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A Theory of the Consumer Product Warranty

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Consumer product warranties are our most common of written contracts, but little is known about what determines their content or how they relate to the reliability and the durability of goods. Since the first appearance of standardized warranties early in this century, two theories have been proposed to explain their role in sales transactions. The first emphasizes the absence of bargaining over warranty provisions. It views warranties as devices of manufacturers to exploit consumers by unilaterally limiting legal obligations. The second and more recent theory focuses on the difficulty consumers face at the time of purchase in estimating the risk of product defects. This theory regards express warranties as messages signaling the mechanical attributes of goods.

Both theories have influenced substantially judicial and legislative responses to product warranties. The view of the warranty as an exploitative device has provided crucial support to the policy of enterprise liability and the replacement of contract principles with tort principles in product defect cases.¹ In addition, the exploitation theory is the intellectual basis for the modern judicial treatment of consumer warranty issues, in particular for the expansive interpretation of warranties implied by law, for the elimination of the requirement of privity of contract, and for the restric-

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1. See note 37 *infra* (discussing influence of exploitation theory on tort law). See generally Morris, *Enterprise Liability and the Actuarial Process—The Insignificance of Foresight*, 70 YALE L.J. 554 (1961) (history of theory of enterprise liability).

tion of the manufacturer's authority to limit available remedies or to disclaim general obligations.² More recently, the signal theory has informed the design of the federal Magnuson-Moss Warranty Act,³ which directly regulates both the form and content of consumer product warranties.⁴

Neither the exploitation nor the signal theory, however, has contributed to the understanding of warranty practices. The exploitation theory derives from the presupposition of overwhelming manufacturer market power, but the connection remains vague between the extent of market power and the specific definition of warranty coverage. Similarly, the signal theory derives from the assumption of consumer misperception of product risks. However plausible this assumption as a general matter, consumer perceptions are very difficult to identify or to measure. As a consequence, hypotheses concerning the relationship between perceptions and specific warranty provisions are highly speculative and essentially nonfalsifiable.

This article proposes a new theory of the standardized warranty and of the determinants of the content of the warranties of individual products. The first Part reviews in more detail the exploitation and signal theories and their observable implications. Part II presents the theory itself. A warranty is viewed as a contract that optimizes the productive services of goods by allocating responsibility between a manufacturer and consumer for investments to prolong the useful life of a product and to insure against product losses. According to the theory, the terms of warranty contracts are determined solely by the relative costs to the parties of these investments. An insurance function of warranty coverage, of course, is well-known.⁵ The novelty of the theory is its emphasis on the variety of allocative investments that consumers may make to extend productive capacity and its consideration of the difficulties of drafting warranty contracts to encourage such investments.

The third Part compares the investment theory of the article with the exploitation and signal theories in a review of the content of sixty-two consumer product warranties. Although more comprehensive and detailed data are needed for a confident judgment, the review demonstrates that the content of these various warranties is generally more consistent with the

2. See J. WHITE & R. SUMMERS, HANDBOOK OF THE LAW UNDER THE UNIFORM COMMERCIAL CODE §§ 9-1 to -13, 11-1 to 12-12 (2d ed. 1980) (reviewing these developments).

3. Magnuson-Moss Warranty—Federal Trade Commission Improvement Act, Pub. L. No. 93-637, §§ 101-112, 88 Stat. 2183 (1975) (codified at 15 U.S.C. §§ 2301-2312 (1976)).

4. See pp. 1306-07 *infra* (discussing Act).

5. See e.g., Brown, *Product Liability: The Case of an Asset with Random Life*, 64 AM. ECON. REV. 149, 157-58 (1974). The description of a warranty as an insurance policy has not illuminated specific warranty practices and has had little influence on the treatment of warranties in courts or legislatures. Cf. *id.* at 159-60 (impossible to determine *a priori* optimal distribution of product defect risk between manufacturer and consumer).

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implications of the investment theory than of the exploitation or signal theory. Finally, Part IV considers the implications of the investment theory for questions of liability for product defects, including defects causing personal injury. This Part shows that, if the investment theory explains warranty practices, developments in modern warranty law are likely to have increased, rather than diminished, the rate of product losses, including personal injury losses.

I. The Implications of the Exploitation and Signal Theories for Warranty Practices

During the last four decades, most approaches to consumer warranty issues by courts and legislatures have accepted the presuppositions of either the exploitation or signal theory. This Part defines the two theories and their implications and reviews the empirical evidence that has led to their acceptance.

A. *The Exploitation Theory*

Standardized product warranties were first introduced, apparently, in the last decades of the nineteenth century.⁶ Initially, these warranties were treated as normal contracts. The principles of nineteenth-century contract law derived from a view of the contract as an arms-length exchange between informed and competent parties. Because of its standardized character, no bargaining between the parties or adjustment of the terms of warranty contracts occurred. As a consequence, throughout the early decades of the twentieth century, courts vacillated between enforcing warranties strictly as normal contracts and enforcing them selectively according to other conceptions of the exchange.⁷

Although common themes appear in early treatments,⁸ a coherent and persuasive theory of the standardized warranty first developed in the extensive literature and case law that followed Friedrich Kessler's celebrated manifesto, *Contracts of Adhesion—Some Thoughts about Freedom of*

6. See Bogert & Fink, *Business Practice Regarding Warranties in the Sale of Goods*, 25 ILL. L. REV. 400, 410-11 (1930).

7. Compare *MacPherson v. Buick Motor Co.*, 217 N.Y. 382, 389, 111 N.E. 1050, 1053 (1916) (irrespective of contract, automobile manufacturer liable for defects) with *Cadillac Motor Car Co. v. Johnson*, 221 F. 801, 802 (2d Cir. 1915) (automobile manufacturer liable only to parties with whom it has contractual relation). See, e.g., Llewellyn, Book Review, 52 HARV. L. REV. 700, 704 (1939) (judges equipped to distinguish between freely bargained-for contracts, which they should enforce, and contracts imposed on one party by another, the provisions of which should be interpreted more flexibly) [hereinafter cited as Llewellyn, Book Review]. The nineteenth-century implication of product warranties (such as the warranty of merchantability or fitness), of course, represents a substitution of a legal for a consensual standard of obligation. See generally Llewellyn, *On Warranty of Quality, and Society* (pt. 1), 36 COLUM. L. REV. 699 (1936).

8. E.g., Bogert & Fink, *supra* note 6, at 413-14; Llewellyn, Book Review, *supra* note 7, at 704.

*Contract.*⁹ According to the theory, a standardized contract is unique principally because its terms are drafted unilaterally by the seller and only involuntarily “adhered to” by the consumer.¹⁰ The seller possesses “unfettered discretion”¹¹ to incorporate terms that serve its interests because its bargaining position is superior to that of the consumer.¹² In some industries, the manufacturer’s superior position stems from the forces of natural monopoly.¹³ In others, firms gain power by unleashing corporate weapons such as patents¹⁴ or tying arrangements.¹⁵ Kessler, in fact, believed that standardized contracts themselves were “devices to build up and strengthen industrial empires,” contributing to what he viewed as the “innate trend of competitive capitalism toward monopoly.”¹⁶

Even in industries with multiple sellers, however, all warranties are alike or substantially similar so that the consumer “is not in a position to shop around for better terms.”¹⁷ Some manufacturers directly collude in establishing warranty terms.¹⁸ Trade associations standardize warranty practices to achieve the same result.¹⁹ Thus, whether there is one seller or many, the consumer possesses no meaningful choice.²⁰ In Kessler’s words, the consumer’s “contractual intention is but a subjection more or less vol-

9. Kessler, *Contracts of Adhesion—Some Thoughts about Freedom of Contract*, 43 COLUM. L. REV. 629, 629-31 (1943); see Leff, *Contract as Thing*, 19 AM. U.L. REV. 131, 140-44 (1970) (discussing history of contract-of-adhesion theory).

10. Kessler, *supra* note 9, at 632. See also Leff, *Unconscionability and the Code—The Emperor’s New Clause*, 115 U. PA. L. REV. 485, 504-05 & n.67 (1967) (discussing origins of “adhesion” metaphor). Kessler’s principal focus was upon standardized insurance contracts, but the analysis has been extended routinely to standardized product warranties. See *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 389-91, 161 A.2d 69, 86-87 (1960); Bogert & Fink, *supra* note 6, at 413-14; Leff, *supra* note 9, at 140-44. Kessler himself, however, thought that the problems of standardized insurance contracts were substantially more serious than those of standardized product warranties. Kessler, *Forces Shaping the Insurance Contract*, 14 U. CHI. CONF. SER. 3, 9 (1954).

11. Kessler, *supra* note 9, at 640; Whitford, *Law and the Consumer Transaction: A Case Study of the Automobile Warranty*, 1968 WIS. L. REV. 1006, 1039.

12. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 386, 389, 161 A.2d 69, 86-87 (1960); Bogert & Fink, *supra* note 6, at 413-14; Hale, *Bargaining, Duress, and Economic Liberty*, 43 COLUM. L. REV. 603, 605 (1943); Kessler, *supra* note 9, at 632; Llewellyn, Book Review, *supra* note 7, at 704.

13. See Kessler, *supra* note 9, at 632; Leff, *supra* note 9, at 141.

14. Bogert & Fink, *supra* note 6, at 414.

15. Whitford, *supra* note 11, at 1068-70.

16. Kessler, *supra* note 9, at 632, 640.

17. *Id.* at 632. Leff has emphasized that even if the consumer has a choice between different warranties, the terms of either warranty cannot be varied, so no true assent is present. Leff, *supra* note 9, at 142.

18. Bogert & Fink, *supra* note 6, at 414; Kessler, *supra* note 9, at 632; Leff, *supra* note 9, at 141.

19. See Bogert & Fink, *supra* note 6, at 407-09, 413-14. The efforts of trade associations were emphasized in the judicial adoption of the exploitation theory. See *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 375, 390-91, 161 A.2d 69, 78, 87 (1960).

20. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 404, 161 A.2d 69, 95 (1960); Bogert & Fink, *supra* note 6, at 413; Prosser, *The Fall of the Citadel (Strict Liability to the Consumer)*, 50 MINN. L. REV. 791, 832 (1966); Whitford, *Strict Products Liability and the Automobile Industry: Much Ado About Nothing*, 1968 WIS. L. REV. 83, 96-97.

untary to terms dictated by the stronger party.”²¹

The exploitation theory predicts, in general, that manufacturers will limit their legal obligations to consumers as much as possible.²² If collusion is widespread, then warranties within individual industries are likely to be similar. It also would be consistent with the assumptions of the theory, however, for the terms of coverage to be correlated with the degree of manufacturer market power.²³ Kessler believed that sellers are especially likely to exclude coverage of risks that are difficult to calculate and of unforeseeable contingencies such as “strikes, fires and transport difficulties.”²⁴ He also predicted that manufacturers would attempt to incorporate terms that reduce the risk of a court or jury being influenced by “‘irrational forces’ to decide against a powerful defendant.”²⁵ Kessler thought this reason explained why manufacturers in the machinery industry, for example, exclude warranty recovery for consequential damages.²⁶

The exploitation theory does not specify unambiguously the relationship between a manufacturer’s warranty practices and its other production or marketing decisions. In an early article, Dean Prosser argued that, without judicial intervention to imply warranties of quality in sales transactions, many manufacturers would provide consumers with “worthless junk.”²⁷ Such relationships, however, have not been addressed extensively. More recent statements of the theory emphasize the marketing power gained from coordinating advertising that makes extravagant promises to consumers with warranties that disclaim responsibility for the promises.²⁸ Professor Slawson, in fact, argues that all standardized contracts are instruments of this type of fraud.²⁹

The exploitation theory found wide acceptance in part because it was the only coherent explanation of standardized warranties until the 1970s. The theory also seemed consistent with descriptions of warranty practices. In an early empirical study of warranty content, Bogert and Fink found widespread exclusions of coverage of component parts, transportation

21. Kessler, *supra* note 9, at 632.

22. See *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 375-78, 161 A.2d 69, 78-80 (1960); Bogert & Fink, *supra* note 6, at 411-13; Whitford, *supra* note 11, at 1041.

23. See Kessler, *supra* note 9, at 642; Leff, *supra* note 9, at 141.

24. Kessler, *supra* note 9, at 631 (referring specifically to insurance contracts, although principle is general).

25. *Id.*

26. *Id.* at 632.

27. Prosser, *The Implied Warranty of Merchantable Quality*, 27 MINN. L. REV. 117, 158-65 (1943).

28. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 373, 384-85, 161 A.2d 69, 77, 83-84 (1960); Prosser, *The Assault upon the Citadel (Strict Liability to the Consumer)*, 69 YALE L.J. 1099, 1123 (1960).

29. Slawson, *Mass Contracts: Lawful Fraud in California*, 48 S. CAL. L. REV. 1, 12 (1974). Professor Posner also describes standardized contracts as serving fraudulent ends. R. POSNER, *ECONOMIC ANALYSIS OF LAW* 85-86 (2d ed. 1977).

costs, and consequential damages, as well as more general limitations of warranty remedies.³⁰ In addition, they claimed to identify a trend in warranty content over time from broad assurances of product fitness toward more narrow representations of strictly mechanical perfection of products.³¹ Kessler's wide experience with standardized contracts in the insurance industry seemed to provide further support.³² More recently, Professor Whitford, in an intensive study of warranty practices in the automobile industry, concluded that automobile manufacturers could draft warranties in any manner desired, that warranties had in fact been drafted to minimize manufacturer's costs, that many warranty provisions were not "commercially justified," and that consumers did not possess sufficient expertise to deal intelligently with the problems of product defects.³³

The most convincing evidence to support the exploitation theory, however, arose from case histories of warranty practices. Courts were asked repeatedly to give effect to warranty provisions that they interpreted as exploitative. In the case of *Henningsen v. Bloomfield Motors, Inc.*,³⁴ involving serious personal injury from an allegedly defective automobile, the terms of the warranty at issue disclaimed the implied warranty of merchantability, excluded consequential damages, and limited warranty remedies to repair or replacement of the defective part as long as the victim had prepaid transport charges for the part. The New Jersey Supreme Court remarked, "It is difficult to imagine . . . a less satisfactory remedy An instinctively felt sense of justice cries out against such a sharp bargain."³⁵ In a decision that has been followed by virtually all other American jurisdictions,³⁶ the court embraced the exploitation theory and refused to enforce the terms of the standardized warranty.³⁷

30. Bogert & Fink, *supra* note 6, at 405-06, 409, 412-13.

31. *Id.* at 410-11.

32. Kessler's essay, *Forces Shaping the Insurance Contract*, *supra* note 10, was particularly influential.

33. Whitford, *supra* note 11, at 1039, 1062. Whitford also mentioned, however, that manufacturers seemed to be concerned about maintaining consumer goodwill. *Id.* at 1016, 1040. *But see id.* at 1036 (dealer makes little effort to maintain goodwill of price shoppers). Whitford did not attempt to reconcile exploitative warranty practices with the concern for goodwill.

34. 32 N.J. 358, 161 A.2d 69 (1960).

35. *Id.* at 375, 388, 161 A.2d at 79, 85.

36. See Prosser, *supra* note 20, at 793-98.

37. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 408, 161 A.2d 69, 97 (1960). The adoption of the standard of strict liability for product defects is based upon the acceptance of the empirical presumption of the exploitation theory: consumers are powerless in relation to manufacturers. James, *General Products—Should Manufacturers be Liable without Negligence?* 24 TENN. L. REV. 923, 925 (1951) (victims of accidents are not culpable; strict liability preferred over fault system where accidents are inevitable); see *Vandermark v. Ford Motor Co.*, 61 Cal. 2d 256, 261, 263, 391 P.2d 168, 170-72, 37 Cal. Rptr. 896, 898, 900 (1964) (manufacturer strictly liable to consumer, regardless of contractual provisions, because in business of selling automobiles that turn out to be defective); *Greenman v. Yuba Power Prods., Inc.*, 59 Cal. 2d 57, 63, 377 P.2d 897, 901, 27 Cal. Rptr. 697, 701 (1963) (strict

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B. *The Signal Theory*

The signal theory of the consumer product warranty maintains that warranty terms provide information to consumers about the mechanical reliability of the product.³⁸ The signal theory builds upon a growing economic literature that examines the “market” for information³⁹ and views the warranty as a tool consumers can use to “process” information about products. According to the theory, a consumer finds it excessively costly to determine precisely product reliability at the time of purchase by direct inspection of the product.⁴⁰ A consumer, however, may look to the warranty as a “signal” of product reliability because reliability is correlated negatively with the costs of warranty coverage;⁴¹ that is, the more reliable the product, the lower the costs of warranty coverage for the manufacturer, and the more extensive the coverage for the consumer. Thus, although a consumer has neither experience with nor knowledge of a product, he may infer its mechanical reliability by inspecting the terms of the warranty alone.

Signals, however, only reduce information costs to consumers. Some consumer misperception of product risks is inevitable.⁴² The extent of misperception is determined by the costs and benefits to consumers of obtaining product information by means of warranty signals, which is to say, by the utility of the warranty as an information-processing tool. The implications of the theory for specific warranty practices are derived by estimating the costs and benefits of processing information in the context

liability designed to protect “powerless” consumer). A strict liability regime presupposes the inappropriateness of allowing manufacturers to define liability by contract. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 404, 161 A.2d 69, 95 (1960) (contractual disclaimer of warranty of merchantability and limitation of remedies invalid because of manufacturer’s “grossly disproportionate bargaining power”).

