (2) spatially distributed new urban economic effects; and (3) spatial patterns of information-seeking imply different price change reactions in a town where an event occurs, in neighboring towns and in distant towns within a region. The lagged price effects may be consistent with rational behavior rather than simply irrational feedback trading."

In short, they go on to say that they find clear evidence of heteroskedasticity in housing prices. Their results also indicate what they call "some mixed evidence" of a risk-reward trade-off in housing price changes.

Market Value Without Market Efficiency

In the absence of market efficiency, simple sales comparison fails without substantial adjustments to account for lack of seller knowledge. To estimate most probable selling price with seller knowledge equal to buyer knowledge, one must utilize a valuation model which is representative of two factors:

1. Includes information which would be rationally considered in the valuation process, and
2. Utilizes methodology congruent with practical analytical process.

The issue of information — or the lack thereof — is really at the core of the appraisal process. Lusht (1983) points out that if perfect information was available (he calls it "complete data") then appraisals would be unnecessary.[52] He likens the perfect information scenario to the stock market, where appraisals are unnecessary.[53] The task of appraisers, as he sees it, is to develop a credible appraised value from usable but imperfect data. However, Lusht (1983) points out that some degree of efficiency is necessarily imputed into the appraisal process, because without it the principal of substitution fails.

Thus, in the absence of market efficiency — when market prices fail to reveal market value — then straightforward valuation techniques fail to accurately predict market value. The appraiser then must resort to more advanced techniques to uncover market value to an acceptable degree of accuracy. Such advanced techniques often include, but are not limited to, survey methodology, case studies, regression analysis, and other reasonably well tested and suitable techniques.

Empirical Findings On Market Efficiency In Impaired Property Cases

Knowledge about and understanding of impairment issues take a long time to diffuse throughout a market. In repeated findings, both in class-action contamination cases as well as in wide-spread construction defects cases (such as EIFS), it has been found that market participants do not fully know about issues and do not fully understand the implications of these issues. This first market failing goes to the "knowledgeable buyer and seller" requirement of market value, and the second issue goes to the "acting prudently" requirement.

However, survey methods have proven very useful in determining damages in a "full-knowledge" market, congruent with the necessary and sufficient conditions for a market value appraisal. These methods, including contingent valuation, conjoint utility measurement, and perceived diminution, have been widely accepted by the courts in contaminated property cases, condemnation cases, and other cases where market-generated evidence (e.g. — prices) are susceptible to inefficiencies and lack of knowledge diffusion.

Summary Of Appraisal Implications

While single family, owner-occupied residences are rarely valued using the income capitalization approach (illustrated in a previous section), the implications are at least as serious and, given the "inversion of home" principles outlined in a previous section,

probably worse. Hence, the relative diminution in value shown as an example for an income-producing property and illustrated by the income approach is probably, at best, a lower bound for the diminution in value of a residence with a comparable physical disutility and a comparable unimpaired value.

Real estate markets are generally inefficient, and as such market prices are representative of true market value ONLY when knowledge is fully diffused throughout a market area and buyers and sellers can prudently act upon that knowledge. Empirical findings in impaired property cases show that this is rarely the case, and then only after impaired markets have sufficient time to mature.

Case Studies, Surveys, and Comparable Properties

Watermark Homeowners Association[54]

In April, 1998, condominium owners in San Diego settled with various EIFS defendants for a total of $11.6 million, the highest per-unit settlement ever in California on a per-unit basis. Based on an original construction cost of $35 million in 1991, this represents a diminution of nearly one-third in value.

Vancouver, British Columbia

The condominium market in Vancouver has been hit with a combination of EIFS-related problems as well as other shoddy workmanship issues. EIFS was used on a number of recently constructed mid-rise condo projects, which are consistently suffering from leaks. As a result, these and other condos have been rendered effectively unmarketable. Newspaper headlines have called Vancouver's leaky condo's a "world class disaster", and building inspection engineers who have inspected the condos have blamed, among other things, "face-sealed cladding that is supposed to keep water out and can't dry out once it leaks."[55]

