ERROR AND BIAS IN BENEFIT-COST ANALYSIS: HUD's CASE FOR THE WIND RULE
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In July 1994, the U.S. Department of Housing and Urban Development (HUD) put into effect new regulations—the "wind rule"—that set stricter wind resistance standards for the construction of manufactured housing (HUD 1994a).[1] HUD presented the economic rationale for the wind rule in its *Regulatory Impact Analysis of Improved Wind Standards for Manufactured Housing* (RIA), which claimed that asymmetric information and externalities had resulted in market failure (HUD 1994b: 21). According to HUD, the wind rule would yield annual benefits of $83.8 million at annual costs of $51.7 million (ibid.: 1); the RIA estimates that the cost of an average single-section manufactured house, which sold for $20,877 before the wind rule, would increase by $1,492 in Wind Zone II and $2,119 in Wind Zone III, and that 56 percent of the increase would be passed on to consumers through higher prices.

The RIA is deeply flawed by errors of omission and commission. First, HUD fails to offer any evidence that asymmetric information affects adversely consumers' choices[2] or that externalities exist; it also

[1]The wind rule amends the National Manufactured Housing Construction and Safety Standards Act of 1974. The new regulations follow closely the standards proposed by the American Society of Civil Engineers in ASCE 7-88 (ASCE 1990). Manufactured houses are the direct descendants, usually larger and without wheels, of mobile homes.

[2]Consumers may not fully understand the technical characteristics of competing products and yet, as *they* see it, have enough information—including information about the reputation of firms along the production-distribution chain—for making choices. Moreover, although producers may have more information about their products, buyers have more information about how they are going to use them.

fails to recognize the limits of benefit-cost analysis. Second, HUD's analysis and computations contain mistakes that systematically bias the results toward more government regulation. For example, HUD uses the wrong formula to calculate the proportion of the cost increase that falls on consumers and fails to shift the demand curve to reflect the claimed increase in quality; correcting just the first of these errors would raise the incidence on consumers from 56 percent to as much as 99 percent. In estimating benefits (foregone damages), HUD confuses expenditures with costs. Correcting this error would cut the estimate of private benefits by two thirds, from $52.3 million to $17 million; public benefits presumably would be cut by a similar amount. In estimating costs, preliminary reports (Keefe 1995) suggest that private costs, as predicted by industry sources, are twice HUD's guess (FMHA 1994: 1). Moreover, public costs make no allowance for enforcing the wind rule. Even using HUD's own methodology and disregarding the costs generated by a regulatory regime (e.g., by inept and rent seeking behavior), benefits appear to be a fraction of costs.

The wind rule affects the quality—not necessarily for the better—of manufactured houses (MHs) and raises their prices in Wind Zones (WZs) II and III. It has a substantial, adverse impact on the welfare of many MH consumers, producers, retailers, and park owners; it also yields unintended consequences, including reduced competition within the MH industry.

Following a reminder about the limits of benefit-cost analysis, this paper provides some highlights of the wind rule, examines the MH industry for signs of market failure/externalities, notes some of the errors in HUD's benefit-cost analysis, and offers an explanation for the wind rule. There is no attempt to offer a "correct" estimate of the benefits and costs of the wind rule.

Limits of Benefit-Cost Analysis

Individuals making a choice compare the benefits and costs of the alternatives that they have selected for consideration, minding their own circumstances of time and place (Hayek 1948).[3] Thus, the issue is not benefit-cost analysis: the issue is who does it and what does it mean under alternative ownership and transaction cost conditions.

In a private property system with low transaction costs, the value that an individual attaches at the margin to a unit of a commodity is

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[3]The benefit of an option is the value of the desirable consequences less the value of the undesirable consequences perceived by the chooser; the cost of an option is the value of the next best alternative foregone (Alchian 1968). The individual making the comparison chooses whether to apply a rough rule of thumb or undertake a more detailed analysis.

roughly equal to the market price.[4] Prices are useful precisely because they measure value at the margin, providing individuals with the information and incentive to shift resource rights from lower- to higher-valued uses. Market prices, however, do not reveal the value that an individual attaches to inframarginal units.[5] As a result, an outside observer cannot measure objectively the total costs and total benefits of a choice (Buchanan 1969).

Individuals deciding the allocation of their own resource rights have an incentive to take account of the resulting economic (value) consequences. The more fully are private property rights defined, assigned, and enforced and the lower are transaction costs, the more fully individuals bear the value consequences of their decisions and have incentive to internalize them. In the limit, private and social costs are the same: there are no external effects (Coase 1960). If transaction costs or legal constraints on private property rights (e.g., government regulation) inhibit the process, externalities may arise, providing individuals with the incentive to evolve new institutional and contractual arrangements to internalize them (Demsetz 1967, Ellickson 1989, Ostrom 1990).