38. An early statement of this theory was suggested in Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488 (1970).

39. See Sugler, *The Economics of Information*, 69 J. POL. ECON. 213 (1961), reprinted in G. STIGLER, *THE ORGANIZATION OF INDUSTRY* 171 (1968).

40. Some degree of consumer ignorance was an important, but not central, assumption of the case law, see *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 365, 375, 379, 384, 161 A.2d 69, 74, 78, 80-81, 84 (1960), and of the writings of the exploitation theorists, see, e.g., Kessler, *supra* note 9, at 632; Kessler, *The Protection of the Consumer under Modern Sales Law, Part I*, 74 YALE L.J. 262, 267-78 (1964); Leff, *supra* note 9, at 156; Prosser, *supra* note 28, at 1133. Professor Slawson, on the other hand, believes that making standard form contracts understandable would hurt rather than help consumers. Slawson, *supra* note 29, at 16-17 (consumers would not read or could not understand standard form contracts even if they were made “understandable,” but courts would not hesitate to enforce such contracts).

41. A.M. SPENCE, *MARKET SIGNALING* 88-90 (1974).

42. Cf. Spence, *Consumer Misperceptions, Product Failure and Producer Liability*, 44 REV. ECON. STUD. 561, 561 (1977) (presuming that consumers will misperceive likelihood of losses from products). Spence recommends governmental fines to repair this form of market failure. *Id.* at 565-67. Of course, the problem of product warranties is more interesting where consumers systematically misperceive product risks—because the market mechanism requires correction—than where consumers make estimates that are highly variant, but on average accurate.

of specific consumer transactions.

The first implication of the signal theory is that warranties of different products are likely to contain similar, if not identical, provisions. This implication follows from the presumption that the more often a consumer expects to buy a product, the greater the value is to him of information about product characteristics. But since a consumer purchases any single appliance or durable only occasionally, the benefit of obtaining warranty information specific to a single appliance is small relative to the benefit of compiling information common to a wide set of consumer goods.⁴³ Thus, a manufacturer's warranty signal is more likely to be successful if it resembles the warranty signals of other products. For this reason, the warranty terms of different products should be similar, each taking advantage of the greater benefit to consumers of general rather than of product-specific information.

A second implication of the signal theory is that wherever warranty terms diverge from the near-uniform standards of most warranties, the divergent terms will offer coverage more generous—not more restrictive—than the uniform terms. According to the theory, upon the discovery of a defect, a consumer acts on the basis of perceptions formed from general information or experience regarding products. In particular, the consumer presumes that the warranty terms of the specific product equal the average terms of all other products.⁴⁴ Such perceptions, however, disadvantage manufacturers who offer less than average warranty coverage because their products are less reliable than the average.⁴⁵ For those defective products, consumers file warranty claims even though the warranties do not extend coverage, thus imposing administrative expenses on the manufacturers and costing them goodwill.⁴⁶ Indeed, it may be cheaper for those manufacturers to expand warranty coverage to the average level than to process "invalid" claims.⁴⁷ As a consequence, warranties that persist in offering coverage different from the average should offer more generous rather than more restrictive coverage.⁴⁸

The third implication of the theory is that subordinate terms of a warranty, as opposed to central terms, are more likely to diverge from the norm and to offer relatively more restrictive coverage. The theory proposes that a consumer benefits more from information relating to the cen-

43. See A.M. SPENCE, *supra* note 41, at 89; Gerner & Bryant, *The Price of a Warranty: The Case for Refrigerators*, 12 J. CONSUMER AFF. 30, 32 (1978); Gerner & Bryant, *Appliance Warranties as a Market Signal?* 15 J. CONSUMER AFF. 75, 78-79 (1981) [hereinafter cited as *Market Signal*].

44. See *Market Signal*, *supra* note 43, at 78-79.

45. *Id.* at 79.

46. *Id.*

47. *Id.*

48. *Id.*

tral terms of a warranty than to subordinate terms.⁴⁹ As a consequence, the pressures leading toward uniform warranty provisions ought to have greater effect with respect to central provisions than to subordinate provisions.⁵⁰ In addition, since consumers are less aware of subordinate terms (because the value of information about them is less), warranties are likely to define subordinate terms more restrictively than average, because invalid claims based upon perceptions of those terms will be rare.⁵¹

Moreover, since consumers remain largely ignorant of the content of subordinate provisions, normal competitive pressures are absent. Manufacturers will define those provisions with reference only to costs of coverage and not to consumer benefits.⁵² At this point, the exploitation and signal theories converge. Signal theorists expect competition to influence the content of central warranty provisions, subject to information processing costs.⁵³ But, like the exploitation theorists, they expect subordinate warranty provisions to be defined in a manner that disregards consumer interests.⁵⁴

The implications of the signal theory have been examined recently by the economists Gerner and Bryant in an empirical study of the content of 108 warranties of washing machines, ranges, refrigerators, air conditioners, and televisions.⁵⁵ Their findings offer mild support for the theory. First, Gerner and Bryant report that most warranties provide coverage of parts and labor costs for one year,⁵⁶ a finding they interpret as confirmation of the advantage of general over product-specific information.⁵⁷ Exceptions to even this basic term of coverage exist, however. For example, only fifty percent of washing machine warranties provide one-year parts coverage, and seventy-one percent of television warranties offer one-year labor coverage.⁵⁸

Gerner and Bryant find less uniformity within the set of warranties whose terms diverge from the basic one-year term. It is consistent with the signal theory that warranties offering a different duration of parts cover-

49. See *id.* at 78-79 (by inference).

50. See *id.* at 79, 84 (by inference).

51. See *id.* at 79-85 (by inference).

52. See *id.* at 84-85 (by inference).

53. See *id.* at 79-86 (by inference).

54. See *id.* at 84-85 (by inference).

55. Their sample incorporates 90% of the models sold during the 1975 model year. *Id.* at 80.

56. This "finding" appears to be accurate only when the terms of coverage are defined very generally. See note 174 *infra* (discussing prevalence of one-year parts and labor coverage).

57. *Market Signal*, *supra* note 43, at 81-82.

58. *Id.* at 82 (Table 1). There are exceptions to the one-year term with respect to the other appliances as well. Gerner and Bryant do not suggest that consumers of different products possess different levels of information. Such an assumption would conflict with the prediction of generalized warranty signals. As a consequence, however, the signal theory does not provide a basis for explaining differences in the terms of warranties of different products. See pp. 1328-46 *infra* (examining differences in warranties).

age provide only extended coverage; that is, coverage greater than the average.⁵⁹ The great majority of warranties that provide a different term of labor coverage, however, restrict coverage below the average one-year term.⁶⁰ Gerner and Bryant explain this difference by supposing that manufacturers find it cheaper to monitor invalid labor claims than parts claims and that manufacturers thus are more willing to suffer consumer dissatisfaction where expensive labor costs are at stake.⁶¹

Finally, as predicted by the theory, Gerner and Bryant find little uniformity in what they assume to be the warranties' subordinate terms: the exclusions and limitations of coverage.⁶² There is some evidence, in addition, that these exclusions are defined solely with reference to manufacturers' costs. One example is the exclusion of consequential damages, which they observe most frequently in refrigerator warranties. According to Gerner and Bryant, refrigerators are more likely than other defective appliances to generate consequential damages in the form of food losses.⁶³

The signal theory has exerted substantial influence on consumer product warranty policy. The objective of the 1974 Magnuson-Moss Warranty Act⁶⁴ is to make warranties more efficient signals.⁶⁵ The Act requires manufacturers to redraft warranties in "simple and readily understood language,"⁶⁶ to disclose all important provisions "conspicuously,"⁶⁷ and to display warranties prominently so that they are available for consumer inspection prior to purchase of the product.⁶⁸ The Act requires manufacturers to designate all express warranties as either "Full" (if they comply with certain minimum standards) or "Limited" (if they do not comply with those standards), in order to reduce the costs of comprehending warranty content.⁶⁹ The drafters hoped that the pressures toward greater than

59. *Market Signal*, *supra* note 43, at 79-80, 81-82 (Table 1).

60. *Id.* at 82-83.

61. *Id.*

62. *Id.* at 84-85 (Table 3).

63. *Id.* at 85.

64. Magnuson-Moss Warranty—Federal Trade Commission Improvement Act §§ 101-112, 88 Stat. 2183 (1975) (codified at 15 U.S.C. §§ 2301-2312 (1976)).

65. See H. REP. NO. 1107, 93d Cong., 2d Sess. 36, *reprinted in* [1974] U.S. CODE CONG. & AD. NEWS 7702, 7718 (conspicuous and clear disclosure required under § 102(a) of Act in order "to improve the adequacy of information available to consumers, prevent deception, and improve competition in the marketing of consumer products"); Priest, *The Structure and Operation of the Magnuson-Moss Warranty Act*, in *ECONOMIC REGULATION AND CONSUMER WELFARE: THE FEDERAL TRADE COMMISSION IN THE 1970S* at 246 (K. Clarkson & T. Muris eds. 1981) (discussing theory of Act).

66. Magnuson-Moss Warranty—Federal Trade Commission Improvement Act § 102(a), 15 U.S.C. § 2302(a) (1976).

67. *Id.* §§ 102(a), 103(a), 105, 106, 108(b), 15 U.S.C. §§ 2302(a), 2303(a), 2305, 2306, 2308(b) (1976).

68. *Id.* § 102(b)(1)(A), 15 U.S.C. § 2302(b)(1)(A) (1976). Kessler emphasized the advantage to manufacturers of warranties with obscure printing and language. Kessler, *supra* note 10, at 9.

69. Magnuson-Moss Warranty—Federal Trade Commission Improvement Act §§ 103-104, 15 U.S.C. §§ 2303-2304 (1976).

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average coverage would lead to universal compliance with Full warranty standards.⁷⁰

The Act's disclosure, availability, and designation requirements, however, affect only the central provisions of warranties. Subordinate provisions, which, according to the theory, consumers are less likely to comprehend, are subjected to direct regulation. The Act prohibits disclaimers of the implied warranties for all warranties,⁷¹ and expands consumer remedies and prohibits tying provisions for Full warranties.⁷²

II. The Investment Theory of the Warranty

In this Part I develop a theory of the consumer product warranty based solely upon the relative costs to the consumer and manufacturer of investments to prolong productive capacity and to insure for product losses. I then define how warranty contracts are likely to be drafted in cases in which contract standardization reduces costs.

A. *The Basic Theory Defined*

Let us relax the empirical assumptions that are the foundations of the signal and exploitation theories in order to predict the contents of warranties where the costs of extending product life and of insuring product losses are the sole determinants of their contents. Imagine that consumers are perfectly informed about the likelihood of a product defect and about the losses that will be suffered should a product become defective. Imagine also that consumers somehow make their preferences regarding warranty terms known to manufacturers⁷³ and that manufacturers are responsive to those preferences. Imagine that warranty contracts are standardized *only* to reduce negotiation costs⁷⁴ and thus that the standardized form itself does not affect the substantive obligations of consumers relative to manufacturers.⁷⁵ Finally, imagine that all products are manufactured under conditions of perfect competition, so that each characteristic of a prod-

70. See S. REP. NO. 151, 93d Cong., 1st Sess. 8 (1973); 120 CONG. REC. 40,712 (1974) (remarks of Sen. Magnuson).

71. Magnuson-Moss Warranty — Federal Trade Commission Improvement Act § 108, 15 U.S.C. § 2308 (1976). A manufacturer offering a Limited, rather than Full, warranty, however, may disclaim the implied warranties for the period after expiration of the warranty. *Id.*

72. *Id.* § 102(c), 15 U.S.C. § 2302(c) (1976). Other subordinate provisions have been regulated under the Act by Federal Trade Commission rule. See 16 C.F.R. §§ 700-703 (1980).

73. See pp. 1346-47 *infra* (discussing how consumer preferences may be registered).

74. Kessler acknowledged the cost savings from standardization. Kessler, *supra* note 10, at 12.

75. This assumption is not unrealistic and is accepted generally with respect to a wide range of product characteristics. Anyone, for example, could arrange to purchase appliances with characteristics designed to personal specifications. Most, however, seem willing to accept machines with standard characteristics, designed to be generally suitable for the large majority of consumers, in order to take advantage of the cost savings.

uct—including warranty terms—serves to optimize the welfare of some dominant class of consumers.⁷⁶ What would be the terms of product warranties?

In the common view, a warranty serves as both an insurance policy and a repair contract. As an insurance policy, a warranty provides that if, within a certain period, the product or some part of the product becomes defective, the manufacturer will compensate the buyer for the loss by repair, replacement, or refund of the purchase price.⁷⁷ As a repair contract, a warranty fixes an obligation upon the manufacturer for some period of time to provide, without charge, services necessary to repair a defect in order to prolong the useful capacity of the product.

A warranty operates as an insurance policy to the extent that the occurrence of a product defect is probabilistic. To insure for a loss is to redistribute wealth from periods in which no losses are suffered to the period in which the loss occurs. A manufacturer can redistribute wealth in this manner by collecting a premium in the sale price from a broad set of consumers for whom the prospects of loss during any single period are unrelated. The market insurance premium reflects both the expected loss for the period and some share of the costs to the insurer of aggregating these unrelated contingencies, called loading costs. A consumer may prefer, however, some personal form of temporal wealth redistribution in the face of a loss. A consumer self-insures for product losses by accumulating savings for the replacement of defective products, by reserving future time for product repair, or, more simply, by expecting to tolerate a defect once it occurs. These methods of self-insurance, of course, also involve costs of transaction. As a general proposition, therefore, we may expect to observe market insurance in a warranty only where the sum of the expected loss and loading costs of market insurance is less than the sum of the expected loss and transaction costs of self-insurance.

As a repair contract, a warranty reflects the respective costs to the consumer and the manufacturer of repair services. Repair by the consumer and manufacturer are substitutes, and the consumer can be expected to purchase repair services as part of the warranty wherever the manufacturer's price is less than the consumer's cost of providing the repair himself. Obviously, a consumer can (and frequently does) provide many repair services more cheaply than a manufacturer. It is plausible, for example, that where shelves fall in a refrigerator, repair by the consumer

76. Because of the standardized form, contracts are not specific to individuals but rather to classes of consumers.

77. I ignore, at this point, personal injury losses from defective products for which product warranties, partly because of acceptance of the exploitation theory, currently are irrelevant. See note 37 *supra*. The investment theory is extended to consider personal injury liability below. See pp. 1350-51 *infra*.

is cheaper. Of course, since the consumer and manufacturer are always free after the purchase of the good to negotiate for the provision of services of this kind, the warranty itself is valuable only if it reduces transaction costs for future agreements. Thus, a warranty may be expected to allocate responsibility to the manufacturer for those types of repairs that most frequently are difficult or burdensome for consumers to provide themselves.

Although the above example, as well as most uses of the word "repair," refers to investments designed to return a product to a condition it enjoyed at some previous period of time, it is worthwhile to consider "repair service" to a product more broadly as any investment designed to optimize the performance of the product over time. Viewed in this light, for example, restraining young children from swinging on a refrigerator door represents an investment in a form of "repair" that may well be less costly than hiring a serviceman at a later date to install new hinges. Similarly, a manufacturer may anticipate future repair services by technological investments in the design of the product that make its operation less susceptible to interruption—designing brackets to hold refrigerator shelves more securely, for example—or by investments to control a consistent quality of production.

With respect to repair investments of this nature, however, a warranty serves a role beyond that of reducing transaction costs. The warranty promise establishes and enforces the obligation of the manufacturer to make investments in the design of the good or in quality control. Such an agreement between the parties subsequent to the sale could not achieve the same result as easily,⁷⁸ so that there are advantages to "tying" the warranty to the sale of the product.⁷⁹ The warranty in this regard operates as a performance bond of the manufacturer.⁸⁰ The value of the bond is equal to the costs to the manufacturer of defective product claims.⁸¹ As long as

78. The terms of subsequent repair agreements preferred by consumers might influence product design to the extent that they provide the basis for the consumers' repeat purchase decisions. See p. 1347 *infra*.

79. The advantage of tying the warranty to the product diminishes, however, to the extent that a manufacturer seeks to capture repeat purchase sales. See note 199 *infra*. The desire for future custom alone will provide an incentive for optimal manufacturer investments. See generally Klein & Leffler, *The Role of Price in Guaranteeing Quality*, 89 J. POL. ECON. (forthcoming 1981) (discussing repeat purchase mechanism).

80. See Barzel, *Some Fallacies in the Interpretation of Information Costs*, 20 J.L. & ECON. 291, 303 n.26 (1977). As an independent example of the warranty's role as a performance bond, the Wilbert burial vault warranty (not included in the sample analyzed below, see pp. 1319-46 *infra*) provides 50-year coverage against deterioration. Because of the extraordinary duration of coverage, the warranty informs the buyer that the manufacturer has established a trust fund in the amount not less than \$25,000 for the payment of warranty claims, "in the event the Manufacturer is no longer in business." I am grateful to J.H. Schlegal for this observation.

81. The signal theory, similarly, presumes that a warranty signal is credible because the manufacturer will incur the costs of coverage. See p. 1303 *supra* (discussing negative correlation between warranty coverage and reliability). The signal theory, however, views consumer information as a more significant determinant of warranty content than costs.

the manufacturer makes appropriate investments, the bond will not be forfeited. The decision to allocate repair investments of this nature between the manufacturer and consumer, however, is identical to the decision of who should bear typical repair costs. As before, we would expect the parties to allocate between themselves, according to relative costs, all investments in "repair," whether in the form of direct reconditioning services, of product design, or of a consumer's care for or maintenance of the product so as to extend its useful life.

