VERTICAL RESTRAINTS WITH HETEROGENEOUS RETAILERS

DISSERTATION

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By

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Dedication

To Laura,
for taking me
the way I am;
and
To Howard,
for not.
Acknowledgements

"More is thy due than more than all can pay." I lean on these words from Shakespeare to express my gratitude to Howard P. Marvel, just as I have leaned on him throughout the entire process of generating the contents of the pages which follow. He has been much more than advisor - motivator, sounding board, critic, friend, and, most significantly, teacher. For these services, as well as many others, I remain eternally in his debt.

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# Table of Contents

Acknowledgements ........................................ iii
Vita ......................................................... iv
List of Tables ................................................ vii

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>II. Literature Review</td>
<td>6</td>
</tr>
<tr>
<td>III. The Model</td>
<td>19</td>
</tr>
<tr>
<td>III.1 The Modelling Framework</td>
<td>19</td>
</tr>
<tr>
<td>III.2 Consumers and The Share Function</td>
<td>22</td>
</tr>
<tr>
<td>III.3 Vertical Integration</td>
<td>24</td>
</tr>
<tr>
<td>III.4 Free Trade</td>
<td>26</td>
</tr>
<tr>
<td>III.5 Exclusive Territories</td>
<td>30</td>
</tr>
<tr>
<td>III.6 RPM: pre-entry</td>
<td>34</td>
</tr>
<tr>
<td>III.7 RPM: post-entry</td>
<td>39</td>
</tr>
<tr>
<td>III.7.1 Entry by Discounters</td>
<td>40</td>
</tr>
<tr>
<td>III.7.2 Potential Entry by High Service Retailers</td>
<td>43</td>
</tr>
<tr>
<td>III.7.3 Joint Entry</td>
<td>46</td>
</tr>
<tr>
<td>IV. Evidence from Litigation on the Incidence of Vertical Restraints</td>
<td>53</td>
</tr>
</tbody>
</table>
IV.1 The Data ........................................ 58
IV.2 Testing for Dependence ......................... 59

V. Conclusion .......................................... 63

Appendices

A. Description of the Data ............................. 66
B. Tables .............................................. 70

List of References ..................................... 81
List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contingency Table</td>
<td>60</td>
</tr>
<tr>
<td>2. Contingency Table - Excluding Duplicate Cases</td>
<td>61</td>
</tr>
<tr>
<td>3. 2x2 Contingency Table - Excluding Duplicate Cases</td>
<td>62</td>
</tr>
<tr>
<td>4. Model Results</td>
<td>71</td>
</tr>
<tr>
<td>5. Model Results</td>
<td>72</td>
</tr>
<tr>
<td>6. RPM only - low λ</td>
<td>73</td>
</tr>
<tr>
<td>7. RPM only - high λ</td>
<td>74</td>
</tr>
<tr>
<td>8. ET only - high λ</td>
<td>74</td>
</tr>
<tr>
<td>9. RPM and ET - low λ</td>
<td>75</td>
</tr>
<tr>
<td>10. RPM and ET - high λ</td>
<td>75</td>
</tr>
<tr>
<td>11. ET only - low λ</td>
<td>76</td>
</tr>
<tr>
<td>12. ET only - high λ</td>
<td>76</td>
</tr>
<tr>
<td>13. Not Guilty/Summary Judgment Cases</td>
<td>77</td>
</tr>
<tr>
<td>14. Franchise Cases</td>
<td>78</td>
</tr>
<tr>
<td>15. Maximum RPM Cases</td>
<td>79</td>
</tr>
<tr>
<td>16. Horizontal Price Fixing Cases</td>
<td>79</td>
</tr>
<tr>
<td>17. Regulation Challenge Cases</td>
<td>80</td>
</tr>
<tr>
<td>18. Miscellaneous Excluded Cases</td>
<td>80</td>
</tr>
</tbody>
</table>
Chapter I