Individuals (e.g., central managers) choosing rules that constrain the allocation of resource rights owned by others respond to a different set of incentives. First, the central managers select the options and characteristics to be considered. These choices are not value-free, and reflect the managers' own preferences and constraints. Second, central managers estimate benefits and costs using market prices that do not reflect the value of inframarginal units and of side conditions. Moreover, the estimating process is strewn with choices that affect the outcome. Third, central managers typically aggregate individual values, making special assumptions about demand functions, losing relevant information, and implicitly assuming that the distribution of benefits and costs does not matter. Fourth, central managers have incentive to massage the data to obtain results consistent with their own preferences and constraints, political and otherwise. Central managers do not bear the value consequences of their decisions (at least not directly, except in the case of bribes) and have incentive to take them into account only as they bear on political and other considerations. Thus, such benefit-cost analyses are biased; their main function

[4]At best (e.g., in equilibrium without corner solutions and side conditions), an individual's marginal rate of substitution between any two commodities is equal to the ratio of their market prices.

[5]The individual making a decision selects the alternatives and characteristics to be considered, forms expectations about consequences, and assigns values. Thus, benefits and costs are subjective: all choices reflect the preferences and constraints of the decisionmaker.

is to provide a legitimacy of sorts for what the central managers wish to do.[6]

Highlights of the Wind Rule

The wind rule requires that MHs be designed by a professional engineer or architect to withstand winds up to 110 mph in Wind Zone III, which includes coastal sections of Florida, Louisiana, North Carolina, the Hawaiian Islands, and parts of Alaska, and up to 100 mph in Wind Zone II, which includes the rest of Florida and coastal areas of other states bordering the Gulf of Mexico and the Atlantic Ocean (HUD 1994a: 2472). The wind rule does not apply to the rest of the United States.

In addition to raising the overall wind resistance requirements, the wind rule strengthens many individual construction specifications. Stricter standards apply to the manufacture of some structural assemblies, components, windows, connectors, and fasteners and the attachment of roofs and wall coverings to sheathing and framing members. For example, roof, wall, and floor framing must be connected using 28 gauge minimum steel strapping or "a combination of strapping and structural rated wall sheathing that overlaps the roof and floor" (ibid.: 2467). The wind rule also sets up guidelines for state and local authorities to regulate ground anchors and tie-down systems and thus, indirectly, the foundations used to support MHs.

HUD'S General Case for the Wind Rule

The wind rule is designed "to ensure adequate safety and durability with respect to high winds" (HUD 1994b: 1). According to HUD (ibid.: 21),

> The market does not provide adequate safety because of a market failure due to asymmetric information. Consumers are less able to distinguish between manufactured housing units built to high wind safety standards from units built to low standards than are producers. ... The government, as a disinterested third party, can solve this market failure by certifying units built to high wind safety standards. Consumers trusting the government imprimatur will be willing to pay for additional wind safety to the point where the marginal benefit equals the marginal cost. Because of the externality aspect of manufactured housing units built to low wind safety standards, (i.e., the public costs of low wind safety standards not borne entirely by the consumers of manufactured housing) the government is

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[6]Benefit-cost analyses may inhibit those government projects where even the most creative analysts cannot produce benefits greater than costs.

justified in requiring a wind safety standard whose marginal costs
exceed private marginal benefits.

HUD simply asserts the existence and adverse effects of asymmetric
information and externalities (e.g., damage from flying MH debris
and debris removal). Even if this were true, however, it does not
follow that the market has "failed" and that government could do
better. Certainly the assertion that government is "a disinterested
third party" is disingenuous at best.

HUD's claim might have some superficial appeal if the market were
not competitive or if significant externalities could be traced to the
size of transaction costs or to limitations in the definition, assignment,
and enforcement of private property rights. Even then it would be
still necessary to establish whether the results entail a failure or a
success and whether central managers could do better. In the present
case, the issue is moot: none of these conditions hold.

The MH Market Is Competitive

The existence of an open, competitive market suggests that private
property rights are reasonably well defined and enforced and that
transaction costs do not block trade. The MH industry is open and
competitive at both the manufacture and retail levels. Legal barriers
to entry are negligible for both producers and retailers, economies of
scale (planned volume of output) are exhausted at small levels of
production, and the costs of entering the market by opening a plant or
a dealership are small (De Alessi 1981: 208–11). Producers continually
enter and exit the market as well as open and close plants; at the end
of 1992, there were 97 producers with 227 plants scattered throughout
the United States.[7] In 1990 there were about 6,800 dealers, most of
whom represented several producers.[8] The MH industry seems highly
competitive, and HUD does not claim or offer any evidence to the
contrary.