It is evident that the various activities described as repair are substitutes for insurance. Repair, like insurance, is a means of reducing the magnitude of a loss from an unexpected event such as a defect. It is important now, however, to depart from the common view of the warranty and to distinguish more clearly between repair as a redistribution of wealth over time, like insurance, and repair as an allocative investment which alters the productive capacity of the good.⁸² The first example of repair—the reinstallation of the refrigerator shelves by the consumer—is a form of self-insurance for the loss. The owner bears the full cost of time and energy necessary to replace the shelves after the event occurs, which, in this case, appears to be cheaper than buying market insurance requiring the manufacturer to replace the shelves. But neither repair by the consumer nor by the manufacturer directly alters the probability of the loss occurring and, thus, is like insurance. The second example—restraining the child from swinging on the refrigerator door—is an allocative investment by a consumer that extends the useful life of the product by reducing the probability of a future loss. Certainly, the burdens of a parent increase as the discipline of children becomes more strict or specific. But, again, it may well be cheaper for a consumer to restrain his child than either to buy market insurance for repair of the door or to pay the manufacturer to design a refrigerator with hinges as sturdy as playground equipment.

Thus, in this terminology, a consumer's decision to accommodate himself to a scratch in the surface of an appliance is an example of self-insurance of the defect. The consumer's earlier efforts to reduce the likelihood of the scratch, for example, by increasing the level of his care or by isolating the appliance, is an allocative investment by the consumer. The manufacturer's promise in a warranty to repair the scratch after it occurs is market insurance. And the manufacturer's production decision to make the surface more resistant to abrasion is an example of an allocative investment by the manufacturer.

Self-insurance, market insurance, and allocative investments by con-

82. Ehrlich & Becker, *Market Insurance, Self-Insurance, and Self-Protection*, 80 J. POL. ECON. 623, 633-43 (1972).

sumers and manufacturers, therefore, are each substitute methods of reducing losses in order to optimize productive services. A consumer selects among these methods according to the relative prices and marginal productivities of each with respect to expected elements of product loss. As the price of market insurance rises, other things equal, the quantity of it demanded will decline, and the demand for self-insurance and for manufacturer or consumer allocative investments will increase. Similarly, as the cost of an allocative investment by the consumer rises—say, in our second example, by the addition of a child to the consumer's family, which makes it more difficult to reduce the probability of loss—the relative attractiveness of market insurance, self-insurance, or an allocative investment by the manufacturer is enhanced. These various ways of reducing product losses, however, may not be perfect substitutes. An individual is likely to select some combination of these four methods to optimize expected utility.⁸³ For example, as the value of a consumer product or of the consumer's life increases—and, as a result, the potential risk from a defect increases—the consumer may increase consumption of each of the four.⁸⁴

Most discussions of product defects in the economics literature⁸⁵ and most legal decisions involving warranties⁸⁶ regard the probability of loss from a defect as inherent in the nature of the product and independent of actions of the consumer. According to this approach, allocative investments by a consumer which serve to reduce the probability of losses are nonexistent, and the only relevant consumer and public policy choice is between consumer self-insurance and manufacturer liability, whether leading to an allocative investment or insurance.⁸⁷ Often these analyses are qualified by a reference to consumer behavior, although seldom by more than an acknowledgement that in some cases a consumer may actively misuse a

83. Of course, a consumer may choose different methods to optimize the value of different characteristics of a product—that is, he may select market insurance for the motor, but self-insurance for scratches—so that some combination of the four methods in the purchase and use of any single consumer product is likely to be observed.

84. This proposition assumes that income effects are held constant.

85. See, e.g., A.M. SPENCE, *supra* note 41, at 88; Brown, *supra* note 5, at 149; Heal, *Guarantees and Risk-Sharing*, 44 REV. ECON. STUD. 549, 550 (1977). But see J.P. Brown, *The Perverse Effect of Guarantees on Maintenance by Buyers* 14-17 (June 1976) (manuscript, Cornell University) (discussing disincentives to consumer maintenance created by product guarantees) (on file with *Yale Law Journal*).

86. See, e.g., *Greenman v. Yuba Power Prods., Inc.*, 59 Cal. 2d 57, 63, 377 P.2d 897, 901, 27 Cal. Rptr. 697, 701 (1963) (consumers of defective products "powerless to protect themselves").

87. When the problem is characterized in this way, the appropriate legal standard is obviously strict liability of the manufacturer; that is, except where there is reason to believe that consumer self-insurance is optimal, a standard of strict liability leads the manufacturer to select between investments to prevent loss and insurance. See, e.g., James & Dickinson, *Accident Proneness and Accident Law*, 63 HARV. L. REV. 769, 780 (1950) (government and large companies in position to reduce accidents; individual's conscious free choice has insignificant effect on occurrence of accidents); Morris, *supra* note 1, at 583-99 (arguing for enterprise liability because enterprises better able to spread risks).

product.⁸⁸ The implicit conclusion of each of these discussions is that allocative investments by a consumer are empirically unimportant to the optimization of the productive life of the good.⁸⁹

Of course, there is no theoretical justification for disregarding allocative investments by consumers. A more important implication of the theory, however, is that there is no meaningful way to consider a product defect independently of a consumer's allocative investments.⁹⁰ Investments to reduce the probability of losses may take very subtle forms. I have alluded earlier to the control of children and the placement of an appliance—as it affects the number of times the appliance is scratched or jarred—as representing allocative investments. As a more general proposition, however, two forms of investment by consumers will affect the likelihood of defects in any consumer product. The first is the consumer's selection of a product suitable for his expected needs. Warranty claims are likely to be more frequent, for example, where a washing machine is undersized or a vacuum cleaner underpowered, or where there occurs some unexpected increase in the demands that the consumer makes on the product. If the consumer accurately anticipates his uses, and if he selects a product designed most appropriately for those uses, the productive capacity of the good is more likely to be preserved.⁹¹ The second form of investment is the consumer's decision about the extent to which he will use the product. A consumer who operates an appliance infrequently may be said to be preserving the life of the product by choosing to store rather than to use it.

Initially, this conception may seem foreign because it is common to infer from personal experience some "normal" use of a product. Indeed, the law requires judges and juries to make inferences of "normal" use by implying in product sales a warranty of merchantability that a product is "of fair average quality" and is "fit for the ordinary purposes for which such goods are used."⁹² If it were possible to infer some "normal" use of a good, then the decision of an individual consumer to use or not to use the good would be analytically irrelevant.

But preferences regarding the frequency of use of a product differ among consumers. The preferences of the particular set of consumers for whom the product has been designed in order to optimize sales cannot be determined by inference. Where the dominant set of purchasers operates the good infrequently and, thus, where the "normal" use of the good is

88. See, e.g., Spence, *supra* note 42, at 566 & n.5.

89. Of course, this presumption is critical both to the exploitation theory and to the theory of enterprise liability. See notes 37 & 87 *supra*; James & Dickinson, *supra* note 87, at 780.

90. See Ehrlich & Becker, *supra* note 82, at 624, 637-43.

91. Thus a consumer can influence even the relationship between the rate of defects and product design.

92. U.C.C. § 2-314(2)(b), (c).

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storage, the level of the consumers' allocative investments in preservation of the product is high.⁹³ As a consequence, the level of the manufacturer's allocative investment in product design or in insurance that optimizes productive services may be very low. In such a case, the design or manner of production of the product may be optimal even though the product appears grossly defective when operated with greater frequency, which is to say, when operated with lower allocative investments in care by consumers.

A warranty in this view is the instrument that expresses consumer preferences for allocative or insurance investments. It is a contract that divides responsibility for allocative investments and insurance between the consumer and the manufacturer. The content of the contract is determined by the respective costs to the two parties of allocative investments or insurance. According to this approach, a manufacturer makes investments to prolong product life up to the point at which the marginal cost of such investments equals the marginal benefit. A manufacturer, then, offers market insurance for those losses or items of service for which market insurance is less costly than insurance or allocative investments by the consumer himself.

To the extent that a manufacturer disclaims liability or excludes or limits warranty coverage, however, it shifts to the consumer the obligation to make allocative investments to preserve the product or to self-insure for its loss. A disclaimer or an exclusion of coverage is the functional equivalent of provisions, common in other contracts, that explicitly require one of the parties to take certain actions to prevent breach or to insure for losses from uncertain events. The theory predicts that disclaimers of liability and exclusions of coverage will be observed in consumer product warranties for those specific allocative or insurance investments that the consumer can provide more cheaply than the manufacturer. In this view, disclaimers and exclusions can be said to be demanded by consumers because of the relative cheapness of consumer allocative investments or of self-insurance.

B. *A Note on Moral Hazard*

This discussion of the factors leading to an optimal division between the consumer and the manufacturer of allocative and insurance investments is identical conceptually to the problem of moral hazard which has been discussed extensively in insurance literature, in particular, in the context of medical insurance.⁹⁴ Following Arrow and Pauly, the usual approach to

93. Put another way, the reduced frequency of defects is attributable to the choice of consumers to forgo use of the machine.

94. See, e.g., Feldstein, *The Welfare Loss of Excess Health Insurance*, 81 J. POL. ECON. 251 (1973); Marshall, *Moral Hazard*, 66 AM. ECON. REV. 880 (1976); Rosett & Huang, *The Effect of*

the problem is to regard the existence of insurance itself as encouraging the purchaser to use too much of the good or service that the insurance supplies.⁹⁵ Thus, an individual who would purchase a certain amount of medical care when charged the marginal cost of the care, demands a greater amount of care if fully insured. Full insurance reduces the price of future purchases to zero, and leads the individual to a socially "excessive" level of consumption, a result said to illustrate the "moral hazard" of insurance.⁹⁶

Moral hazard in the context of health insurance has been shown to represent a shift from *ex ante* allocative investments in care toward *ex post* investments in medical services which, given insurance, cost less at the margin.⁹⁷ Thus, medical insurance diminishes the individual's marginal incentive to invest in the preservation of his health. In general, however, moral hazard will appear in every context in which the investments or actions of the insured affect the probability of loss. The moral hazard problem is resolved, as in the investment analysis of warranties, by an *ex ante* definition of the insurance contract according to the relative costs of preservation (allocative investments) and of insurance.⁹⁸

C. *Defining Standardized Contracts: Reducing Differences in Risks*

The task of defining optimal warranty provisions⁹⁹ resembles the task of defining optimal rate classes in insurance contracts. In all insurance contexts, it is advantageous for an insurer to segregate applicants according to the level of risks added to the insurance pool. If the risk of loss of an individual can be predicted, then the insurance premium can be tailored to reflect the likelihood of future payouts. In particular, insurance coverage can be offered at a lower premium to an individual for whom the risk of loss is relatively low.

For most types of insurance, of course, it is prohibitively costly either to

Health Insurance on the Demand for Medical Care, 81 J. POL. ECON. 281 (1973).

95. Arrow, *Uncertainty and the Welfare Economics of Medical Care*, 53 AM. ECON. REV. 941, 961-62 (1963); Pauly, *The Economics of Moral Hazard: Comment*, 58 AM. ECON. REV. 531, 532-35 (1968).

96. This formulation is taken from Pauly, *supra* note 95, at 535.

97. See Rosett & Huang, *supra* note 94, at 298.

98. See Ehrlich & Becker, *supra* note 82, at 641-43 (explaining reduction of moral hazard). The moral hazard literature raises the optimization question from the standpoint of the seller of insurance rather than the buyer. The content of product warranties might be analyzed in this manner by asking how a manufacturer selects the elements and level of coverage by observation of product sales. The analytical solution is identical: the manufacturer declines to extend coverage where the costs of coverage exceed the benefits to consumers because of the substitution by consumers away from less costly investments in prevention or self-insurance.

99. I assume in the following discussion that the standardization of warranties reduces the joint costs of contract formation of the manufacturer and consumer, an uncontroversial assumption. See note 74 *supra*.

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predict exactly the risk that an individual brings to a pool or to charge individual premiums. As a consequence, an insurer is forced to lump individuals into separate classes or, sometimes, into a single class. The premium charged each member of the class must reflect the average level of risk of the class. Thus, the premium undercharges relatively high-risk individuals and overcharges relatively low-risk individuals. At the margin, some low-risk individuals are likely to find that the cost of market insurance exceeds the benefit, and will shift to allocative investments that reduce the likelihood of the loss or to self-insurance. In the context of consumer products, these individuals will shift their purchases to products sold without, or with less, warranty coverage. The more precisely the insurer is able to construct classes comprising individuals with relatively similar levels of risk, however, the smaller the discrepancy will be between the premium and the value of insurance to the lower risk members of the pool. Thus, the lower risk members become less inclined to substitute self-insurance for market insurance. As a general proposition, therefore, discrimination that reduces differences in risk between members of a given insurance class optimizes the sale of insurance.

It is common for life, medical, accident, and home insurers to obtain information about applicants prior to making contracts in order to place applicants in appropriate insurance classes. Insurers routinely solicit information about age, sex, property location and value, as well as medical records and driving histories in order to construct rate classes.¹⁰⁰ Some insurers make it possible for individuals with characteristics that tend to be correlated with low levels of risk, such as abstemious smoking and drinking habits, to identify themselves in order to qualify for lower premiums. Analogues to these methods of discrimination, however, are not immediately apparent in the context of consumer product insurance. Typically, insurance policies for consumer product losses are tied to the sale of the product itself, so that the insurance pool invariably consists of all consumers who have purchased the product.

Consumers may differ in two general ways with respect to risk under a product warranty. First, the amount of use of a product during the period of warranty coverage may vary considerably between consumers. Compare, for example, the expected service costs to a washing machine manufacturer from a family with many children and from a family with only a single child. The costs of service to the large family will almost certainly be greater. If the manufacturer could define warranty coverage in terms of number of washloads, however, as an automobile manufacturer defines

100. The information on which the medical or accident insurer relies, of course, is frequently a by-product of the activities of other industries, such as the rendering of medical diagnosis or the administration of the traffic laws.

coverage in terms of mileage, then the expected costs from the two families to the manufacturer might be similar. But for washing machines, as well as for most other consumer appliances, the least costly measure of use appears to be duration of ownership. As a consequence, no matter what the period of coverage, the amount of use of the machine by the two families is likely to differ greatly. The insurance premium must be set to cover all expected costs of service. Thus, smaller families at the margin may find warranty protection to be worth less than its cost.

Second, the risk of loss may differ between consumers with respect to what I will call the "intensity" of product use. Compare now for the large and small families, the expected service costs to a television manufacturer. The amount of use of the television—that is, the number of viewing hours—might be identical for the two families. Nonetheless, the probability of a warranty claim is likely to be higher for the larger family, because of the greater number of individuals operating the set, because of the greater frequency of channel changes, and because of the greater risk in a large family that the set will be jostled, that the antenna will be struck, or that the machine will otherwise be treated roughly.

I define "intensity" of use as inversely related to the marginal cost to the consumer of "care" for the machine,¹⁰¹ that is, the cost of allocative investments to reduce the probability of a loss. The cost of monitoring the activities of children is likely to increase as the number of children increases. Thus, the family with many children is more likely than the family with a single child to substitute recovery under a warranty for allocative investments in care of the machine. As a consequence, the cost to the manufacturer of warranty coverage will be greater for the machine sold to the larger family. Again, at the margin, consumers with smaller families may find it advantageous to shift their purchases to machines sold without, or with less, warranty coverage.

Although product insurers do not directly acquire information about consumers prior to sale, a variety of subtle methods can enable them to segregate consumers. For example, a manufacturer can develop models of a product that differ with respect to characteristics related to differences in intensities or amounts of consumer use. A manufacturer of washing machines may produce models that differ in motor size or washbasket volume that are differentially convenient to families of different sizes. If these product characteristics segregate consumers according to the extent or intensity of use, then the manufacturer can offer, for each individual model,

101. The distinction between "intensity" and amount of use corresponds to the distinction in economics between movements along a cost (supply) curve and movements of the cost curve with respect to different scales of operation. See J. HIRSCHLEIFER, *PRICE THEORY AND APPLICATIONS* 115-18 (2d ed. 1980).

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different allocative investments and levels of warranty coverage determined by the expected warranty claims for each model.

This technique, however, may achieve only partial success. The advantage to a manufacturer of culling out higher intensity or higher volume consumers from a particular insurance pool is to enable it to offer warranty coverage at a relatively lower premium, or greater coverage at the same premium, of models designed for lower volume or intensity uses. A lower premium or more extended coverage, however, makes those machines relatively more attractive to all consumers, including those who expect to use the machine with greater intensity or in higher volume. At the margin, some of these consumers can be expected to purchase machines undersized for their needs. Such purchases substitute the extended warranty coverage of the lower volume machine for the mechanical superiority of the higher volume machine. This adverse selection by higher volume or intensity consumers will force manufacturers to reduce the extended coverage of the lower volume machine or to charge a higher premium for it. Either reaction will reduce the attractiveness of the lower volume machine to the lower risk members of the pool.¹⁰²

A separate but closely related method of segregating consumers is to offer warranty contracts with different terms at different premiums in conjunction with the sale of a given product. Recently, the domestic automobile manufacturers have introduced insurance policies for separate fees extending coverage for periods beyond the basic twelve-month warranty.¹⁰³ The optional service contract of many appliances is similar. These contracts segregate consumers according to the amount of insurance coverage they wish to buy.¹⁰⁴ The warranty provides a term of basic coverage demanded by the lowest risk members of the pool. Those consumers for whom the risk is greater, however, can purchase more extensive coverage. Because relatively high-risk consumers are more likely to select such contracts, their premiums are likely to be proportionally higher for a given duration of coverage than the premiums of the basic warranty included in the sale price.¹⁰⁵

A more subtle method of differentiating consumers is the offer by many retailers of warranty coverage that is separate from and, typically, more

102. This discussion is similar to that of Akerlof, *supra* note 38, at 492-93. Akerlof, however, focuses in his principal illustration upon the technological characteristics of a product rather than upon differential product use by consumers.