Introduction

Manufacturers of a wide variety of products often desire retailers to provide some types of pre-sale services in conjunction with offering their brands for sale. Such demand enhancing services range from in-store demonstrations by knowledgeable salesmen to quality or fashion certification by retail establishments\(^1\) and have been utilized in the promotion of products as diverse as perfume and rifles.\(^2\) The salient characteristic of these services is that a consumer may benefit from them without necessarily purchasing the product from the dealer who provided the service. For example, nothing prevents a consumer from purchasing a product at a discount dealer after having visited a high quality retailer to learn of the product's utility from a specially trained technician. The discounter is able to offer the lower retail price since it need not recover the expenditures associated with the technician. Because of this "free-rider" problem, the manufacturer must devise some mechanism to protect its dealers' investments in these desirable pre-sale services.

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\(^1\) The former type of services are described in detail in Telser (1960), the latter in Marvel and McCafferty (1984).

\(^2\) See Overstreet (1983) and Ippolito (1988) for a thorough listing of the types of products for which such services have been employed.
Two commonly proposed remedies for this predicament are minimum resale price maintenance (RPM) and dealer exclusive territories (ET). By specifying a retail price below which no retailer may sell the product (RPM), the manufacturer prevents any retailer from luring potential customers away from rivals with lower prices. Alternatively, granting a retailer an exclusive territory removes all potential free-riding retailers.

For many years, economists have argued that, in the eyes of the manufacturer, the ET option has the shortcoming of granting monopoly pricing power to the lone retailer. Allowing the retailer to mark the retail price up to the monopoly level is counter to the manufacturer's interest, as the higher retail price reduces the derived demand for the manufacturer's product. Recently, however, several of the leading analyses of vertical restraints (Mathewson and Winter (1984), Rey and Tirole (1986)) have, among other things, argued that manufacturers can combat the double marginalization problem inherent with territorial restriction by supplying dealers at marginal cost and extracting the discounted stream of rents expected to be earned by dealers with an up-front payment of some sort. My analysis disallows this possibility on several grounds.

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3 Since 1975, all vertical price restraints, including RPM, are per se violations of the antitrust laws, whereas non-price vertical restraints, since 1977, are subject to a rule of reason analysis. However, the Supreme Court has significantly narrowed the scope of the per se illegality rule regarding RPM. See the Court's decisions in Monsanto Company v. Spray-Rite Service Corporation (1984) and Business Electronics Corporation v. Sharp Electronics Corporation (1988). In Monsanto, the Court ruled that a per se violation could not be inferred solely from evidence that a manufacturer had terminated a price-cutting distributor after having received complaints from the distributor’s competitors. In Sharp, the Court went even further, holding that an agreement between a manufacturer and a dealer whereby the manufacturer would terminate any price-cutting dealer was not the same as an RPM agreement. Rather, per se illegality required an agreement between the manufacturer and all dealers. For a thorough legal history of RPM, see Overstreet (1983). Throughout this paper, I assume that both options are open to the manufacturer.

4 The initial analysis of double marginalization is usually attributed to Spengler (1950).
If manufacturers could truly extract dealer rents with up-front payments, the option of exclusive territories would be costless to the manufacturer. Given the choice between RPM and ET, then, the manufacturer would always opt for ET, since non-price vertical restraints are subject to a more lenient legal standard. The record of litigation, however, is replete with instances in which the manufacturer does, in fact, attempt to employ an RPM program. This suggests that the option of territorial or customer restriction is not as perfect as an analysis incorporating an up-front payment would indicate. Furthermore, any type of up-front payment is not sub-game perfect and, as such, does not constitute a credible commitment on the part of the payment receiver.\(^5\) Once the manufacturer has received the discounted stream of rents in the form of an up-front payment, it has a clear incentive to engage in opportunistic behavior by supplying at a wholesale price above marginal cost. Finally, an examination of private and governmental litigation involving territorial restriction reveals that discussion of any type of up-front payment in the opinions or decrees is exceedingly rare. This empirical evidence suggests that up-front payments are seldom used in practice.