Wilmington, North Carolina

Another case study involved a task force study of 209 homes in Wilmington, North Carolina, a community in which over 3,200 residences had experienced problems with synthetic stucco siding (EIFS). A study of a subdivision containing near equal amounts of houses containing synthetic stucco siding and those without (or with external finishing containing less than 50 percent synthetic stucco siding), showed five times more sales of non-EIFS houses than those containing EIFS, and a lower sales price to list price ratio for those containing EIFS. Properties included in this last figure included house where the seller had either replaced or contracted to replace the siding as a condition of sale. At the time Mundy Associates originally researched this case study, most realtors were requiring disclosure of any problems related to the siding and some were reluctant to list EIFS houses altogether. Many realtors reported that buyers were asking not to be shown EIFS houses and the affected houses were virtually impossible to sell. Owners, in order to market their homes, were replacing EIFS with another siding such as brick, wood or vinyl. The cost of recladding the homes were borne by the seller and represents a discount in value. In addition, there appeared to be a further value discount of about 10 percent for the reclad homes caused by uncertainty about the structure.[56]

Emoryville, California

This case study involves a 585-unit high rise condominium building, Pacific Park Plaza, in Emoryville, California. In June 1989, the homeowners filed a construction defect lawsuit against the developers and builders of the building because of curtain wall leakage throughout the building. The homeowners settled with the developers' and builders' insurance companies for $19.3 million in April 1994. The total sum of this settlement was invested in repair costs. While the building was involved in litigation and repairs, the local banks redlined Pacific Park Plaza, refusing to loan on the property and in some cases discounting existing loans in order to get rid of them.[57]

Puget Sound Region

There are several buildings located in the Puget Sound region which were originally clad in EIFS products and which have been repaired or still need to be repaired and resided. Conversations with the building repairers disclosed the work could be extensive and costly. There had been quite a bit of local publicity, principally from several newspaper articles about problems with EIFS in Seattle and Vancouver, BC. The Newmark Building, located on Second Street in the Downtown core is one such building. The owners of the Newmark were required to provide funds to repair their building before mediation began. Repairs were planned to begin soon.

As of the time of our research, transaction data was limited for the Puget Sound region. Despite a "hot" residential real estate market which has permeated the region for most of the decade (1990s), there were few transactions of post-remediated EIFS-clad homes. Thus, to address the issue of buyer behavior in terms of remediation of a property and post-remediation stigma, results of a survey conducted by Mundy & Associates provides the best evidence of how a potential buyer might behave when well informed. The purpose of the survey was to determine price discounts to a residence affected by EIFS.

A survey of owners who had recently purchased Puget Sound waterfront homes was conducted in early August, 1996. The respondents had purchased their homes in the prior three years, and were randomly selected from transaction lists. A total of 13 interviews were completed among the owners of 2,250-3,500 square foot homes. The interviews were conducted in the home. Results of the survey are summarized below.

Interviewees were then provided pictures of the house under repair and information on the repairs and the repair costs. Of the 13 persons interviewed, 77 percent would not purchase the home after becoming informed of the repairs. Of those that would still purchase the home, 67 percent would do so if a discount was offered with a guarantee on all walls, 63 percent if the house was offered "really cheap." The percentage of discount was greater among this group of buyers. The mean discount was 35.5 percent, the median 35 percent-40 percent. Based on a typical value for a waterfront home of $750,000, 92 percent of the buyers would expect to pay less than $750,000, with a mean discount of $234,600 and a median discount of $300,000. Of those interviewed who would not consider purchasing the home, 40 percent would not do so because the house had too many problems, requiring too much attention. In addition, 40 percent would not purchase the home because of concern for those walls, which had not as yet shown deterioration.

In conclusion the interviewees were asked to rate various concerns regarding the house on a 0-10 scale, with equaling an extremely concerned condition and 0 equaling no concern. A concern that there may be a stigma associated with the house when compared with other houses in the area rated 8.1. A concern for the original walls, which have not been replaced but may need replacement in the future, was 9.3. A concern that it would be more difficult to get a loan on the house rated 7.6.

Results of the survey reveal a high level of concern for the need for future repairs and a high level of concern for any stigma, which may be associated with EIFS-clad residences.[58]

Savannah, Georgia

Faye Smith of Richmond Hill, Georgia (a suburb of Savannah) owns both a commercial building used as a beauty salon and a residence which are clad with EIFS siding. In Spring, 1999, she settled with the manufacturer on the commercial building for an undisclosed amount. Her residence has suffered cracks and blisters in the siding, and she's had to replace rotten wood beneath the siding and eradicate ants and insects attracted to the rotten wood. As of March, 1999, she estimated her direct repair costs at $15,000, and litigation was pending.