103. Wall St. J., Oct. 11, 1979, at 1, col. 4.

104. See Pauly, *Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection*, 88 Q.J. ECON. 44, 60 (1974); Rothschild & Stiglitz, *Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information*, 90 Q.J. ECON. 629, 641-42 (1976).

105. See Pauly, *supra* note 104, at 60.

extensive than the coverage offered by the product manufacturers themselves.¹⁰⁶ This additional coverage need not be explicit. It may take the form only of a more liberal or courteous return or exchange policy. It is not uncommon, however, for retailers to announce and, thus, to make contractual a guarantee of consumer "satisfaction"¹⁰⁷ that far exceeds the typical manufacturer warranty. This practice enables consumers to segregate themselves according to the level of protection each desires. Those consumers who value their time highly and who avoid allocative investments in care and maintenance or insurance investments in self-repair of products, may seek out retailers with liberal policies, although the products can be purchased at lower retail prices elsewhere. Dealers who offer more extensive warranty coverage are undoubtedly fully compensated for doing so, but their customers are less likely to be those for whom the costs of allocative investments or self-insurance are relatively low.

Finally, a manufacturer may segregate consumers by means of explicit contractual provisions in the warranty. A manufacturer, for example, may exclude warranty coverage for a particular use of a product or specific class of consumers for which the volume or intensity of use is relatively high. The common provision that excludes coverage of commercial use is an obvious example. This provision narrows the class of those insured to domestic users of the product and may be incorporated to enforce a manufacturer's segregation of domestic and commercial purchasers by model design.

Some elements of product loss, however, may be excluded from coverage in the warranties of all product models. A common example is the exclusion of liability for consequential damages. The unavailability of any coverage of some loss, nonetheless, may be related to the reduction of differences in risk between members of the insurance pool. Where consumers differ substantially in the incidence or magnitude of a loss, such as consequential damages, there may be no single premium attractive to a sufficient number to justify offering coverage. Put another way, the increase in the premium required for coverage of such losses may be greater than the benefit of coverage to large numbers of consumers. If so, the sale of product insurance may be optimized by excluding coverage altogether.

Warranty exclusions are a form of product standardization. An exclusion of some element of loss is indistinguishable analytically from the exclusion of, say, magenta and aquamarine as product colors. If the number of consumers willing to purchase machines of unusual colors is very small, it may not be worth the cost for the manufacturer to introduce the

106. See Ross & Littlefield, *Complaint as a Problem-Solving Mechanism*, 12 LAW & SOC'Y REV. 199, 207, 211 (1978) (retailer studied offered coverage far more extensive than any manufacturer).

107. See *id.* at 211-12 (discussing Sears, Roebuck guarantee).

colors into the product line. Similarly, if the incidence or magnitude of an element of loss differs greatly between consumers of a product, the market for insurance may not be sufficiently large to justify offering insurance. Such a warranty exclusion enables the manufacturer to offer, for losses not excluded, either more extensive or less costly warranty coverage than if no exclusion were made, just as the production of appliances in a limited range of colors lowers price by reducing the costs of production and distribution. In this respect, consumers of the product may be said to have demanded the exclusions.

The segregation of consumers by explicit contractual provisions, however, is effective only to the extent that the manufacturer can identify prior to sale those consumers, product uses, or elements of loss for which differences in risk across the set of potential consumers are great. All those not identified and segregated must be lumped into a common pool, high-risk and low-risk alike. The terms of the standard warranty, then, establish the minimum level of coverage that is demanded uniformly by each member of the large class of purchasers; that is, a base level that can be supplemented in the variety of ways suggested above by those consumers desiring more extensive protection. The standard level of coverage comprises the minimum performance bond necessary to encourage appropriate investments by manufacturers in the design or mechanical qualities of the product and the minimum insurance coverage demanded by the lowest risk members of the consumer pool.¹⁰⁸

III. An Empirical Examination of the Theories

This Part evaluates whether the exploitation, signal, or investment theory best explains the content of consumer product warranties by reviewing the provisions of warranties issued in 1974 of sixty-two consumer products comprising sixteen different product groups.¹⁰⁹ The sample warranties were taken from a wide range of consumer products, including household appliances such as refrigerators, ranges, washers, dryers, and

108. Yoram Barzel suggests, as part of a general theory of measurement costs, that the duration of warranty coverage will be that period sufficient to allow the consumer to discover latent defects where inspection is cheaper for the consumer than for the manufacturer. Y. Barzel, *Measurement Cost and the Organization of Markets* (July 1979) (manuscript, University of Washington) (on file with *Yale Law Journal*). Others have expressed a more limited version of this theory. See Bogert & Fink, *supra* note 6, at 403; Best & Andreasen, *Consumer Response to Unsatisfactory Purchases: A Survey of Perceiving Defects, Voicing Complaints, and Obtaining Redress*, 11 *LAW & SOC'Y REV* 701, 702 (1977). Because there are no readily available means of measuring consumers' inspection costs, this theory cannot account—except by definition—for differences in warranty duration.

109. The warranties were compiled by the Federal Trade Commission for a study of the effects of the Magnuson-Moss Warranty Act. See J. SCHMITT, L. KANTER, & R. MILLER, *IMPACT REPORT ON THE MAGNUSON-MOSS WARRANTY ACT*, BUREAU OF CONSUMER PROTECTION, FEDERAL TRADE COMMISSION (STAFF REPORT) 11 (1980). The warranties surveyed in this article were issued in 1974, prior to the enactment of the Warranty Act.

televisions, relatively inexpensive products such as cookware, and more significant durables such as automobiles, recreational vehicles,¹¹⁰ and on-site mobile homes.¹¹¹

For this study I have inspected only copies of the warranties; I have collected no information regarding the frequency or magnitude of warranty claims of individual products or of warranty practices of manufacturers. A comparison of warranty terms alone, however, cannot provide sufficient grounds to accept or reject any of the theories. The investment theory, in particular, implies a precise relationship among price, cost, and warranty coverage, which I cannot examine. The results of the survey nevertheless are highly suggestive and support, I believe, more detailed empirical work.

A. *Direct Tests of the Exploitation and Signal Theories*

This subpart examines the exploitation theory by comparing warranty coverage to measures of manufacturer power, and the signal theory by comparing warranty duration to estimates of the service life of various products.

1. *The Exploitation Theory: Warranty Coverage and Manufacturer Market Power*

According to the exploitation theory, manufacturers exercise their powerful market position by imposing one-sided warranty terms on weaker consumers. Although some discussions treat the bargaining position of all manufacturers as superior to that of consumers,¹¹² most consider the size of the manufacturer crucial, so that warranties less favorable to consumers are offered by the larger rather than the smaller firms within an industry.¹¹³ Still other treatments describe manufacturer market power as a

110. There are four leisure vehicles represented in the warranty sample. "Travel trailers" are large units (often with kitchens and bedrooms) towed behind a principal vehicle. "Recreational vehicles" (Type A Motor Homes) are large, self-propelled motor homes (often with kitchens and sidebeds). "Coaches" (Type C Motor Homes) consist of a normal auto van chassis and cab to which is attached a relatively small living area (with beds and kitchen). "Truck mounts" are camping units attached to the bed of a pick-up truck.

111. The sample was not randomly drawn, but includes warranties of both dominant and relatively insignificant firms within the various industries. See p. 1321 *infra* (Table 1). The warranties of this sample represent a broader set of products than those of the Gerner and Bryant sample, see *Market Signal*, *supra* note 43, at 80 (household appliances only), but are less inclusive. The Gerner and Bryant sample contained at least eighteen warranties of each of five products. The provisions of the warranties of my sample appear very similar to those of both the Gerner and Bryant sample and the sample in Bogert & Fink, *supra* note 6, at 403-09 (describing sample). But see p. 1337 *infra* (apparent differences between Gerner and Bryant sample and this sample with respect to original purchaser limitation).

112. See, e.g., Slawson, *supra* note 29, at 2.

113. A recent study compared warranty content with manufacturer size as measured by annual

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consequence of the absence of competition, whether because of monopolization or of express or tacit collusion.¹¹⁴ Thus, although a firm is large, its warranty practices may be constrained by competition with a group of small firms.

A principal weakness of the exploitation theory is that it provides no theoretical link between market power and product warranty terms. Why would a firm with market power maximize its returns by offering one-sided warranty terms rather than by manufacturing shoddy goods or by charging a monopoly price? Generally, monopoly profits are maximized by selling a product identical in all respects (except price) to the product offered under competition.¹¹⁵ Thus, in theory, a monopolist (or a group of conspiring firms) will gain the greatest return by offering the consumer an optimal warranty, but at a price that exceeds marginal costs.

Table 1 tests the exploitation hypothesis empirically. It compares individual firm power in appliance markets with the content of each firm's warranty. Columns (2) through (10) array individual manufacturers according to each firm's share of the sales of a single appliance. The rows describe the content of each firm's warranty for the appliance, including the duration of basic and extended parts and labor coverage and the major exclusions and limitations of liability. The exploitation theory implies that the larger a firm's market share, the more restrictive the terms of its warranty will be.

Table 1 offers little support for the exploitation theory. The basic parts coverage of the firms with larger market shares is similar to that of firms with smaller market shares, although two relatively small firms offer unusually long coverage—five years (columns (7) and (9)). Moreover, the extended parts coverage of the smaller firms appears less generous than

sales volume in dollars. Note, *An Empirical Study of the Magnuson-Moss Warranty Act*, 31 STAN. L. REV. 1117, 1141-44 (1979). As a measure of size, dollar sales volume alone fails to distinguish between firms producing differently priced products. Thus, for example, a dominant manufacturer of cookware may appear less significant than a relatively small manufacturer of on-site mobile homes. The study found that manufacturers with relatively larger sales volumes offered the more generous warranty terms. *Id.* at 1141-42.

114. This was Kessler's view. Kessler, *supra* note 9, at 632; see *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 390-91, 161 A.2d 69, 87 (1960) (three auto manufacturers using identical warranties had 93.5% share of market).

115. Sales in any market are maximized by the offer of product characteristics that are most responsive to consumer demands. See Posner, *Natural Monopoly and its Regulation*, 21 STAN. L. REV. 548, 548-85 (1969); Swan, *Optimum Durability, Second-Hand Markets, and Planned Obsolescence*, 80 J. POL. ECON. 575, 577, 582 (1972). It is possible that warranty provisions could be employed to enable discrimination in prices to increase profits further. Product warranties, however, tend to exclude from coverage high- rather than low-intensity users. See pp. 1330-46 *infra*. High-intensity users are usually those for whom the costs of the substitutes for warranty coverage—the consumer's allocative or insurance investments—are relatively high. Consumers who face costly substitutes, however, are the principal targets of price discrimination. Thus, the profit-maximizing discriminatory tactic would seek to include high-intensity users in the warranty pool, and to charge them a price that exploits the relative difficulty of substitution, rather than to exclude them.

Table 1. Warranty Coverage and Firm Market Share by Number of Firms, for Selected Appliances,* 1974

Warranty Provision ¹	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
				Percent Market Share by Product ²						Insignif- icant ³
		>20	18-19	12-13	10-11	8-9	6-7	4-5	<3	
N		2	2	2	1	2	4	2	8	7
Basic Parts	1	1	2	1	1	2	3	2	6	6
Coverage (years)	2	1		1					1	1
	5						1		1	
Extended Parts	0			1			1	1	2	1
Coverage (years)	2	1			1	1	1		1	1
	5	1	2†	1		1	2†	1	6	5
Basic Labor	0			1		1			1	1
Coverage (years)	1	1	1	1			3	2	6	6
	2	1			1	1			1	
	5		1				1			
Extended Labor	0	1	1	2	1	1	2	2	4	3
Coverage (years)	1	1				1				
	5		1‡				2		4	4
Original Purchaser Limitation		1				1	3	1	4	3
Exclude Consequential Damages			1			1	1		1	
Disclaim Merchantability			1			1	1		1	

* Refrigerators, gas & electric ranges, washers, room air conditioners, color televisions. Both dryer warranties are issued by the same firm (different subdivisions); their terms are generally identical. Only their composite market share is available; thus, I treat them as one firm.

† Where all parts are covered for five years, I indicate extended as well as basic coverage.

‡ One manufacturer offers 10-year coverage of certain parts and labor expenses.

Sources:

1. Warranties provided by Federal Trade Commission, June 1978.

2. Derived from *Who's Who and What's What in the Appliance Industry*, 22 APPLIANCE MANUFACTURER 60, 65 (1974).

3. *Id.*

that of larger firms. Five of twenty-one relatively small firms (seven percent market share or less) offer no extended parts coverage, whereas only one of nine firms with a market share greater than seven percent offers no coverage. Basic labor coverage appears equivalent between large and small firms. Extended labor coverage provisions, however, provide greater support for the exploitation theory. A greater proportion of smaller than of larger firms offer five-year labor coverage, although one firm with a nineteen percent market share—General Electric, the largest manufacturer of air conditioners—offers ten-year extended coverage of selected parts and labor expenses. Finally, the distribution of the exclusions of liability tends to refute the exploitation theory. Limitations of coverage to the original purchaser, disclaimers of the implied warranties, and exclusions of consequential damages are relatively infrequent in the warranties of firms possessing more than nine percent of a product market, but appear more often in the warranties of smaller firms.

The results of Table 1 might fail to support the exploitation theory

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because the Table does not distinguish atomistic from concentrated industries. Perhaps market power is more accurately measured by considering the extent of competition between manufacturers in individual industries, rather than the absolute size of the manufacturer alone. Tables 2 and 3 compare industry concentration to warranty content. Table 2 compares concentration to the warranty duration and the service life expectancy of the appliances. Column (2) presents Herfindahl concentration index estimates¹¹⁶ for these product groups, in descending order of concentration. Columns (3) and (4) show the duration of extended parts and labor coverage, respectively. The exploitation theory implies that as concentration is greater, duration of coverage will be shorter.

Table 2. Industry Concentration, Warranty and Service-Life Duration, by Product, 1974

(1) Product	(2) N	(3) Herfindahl Index ¹	(4) Extended Parts Coverage ² (years)	(5) Extended Labor Coverage ² (years)	(6) Service Life Expectancy ³ (years)
Freezers	1	.225	5*	5*	20.4
Washers	5	.197	5	0	10.8
			(4 manufacturers)		
Electric Ranges	4	.193	3	0	12.1
			(1 manufacturer)		
Dryers	2	.191	2, 5	0	13.7
			(1 manufacturer)		
Refrigerators	5	.159	5	5*	15.2
Gas Ranges	2	.151	0	0	13.5
Color Televisions	3	.125	2	0	12.0
Room Air Conditioners	10	.099	5*	5	
			(7 manufacturers)		

* Where all parts are covered for five years, I indicate extended coverage.

Sources:

1. Derived from *Who's Who and What's What in the Appliance Industry*, 22 APPLIANCE MANUFACTURER 60, 65 (1974).
2. Warranties provided by Federal Trade Commission, June 1978.
3. Ruffin & Tippet, *Service-Life Expectancy of Household Appliances: New Estimates from the USDA*, 3 HOME ECON. RESEARCH J. 159, 169 (1975) (April 1973 sample).

Table 2 fails to support this implication. The least concentrated product group—air conditioners—offers a duration of warranty coverage identical to that of both a moderately concentrated product group—refrigerators—and a highly concentrated product group—freezers.¹¹⁷ A

116. The Herfindahl index consists of the sum of the squares of the market shares (in percent of sales) of each firm. See G. STIGLER, *The Measurement of Concentration*, in THE ORGANIZATION OF INDUSTRY 29, 31 (1968). This measure is consistent with the exploitation theory because it gives relatively greater weight to the market shares of larger firms than does the standard four-firm concentration ratio.

117. These three products are similar in that each contains a sealed refrigeration unit. Cf. pp. 1330-31 *infra* (discussing implication of investment theory with respect to extended coverage of products that contain sealed refrigeration systems).

relatively unconcentrated product group—gas ranges—offers the least extensive duration of coverage.¹¹⁸ Column (5) gives estimates of the first-owner service life expectancy of the various appliances: a measure of the average period of service of the product to the original purchaser.¹¹⁹ Some exploitation theorists would suggest that the power to exploit consumers will be expressed in the technological durability of the product as well as in warranty terms.¹²⁰ Column (5), however, does not confirm that hypothesis. Indeed, the product of the most concentrated group—freezers—is also the most durable.