My approach, then, is to argue that, although the ET option is imperfect, so too is RPM.\(^6\) Under an RPM regime where retail prices are uniform across the dealer network, the level of service offered by retailers is not always the sole determining factor in consumer purchasing decisions. When aggregate demand depends in part on dealer service levels, RPM will typically ameliorate the free riding problem, but will not always eliminate it entirely. Whenever some residual free riding on services remains,


\(^6\) See Klein and Murphy (1988) for an alternative argument on the imperfections of RPM.
dealers select service levels strictly less than those desired by the manufacturer. This relative shortfall in service provision, in turn, harms the manufacturer by reducing overall demand for its product.

I analyze a monopolist manufacturer’s choice of distribution system with a model of a retail marketplace comprised of dealers of two types: low service, discounting retailers who compete via retail prices and high service retailers who compete in services. The model yields solutions for wholesale and retail prices, service levels, and manufacturer profitability measures under vertical integration, free trade, exclusive territories, and RPM. Comparisons of manufacturer profits suggest which of the vertical structures is optimal for various combinations of the model’s parameters.

In particular, the model suggests conditions under which manufacturers select one type of vertical restraint over the other and therefore provides an empirical link between a product’s characteristics and the manner in which that product is likely to be distributed. Products with long life spans are most prone to residual free riding on services. Manufacturers of such products are more likely to protect dealer services with exclusive territories. Products which change often relative to frequency of consumer purchase quickly render information provided through dealer services obsolete. These types of products are apt to be distributed using RPM. As manufacturer demand becomes more responsive to dealer service provision, it becomes more likely that the product will be distributed utilizing exclusive territories. Finally, the model suggests that RPM may be most effective when combined with some form of restricted distribution.

These hypotheses are then tested by applying nonparametric statistical methods to information obtained from RPM and territorial restriction litigation between 1976 and
1982. 119 cases involving government and/or private litigation were analyzed and summarized. The data from these cases strongly support the model's conclusions.

After briefly reviewing the relevant literature, I outline the modeling framework and assumptions. The body of the dissertation is devoted to a retail marketplace model in which the manufacturer's choice of distribution distribution system is analyzed. I then empirically test the model's main hypothesis by examining data found in vertical restraint litigation. The dissertation concludes with a brief summary and a discussion of possible extensions to the analysis.
Chapter II

Literature Review

The notion that minimum resale price maintenance (RPM) can be used to encourage the provision of dealer pre-sale services is generally accredited to Telser’s (1960) seminal paper.¹ Under Telser’s so-called “special services” theory, manufacturers desire that their dealers provide pre-purchase demand-enhancing services, such as attractive product display areas, product demonstrations, and knowledgeable salespersons. It is entirely possible, however, for a potential customer to consume such services, yet purchase elsewhere the product to which the services apply. In particular, nothing prevents a consumer from benefitting from these services at a “full service” retail establishment, but purchasing the product at a discount dealer at a lower price. In the absence of any protection for service investment, retailers will be reluctant to provide these desirable services. In effect, a free market will underprovide the special services or, in fact, fail to provide them at all.

For Telser’s theory to apply, it must be impossible or impracticable to charge consumers separately for these services. Direct payment would eliminate entirely the free rider problem. It must also be impossible or impracticable to compensate dealers directly for service provision. Compensation may involve prohibitive monitoring

¹ Several earlier authors, including Silcock (1938) and Taussig (1916), had, however, incorporated such services into their analyses.
costs, for example. Finally, the special services must occur prior to the actual sale of the product. The service free riding is ameliorated to any extent that such services are rendered post-sale to consuming customers only.

A manufacturer can, according to Telser, protect its dealers' investments in pre-sale services by imposing uniform minimum RPM. By setting a minimum price, discount dealers can no longer lure potential customers away from full service retailers with lower retail prices. The manufacturer grants the retailers a sufficient per unit margin so as to compensate for service expenses. Furthermore, since the retailers are no longer able to compete by lowering the retail price below the RPM level, they, so the theory goes, compete in a non-price fashion via the pre-sale services desired by the manufacturer.