External Effects Are Negligible

In the absence of any supporting evidence, HUD's claim of external-
ities is not convincing. MHs typically are privately owned and located

[7]The number of firms and plants over the relevant period is (MHI 1996: 23):

	1991	1992	1993	1994	1995
Firms	85	97	93	98	92
Plants	216	227	244	269	285

[8]Memo dated 2/18/94 to the author from Edward R. Mack, Jr., Florida Manufactured
Housing Association. According to a 1974 survey, about 75 percent of the dealers represent
3 or more manufacturers and 41 percent represent 5 or more (Owens-Corning 1975: 29).

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in dedicated parks whose private owners have the incentive to supply the environment demanded by their customers. Different parks provide different kinds of amenities, including degrees of protection from external effects. There are differences in the foundations and anchor/tie-down systems, the sizes and quality—including wind resistance—of MHs, the distances between units, and so on. MH owners choose a site with the combination of attributes that suits them best, including protection from wind damage. After a hurricane, of course, some may wish that they had chosen otherwise.

HUD did not measure the actual damage attributable to external events, let alone the damage—if any—exceeding the amount (implicitly) allowed for in the contract for using a site. And the cost of removing MH debris, essentially kindling, is much smaller than HUD's estimating procedure implies.[9]

Consumers Have Adequate Information

HUD asserts that producers are better informed than buyers about MH characteristics and thus—a *non sequitur*—that buyers lack adequate information. The evidence suggests otherwise. Most MH manufacturers typically sell their output through independent dealers who represent from two to five manufacturers and provide customers with a broad range of choices regarding size, quality, and price. In addition, customers typically visit at least four dealerships before making a decision (Bernhardt 1976: 40–43). As a result, even first-time buyers on average are exposed to the products of a dozen manufacturers.

Repeat buyers benefit from their own experiences as well as from those of others, including their neighbors in MH parks. First-time buyers, however, also benefit from the experience of repeat buyers. Buyers typically arrange for a site in an MH park before completing a purchase; accordingly, they visit at least one site and have the opportunity to acquire more information at a relatively low cost from prospective neighbors and MH park managers. In this environment, manufacturers have incentive to provide the kind of MHs that consumers demand and dealers have incentive to inform their customers about product characteristics. Additionally, the typical MH is manufactured locally and interested buyers can visit the plant. There is no indication that consumers lack adequate information.

Of course, it is sufficient that some consumers be well informed. In a competitive market, the choices of consumers at the margin guide the decisions of producers. Repeat and other well-informed buyers

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[9]HUD allocates post-disaster relief expenditures to MHs on the basis of the ratio of MHs destroyed to total housing units destroyed (HUD 1994b: 16).

choose those MHs with the price-quality combinations, including safety and durability, that they prefer. The shifting at the margin of dollar votes toward those MHs that offer a better price-quality combination, as the consumers themselves see it, drives the market. In a well-functioning market there are broad variations in product quality. Some consumers choose to buy lower-priced MHs that are less durable and less safe in a hurricane or tornado while others choose MHs that are more durable and capable of sustaining higher winds. Moreover, consumers need not be knowledgeable about the technical characteristics of a product in order to make informed choices. The reputations of producers and retailers, who act as expert buyers for consumers, provide bonds that assure specific performance and inform consumers.

HUD argues that consumers would be willing to pay the higher price for the higher safety imposed by the wind rule once the information of higher quality is conveyed by government certification that the MHs are built to high wind safety standards (HUD 1994b: 21). As shown below, HUD's own data do not support that statement. If it were true, however, the government could simply certify the wind safety of various MHs and let consumers make their own choices. Although such an arrangement has its own drawbacks, it would impose fewer restrictions on producers' and consumers' choices.

HUD's Inference of Market Failure Is Not Warranted

In an attempt to justify the assertion that asymmetric information resulted in market failure, HUD (1994b: 21) notes:

> Since the estimated private costs and private benefits of increased wind safety are so close, the question arises as to why the market does not provide a comparable level of safety without a government rule. The market does not provide adequate safety because of a market failure due to asymmetric information.

HUD's estimated annual private benefits of $52.3 million and annual private costs of $49.3 million (Table 1) indeed are close.