The evidence most persuasive to judicial acceptance of the exploitation theory, however, was the correspondence between the high level of concentration in the automobile industry and the restrictive content of automobile warranties, in particular, the prevalence of disclaimers and exclusions of liability.¹²¹ The automobile industry, of course, is more highly concentrated than any of the appliance industries, and its warranties are more restrictive. Perhaps a view of concentration and warranty content that incorporates a broader range of products would confirm the implications of the exploitation theory?

Table 3 compares the major warranty exclusions with industry concentration for thirteen product groups: the automotive products (automobiles, recreational vehicles, coaches, and travel trailers), the appliances, and on-site mobile homes. Columns (2) and (3) present Herfindahl index and four-firm concentration measures for these products; columns (4), (5), and (6) indicate the proportion of sample warranties incorporating the major exclusions.

Table 3 confirms the extraordinary concentration of the automobile industry and the great frequency of exclusions in automobile warranties, at least in comparison to the appliance groups (except, notably, dryers). Table 3 shows, however, that the frequency of exclusions in recreational vehicles, coaches, and, in part, in travel trailers is as high as in warranties of automobiles. Recreational vehicles, coaches, and travel trailers, of course, are industries of low concentration. By either of the two measures, they are many times less concentrated than even the appliance groups and are among the most atomistic of all manufacturing industries.

118. Although this sample contains only one freezer and two gas range warranties, the Gerner and Bryant study showed similar durations of warranty coverage for these products. *Market Signal*, *supra* note 43, at 13 (Table 2).

119. The estimate was drawn from a nationwide sample, although the article does not indicate when the survey was conducted. See Roussos & Konopa, *Ownership Levels, Acquisition and Disposition Channels of Selected Consumer Durable Used-Goods*, 8 AKRON BUS. & ECON. REV. 30 (1977).

120. See Prosser, *supra* note 27, at 158-65 (unless courts regulate sales transactions, manufacturers will sell "worthless junk").

121. See p. 1302 *supra* (discussing *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 161 A.2d 69 (1960)); note 114 *supra* (same).

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Table 3. Industry Concentration and Warranty Exclusions, by Product, 1974

Product	N	Herfindahl Index ¹	Four-firm Concentration ¹	Proportion Disclaiming Merchantability ²	Proportion Excluding Consequential Damages ²	Proportion Limiting Coverage to Original Purchaser ²
Automobiles	4	.359	100	75	75	0
Freezers	1	.225	71	0	0	0
Washers	5	.197	73	0	0	40
Electric Ranges	4	.193	73	0	0	25
Dryers	2	.191	73	100	100	100
Refrigerators	5	.159	72	20	20	20
Gas Ranges	2	.151	75	0	0	50
Color Televisions	3	.125	60	0	0	66
Room Air Conditioners	10	.099	59	20	20	40
Recreational Vehicles	5	.078 ³	44 ³	80	100	80
Travel Trailers	4	.053	33	50	50	100
Coaches	5	.034 ³	28 ³	80	80	60
Mobile Homes	4	.027	29	50	25	25

Sources:

1. Derived from 1975 AUTOMOBILE FACTS & FIGURES 14 (automobiles); *Who's Who and What's What in the Appliance Industry*, 22 APPLIANCE MANUFACTURER 60, 65 (1974) (freezers, washers, electric ranges, dryers, refrigerators, gas ranges, color televisions, and room air conditioners); R.L. POLK & CO., NEW MOTOR HOME, TRAVEL TRAILER AND MOBILE HOME REGISTRATION SERVICE (1974) (includes all United States registrations, except Oklahoma; concentration measures include manufacturer rather than brand product share, which may overstate concentration; insignificant firms not accounted for individually comprise 10%, 14%, 8%, and 20% of recreational vehicle, coach, travel trailer, and mobile home figures, respectively; these firms were not included in concentration measures).

2. Warranties provided by Federal Trade Commission, June 1978.

3. For some firms, only joint recreational vehicle-coach registrations were available. I use the summary figure in both categories, and thus overstate actual concentration. Recreational vehicles and coaches are built upon chassis manufactured by the three largest automobile firms. Recreational vehicle and coach warranties, however, extend only to independently added equipment; chassis are warranted separately. See p. 1329 *infra* (Table 5).

These data suggest that the correlation between concentration and restrictive warranty content in automobile warranties is spurious. Indeed, Table 3 demonstrates that there is no clear relation between concentration levels and product warranty content. Table 3 does suggest that, with respect to exclusions of liability, there are great similarities, first, within the warranties of the automotive products and, second, within the warranties of appliances, regardless of concentration. I shall explain, below, that these similarities appear to derive from the different ways consumers use appliances and automotive products, an explanation which is consistent with the investment theory.¹²²

122. See pp. 1333, 1334, 1338, 1345-46 *infra*.

2. *The Signal Theory: Warranty Duration and Service Life Expectancy*

The signal theory rests on the assumption that warranty terms reflect the mechanical durability of the product. According to the theory, the costs of comprehending warranty information require consumers to generalize information about a range of related products. Generalization may attenuate to some extent the correspondence between warranty duration and service life.¹²³ Thus, the duration of coverage may not equal product service life exactly. The signal theory's fundamental implication, however, is that the relationship between warranty duration and service life expectancy is direct and positive and is a relationship upon which consumers can, with confidence, base their purchasing decisions.¹²⁴

Table 4 compares the duration of basic and extended parts coverage with measures of expected service life for various appliances and for automobiles. The products are listed in descending order of service life expectancy. Column (4) gives estimates of the duration of service life to original owners of these products. Column (5) gives estimates of the total service life of the product itself, regardless of the number of owners.¹²⁵

Table 4 shows only a very crude relationship between warranty duration and life expectancy. The single warranty of the most durable product—freezers—offers the longest period of basic parts coverage. However, three of five warranties of the appliance with the least durability—washers—offer a period of basic parts coverage twice that of seventeen warranties of the more durable products—color televisions, electric and gas ranges, dryers—and four warranties of refrigerators. In addition, the warranties of two appliances that are most durable—freezers and refrigerators—offer the longest period of extended parts coverage, but so do the warranties of the least durable appliance—washers. Moreover, there is no ordinal relationship among the appliances of intermediate durability.

More curious is the relationship that Table 4 reveals between service life expectancy and the absolute level of warranty duration. The service life expectancies of the appliances range from eleven to twenty years. The signal theory assumes that it is economical for consumers to generalize information about the basic coverage terms of various products. The simplified categories of Table 4, in fact, seem to bear out the generalization hypothesis. Although there are some variations, seventeen of the twenty-

123. *Market Signal*, *supra* note 43, at 77-78.

124. *Id.* at 77-79.

125. The figures result from separate studies: the estimates of service life to first owners, column (4), derive from an extensive nationwide sample. *See* note 119 *supra*. The estimates of total product life (all owners), column (5), derive from a 1970 Whirlpool Corporation study of Whirlpool products, which may differ from the average.

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Table 4. Product Service-Life Expectancy and Duration of Parts Coverage, by Appliance, 1974

Appliance	(1) N	(2) Duration Basic Coverage ¹ (years) (by firm)	(3) Duration Extended Coverage ¹ (years) (by firm)	(4) Service Life Expectancy for First Owner ² (years)	(5) Total Service Life Expectancy ¹ (years)
Freezers	1	5	5*	20.4	18
Refrigerators	5	1 (4), 5(1)	5*	15.2	15
Dryers	2	1	2, 5	13.7	15
Gas Ranges	2	1	0	13.5	
Electric Ranges	4	1	3 (1)	12.1	14
Color Televisions	3	1	2	12.0	
Washers	5	1 (2) 2 (3)	5 (4)	10.8	12
Appliance Average (nonweighted)				14.0	14.8
Automobiles	4	1	0		9.4

Note: Numbers in parentheses within the table indicate manufacturers.

* Where all parts are covered for five years, I indicate extended as well as basic coverage.

Sources:

1. Warranties provided by Federal Trade Commission, June 1978.

2. Ruffin & Tippet, *Service-Life Expectancy of Household Appliances: New Estimates from the USDA*, 3 HOME ECON. RESEARCH J. 159, 169 (1975) (April 1973 sample).

3. Appliances: Whirlpool Corporation, Marketing Studies Department, 1970 Study (on file with *Yale Law Journal*). Automobiles: Teknekron, Inc., Factors Influencing Product Durability, reprinted in SEN. REP. No. 12, 93d Cong., 1st Sess., 139, 168 (1973) (study undertaken around 1970).

two appliance warranties, as well as the four automobile warranties, offer basic-parts coverage for one year.¹²⁶

The peculiarity of this finding, however, is apparent. Why is basic-parts coverage of one year the generalized durability signal of these products? The average service life of all appliances is, according to one measure, 14.0 years and, according to the other, 14.8 years. The shortest service life expectancy of the appliances within the set is, by one measure, 10.8 years and, by the other, 12 years. If warranty duration is a signal of the purely mechanical characteristics of a product, without regard to a consumer's allocative investments in prolonging product life, what explains a durability signal of one year, rather than ten years or fourteen years? The signal theory does not answer this question and suggests no method for discovering an answer.¹²⁷

126. A more careful inspection of the warranties, however, discloses that one-year parts coverage is only a residual term from which there are many variations. See note 174 *infra*.

127. Also inconsistent with the signal theory are the offer by retailers and manufacturers of different warranty coverage, see p. 1318 *supra*, and the distinctions with respect to coverage among types of purchasers and uses of the product, see pp. 1331-38 *infra*. In each case, the technological characteristics of the product—the subject matter of the signal—are identical, even though the signals are different.

B. *Differences in Specific Warranty Provisions*

This subpart examines the contents of the sample warranties more carefully. It reviews specific warranty provisions and considers whether differences with respect to these provisions in the warranties of different products are explained most persuasively by the exploitation, signal, or investment theory.

1. *The Duration of Parts Coverage*

The parts coverage provision of most product warranties has two elements: the first establishes coverage of most product parts for some basic term—commonly one year;¹²⁸ the second defines exceptions to this basic coverage.¹²⁹ The exceptions consist, for specific product parts, of exclusions from coverage altogether, limitations of coverage to periods less than the basic term, or extensions of coverage beyond the basic term.

The three theories interpret these parts provisions differently. Provisions excluding or limiting parts coverage are consistent with the exploitation theory. This theory, however, does not indicate which parts will be excluded from coverage nor, for that matter, why all parts are not excluded from coverage. In addition, it does not explain why some parts are given extended coverage. The implications of the signal theory are equally unclear. Gerner and Bryant predict a lack of uniformity across products in the parts excluded from coverage because consumers are unaware of the exclusions.¹³⁰ They also predict, at one point, that manufacturers will exclude those aspects of coverage most costly to them¹³¹ but, at another, that the parts excluded will be those inexpensive and easily repaired by consumers.¹³² Finally, according to the investment theory, the treatment of product parts will be related to differences in risk between consumers as a consequence of differences either in intensity or volume of use of the product.¹³³

128. For a more precise evaluation of how common one-year parts and labor coverage is, see note 174 *infra*.

129. In my view, this structure itself influenced the formation of the exploitation theory. Some statements of the exploitation theory view the warranty as giving the appearance of coverage while in fact limiting and disclaiming coverage. The structure also influenced the formulation of the signal theory, which views a consumer as comprehending the basic terms of coverage but ignoring exceptions and exclusions of liability. Since the number of exclusions and disclaimers is quite small, the advantage in simplicity of this structure is apparent. It is difficult to imagine, for example, a warranty in which the manufacturer lists all the parts and characteristics of the product to which coverage is extended.

130. *Market Signal*, *supra* note 43, at 84.

131. *Id.* at 84-85.

132. *Id.* at 81 n.7.

133. Gerner and Bryant, in the sole empirical study of parts coverage, found warranties providing only extended rather than limited terms of parts coverage, a fact they interpret to be consistent with the signal theory's prediction of pressures toward greater-than-average coverage. *Id.* at 82-84 (Tables 1 & 2).

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Table 5 lists product parts excluded from coverage in the warranties of my sample. There is little uniformity across products in parts excluded, which is consistent with the (weak) implication of the signal theory. The signal theory's more precise implication, however, is not confirmed. The parts excluded appear to be neither those most costly to manufacturers nor those most easily repaired by consumers. Certainly, the dollar value of light bulbs and gaskets in comparison to other product parts is small. But many excluded parts, such as plastic parts, the trim and finish, enamel, and porcelain and glass pieces, are likely to be specific to the particular product model. The consumer has no evident cost advantage in providing replacements for these parts.¹³⁴

Table 5. Product Parts Totally Excluded from Warranty Coverage, 1974

Product	(N)
Cookware	1 None
Refrigerators	5 Light bulbs, plastic parts, gasket, porcelain, exterior finish, fuses
Freezers	1 Plastic parts, gasket
Gas and Electric Ranges	6 Light bulbs, finish or trim
Washers	5 Light bulbs, porcelain
Dryers	2 Light bulbs, glass pieces (one manufacturer excludes all nonworking parts)
Room Air Conditioners	10 Air filters
Color Televisions	3 Antenna system (two manufacturers)
Stereo Equipment	2 Plastic parts, needles, batteries, knobs, cabinets
Automobiles	4 Paint, appearance (one manufacturer); tires separately warranted
Recreational Vehicles	5 Chassis, tires, appliances, all separately warranted
Coaches	5 Fabrics, carpets, windows, windshield (one manufacturer); chassis, tires, appliances, all separately warranted
Truck Mounts	4 Interior surface (one manufacturer); chassis, tires, all separately warranted
Travel Trailers	5 Tires, batteries, appliances, all separately warranted
On-site Mobile Homes	4 Non-integral furniture, plumbing and appliances, all separately warranted

Source: Warranties provided by Federal Trade Commission, June 1978.

134. Some warranties exclude only those components warranted separately by the component manufacturer. Prosser believed that exclusions of this nature were unfair to consumers because of the potential obstacles to recovery from the component manufacturer. See Prosser, *supra* note 28, at 1124. Several warrantors in the sample, however, offer to aid the consumer in pursuing component warranty claims.

The parts excluded from coverage in Table 5, however, can be interpreted as those product components most vulnerable to different intensities of use by consumers. The parts typically appear to be either easily breakable—glass and plastic parts, porcelain, phonograph needles—or exterior parts sensitive to scratching, abrasion, or rough use—paint, cabinets, the finish or trim. Differences between consumers in volume of use may affect some of the parts, such as batteries and fuses.¹³⁵

Product parts given coverage less than the standard one-year term are similar.¹³⁶ One range warranty limits coverage of glass and other finishes on the range to a thirty-day period. A stereo warranty limits coverage for defects in cabinets, wood products, plastic protective covering, knobs, dress panels, and trim to a period of ten days. Several warranties offer coverage of porcelain parts and other parts of the finish only until the buyer has completed an initial inspection of the product. These warranties offer some insurance against defects in manufacture or delivery, but they require consumers to determine the existence of such defects within a very short period, before the risk of the consumer's participation in the damage increases substantially.

Many warranties also cover specific product parts for periods well beyond the basic one-year term. Refrigerator, freezer, and air conditioner warranties, for example, commonly offer five-year coverage of the sealed refrigeration system. Similarly, most warranties of washing machines in the sample offer five-year coverage of the machine's transmission. The Airstream travel trailer warranty covers the metal shell, frame, and axle assembly for life to the first owner. Each of the television manufacturers offers two-year coverage of the picture tube.¹³⁷

Again, the selection of these parts for extended coverage cannot be explained convincingly as a form of exploitation or signaling. Yet the parts have two similar characteristics that lend support to the investment theory. First, they are the parts most critical to the continued productive capacity of the good.¹³⁸ The failure of a refrigerator's sealed cooling system, for example, imposes a much greater loss on a consumer than does dam-

135. The exclusion of coverage of the antenna system in the two television warranties is difficult to interpret. The third television warranty, which describes coverage more elaborately, excludes coverage of home antenna systems, rather than coverage of the system that accompanies the individual set. Perhaps the other two warranties are meant to be interpreted similarly.

136. Gerner and Bryant do not discuss such provisions. See *Market Signal*, *supra* note 43.

137. In addition, coverage is offered, in one recreational vehicle warranty, of defects in body lamination for the lifetime of the product; in one air conditioner warranty, of the "Lexan" protective cover for ten years; in one electric range warranty, of the heating unit and surface controls for three years; in one dryer warranty, of the drum assembly for five years; and in one stereo equipment warranty, of the turntable and receiver for two years and of the speakers for five years.

138. Gerner and Bryant make a similar observation, but do not attempt to reconcile it with the implications of the signal theory. *Market Signal*, *supra* note 43, at 82.

age to a tray or shelf. Where the magnitude of the potential loss is greater, consumer demand for a performance bond from the manufacturer—or for insurance¹³⁹—is likely to be greater.

Second, these parts are housed deep within the product, protected by the product's outer shell and often by padding and internal bracing. They are thus likely to be less susceptible to damage from rough handling or careless treatment short of active misuse.¹⁴⁰ These parts, of course, remain subject to differences in the volume of use between consumers—which could explain why the duration of extended coverage is substantially less than most measures of the productive life of the machine.¹⁴¹ But it is plausible that differences between consumers in prevention costs affect these parts less than they do the exterior cover and operating controls of which coverage is shorter.¹⁴²

2. *The Commercial Use Exclusion*

Product warranties commonly deny coverage altogether if the product is put to commercial, rather than to domestic, use. Neither the exploitation nor the signal theory provides a plausible explanation of this exclusion. As a first approximation, the bargaining position of a commercial buyer is equivalent to that of a manufacturer, or at least is much less disparate than the bargaining position of a consumer. Yet it is the commercial buyer rather than the consumer who is excluded from coverage.