The Savannah Morning News, in a story dated January 24, 1999, estimated 3,000 owners of recently built homes in that part of Georgia were facing an average of $21,000 each in immediate repair costs to maintain EIFS-clad homes. Arnold and Maria Drown of Savannah purchased a new home for $117,000, and were immediately faced with about $25,000 in estimated repair costs, not including any stigma or loss in marketability. According to the newspaper article, other homeowners in the area have faced repair bills as high as $100,000.

Myrtle Beach, South Carolina

Joy and Don Calhoun recently constructed a 3,600 square foot home at a cost of approximately $400,000, clad with EIFS siding. They subsequently had to abandon the home due to the air quality inside, which was tested and found to carry dangerous levels of toxic mold. Within three years of construction, the outside changed color, the inside walls grew black mold, including the extremely toxic stachybotrys mold, and slugs were found to be living inside the exterior walls. The Calhouns began suffering a variety of ailments related to these problems, according to their physician, Dr. Eckardt Johanning, of the Eastern New York Occupational and Environmental Health Center. As of April, 2000, their residence was boarded up and unmarketable.[59]

Preston, Washington

Kirby and Ginger Lang purchased an unfinished 6,000-square-foot residence in Preston, Washington, in late 1996, with a "finished" value estimated at $650,000. The Lang immediately finished a large in-law apartment above the garage (approximately 1,200-square-feet) and moved into that with their four young children. They then began the process of finishing the remaining 5,000-square-feet. The exterior of the dwelling was finished with EIFS by the previous owner.

The Lang family began suffering respiratory ailments. In early 1999, they read about the EIFS-related problems, and attempted to sell the home. Under physicians' care, they

moved out of the dwelling and purchased another home. The EIFS-clad home could not be sold despite a very high demand for residences of this size and price range in the suburban Seattle market. The Lang's eventually turned the home back to the mortgage lender, which has also been unable to sell the home. The unfinished home continues to sit vacant and on the market.[60]

Fairfax County, Virginia

James and Kristen Maday purchased an EIFS-clad home in Hunter Mill Estates, an upscale neighborhood near Vienna, Virginia, in August, 1996, at a price of $522,362, and moved in with their four children. This price was typical of the executive-sized homes in this neighborhood during that period. Many of the homes in this neighborhood were EIFS-clad, and at the time the local real estate community did not know or did not understand the difference between EIFS and traditional stucco. Many of these homes were sold as "stucco" homes, and many residential appraisals listed the siding material as "stucco."[61] Interviews with local real estate brokers revealed a widespread lack of understanding about the difference between EIFS and synthetic stucco. Since Virginia is not a full-disclosure state, many re-sales occurred without buyers knowing or understanding what they were purchasing. During the late 1990's and into 2000, the upscale residential market in northern Virginia was one of the hottest in the U.S., with plenty of demand and insufficient supply. As a result, house prices soared. However, as individual EIFS residences began manifesting problems, homeowners complained to their builders. In some situations, builders offered to completely strip and re-clad houses with other siding products. However, the act of recladding caused additional stress to house structures, leading to diminished economic lives of the residences. Other homeowners including the Madays, recognized this and began to file suits against the builders. Most of these suits were settled in private settlements. The Maday case did not settle, and ended up in trial. The Madays alleged a loss in property value pre-remediation as well as stigma damages if and when remediation ever occurred. The jury concurred, finding that the home, which would have been valued in the $675,000 range "unimpaired", had been rendered nearly unmarketable without remediation of the EIFS.[62]

Summary Of Empirical Findings

Pre-remediation, EIFS-clad homes suffer a diminution in value driven by three factors:

- The unknown costs, inconvenience, intrusion, and loss of marketability resulting from the EIFS pre-repair;
- The unknown costs, inconvenience, and intrusion of the repair itself; and
- The unknowns faced post-repair.

Pre-remediation, the dwelling is often reduced to a value-in-use, with significant loss in marketability and inconvenience from intrusion. Thus, in the pre-repair state, diminution in value appears to range from one-quarter to one-third of unimpaired value of the residences, although higher amounts are found when the EIFS has caused more severe manifestations (e.g. — mold or "sick building" syndrome) where habitability and thus value-in-use are reduced to zero. In the extreme, pre-repair houses are frequently rendered totally unmarketable and/or uninhabitable.

Post-remediation, the residences continue to suffer a diminution in value resulting. Marketability is reduced as a large proportion of the potential buyers refuse to consider EIFS-clad homes and many of those who would consider will only do so at a discount from "unimpaired" value. These are the economic manifestations of stigma.