The evidence developed in this paper, however, suggests a more reasonable explanation for the behavior of consumers: as *they* see it, the additional costs are greater than the additional benefits. Indeed, HUD's own data show that costs either exceed or are trivially less than benefits in three of the four MH categories considered (Table 2). Thus, costs exceed benefits for most buyers, especially low-income families purchasing lower-quality units (the lower is the quality, the more binding is the wind rule and the higher is the cost of meeting it).

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TABLE 1

HUD: TOTAL ANNUAL BENEFITS AND COSTS
(Millions of Dollars)

	Benefits	Costs
Private:		
Consumers	52.3	27.4
Producers	0	21.9
Subtotal	52.3	49.3
Public	30.4	2.4
Reduced Death/Injury	1.1	0
Totals	83.8	51.7

SOURCE: HUD (1994b: 25–29).

TABLE 2

INCREASE IN PRIVATE BENEFITS, COSTS, AND PRICES PER MH

	Wind Zone II		Wind Zone III	
	Single Section	Multi-Section	Single Section	Multi-Section
Private Benefits, HUD	$1,516	$2,062	$2,022	$2,750
Private Costs, HUD	1,492	1,813	2,119	2,722
Increased Prices, HUD	829	1,007	1,177	1,512
Increased Prices, Revised	1,407	1,710	2,100	2,698

SOURCE: HUD (1994b: 15, 21, 24) for HUD's estimates.

HUD's Estimate of Costs and Their Incidence

HUD estimates the wind rule's annual private costs at $49.3 million, with 56 percent shifted to consumers, and annual public costs at $2.4 million (Table 1). These estimates are flawed.

Private Costs

HUD defines private costs as the increase in production costs due to the wind rule; additional costs incurred by MH retailers and park owners are ignored. To obtain this estimate, HUD calculated the additional costs of complying with each provision of the wind rule for each type of MH expected to be sold in each wind zone. Addressing the estimate at this level of detail is beyond the scope of this study. Industry sources, however, predicted that the increase in production costs due to the wind rule would be twice HUD's estimate (FMHA 1994: 1); preliminary market data from Florida bear this out (Keefe

1995). Moreover, HUD neglects the costs generated by the regulatory process itself. These costs arise from regulatory constraints that are inept or the product of rent-seeking efforts and that inhibit innovation, adaptation to change, and competition.

HUD allocates private costs between consumers and producers based on the estimated price elasticities of the demand for and supply of MHs. The RIA (HUD 1994b: 23) uses the formula:

$$\Delta P = [E_S / (E_S - E_D)] \Delta C = F \, \Delta C, \qquad (1)$$

where ΔP is the change in price, ΔC is the change in construction cost, E_S is the price elasticity of supply, and E_D is the price elasticity of demand. The coefficient $F \equiv E_S/(E_S-E_D)$ summarizes the combined effects of the demand and supply price elasticities and shows the percentage of the additional production costs passed on to consumers.

MH demand and supply price elasticities for WZs II and III apparently were not available. Rather than develop them, HUD simply chose some existing alternatives. In the case of demand, HUD (ibid.: 22) set $E_D = -2.4$ based on three independent studies that reported nationwide MH demand price elasticities of -2.37 (Morgan and Belknap 1982), -2.5 (Gates 1984), and -2.4 (Meeks 1993); the latter covered the period 1961–89. In the case of supply, HUD used the nationwide, long-run supply price elasticity for new, single-family houses of 3.0 estimated by Topel and Rosen (1988) using data for 1963–83 (ibid.: 23).

These demand and supply elasticities yield the coefficient $F = 3/(3+2.4) = 0.56$, indicating that 56 percent of any increase in production costs is passed on to consumers and 44 percent rests on MH producers. Having estimated the total increase in private costs at \$49.3 million, HUD finds that \$21.9 million would be borne by producers (presumably through a loss in firm-specific capital) and \$27.4 million by consumers (Table 1) through higher MH prices (Table 2).

There are several problems, however, with HUD's estimating procedure. Focusing on just two issues, HUD's use of the nationwide price elasticity of supply erroneously assumes that the wind rule applies to *all* MHs, not just those in WZs II and III, while HUD's assumption that the demand curve remains unchanged is inconsistent with its claim that consumers would be willing to pay for the changes required by the wind rule—in *HUD's* model, the demand curve should *increase* by the amount of the increase in costs.[10]

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[10]There are other problems with HUD's estimating procedures. For example, the RIA does not indicate whether the conditions underlying equation (1) hold. The RIA also makes no effort to establish whether the price elasticity of supply for new, single family houses (which are built on site, subject to weather conditions, by relatively skilled workers) is a good proxy