The exclusion of commercial use also seems inconsistent with the signal theory. If warranty terms signal the purely technological characteristics of a good at the time of purchase, then there is no reason to distinguish between domestic and commercial buyers. Furthermore, the signal theory suggests that exclusions appear in warranties where the costs of information about the likelihood of losses are relatively high. It stretches the imagination, however, to believe that information about the likelihood of

139. It is very difficult to segregate empirically demand for a performance bond from demand for insurance. The dollar value of many consumer products is sufficiently low to question whether the loading costs of manufacturer-insurance are worth bearing.

140. The manufacturers universally exclude coverage of "defects" caused by consumer misuse.

141. See p. 1327 *supra* (Table 4).

142. Some warranties incorporate provisions limiting coverage of repair parts to the original duration of the warranty. There is no reason why coverage of repair parts, but not of original parts, is an avenue of exploitation. Nor is there a coherent description of how differential consumer information would lead to a distinctive treatment of repair parts.

Two possible explanations of the provision are consistent with the investment theory. First, the interaction of a new part with the remaining used parts, like a new saddle on a horse, could increase the likelihood of product breakdown. Thus, the level of claims regarding even the new part could be differentially greater. Second, the repair itself may indicate a significantly higher intensity of consumer use of some specific product part. Thus, the provision might serve to segregate *ex post*, rather than *ex ante*, those consumers for whom the costs of repair are differentially higher. The provision might also serve to record for the manufacturer exactly when its obligation ends. The costs of accounting for the remaining coverage of repaired items, however, are probably not significant.

product losses is less available to a commercial buyer than to a consumer.

According to the investment theory, an exclusion from coverage reduces differences in risk between purchasers of a product. Commercial purchasers may subject a product both to a greater volume of use over a given period and to a greater intensity of use, especially where the product is rented to others, such as a washer or dryer at a laundromat. A person renting rather than owning a product is less likely to invest in "care" in order to optimize the productive life of the machine.¹⁴³ According to the investment theory, however, the express exclusion of commercial use from warranty coverage is related to other methods a manufacturer may have to segregate consumers by differences in risk, such as differences in model design or selective marketing techniques. Unfortunately, the warranty sample provides no information concerning such alternative methods available to manufacturers.

Within the sample, the warranties of washers, dryers, freezers, and gas ranges exclude commercial use universally; the warranties of some refrigerators (four of five), electric ranges (three of four), televisions (one of three), travel trailers (one of five), recreational vehicles (two of five), coaches (two of five), and truck mounts (two of four) exclude it; and the warranties of cookware, air conditioners, stereos, automobiles, and on-site mobile homes do not exclude commercial use.

The warranty data alone are insufficient to support fully an explanation of these different treatments of the commercial use exclusion consistent with the investment theory. Two limited observations, however, can be made. First, subtle differences in definitions of the commercial use exclusion in various warranties indicate attempts to reduce differences in risk. Several warranties, for example, define coverage in terms of the product's household function rather than of its actual use. Thus, the product is warranted to commercial users, but only to the extent normal for a household. In addition, one refrigerator warranty excludes commercial use only for the extended period of coverage (second through fifth years) of the sealed refrigeration system; commercial and domestic purchasers alike receive warranty coverage for the first year of use. The effect of the more precise definition of the exclusion in these provisions is to extend coverage more broadly for the residual set of consumers.

Second, manufacturers that are able to define the duration of warranty coverage according to the volume of use of the product—manufacturers of automobiles, coaches, and recreational vehicles who can measure warranty duration by mileage—exclude commercial use less frequently, an outcome

143. A renter will invest only to the extent that he can gain the return from the investment during the rental period.

consistent with the investment theory. Of the eight warranties measuring duration by mileage, only one excludes commercial use; in contrast, of the six measuring duration by time, three exclude commercial use. These relationships are not strong, and the distinction remains tentative. It is plausible, however, that a manufacturer reduces the difference in the risks introduced by commercial and domestic users by defining coverage in a way that equalizes differences in rates of use over time between these purchasers. Some difference in risk will persist, of course, because of differences in the intensity of commercial and domestic product use.

3. *Miscellaneous Use and Repair Exclusions*

Several of the sample warranties exclude coverage of miscellaneous uses or types of repairs peculiar to individual products. For example, the Chrysler automobile warranty excludes coverage of repairs resulting from "racing, sustained high speed use, . . . high speed acceleration or shifting transmission gears at high engine RPM." The Midas recreational vehicle warranty excludes coverage not only of all commercial uses but also of personal recreational uses by a club or group. Several of the automotive product warranties exclude repairs that result from carrying heavy loads or hauling trailers. The KLH warranty excludes coverage of the costs of demagnetizing stereo equipment.

None of these various exclusions can be easily explained as serving a signaling function or as reflecting some special exploitative opportunity.¹⁴⁴ The exclusions, however, seem related to uses of the product for which warranty costs are likely to be substantially greater than usual. A club or group, for example, can be expected to subject a recreational vehicle to more intensive use than any single purchaser.¹⁴⁵ Similarly, the strain on an engine or transmission is likely to be greater if an automobile is used for racing rather than for commuting or family driving.¹⁴⁶ This interpretation does not suggest that the products are not or could not be made suitable for uses excluded from coverage, but only that repair costs for these uses are likely to be substantially higher than for average use. A dominant group of consumers not expecting to use the products in these ways may prefer those products sold with the lower insurance premiums made possible by the exclusions.¹⁴⁷

144. Neither the exploitation nor signal theorists have addressed these exclusions.

145. A gas range warrantor incorporates a similar distinction: the 1974 warranty limits coverage to "normal household use." The 1978 warranty for the same product limits coverage more precisely to "normal single family household use." Thus, multiple family household use was excluded in 1978.

146. See Whitford, *supra* note 11, at 1063.

147. The universal exclusion of damage due to consumer misuse is an obvious illustration of the same point.

Provisions that exclude coverage of defects that result from exposure of the product—usually a vehicle—to natural weather or use conditions illustrate the principle in a different way. The Superior coach warranty, for example, excludes coverage if “circumstances beyond the control of the manufacturer . . . cause the body or parts to become defective depending . . . on where and how the owner drives, weather, atmospheric conditions, varying road surfaces, individual driving habits and vehicle usage.” The Swinger truck mount warranty excludes coverage of damage from “deterioration of paint, bright metal or soft trim from wear or exposure or any stains to any surface or fabric . . . regardless of cause.” In addition, the Swinger warranty disclaims responsibility for “the re-caulking of the body periodically, the re-coating of the roof around the vents, . . . [and] the recoating of seams and roof edges.”

The exploitation or signal theory might interpret these provisions as indications that the product is particularly vulnerable to expected weather conditions. The investment theory, on the other hand, suggests two reasons why warranties might exclude deterioration from weather conditions. First, consumers are likely to make different investments to prevent deterioration, such as in the extent to which they garage vehicles or in the frequency with which they clean and wax them. Second, in a national market, individual products are likely to be exposed to weather conditions that differ substantially in severity. For either reason, a dominant set of consumers could prefer the exclusion of coverage of losses to products subjected to deterioration from weather or use. The warranty sample alone, of course, is insufficient to confirm either interpretation. It is instructive to note, however, that the Swinger truck mount warranty does not exclude coverage generally of the repair of all leaks in the roof or body, but only excludes the obligation to repair leaks by the recaulking and recoating of the body and seams after some period of initial use. The need to recaulk a truck mount, as opposed to the need for initial caulking, is likely to differ among consumers according to the extent of exposure to rapid temperature changes or other severe conditions.¹⁴⁸

Finally, the warranties of virtually all products terminate coverage if

148. Similarly, two automobile manufacturers offer basic coverage for 12 months, but restrict to 90 days the obligation to perform engine adjustments. A color television warranty limits coverage of labor costs in adjusting and repairing the set to 90 days. A stereo warranty excludes coverage of stylus wear, dial alignment calibration, and tape head cleaning. The vehicle warranties also commonly exclude coverage of parts frequently replaced in normal maintenance such as spark plugs, filters, and windshield wipers, although coverage is extended to original parts. These provisions illustrate the same principle. All consumers expect to demand *some* level or number of adjustments or maintenance parts, but the level or number may differ substantially according to the intensity of use or the particularity of the individual consumer. As a consequence, some dominant set of consumers who use the product less intensively may express a preference for the exclusion of adjustments and maintenance parts from coverage.

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the consumer modifies or alters the product. Again, such a restriction has no apparent exploitative or signaling function. It is not implausible, however, that the consumer's decision to substitute his own design expertise for that of the manufacturer might lead to higher levels of product failure.¹⁴⁹ The virtually universal provision terminating warranty coverage if repairs are made by an unauthorized service person or shop may be only a special case of the same point.¹⁵⁰

4. *Limitation of Coverage to the Original Purchaser*

Many warranties cancel coverage if the original purchaser sells or otherwise transfers ownership of the product prior to the expiration of the period of basic or extended coverage. These provisions would be consistent with the exploitation theory only in the unlikely event that there exist differences between the bargaining power of purchasers who resell products and of purchasers who retain them for the relatively limited periods of warranty coverage.¹⁵¹ The signal theory provides a more plausible hypothesis. If the buyer is uninformed at the time of the original purchase—either because he does not read the warranty or because he does not consider whether he will later want to resell the product—the original purchaser limitation will mean nothing to him and will not affect his purchase decision.¹⁵² Thus the manufacturer may incorporate freely this limitation into the warranty.¹⁵³ The signal explanation, of course, does not distinguish among individual products; because coverage to subsequent purchasers always imposes some costs, the limitation should appear universally.¹⁵⁴

The investment theory suggests a different explanation. To the extent that the intensity of the first purchaser's use cannot be detected by second-

149. Many warranties specify that the exclusion applies only if the modification contributes to the defect, although others are drafted to exclude coverage if any modification is made. If the modification is unrelated to the defect, the exclusion of coverage may appear exploitative. (But can it be shown to be profit-maximizing?) For a confident conclusion, information is needed about the invocation of the exclusion in practice.

150. The service center requirement may also provide a convenient means for the manufacturer to obtain information about the sources of product defects. The requirement may be particularly important to a manufacturer where the dealer has responsibility for preadjustment or assembly of the product, so that dealer and manufacturer obligations are correctly allocated. The Federal Trade Commission under the Magnuson-Moss Warranty Act, however, has prohibited the requirement in Full warranties because of the fear of tying arrangements. See Priest, *supra* note 65, at 251-52.

151. The service-life expectancy of products appears to be universally more extensive than the term of warranty coverage. See p. 1327 *supra* (Table 4).

152. It is not sufficient, according to this hypothesis, that the buyer at the time of purchase appreciate only some probability of future resale; rather, the buyer must systematically underestimate the likelihood of resale and thus the cost to him of the original purchaser limitation. Spence believes that consumers will systematically underestimate product risks. Spence, *supra* note 42, at 569-71.

153. *Market Signal*, *supra* note 43, at 78-79.

154. See *id.* (by inference).

hand purchasers, those first purchasers who expect to transfer products to others may invest relatively less in care and maintenance or may subject products to a relatively greater volume or intensity of use prior to resale.¹⁵⁵ If so, second-hand items are more likely to require servicing.¹⁵⁶ As a consequence, purchasers who expect to retain products will prefer warranties that limit coverage to the original purchaser in order to remove second-hand items from the warranty pool. This explanation implies that the appearance of the limitation will not be universal but will be correlated, first, with the duration of basic or extended coverage—because the longer the term, the greater the opportunity for the owner to use the good intensively prior to resale—and, second, with the product's susceptibility to reduction in service life from intensive use.

An extension of this theory explains why markets for second-hand goods exist at all for some products and not for others. It is well known that the size of second-hand markets differs dramatically for different goods.¹⁵⁷ The extent of the second-hand market in any product will be determined by the relationship between the difficulty of estimating the remaining productive life of the good and the product's susceptibility to deterioration from intensive use by earlier owners.¹⁵⁸ Theoretical treatments of markets for new and used durable goods have focused exclusively on manufacturers' technological investments in order to demonstrate, in general, that manufacturers in both competitive and monopolistic industries will invest equally in increasing product durability.¹⁵⁹ None of the studies,

155. In economic terms, purchasers expecting to resell resemble renters. See note 143 *supra*. Of course, consumers may decide to resell a product after they discover that they have subjected it to intense use.

156. A similar point is made in Akerlof, *supra* note 38, at 489-91, although his principal illustration assumes differentially inferior technological characteristics of certain items—"lemons"—rather than differential levels of consumer investments. Akerlof considers consumer investments in illustrations of health insurance, honesty, and credit but does not apply the point to products. See *id.* at 492-94, 495-99. Akerlof also remarks that warranties are a means of counteracting the adverse selection problem. *Id.* at 499.

157. A recent study, for example, shows that second-hand typewriters constitute 32.6% of the total typewriter inventory while second-hand clothes dryers constitute only 11.5% and second-hand blenders only 4.5% of the total dryer and blender inventories, respectively. See Roussos & Konopa, *supra* note 119, at 31 (Table 2).

158. The ability to estimate remaining service life and the technological susceptibility of the product to deterioration are related determinants of second-hand markets. As it becomes more difficult to estimate service life, first-owners can employ an item with greater intensity without affecting the resale price of the individual item. Such intense use, however, affects the price of the set of items because the expected service life to second-hand purchasers diminishes.

159. Of course, price is higher in monopolistic industries. See, e.g., Benjamin & Kormendi, *The Interrelationship Between Markets for New and Used Durable Goods*, 17 J.L. & ECON. 381, 388-401 (1974) (competitive and monopolistic manufacturers have similar attitudes towards second-hand markets); Miller, *On Killing off the Market for Used Textbooks and the Relationship between Markets for New and Secondhand Goods*, 82 J. POL. ECON. 612, 613-16 (1974) (comparing prices paid for new and used books in competitive and monopolistic industries); Swan, *Alcoa: The Influence of Recycling on Monopoly Power*, 88 J. POL. ECON. 76, 90-92 (1980) (prices rise when monopoly is achieved in either primary or second-hand market); Swan, *supra* note 115, at 582 (monopolists ensure

however, has considered the role of investments by consumers in influencing the size of the second-hand market¹⁶⁰ or the role of the warranty in influencing optimal investments by consumers.¹⁶¹ The investment explanation suggests that the inclusion of the original purchaser limitation should be inversely correlated (roughly)¹⁶² with the size of the second-hand market. The more susceptible a product is to intensive use, the smaller the second-hand market for the product will be, and the more likely it will be that warranty coverage is limited to the original purchaser.

Table 6 compares the original purchaser limitation in the sample warranties to estimates of the extent of a second-hand market for each appliance. Column (2) lists in declining order the proportion of warranties of each product that incorporates the original purchaser limitation. Column (2) shows that the limitation is far from universal, a result inconsistent with the implications of the signal theory.¹⁶³ Column (3) presents estimates from a study of the proportion of used products among the total market inventory of those products.¹⁶⁴ The two sets of figures appear to support the implication that an inverse relationship exists between the original purchaser limitation and the size of the used-goods market.¹⁶⁵ The limited number of warranties of each product in the sample, however, makes the result only suggestive. Column (4) lists the findings of the Gerner and Bryant study, which fail to support the relationship.¹⁶⁶ A further, more careful study is needed.

greater profits by raising price rather than by reducing quality).

160. The point, however, may be inferred from Akerlof, *supra* note 38, at 489-91, discussed in note 156 *supra*.

161. Most studies have considered goods that are relatively insensitive to consumer use, such as aluminum, see Swan, *supra* note 159, land, see Coase, *Durability and Monopoly*, 15 J.L. & ECON. 143 (1972), and (perhaps, see note 157 *supra*) typewriters, see Benjamin & Kormendi, *supra* note 159.

162. Of course, there are other determinants of the extent of second-hand markets, including changes over time in a particular consumer's demand for a product. For example, of the respective total inventories of their products, second-hand boats comprise 48.3%, pool and ping-pong tables, 38.3%, and cribs, 27.7%. Roussos & Konopa, *supra* note 119, at 31 (Table 2).

163. Of the 62 warranties of the sample, 31 limit coverage to the original purchaser. Of the 106 warranties of the Gerner and Bryant sample, 36 limit coverage to the original purchaser. *Market Signal*, *supra* note 43, at 85 (Table 3). Gerner and Bryant do not attempt to explain why the limitation is not incorporated universally.

164. Roussos & Konopa, *supra* note 119, at 31 (Table 2). The article does not indicate when the survey was conducted.

165. The inverse relationship is obvious, but the second-hand market estimates must be analyzed carefully. Although individual product figures were not given for the sample as a whole, 37% of second-hand products were obtained as gifts rather than by purchase. It is possible that products given to others—say, by parents to children—are used prior to transfer relatively less intensively than products resold. Furthermore, the Roussos and Konopa study was conducted in Cedar Rapids, Iowa, which may contain a population unusually homogenous in various respects including product use. If so, the figures may reflect a larger second-hand market than exists in other cities.

166. I have corrected what appear to be arithmetical errors in the Gerner and Bryant table, *Market Signal*, *supra* note 43, at 85 (Table 3).