Post-repair, residences continue to suffer a diminution in value resulting from stigma — the unknowns associated with undiscovered damages and/or physical manifestation, increased future lending costs, and decreased marketability. For example, it is apparent that post-repair EIFS homes will require longer to market. From a time-value-of-money perspective, a delay of 6 months in marketing such a home, at a re-investment rate of 10 percent annualized, translates into approximately a 5 percent diminution in value EVEN IF the home sells for full unimpaired value. However, it is additionally apparent that even with increased marketing time, selling concessions are probably necessary. The Wilmington, North Carolina findings of a 10 percent diminution in value appears to be closest to reality in a fully-informed market acting at equilibrium.

ENDNOTES

1. Much of the material in this section is taken from Kilpatrick, John, Doug Brown, and Ron Rogers, "The Performance of Exterior Insulation Finish Systems and Property Values" Appraisal Journal, January, 1999. This article was subsequently cited in The New York Times article, "Some Users of Fake Stucco Find Headaches are Real," by Fred Bernstein, July 3, 1999, page E-5. Additionally, much of this was presented at a Symposium on EIFS, held June, 1999, in Washington, DC, by U.S. Inspect.

2. "Exterior Insulation and Finish Systems," *Natural Hazard Mitigation Highlights* No. 7, February, 1997, Insurance Institute for Property Loss Reduction, 1-12.

   Recently, the EIFS industry has begun using alternative substrates and application methods in an attempt to address moisture problems.

4. Kilpatrick, et. Al, op. cit.

5. *Natural Hazard Mitigation Insights*, 4.

6. The Society of Testing and Materials publishes a generic impact-resistance test, ASTM E 695, which can be used, but EIFS impact resistance standards are not commonly published.

7. R.G. Thomas, Jr., *The Exterior Insulation and Finish Systems Design Handbook*, 70.

8. R. Kenny and R. Piper, "Proposed material and Application Standards for More Durable Exterior Insulation and Finish Systems," *Development, Use, and Performance of Exterior Insulation and Finish Systems*, (ASTM, 1995), 56-57.

9. Ibid, 57-60.

10. *Use of Materials Bulletin No. 101*, HUD, (July 26, 1993).

11. "Special Inspections Vital in Proper EIFS Installation," *The Building Official and Code Administrator* (my/June, 1996), 20.

12. C. Kidder, "EIFS Under Scrutiny," *Journal of Light Construction* (April, 1996), 12.

13. J. Crandell and T. Kenney, *Investigation of Moisture Damage in Single-Family Detached Houses Sided with Exterior Insulation Finish Systems*, (NAHB, 2nd Ed., January, 1996), 6.

14. *Natural Hazard Mitigation Insights*, 7.

15. *A Summary of the Effects of Hurricane Opal on the Florida Panhandle*, (IIPLR, March, 1996), 6.

16. G. Nichols, S. Gerace, and J. Slaght, "A Survey of Hurricane Erin", *Southern Building*, (March/April, 1996), 14.

17. *Bulletin 92-7*, City of Vancouver (August 20, 1992)

18. *Bulletin 95-9*, City of Vancouver (December, 1995)

19. Sherrie Winston, "Cladding System Troubles Mount," *Engineering News Reporter* (October 28, 1996), 12.

20. "Stucco Maker Agrees to Terms," *Engineering News Reporter* (June 1, 1998), 19.

21. Dateline, NBC-TV, original broadcast date March 22, 1999.

22. Kilpatrick, et. Al., op. cit.

23. For example, see http://www.appraisalinstitute.org/AI/OnlineEd/Resources/ol626/glossary/ol626_glossary.htm for definitions. See also, for example, http://www.appraisalinstitute.org/AI/OnlineEd/2/12/43/429/ol626_mod5_content3.htm where the institute notes the cost-approach differences between EIFS and other siding components.

24. See their web site, http://www.rac.net.

25. Marshall now refers to a category of siding material as "Synthetic Plaster on Rigid Insulation (EIFS)". See, for example, page 41-5 of the current Commercial Cost Handbook, updated September, 1998.

26. Arens, Scott, "The Valuation of Defective Properties: A Common Sense Approach," *The Appraisal Journal*, (April, 1977), 143-148.

27. *Standards of Professional Appraisal Practice of the Appraisal Institute* (The Appraisal Institute, January 1, 1998), 113.