Given the supply for the total market, the standard equation for estimating the price elasticity of supply for an individual submarket (McCloskey 1985: 145) is:

$$E_{Si} = (Q/Q_i) E_S - [(Q - Q_i) / Q_i] E_D, \qquad (2)$$

where E_{Si} is the price elasticity of supply in the ith submarket, Q is the quantity sold in the (total) market, and Q_i is the quantity sold in the ith submarket; as before, E_S is the price elasticity of the market supply and E_D is the price elasticity of the market demand. The proportion F_i of the increase in production costs passed on to consumers in the ith submarket can then be computed using the general formula used by HUD, that is, $F_i \equiv E_{Si} / (E_{Si} - E_D)$.[11]

If the price elasticity of supply is equal to infinity, then a shift in demand has no effect on prices and, for that purpose, can be ignored. The $E_S = 3$ used by HUD is a long way from infinity, and the substantial increase in demand reflecting the claimed increase in quality would occasion a further, substantial increase in prices that HUD does not estimate.

Wind Zone III. HUD reports that 4,200 MHs (2,268 single and 1,932 multi section) were shipped into WZ III in 1992 (HUD 1994b: 23). Using HUD's own estimates of E_S, E_D, and Q_i and total shipments $Q = 210,787$ in 1992 or 254,276 in 1993 (MHI 1996: 36), the price elasticity of supply is 270 and $F_{III} = 0.99$; that is, 99 percent rather than 56 percent of the cost increase is passed on to consumers in WZ III. The increase in price is 78 percent greater than HUD estimated— even without allowing for the rise in demand due to the increase in MH quality claimed by HUD.[12]

Note that demand and supply price elasticities do not capture dynamic elements, and the RIA does not take into account the rapid

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for the price elasticity of supply for MHs (which are built indoors, using assembly-line techniques, by relatively unskilled workers).

[11]Equation (2) is used to derive the price elasticity of supply in WZs II and III, because firms can produce MHs that do not meet the wind rule and sell them outside these zones. The same equation presumably should have been used to obtain the separate nationwide price elasticities of supply for single and multisection MHs *before* deriving the corresponding elasticities in WZs II and III (the incidence on these consumers then would be about 7 to 8 percentage points lower than the revised estimates). The equation $E_{Di} = E_D/(Q_i/Q)$ is not used to obtain the price elasticity of demand in WZs II and III, because buyers in these submarkets cannot buy MHs that do not meet the wind rule. The RIA does not address these and related issues, thus failing to provide an economic rationale for HUD's calculations.

[12]The price increase in Florida might be smaller than elsewhere. Because much of the state is a long peninsula lying within WZs II and III, transportation costs inhibit producers in lower Florida from shifting their sales elsewhere. Accordingly, they would be more likely than manufacturers elsewhere to go bankrupt or bear a higher proportion of the cost increase.

increase in nationwide MH shipments (presumably demand-driven) that began in 1992.[13] In any case, why should manufacturers incur a loss of several hundred dollars per unit produced for sale in WZ III if they can reduce their losses by shutting down, reducing output, or producing unmodified MHs for sale elsewhere?

Turning to quantity, HUD estimates the change in MHs shipped according to the formula:

$$\Delta Q = (\Delta C / P) Q E_D F, \qquad (3)$$

where ΔQ is the change in quantity, ΔC is the change in cost, and the other terms are as previously defined. Based on the increase in costs and the price elasticities used by HUD and an incidence of 99 percent, the decrease in MH sales in WZ III would be 78 percent greater than HUD estimated: a drop of 580 single and 341 multi sections rather than 325 single and 191 multi sections (Table 3).[14] These results, of course, would be partially offset by the increase in demand reflecting the increase in MH quality perceived by consumers.

Wind Zone II. HUD reports that 14,631 single and 12,271 multi section MHs are shipped annually to WZ II (HUD 1994b: 23). Using HUD's estimates of E_S, E_D, and Q_i, and total shipments $Q = 210,787$ units in 1992 or 254,276 units in 1993, then the price elasticity of

TABLE 3
DECREASES IN QUANTITY OF MH UNITS

	Wind Zone II	Wind Zone III
Single Section:		
HUD	1,477	325
Revised	2,509	580
Multi-Section:		
HUD	808	191
Revised	1,372	341

SOURCE: HUD (1994b: 24) for HUD's estimates.

[13]Compare WZ III shipments of 4,200 units to nationwide shipments and their year-to-year variation, including an increase of 133,219 units from 1990 to 1994 (MHI 1996: 36):

1987	1988	1989	1990	1991	1992	1993	1994
232,598	218,429	198,254	188,172	170,713	210,787	254,276	303,932.