Table 6. Original Purchaser Limitation (1974) and Used Product Inventory (1977), by Appliances

Product	(1) N	(2) Original Purchaser Limitation ¹ (percentage)	(3) Used Products in Total Inventory ² (percentage)	(4) Gerner-Bryant Estimates Transfer- ability Limitation ³ (percentage)
Dryers	2	100	11.5	
Televisions	3	66	12.3	38
Stereo Equipment	2	50	12.5	
Washers	5	40	14.4	33
Room Air Conditioners	10	40	29.6	23
Gas and Electric Ranges	6	33	29.4	44
Refrigerators	5	20	27.4	30
Freezers	1	0	25.7	

Sources:

1. Warranties provided by Federal Trade Commission, June 1978.
2. Roussos & Konopa, *Ownership Levels, Acquisitions and Disposition Channels of Selected Consumer Durable Used-Goods*, 8 AKRON BUS. & ECON. REV. 30 (1977).
3. *Market Signal*, *supra* note 43, at 14 (Table 3 (corrected)).

The investment hypothesis may be tested differently by examining the original purchaser limitation in the warranties of automobiles, recreational vehicles, and coaches. The hypothesis implies that the original purchaser limitation is less likely to be incorporated where purchasers who use the product relatively extensively are removed from the warranty pool by defining duration in terms of volume of use (for these products, mileage).¹⁶⁷ Of the eight warranties that define coverage by mileage, two limit coverage to the original purchaser. Of the six warranties that define coverage by periods of time, however, five limit coverage to the original purchaser. This finding tends to support the investment theory.¹⁶⁸

5. *The Allocation of Warranty Labor Charges*

The most basic form of warranty coverage is the promise to provide replacements for parts found to be defective during the warranty term. Most warranties also cover the labor costs necessary to complete the repair; that is, the direct costs of replacing the defective part. Other warranties, however, offer only partial coverage or no coverage of labor charges. Some warranties, for example, cover the costs of the repair itself, but require the consumer to pay the serviceman's travel charges. Many more

167. Mileage can be observed by a second-hand purchaser. Thus, except to the extent of fraudulent resetting of odometers, there is likely to be a less direct relationship between the size of the second-hand market for these products and the incorporation of the original purchaser limitation. Mileage, however, measures only volume and not intensity of use.

168. It is also consistent with the theory that one refrigerator warrantor limits coverage to the original purchaser only for the five-year period of extended parts and labor coverage. Both the original and subsequent purchasers of the refrigerator receive parts and labor coverage for the basic one-year term.

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warranties require the consumer to pay the costs of transporting the defective product to a service center for repair.

Neither the exploitation nor signal theory suggests explanations of the allocation of these various service charges. The signal theory implies, in general, that the assignment will be similar across different products because of the need for uniform signals.¹⁶⁹ Gerner and Bryant find one-year parts and labor coverage in the warranties of at least seventy-one percent of four of the five appliances studied, which they claim confirms the signal theory.¹⁷⁰ They admit, however, that a large number of warranties provide coverage of both parts and labor for periods greater and less than one year. Many warranties offer parts coverage beyond one year, which they explain as the consequence of the lower frequency of invalid claims where coverage above rather than below the average is offered.¹⁷¹ A much larger proportion of their sample warranties, however, restricts labor service coverage below the one-year term, a finding which is inconsistent both with the prediction of uniformity and with the special explanation of parts coverage. Gerner and Bryant explain the less extensive coverage of labor charges as related to the lower costs to the manufacturer of monitoring "warranty claims for invalid labor [as opposed to parts] charges."¹⁷² They also assert that because of the greater dollar magnitude of labor costs than parts costs, "dealers and manufacturers may prefer incurring consumer dissatisfaction" by shifting labor costs to consumers.¹⁷³ There is no plausible explanation consistent with the exploitation theory for differential coverage of parts and labor charges.¹⁷⁴

The warranties of my sample show substantial variations from the uniformity predicted by the signal theory.¹⁷⁵ Like the Gerner and Bryant

169. *Market Signal*, *supra* note 43, at 78-79.

170. In the fifth appliance, washing machines, one-year coverage appeared in 50% of the warranties. *Id.* at 82.

171. *See id.* at 79, 82-83.

172. *Id.* at 82.

173. *Id.* at 83.

174. Is it more exploitative to offer a longer period of labor than parts coverage, or the reverse? It is commonly thought that manufacturers exploit consumers by charging high prices for repair parts. Consumers seem especially vulnerable because of the difficulty of finding substitute parts designed specially to fit certain products. Substitutes for labor services to replace the parts, however, are available at any service shop. Thus, it is inconsistent with the exploitation theory that, to the extent parts and labor coverage differ, the warranties in the sample universally offer longer parts than labor coverage. In addition, some manufacturers guarantee that replacement parts will be kept in stock. The Roper range warranties, for example, promise to stock functional parts for ten years and nonfunctional parts for seven years.

175. My warranty sample confirms the uniformity hypothesis only by a superficial reading. If only the basic term of coverage is examined—that is, if one ignores provisions extending or restricting coverage of either parts or labor—then 41 of the 61 warranties provide coverage for one year. On the other hand, if the provisions extending or restricting parts and labor coverage are included, only 12 of the 61 warranties provide one-year parts and labor coverage. Most of these 12 warranties are of vehicular products. One-year coverage of all parts and labor expenses is offered by 9 of the 23 vehicu-

sample, most common are warranties that offer shorter periods of labor than of parts coverage. The investment theory implies that manufacturers will allocate labor charges in order to reduce differences between consumers in the expected magnitude of those charges.

Table 7 indicates warranties that distinguish coverage of labor and parts charges. Columns (2) and (4) indicate the number of warranties of which the period of labor coverage is less than the period of parts coverage—in column (2) for the basic term and in column (4) for the extended term of coverage. The warranties of washers, air conditioners, televisions, dryers, on-site mobile homes, and, occasionally, vehicular products most frequently offer more restricted labor than parts coverage. There are no immediately apparent similarities among these products, although some more limited observations suggest an investment theory explanation.

First, the allocation to the consumer of labor charges may be related to the availability of service contracts. Many warranties allude to optional service contracts that cover labor expenses for periods beyond those of warranty coverage.¹⁷⁶ The option of a separate service contract suggests an interpretation different from those of the exploitation or signal theories. Where a separate service contract is available, a consumer can determine independently whether the additional labor coverage is worth the price. The separate offer of labor coverage, for a separate price, reduces the warranty premium tied to the sale of the basic product and thus may optimize insurance sales. Only one of the sample warranties incorporates the terms of the optional service contract. The Emerson air conditioner service contract offers in-shop coverage of the sealed refrigeration system for four years beyond the one-year warranty term at a price of five dollars. Although I have no basis for evaluation, the price seems remarkably low for the coverage offered and illustrates that the Emerson company believes that most consumers prefer air conditioners with one year of labor coverage and a five dollar discount than five years of labor coverage at the higher price. Those consumers who prefer longer coverage, then, can transact for it separately.

Second, the exclusion of coverage of service call and transport charges may be consistent with the investment theory. These costs are likely to differ among consumers according to the distance between the consumer's

lar product warranties, but by only 1 of the 34 appliance warranties and by 2 of the 4 on-site mobile home warranties. A peculiar theory of consumer information must be fashioned to regard the similarity between these 12 warranties as a signaling phenomenon.

176. Service contracts, typically, are sold separately; they were not provided with the sample warranties.

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Table 7. Parts & Labor Coverage, Transport Coverage, and Exclusion of Damages by Firm, 1974

(1) Product	(2) N	(3) Basic Labor< Parts	(4) Duration Extended Parts (years)	(5) Excluded Labor< Parts	(6) Exclude Service Call	(7) Exclude Transport	(8) Foreign Exclusion	(9) Disclaim- Merchant- ability	(10) Exclude Conse- quential Damages
Cookware	1	n.a.*	n.a.*	n.a.*	n.a.*	1	0	0	0
Refrigerators	5	0	5	0	1 (total)	3	4	1	1
Freezers	1	0	5†	0	2 (after 1 year)	1	1	0	0
Gas Ranges	2	0	0	n.a.	1 (total)	0	1	0	0
Electric Ranges	4	1	3	1	1 (total)	1	2	0	0
Washers	5	3	(1 manufacturer)	4	3 (after 1 year)	1	3	0	0
Dryers	2	0	(4 manufacturers)	2	1 (total)	1	2	2	2
Room Air Conditioners	10	3	5†	3	2 (after 1 year)	5	7	2	2
Color Televisions	3	1	2	3	4 (total)	1	3	0	0
Stereo	2	0	5, 2	0	1 (after 2 years)	2	0	1	0
Automobiles	4	0	(1 manufacturer)	n.a.	2 (total)	3	3	3	3
Recreational Vehicles	5	1	0	n.a.	3 (total)	5	0	4	5
Coaches	5	1	0	n.a.	1 (after 1 year)	5	0	4	4
Truck Mounts	4	1	0	n.a.	5 (total)	4	0	2	3
Travel Trailers	5	1	0	n.a.	4 (total)	5	0	3	2
On-site Mobile Homes	4	2	0	n.a.	5 (total)	2	0	2	1

* The single cookware manufacturer promises to replace the entire product if it fails during the warranty period. As a consequence, labor charges are irrelevant.
† I include firms whose term of basic coverage is 5 years.

Source: Warranties provided by Federal Trade Commission, June 1978.

home and the manufacturer's service center.¹⁷⁷ For products sold nationwide, some consumers may live a sufficient distance from a service center to affect significantly total service call and transport costs. Consumers located more centrally may find it cheaper to bear service call and transport charges themselves than to purchase coverage for such charges in a warranty. In the sample, fifty-four of sixty-one warranties exclude service call charges for some period of warranty coverage, and thirty-six of sixty-one exclude service call charges completely (column (5)). Forty of sixty-two warranties exclude coverage of transport charges (column (6)).

Service call and transport charges also seem to influence provisions that limit warranty coverage on the basis of the location of the product at the time it becomes defective. Many warranties provide that coverage is available only if the product is located within the United States and Canada, within the United States alone, or within the contiguous United States (excluding coverage in Alaska and Hawaii). The exploitation and signal theories offer no ready explanation of these exclusions. All warranties in the sample were collected from sources within the contiguous states. The purchasers affected, thus, are not necessarily foreigners, who might be especially vulnerable or uninformed, but rather individuals who purchase the product within the United States for foreign transport. Furthermore, it is implausible that Canadians, Alaskans, or Hawaiians, as classes, are more easily exploited or less able to process product information.

These exclusions might possibly be related to substandard performance of electrical or water utilities in these locations, an explanation consistent with the investment theory. Many warranties, however, specifically exclude coverage of defects caused by abnormal electrical supply or mineral deposits. Nevertheless, I cannot reject this explanation.¹⁷⁸

In my view the location exclusions are related to service call and transport charges. It is not implausible that charges are high relative to the mean for a serviceman to travel or for the good to be transported within foreign countries, across the expanses of Alaska or between the various Hawaiian islands, and are especially high for transport to the contiguous

177. The allocation to the consumer of various labor charges resembles coinsurance or deductible provisions in more typical insurance contracts. Coinsurance requires the insured to pay some share of the total expense of each claim. An insurance deductible, on the other hand, requires the insured to pay upon recovery some initial fixed amount, unrelated to the magnitude of the claim. The obligation to pay the labor costs of repairing a defect resembles coinsurance, because the payment that the consumer makes is likely to vary with the seriousness of the defect. The consumer's obligation to pay the serviceman's travel charges to the site of the product or the cost of transporting the product to a service center resembles an insurance deductible. The cost is incurred for each claim, but is fixed and, thus, unrelated to the seriousness of the defect. Coinsurance and deductibles, of course, are common methods of placing incentives on the insured to take precautions to avoid losses.

178. The foreign use exclusions are not incorporated universally in the warranties. Thus, it is not likely that they are related to differences in warranty law between jurisdictions.

states. This explanation does not presume that these locations lack dealers or service centers, but only that the distance between service centers and consumers is relatively greater—perhaps only because there are fewer centers—in these locations than in the contiguous United States. Again, both manufacturers and the dominant set of consumers may gain by shifting these charges to foreign buyers who can differentially invest to prolong service life, rather than by increasing the insurance premium for all buyers to cover the additional costs peculiar to this relatively small set.

This hypothesis implies that manufacturers are more likely to exclude foreign coverage if the warranty allocates transport charges to the manufacturer than to the consumer. The evidence from the sample is generally consistent. Of twenty-two warranties allocating transport costs to the manufacturer, fourteen exclude foreign coverage (sixty-four percent). On the other hand, of forty warranties allocating transport charges to consumers, twelve exclude foreign coverage (thirty percent). Examined differently, of sixty-two warranties, twenty-six exclude foreign coverage and twenty-eight require consumers to pay transport charges. Only eight warranties in the sample provide foreign coverage of transport charges. Similarly, only thirteen of the sixty-two sample warranties provide coverage of transport charges from Canada. Finally, several warranties incorporate separate terms offering coverage in Alaska and Hawaii, but specifically excluding coverage of transport charges from these locations.

6. *The Disclaimer of the Implied Warranty of Merchantability and the Exclusion of Consequential Damages*

The Uniform Commercial Code implies a warranty of merchantability in all sales contracts.¹⁷⁹ The warranty requires that the item be of sufficient quality to “pass without objection in the trade” and that it be “fit for . . . ordinary purposes.”¹⁸⁰ The Code allows a disclaimer of the warranty of merchantability provided that certain technical requirements are met.¹⁸¹ At the time the warranties in the sample were issued, however, such a disclaimer was prohibited by statute in several states and was rendered ineffective by judicial decision in many others.¹⁸² If the warranty of merchantability or any other general warranty is breached, the Code awards the buyer the costs of repairing or replacing the product as well as

179. U.C.C. § 2-314(1).

180. *Id.* § 2-314(2)(a), (c).

181. *Id.* § 2-316.

182. See Clark & Davis, *Beefing Up Product Warranties: A New Dimension in Consumer Protection*, 23 U. KAN. L. REV. 567, 577-97 (1975). Unfortunately, I have no information about the particular sales areas of the sample products.

consequential damages.¹⁸³ Consequential damages represent losses that result from the inability of the buyer to make use of the product for a purpose that could be anticipated by the seller.¹⁸⁴ In modern times, consequential damages of the greatest magnitude occur where product failure causes personal injury, and may include hospitalization costs, disability income, and the value of pain and suffering.

The disclaimer of the warranty of merchantability has always appeared suspect. It seems peculiar for a manufacturer to deny openly that its product can "pass without objection" or is ordinarily fit. Indeed, the attitude of manufacturers toward what appears to be an unexacting standard has provided substantial fuel for both the exploitation and signal theories. The disclaimer of a warranty of no greater than ordinary product quality appears quintessentially exploitative.¹⁸⁵ Similarly, such a disclaimer displayed conspicuously in a product warranty¹⁸⁶ seems to corroborate the signal theory's assumption that consumers are ignorant of warranty terms at the time of purchase.

The exploitation theory implies that all manufacturers will both disclaim the implied warranty of merchantability and exclude coverage of consequential damages. The implication of the signal theory is similar, except that the disclaimer and exclusion derive from consumer ignorance rather than more typical sources of monopoly power. The investment theory, however, suggests different interpretations of the two provisions. The effect of the legal implication of the warranty of merchantability is to delegate to a jury the judgment of what are the "ordinary" purposes to which a product may be put. A jury may appreciate the class of consumers and uses for which the product is designed. But if the jury errs, its verdict will charge a manufacturer for the failure of a product to satisfy a use not preferred by the dominant class of consumers, making both the class of consumers and the manufacturer worse off. Manufacturers whose

183. U.C.C. §§ 2-713(1), -714(3). In addition, the Code awards incidental damages, which include the costs of inspecting or storing a defective product, arranging for its repair, or buying a replacement. *Id.* § 2-715(1); see J. WHITE & R. SUMMERS, *supra* note 2, § 10-3 (surveying case law defining incidental damages).

184. See U.C.C. § 2-715(2); see J. WHITE & R. SUMMERS, *supra* note 2, § 10-4 (surveying case law defining consequential damages).

185. According to the New Jersey Supreme Court, Chrysler Motor's reliance on a disclaimer of implied warranties and on an exclusion of consequential damages to deny Mrs. Henningsen recovery for her injuries most clearly revealed the operative characteristics of modern warranties. *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 388, 405, 161 A.2d 69, 85, 95 (1960); see p. 1302 *supra* (discussing *Henningsen*). Following *Henningsen*, most jurisdictions have routinely disregarded product warranty terms where a consumer suffers personal injury. See Whitford, *supra* note 20, at 127 (in automobile defect cases involving personal injury, courts have applied strict liability theory, and disclaimer of liability clauses have insignificant role). Thus, the consequential damages excluded by the sample warranties are only commonplace forms of property loss, lost time, or inconvenience. See pp. 1350-51 *infra* (discussing implications of investment theory for personal injury liability).

186. See U.C.C. § 2-316(2) (requiring conspicuous display).

Warranties

products have a wide range of potential uses are exposed to greater risk from this delegation and will be more likely to disclaim the implied warranty of merchantability.¹⁸⁷ On the other hand, manufacturers will exclude consequential damages where the expected differences among consumers in consequential losses are high.