28. See, for example, Bill Mundy, "Stigma and Value," *The Appraisal Journal* (January, 1992): 7-13; James A. Chalmers and Scott A. Roehr, "Issues in the Valuation of Contaminated Property," *The Appraisal Journal* (January, 1993) 28-41.

29. The North Carolina Homebuilders Association reports that 95% of randomly tested homes have damage averaging between $3,000 and $5,000. The EIFS Industry Members Association Inspected 68 homes in North Carolina. 61 had some damage, and nearly 10% had damage in excess of $10,000. Several North Carolina homebuilders report repair costs as high as $100,000. Allen Golden, assistant director of inspections for Hanover County, NC, reports one insurance settlement of $417,000. See Rick Schwolsky, "Troubleshooters Target EIFS," *Builder* 9 (March, 1996), 168-171.

30. Schwolsky, op. cit, 169. One homeowner of a 6-month old EIFS-clad home with minor moisture problems was quoted as saying, "I couldn't give this house away now if I wanted to." While this may be an extreme case, and hyperbole not withstanding, substantial anecdotal evidence indicates severe market reaction to EIFS-clad residences.

31. Mundy, "Stigma and Value," op. cit.

32. Federal Register, Vol 55, No. 163, August 22, 1990.

33. The Appraisal of Real Estate, 11th ed. (Chicago: The Appraisal Institute, 1996), pgs. 22-24.

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36. Grossman, S.J., and J. Stiglitz (1976), "Information and Competitive Price Systems," The American Economic Review 66, 246-253.

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41. Titiroglu, D. (1992), "Efficiency in Housing Markets: Temporal and Spatial Dimensions," Journal of Housing Economics 2, 276-92.

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44. Clayton, Jim, (1996) Rational expectations, market fundamentals, and housing price volatility, Real Estate Economics 24, 441-470.

45. Shiller, R.J., Market Volatility (Cambridge, MA: MIT Press, 1989).

46. Clayton, Jim (1996), "Rational Expectations, Market Fundamentals, and Housing Price Volatility," Real Estate Economics 24, 441-470.

47. Engle, R.F., and V.K. Ng, (1993), "Measuring and Testing the Impact of News on Volatility," Journal of Finance 48, 1749-1778.

48. Case, K., and R. Shiller (1989), "The Efficiency of the Market for Single Family Homes," American Economic Review 79, 125-137.

49. Case, K., and R. Shiller, (1990), "Forecasting Prices and Excess Returns in the Housing Market," Journal of the American Real Estate and Urban Economics Association 18, 253-273.

50. Tirtiroglu, D. (1991), Information Processing by Markets and Market Efficiency, Ph.D. dissertation, U. of Connecticut, Storrs, Ct.

51. Tirtiroglu, D. (1992), "Efficiency in Housing Markets: Spatial and Temporal Dimensions," Journal of Housing Economics 2, 276-292.

52. Lusht, Kenneth M., "Most Probable Selling Price," Appraisal Journal, July, 1983.

53. Lusht's argument is actually a bit faulty in this regard, but for reasons which actually support his hypothesis. The stock market is FULL of appraisers — they are called stock analysts — simply because the stock market itself is informationally inefficient. Given that the real estate market has been shown, in subsequent studies, to be informationally inferior to the securities market, the need for appraisers and appraisals is ever more incumbent on real estate.

54. Case studies come from original research performed by Mundy Associates.

55. "Vancouver, B.C.: a world-class disaster," Seattle Times, September 6, 1998. See http://seattletimes.nwsource.com/news/local/html98/vanc_090698.html

56. Source: Mundy Associates LLC files and interviews.

57. Source: Mundy Associates LLC files.

58. Source: Mundy Associates LLC files, interviews, and surveys.

59. Source: June 6, 2000, episode of Extra-TV, copyright Warner Brothers Television.

60. Source: Mundy Associates interviews with homeowners and inspection of the residence.

61. The systemic failure of the northern Virginia appraisal community to note the difference is a clear and compelling example of the failure of information about EIFS to fully permeate the appraisal profession.

62. Jackman, Tom, "Builder to Pay for Damages," Washington Post, September 30, 2000, page B1; and Mundy Associates interviews with the homeowners and inspections of this and neighboring residences. The actual jury award included complete loss of value of the home plus punitive damages and attorneys fees totaling $1.3 million. ■

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