[14]These results are not sensitive to the price elasticity of demand. Letting E_D be as small as -0.24, one-tenth the elasticity used by HUD, or as great as -24, ten times the elasticity used by HUD, changes the incidence of the cost increase by only 1 percentage point in WZ III and 6 percentage points in WZ II.

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supply is 40 and F_{II} = 0.94; that is, 94 percent rather than 56 percent of the cost increase would be passed on to consumers. In WZ II, the increase in prices and the decrease in unit sales would be 70 percent greater than HUD guessed; sales would fall by 2,509 single and 1,372 multi sections rather than 1,477 single and 808 multi sections. Again, the increase in demand reflecting the increase in quality perceived by consumers is not taken into account.

A price increase close to the increase in costs makes sense. HUD estimates that producers bear a loss of about $663 per single and $806 per multi section MH sold in WZ II. But producers selling in WZ II also have the option to shut down, reduce output, or sell elsewhere, the latter a real opportunity in the rising market at the time.

General Comments. HUD's estimate of the rise in private costs ignores some important cost-increasing elements. First, the MHs shipped to WZs II and III will be fewer and built to different specifications from those shipped elsewhere. As a result, some of the economies of scale previously available will be lost. Second, plants on average will be located further from MH parks and transportation costs, a significant portion of the full price of MHs, will be higher. Third, fewer firms will produce MHs for WZs II and III, and there will be less competition.

The revised changes in prices and quantities are based on HUD's estimates of private costs. Although it is too early to assess the consequences of the wind rule, some Florida MH manufacturers report that the increase in costs due to the wind rule occasioned an increase in MHs prices of about 20 percent (Keefe 1995).[15] This increase is consistent with the industry's claim that the increase in production costs would be twice HUD's estimate and with this study's suggestion that the full increase in costs would be passed on to consumers. If these findings are correct, then quantities would be substantially smaller than HUD calculated.

Public Costs

HUD reckons public costs as the deadweight loss (putative loss in consumers' surplus) from the fall in MHs sold. If the decrease is greater than HUD estimated, as seems the case, public costs would be correspondingly higher. More to the point, estimates of consumers'

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[15]The wind rule has been in place for little more than a year and more data are necessary to control for changes in other variables. For example, in Florida the decrease in supply occasioned by the wind rule is entangled with other events, including an increase in demand due to Hurricane Andrew and a decrease in demand due to changes in the residence requirements of the Canadian health program, which kept more elderly Canadians at home, and an increase in MH insurance rates.

surplus are subject to theoretical and empirical limitations too well known to justify further discussion.

HUD also implicitly assumes that implementing the wind rule is costless. But there will be costs borne either by taxpayers, increasing public costs, or by consumers through various fees and charges, increasing private costs.

HUD ignores other costs, including the higher cost of temporary housing after a disaster. Following Hurricane Andrew, MHs shipped into WZ II and III were a major source of temporary housing; indeed, many householders moved into MHs placed next to their site-built houses while the latter were being repaired. Because MHs that do not meet the wind rule could not be shipped into WZs II and III, this option would be drastically reduced.

HUD's Estimate of Benefits

HUD considers three categories of benefits: private, public, and those associated with reduced death and injury (Table 2). These estimates will be examined in turn, with the focus on the largest component: private benefits.

Private Benefits

HUD measures private benefits as the decrease in property damage due to increased wind resistance. Property damage is based on data from Hurricane Andrew for "insurance payments to manufactured housing residents provided by Allstate Insurance Company, and the U.S. Small Business Administration (SBA) loans for uninsured losses to housing" (HUD 1994b: 12). "Thirty-three years of annual savings is discounted to the present, summed over all units produced in a year, and compared" (ibid.: 11).[16]

HUD claims that building MHs to the wind rule will reduce wind-caused property damage by 75 percent in WZ II and 83 percent in WZ III (ibid.). Hurricane Andrew, however, was unusually powerful, with sustained wind speeds above 133 mph and gusts to 175 mph, well in excess of the 100 to 110 mph envisioned by HUD in WZs II and III. Using Andrew as a benchmark would overestimate benefits: evidence from the damage that Andrew inflicted on site-built houses suggests that HUD's wind rule would have little effect under such extreme conditions (Fronstin and Holtmann 1994).

A more important point is that using payments by Allstate and loans by SBA confuses expenditures with costs. Allstate insurance policies

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[16]The estimate is highly sensitive to assumptions regarding the severity and frequency of storms, the discount rate—HUD used 7 percent (HUD 1994b: 14)—and other matters.

typically provided coverage well in excess of market value, and SBA loans generally were for new MHs rather than for used MHs of the same vintage and conditions as those destroyed by the hurricane.