Columns (8) and (9) of Table 7¹⁸⁸ list the number of warranties that disclaim the implied warranty of merchantability and exclude consequential damages.¹⁸⁹ The disclaimers and exclusions are far from universal. Of sixty-two warranties, only twenty-four disclaim merchantability and only twenty-three exclude consequential damages. Furthermore, none of the manufacturers within six of the sixteen product groups disclaims merchantability and none within seven of the sixteen groups excludes consequential damages. These figures, of course, are inconsistent with both the exploitation and signal theories. Moreover, the data tend to refute the exploitation and signal hypotheses in other ways. We have seen that there is little apparent relation between firm market power and disclaimers or exclusions.¹⁹⁰ Furthermore, the distribution of disclaimers and exclusions does not seem to correspond to coherent estimates of the level of consumer information. Why should purchasers of dryers, automobiles, recreational vehicles, and coaches be systematically less informed about disclaimers and exclusions than purchasers of washers, televisions, ranges, and mobile homes?

Upon closer examination of the data, it is warranties of the vehicular products that most frequently disclaim the warranty of merchantability and exclude consequential damages. The warranty of merchantability is disclaimed in sixteen of twenty-three vehicular product warranties, as compared with only six of thirty-four appliance warranties and two of four mobile home warranties. Similarly, consequential damages are excluded in seventeen of twenty-three vehicular product warranties, but in only five of thirty-four appliance warranties and in one of four mobile home warranties.¹⁹¹ With respect to the disclaimer, the range of potential uses may be greater for vehicular products than for appliances such as ranges, washers, and televisions.¹⁹² Moreover, the vehicular product war-

187. Provisions naming the manufacturer as the sole judge of whether a product is defective serve the same function. See Marshall, *supra* note 94, at 883; Pauly, *supra* note 104, at 61.

188. See p. 1341 *supra* (Table 7).

189. Incidental damages are excluded by 11 of 62 firms. The exclusion may be related to the allocation of service costs since the costs of a repair are considered as incidental damage. Nine of 11 warranties that exclude incidental damages place liability for transportation costs on the consumer.

190. See p. 1325 *supra* (Table 3).

191. The disclaimer of merchantability is not always accompanied by an exclusion of consequential damages. Of 24 warranties that incorporate at least one of the provisions, however, 18 warranties both exclude consequential damages and disclaim merchantability.

192. I have no explanation, however, for the occasional appearance of the disclaimer in the war-

warranties are those which most frequently incorporate exclusions of specific uses, such as racing, towing, or hauling heavy loads.¹⁹³

Similarly, differences among consumers in the potential magnitude of consequential damages may be greater for vehicular than for other products. Many vehicular warranties enumerate several elements of loss stemming from the incapacity of the vehicle—loss of time, meals, lodging, the cost of a rental car—that are specifically excluded from coverage. The magnitude of these losses, of course, varies with the driving patterns of each consumer. A more significant element of consequential loss is damage to property where a defect leads to a traffic accident. The exclusion of recovery for this loss, however, is likely to reflect only the relative superiority of consumer self-insurance—by means of an accident or collision policy more carefully designed to the individual's needs.¹⁹⁴ These explanations of the data, however, are only suppositions. They cannot be confirmed or refuted from the warranty sample.

C. *How Consumers May Register Preferences*

It is a common belief that warranty content has little influence on consumer purchase decisions because a consumer only learns warranty terms after purchase or after discovery of a defect.¹⁹⁵ This belief has been closely connected with the exploitation theory;¹⁹⁶ it explains how a manufacturer is able to impose one-sided warranty terms. The signal theory also accepts the proposition in large part: although consumers may possess some general warranty information prior to purchase, they remain totally ignorant of large numbers of significant provisions.¹⁹⁷ Thus, according to both the exploitation and signal theories, there is little relationship between consumer preferences and warranty terms.

The actual influence of consumer preferences, of course, is an empirical question. Neither exploitation nor signal theorists have compiled direct empirical support for the absence of influence. The strongest direct evidence, perhaps, derives from introspection. Most of us can recall occasions as consumers in which we have been uninformed about warranty content at the time of purchase. If the large majority of consumers behave similarly, how is it possible, even in competitive product markets, for consumer preferences to influence the way manufacturers draft warranties?

warranties of refrigerators (1), dryers (2), room air conditioners (2), and stereo equipment (1).

193. See p. 1333 *supra*.

194. See pp. 1350-51 *infra* (discussing superiority of self-insurance).

195. See, e.g., Staff Report on Consumer Product Warranties, House Interstate and Foreign Commerce Comm. 13 (Sept. 17, 1974) (on file with *Yale Law Journal*).

196. See pp. 1300-01 *supra*.

197. See pp. 1303, 1305 *supra*.

Warranties

Competition with respect to warranty content may take two forms. First, manufacturers compete, not over the entire set of consumers, but over the set of marginal consumers. If a small group of consumers reads warranties and selects among products according to warranty content, manufacturers may be forced to draft warranties responsive to the group's preferences, even though the large majority of consumers generally neglect warranty terms. Second, warranty content may affect the repeat purchase rather than the initial purchase decision. A consumer may select among competing brands according to his experience with a specific product and with its warranty.¹⁹⁸ If so, manufacturers may be forced to draft warranties responsive to consumer preferences in order to assure a continued custom.¹⁹⁹

The warranty sample provides only indirect (but highly suggestive) evidence that consumer preferences for allocative investments and insurance influence warranty terms. Further empirical study is needed for a precise definition of the process of competition over warranty provisions.

IV. Implications of the Investment Theory

The previous Part shows, I believe, that the investment theory explains warranty practices more comprehensively than either the exploitation or signal theory. The evidence tends to confirm that the allocation of responsibilities between manufacturers and different sets of consumers by standardized warranties is responsive to consumer preferences, and establishes coherent economic incentives for manufacturer and consumer investments to optimize productive services. Further research, of course, is required before a confident conclusion can be reached. If, however, the validity of the investment theory is presumed, that is, if manufacturers and consumers invest to optimize productive services, what have been the effects of modern judicial and legislative policies with respect to consumer product warranties?

A. *Optimal Prevention and Insurance*

Courts have accepted the view that manufacturers employ standardized

198. A consumer, of course, may also rely on the advice of family members or friends with respect to their experience with product warranties.

199. To the extent that its content is influenced by repeat purchase decisions, the warranty operates as a guide to the service and insurance that a warrantor will provide rather than as a performance bond. *See* p. 1309 *supra*. A warranty is necessary as a performance bond only where the consumer fears that after purchase, the manufacturer will refuse service or insurance if the product is defective. A manufacturer seeking repeat purchasers, of course, could not consistently refuse such performance. The warranty may continue to serve as a performance bond, however, to first-purchasers.

warranties to exploit consumers,²⁰⁰ and they have responded to exploitative behavior in two ways. Courts have interpreted sales transactions to provide more extensive warranty protection to consumers than the manufacturers themselves have offered voluntarily. The implication of warranties of merchantability and fitness—as well as the prohibition on disclaiming these warranties—and the expansion of the set of beneficiaries of warranties by the elimination of the privity of contract requirement are examples. In addition, courts have refused to give effect to manufacturer attempts to segregate consumers by the level of risk they bring to the warranty pool. Courts have refused to enforce warranty provisions that limit remedies and that exclude consequential damages, in particular, personal injury damages for which manufacturers are now strictly liable.

The implications of the investment theory with respect to these developments are clear: the warranty coverage required by courts is suboptimal and increases the likelihood of product defects. It is well-established that if, in a competitive market, consumers have different accident probabilities, sales of contracts to insure—or to invest to reduce the probability of loss—are optimized where the seller segregates consumers according to levels of risk and sells each class of consumers a separate contract at a separate premium reflecting the accident probability of the class.²⁰¹ If sellers are prevented from segregating consumers according to risk levels, however, both manufacturers and consumers are worse off. First, there may be no single insurance-allocative investment contract that satisfies the preferences of both low- and high-risk consumers.²⁰² Put another way, at a common premium, losses may be so disparate as to be uninsurable. Second, even if a manufacturer can devise some single insurance-allocative investment package that is attractive to some high- and low-risk consumers, such a contract is likely to satisfy the preferences of these consumers less fully than would separate contracts. Rothschild and Stiglitz have shown that a single contract of this nature is likely to make high-risk consumers no better off than would separate contracts, but will make low-risk consumers worse off.²⁰³

In limiting the segregation of consumers, courts and legislatures have focused primarily on the remedial provisions of warranties—for example, the exclusion of consequential damages, in particular, personal injury

200. See p. 1302 *supra*.

201. See, e.g., Rothschild & Stiglitz, *supra* note 104, at 629.

202. Akerlof, *supra* note 38, at 492-94; Rothschild & Stiglitz, *supra* note 104, at 637. For ease of exposition, I discuss two risk levels, but the proposition holds for the grouping of any set of consumers for which the risk of loss differs.

203. Relatively low-risk consumers are worse off because the premium (and perhaps the amount of insurance available) are higher than if separate contracts were offered. Rothschild & Stiglitz, *supra* note 104, at 638.

damages. Subject to competitive pressures, manufacturers may be expected to respond to these legal constraints by canvassing the range of alternative techniques for identifying and segregating different risk classes. It is possible that some of the provisions discussed above²⁰⁴ that serve to segregate different uses or consumers of products were introduced in response to the extension of general warranty liability and the suppression of other risk segregating methods. The term of basic coverage itself segregates consumers by risk levels if consumers with different accident probabilities demand different quantities of insurance.²⁰⁵ The one-year basic warranty term may be especially common because it represents, given judicial and legislative restrictions on other forms of risk segregation, a common minimum point at which the insurance preferences of high- and low-risk consumers converge.

A third implication of the investment theory is more striking and suggests another method of testing the theory. The investment theory regards consumer investments to prolong the life of a product as a substitute for manufacturer investments to prolong product life.²⁰⁶ The warranty allocates responsibilities between the parties according to the relative costs of these investments; that is, the warranty allocates responsibilities to (places liability on) consumers where the marginal cost of consumer investments is lower than the marginal cost of manufacturer investments. Judicial decisions expanding the manufacturer's warranty liability lead, however, to the substitution of manufacturer investments for consumer investments. It follows that judicial decisions lead to the substitution of more costly investments in place of less costly investments and, thus, increase the marginal cost of investments to prolong product life. As the price of prolonging product life (or any commodity) increases, the quantity of it demanded declines. Therefore, judicial decisions expanding the warranty liability of manufacturers will lead, at the margin, to fewer investments that serve to prolong product life and to prevent defects than before. As a consequence, product life will diminish and fewer defects will be prevented. Although seemingly ironic, the investment theory implies that the judicial expansion of manufacturer warranty liability diminishes product life and increases the rate of product defects.²⁰⁷

204. See pp. 1328-46 *supra*.

205. See p. 1319 *supra*.

206. See pp. 1309-11 *supra*.

207. Increased costs may lead to the sale of fewer products. As a consequence, the absolute number of defects may decline, although the rate of defects in those products sold will increase. The total social loss from and increase in the defect rate, of course, must also consider those losses to third parties previously disregarded by consumers in their purchase decisions.

The investment theory suggests that legal rules regarding warranties are inefficient, a finding inconsistent with Professor Posner's hypothesis of common-law rule efficiency. See R. POSNER, *supra* note 29, at 179-81. Many of these rules—the implication of warranties by law, restrictions on privity of

B. *The Investment Theory, Personal Injury Loss, and Strict Liability*

The most dramatic development in product warranty law in the last two decades is the abandonment of principles of warranty interpretation and the adoption of a strict liability standard in cases involving personal injury from a defective product. Crucial to the adoption of the strict liability standard is the empirical assumption that consumers can take no action to prevent personal injury loss.²⁰⁸ Given the assumption, it is difficult to justify warranty provisions excluding recovery for personal injury damages.

Consumers, however, may prefer the exclusion of personal injury losses from warranty coverage for various reasons. If personal injury losses, like other forms of product loss, differ substantially among consumers of a product, those consumers for whom the risk is relatively low may be better off if no personal injury coverage whatsoever is offered. First, contrary to the empirical assumption of the policy of strict liability, consumers may differ with respect to the precautions that they take or the care with which they use the product. Again, actions "preventing" (reducing the probability of) personal injury loss may take subtle forms. Consumers who take care, say, not to use machine products in the presence of bystanders²⁰⁹ or who use such products only infrequently may subject the warranty pool to a substantially lower level of risk than more intensive users. This class of consumers may demand the exclusion of personal injury losses from warranty coverage, and if the class is sufficiently large, manufacturers might find that competition requires incorporation of the exclusion.

The exclusion of personal injury losses can optimize investments to reduce the probability of product losses and to insure in a second way. Product insurers are seldom able to obtain information about individual consumers that health, home, and automobile insurers commonly employ to define optimal risk classes.²¹⁰ In general, product insurers must treat all consumers as equals and charge each a warranty premium reflecting the average risk level of the pool. The individual information collected in other insurance contexts, however, may be effective in segregating optimal classes for product insurance. If so, it would optimize insurance sales to

contract—derive from the nineteenth or early twentieth centuries, a period from which Posner draws much of the support for his hypothesis.

208. See, e.g., James & Dickinson, *supra* note 87, at 780.

209. This situation suggests how the requirement of horizontal privity of contract may serve to reduce differences in risk. The requirement culls from the warranty pool family members, guests, and bystanders. The number of such individuals exposed to risk from a product defect may vary substantially among consumers. If the dominant class of consumers infrequently operates products in the presence of third parties, the privity rule may optimize product sales.

210. See p. 1315 *supra*.

offer product liability coverage as an aspect of health, home, or automobile insurance, rather than as a separate policy tied to the sale of each product.²¹¹ An insurer could charge a lower than average premium to a consumer for whom the risk of loss or the magnitude of expected damage is relatively low, such as a consumer who is employed as a manual laborer, earns a wage rather than a salary, makes lower than average earnings, or has a small family or relatively less valuable possessions. Again, it is the consumer who subjects the pool to relatively low levels of risk—whether the low level of risk derives from relative carefulness or from a lower expected dollar loss from a disabling accident—who is most harmed by lumping consumers into a single product insurance pool. Thus the adoption of a strict liability standard has a regressive redistributive effect. Consumers who are more careless or earn higher than average incomes are those for whom the warranty premium is less than the level of risk that they introduce into the pool and are therefore the beneficiaries of the strict liability standard.

The implications of involuntary manufacturer liability for personal injury losses are similar to the implications of the expansion of warranty liability generally.²¹² Most significantly, at the margin, consumer investments and manufacturer investments are substitute means of reducing the probability of defects causing personal injury. As a consequence, the shift to manufacturer liability increases the cost of these investments. Fewer investments to prevent personal injury losses are likely to be made. Again, the adoption of the strict liability standard is likely to have increased the rate of personal injury losses from defective products.²¹³

Conclusion

The superior predictive ability of the investment theory over the exploitation and signal theories could result from the greater empirical significance, at the margin, of the determinants of the investment theory. I do not believe, however, that sufficient evidence has been compiled to support such a conclusion. Rather, the superiority of the investment theory with respect to warranty content derives, in my view, from the nature of the determinants of the theories. The determinants of the investment theory are the costs of warranty coverage and differences in costs between consumers; the determinants of the exploitation theory, the relative bargain-

211. The standard homeowner insurance policy offers coverage of various losses from defective products, such as explosion or electric shock. INSURANCE INFORMATION INSTITUTE, *SAMPLE INSURANCE POLICIES* 14 (1975). I am indebted to Richard Epstein for this observation. Of course, most automobile policies provide coverage of various losses that result from a defective automobile.

212. See pp. 1348-49 *supra*.

213. See note 207 *supra*.

ing position of manufacturers and consumers; and the determinants of the signal theory, the level of consumer information.

The determinants of the investment theory differ from the others in two important respects. First, the costs of warranty coverage are more easily defined and measured than either relative bargaining position or the quantum of consumer information. As a result, the investment theory's implications are likely to be both more precise and more readily verified or refuted. Market share and concentration measures, for example, are too crude to demonstrate any relationship between bargaining power and warranty content.²¹⁴ Similarly, although it is admittedly costly for consumers to obtain information about product reliability, it is difficult to judge how costly it is and what alternative sources of information are available. The more specific implications of the signal theory thus have no verifiable basis. The implication that consumers generalize information from a range of products requires a belief that consumers cannot read individual product warranties to obtain current and specific information directly.²¹⁵ In addition, the distinction between basic warranty terms that serve a signaling function and exclusions that consumers ignore is arbitrary. Neither of these implications can be refuted within the terms of the theory itself. Gerner and Bryant justify several of the implications by comparing the relative benefits to consumers with the costs to manufacturers of provisions and exclusions.²¹⁶ But if the benefits and costs of a provision determine consumer perceptions of the provision, then the study of benefits and costs, rather than of perceptions, will provide the most accurate method of predicting warranty practices.²¹⁷

The second important advantage of the determinants of the investment theory over those of the alternative theories is that aspects of design, manufacture, and use of a product are more likely to be determined by costs than by relative bargaining position or consumer information. As a consequence, a theory based upon costs allows the immediate comparison of warranty practices to other production decisions and, thus, is more comprehensive than competing theories. It is the generality of costs as the determinant of warranty content that generates the rich and diverse implications of the investment theory.

214. See pp. 1322-25 *supra* (Tables 1-3).

215. See note 58 *supra* (related criticism of signal theory).

216. *Market Signal*, *supra* note 43, at 78-79.

217. The signal theory, in addition, does not provide a comprehensive theory of consumer perception. For example, the theory offers no insight into the relationship between manufacturer investments in establishing a reputation or brand name and in offering warranty coverage as signals of product reliability.