Insurance policies can be for Cash Value, Replacement Value, or Stated Value. Under Cash Value, the insurer agrees to pay up to the initial purchase price less depreciation of the MH damaged or destroyed; thus, cash value approximates the market value of the MH. Under Replacement Value, the insurer agrees to repair the MH or replace it, regardless of its age and condition, with a new, like MH. Under Stated Value, the insurer agrees to repair the MH or replace it with a new, like MH, up to the amount stated in the policy.

According to Allstate, two-thirds of its MH policies in Dade County were for replacement value and only one-third were for cash value, the method implicitly assumed by HUD.[17] In addition, some claims were fraudulent and many payments were generous.[18]

Because the benefits from the wind rule reflect damage foregone, they must be based on actual damage. According to HUD (1991), in 1991 the median MH age was 13 years for owner-occupied units and 17 years for renter-occupied units. As a rough approximation, suppose that the average age of the MHs destroyed by Hurricane Andrew was 15 years. Next, let a 15-year-old single section MH sell for $6,000,[19] its new replacement sell for $20,877,[20] two-thirds of Allstate's policies be replacement value and one-third be cash value. Then Allstate on average would pay out $15,918 [= ($20,877 x 2 + $6,000)/3] and HUD would report benefits of $11,939 [= $15,918 x 0.75] in WZ II and $13,212 [= $15,918 x 0.83] in WZ III. The average opportunity cost of the MHs destroyed, however, is $6,000 and the corrected benefits would be $4,500 [= $6,000 x 0.75] in WZ II and $4,980 [= $6,000 x 0.83] in WZ III. Thus, HUD overestimates private benefits by a factor of 2.7.

SBA loans were for new MHs. Here, HUD would overestimate private benefits by a factor of 3.5 (e.g., $20,877 x 0.75 / $4,500). Even using HUD's coefficients for the reduction in property damage occasioned by the wind rule, correcting HUD's confusion of expenditures with costs suggests that HUD overestimates private benefits by a factor between 2.7 and 3.5.[21]

[17]Telephone conversation of 2/21/94 with Mr. Jeff Kucera, Allstate Insurance home office, North Brook, Illinois.

[18]Insurance adjusters who processed Andrew-related claims in Florida were compensated partly on the sizes of the claims. They had incentive to be generous.

[19]In 1992, the market value of a 15-year-old single section MH was $6,000 or less (estimate provided by the Florida Manufactured Housing Association, February 1994).

[20]This is the market price used by HUD for a single section MH (HUD 1994b: 24).

[21]The relationship between the replacement and market values of MHs presumably reflects the relationship between the replacement and market values of their contents.

Public Benefits

HUD measures public benefits as the reduction in government expenditures for emergency housing, disaster relief grants to individual families, and debris removal attributable to MHs. The proportion of total expenditures allocated to MHs is based on the ratio of MHs destroyed to total housing units destroyed (HUD 1994b: 16). This procedure is flawed: among other things, a destroyed house leaves a great deal more debris than a destroyed MH. More fundamentally, it again confuses expenditures with costs, overstating benefits.

As in the case of insurance payments and SBA loans, government expenditures are not a good estimate of the appropriate economic costs. Many government expenditures are simply transfer payments, and their reduction does not represent a reduction in costs. If the overstatement of public costs is similar to that for private benefits (and could well be greater), correcting this error would also reduce HUD's estimate of public benefits by two-thirds.

Benefits of Reduced Death and Injury

The estimated benefits of the reduction in death and injury from reduced wind damage to MHs are relatively small. Given HUD's track record, presumably they are overestimated.

Distributional Effects of the Wind Rule

Aggregate benefits and costs provide no information regarding the distribution of gains and losses. In general, the costs of building to meet the wind rule are higher for lower-quality MHs (higher-quality MHs already meet some of the new standards) while the associated benefits are lower (users of these MHs cast their dollar votes for lower-quality). Even using HUD's procedures and data, lower-income MH users lose.

HUD nods at the issue in the subsection "Distributional Impact" (HUD 1994b: 33–34). HUD argues that the estimated price increase of a single section MH is a relatively small percentage (3.9 percent in WZ II and 5.6 percent in WZ III) of the yearly median income ($21,052) of MH owners, and concludes that only a few lower-income users will be adversely affected. Using the corrected data would double or even quadruple these percentages.

Looking at median income, however, avoids the issue. For example, 20 percent of all MH owners have incomes of less than $10,000. For these individuals, the price increase for a single section MH represents 8 to 14 percent (8 percent using HUD's estimated incidence, 14 percent using the revised incidence) of their income in WZ II and

12 to 21 percent in WZ III. Moreover, 16 percent of all MH renters have incomes of less than $5,000. For these individuals, the price increase for a single section MH represents 17 to 28 percent of their income in WZ II and 24 to 42 percent in WZ III. Owners and renters of multi section MHs are affected even more. If costs are greater than HUD's estimate—twice as much according to industry estimates—all these percentages are correspondingly higher.

Furthermore, it is not very useful to compare the increase in price, a stock, to annual income, a flow. Using the revised incidence, the average price of a single-section MH in WZ III would increase by 10 percent (= $2,100/$20,877) and by much more for lower quality units. Thus, actual and imputed rentals would increase by at least 10 percent and possibly as much as 20 percent. MH renters, especially those with incomes less than $5,000, would take a real hit. And many prospective MH owners would be priced out of the market. HUD either does not fully recognize the problem or is trying to ignore it.[22]

Effect of the Wind Rule on Product Quality and Competition

HUD claims that the wind rule will improve the quality of MHs. Presumably it will improve their wind resistance, but it will not necessarily increase their overall quality. The increase in MH prices will force consumers to reduce their consumption of other commodities, including MH quality characteristics not covered by the wind rule or other regulations. As a result, MH prices may not rise as much as expected but the overall quality of some new units marketed in WZs II and III will deteriorate as consumers see it.

The overall quality of the stock of MHs in WZs II and III almost surely will decline. In the normal course of events, as MHs age and wear out they are replaced with newer units. Because new MHs are now substantially more expensive, there will be incentive to repair older units and maintain them in service longer. Paradoxically, one effect of the wind rule is to generate, at least over the near term, a population of older MHs that is less resistant to strong winds.

The wind rule also will reduce competition in WZ II and III. Before the wind rule, producers in WZ I could enter WZs II and III without modifying their units. Segmenting these markets reduces competition with the usual consequences.

[22]HUD also ignores the geographical diversity of MH owners and renters and the resulting differences in response. For example, in Florida many MHs are the winter residences of out-of-state retirees, while in the Carolinas many MHs are the permanent residences of low-income families, typically black.

Why the Wind Rule?

Without the public component, HUD's benefit-cost analysis hardly supports the wind rule. The weakness of HUD's own case raises the obvious question: why the wind rule? The documentation for the rule, including the RIA, suggests one explanation.

The federal government has adopted a growing range of formal and informal programs, including the Federal Emergency Management Administration and various military support activities (e.g., emergency rations), supposed to benefit victims of disasters. The income transfers resulting from the recent spate of floods, earthquakes, hurricanes, and other natural disasters have turned out to be quite large. Apparently it is politically more expedient to require individuals to take precautions that reduce federal expenditures in case of disaster—a move that would also benefit insurance companies and other special interest groups—than to reduce or eliminate coverage. Once the political process is underway, of course, there is opportunity for various groups—including government agencies such as HUD—to advance their private interests as well as their own view of the public interest.

Conclusion

Benefit-cost analyses conducted by third parties are inherently flawed. Among other limitations, the choices used to structure and conduct the analysis are guided by the preferences and constraints of the individuals managing the analyses rather than by the preferences and constraints of the individuals affected by the rule, and the distribution of gains and losses typically is disregarded. Moreover, such studies simply assume that the proposed rule, as implemented in practice, will work perfectly.

In addition to these flaws, HUD's benefit-cost analysis—even within its chosen frame of reference—is riddled with errors. For example, HUD uses the wrong formula to compute the incidence of private costs and neglects to shift the demand for manufactured homes to reflect the claimed increase in quality (grossly underestimating the incidence on consumers), confuses expenditures with costs (grossly overestimating benefits), and omits enforcement costs. Correcting for just some of these errors suggests that, using HUD's own methodology, the benefits of the wind rule are well below the costs. If the increase in production costs is twice HUD's estimate, as industry sources predicted and preliminary evidence suggests, then presumed benefits are a fraction of presumed costs. Consumers (especially those in the lower income brackets), manufacturers, dealers, and park owners in

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WZs II and III will be worse off. The market will be less competitive and the quality of some MHs may actually deteriorate.

The RIA provides point estimates of costs and benefits. Considering the makeshift nature of the parameters (e.g., price elasticities) used, it would have been particularly useful to examine the sensitivity of the results to small changes in these parameters. Such an exercise would have revealed a substantial probability that, even using HUD's methodology and without correcting any of the errors, the presumed costs of the wind rule would exceed the presumed benefits.

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