Telser implicitly assumes, however, that the RPM price floor eliminates completely the service free riding problem. As I show later in the modeling section of this paper, this need not necessarily be true. In a retailing environment when aggregate demand depends on dealer services, a high service retailer can still bestow benefits on its rival discounting retailers when it increases its own service level. Under this scenario, some residual free riding remains under RPM.

Even the general view that RPM is often implemented in an attempt to protect dealer service investment is not without its critics. In a recent paper, Klein and Murphy (1988) argue that the elevated margin granted to retailers by RPM does not, in and of itself, sufficiently encourage retailers to supply the types of services desired by the manufacturer. Nothing, they say, prevents a retailer from simply pocketing the higher margin but continuing to free ride. They propose an alternative role for RPM and other vertical restraints. In particular, they argue that the purpose of RPM is to decrease the short term gain to nonperforming dealers and to increase the long run gain to
performing dealers. Here, the role of RPM is to create a stream of quasi-rents which the nonperforming retailer would forgo if caught not providing the services encouraged by the manufacturer.

For RPM to be effective under this scenario the manufacturer must necessarily monitor its retailers to determine if they are sufficiently supplying the specific services it desires. If, however, the manufacturer is forced to monitor its dealers, despite the associated cost, it could simply pay its dealers directly for service provision. If this were possible, there would be no need for RPM, as argued above.

In addition to the recent Klein and Murphy proposal, other more established theories to explain the presence of RPM exist, as witnessed, for example, by the repeal of the Miller-Tydings and McGuire Acts in 1975 and the resultant per se illegality standard for RPM. Perhaps the most popular theory posits that RPM is a device used to facilitate dealer collusion. Under this theory, traditional retailers, in an effort to protect themselves from aggressive, price-cutting discounter s, jointly coerce manufacturers to establish an RPM program. A chief piece of evidence adduced to support this theory is the fact that retailers, often through trade associations, were major proponents of fair-trade laws. Support for this collusive, anti-competitive theory exists in a variety of work, including those of Yamey (1952), Gould and Preston (1965), and Bowman (1955).

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2 The following example illustrates that monitoring can be prohibitively costly and of questionable efficacy. In 1955 a spokesman for the Sheaffer Pen Company, who had been practicing RPM, noted that, despite a two year campaign of tracking down and instituting legal proceedings against price cutting retailers, at a cost of over $1 million (in 1955 dollars), “we found that Sheaffer merchandise still found its way into discount houses. We found that we couldn’t enforce our program vigorously enough so that small retailers were in a position to compete with the discount houses and other merchandisers.” “Sheaffer Says It Dropped Fair Trade So It Could Get Into Discount Houses,” Advertising Age, December 12, 1955, pp. 1,8.

3 Telser (1990) provides his own forceful rebuttal to the Klein and Murphy argument.

4 See, for example, Palamountain (1968), Corey (1952), Study of Monopoly Power (1952), Grether (1939), and Ornstein (1985).
A second theory also utilized to explain some instances of RPM proposes that the practice is used by manufacturers to promote their own collusion. This theory suggests that manufacturers set retail prices above the competitive level and then use RPM to help detect manufacturer price cutting. The evidence used to support this theory primarily relies on specific case studies. Such cases are reported in Telser (1960), Bowman (1955), and McLaughlin (1979), which, respectively, describe situations involving light bulbs, spark plugs, and enameled ironware.

These two collusive theories, however, suffer from a host of theoretical problems, as well as some convincing recent empirical criticisms. The dealer collusion theory presupposes that the dealers in aggregate possess power sufficient to force the manufacturer to act counter to its best interest. In most retail markets, however, dealer entry is relatively easy. Unconstrained entry is a severe hindrance to collusion. Moreover, many retail markets are characterized by numerous independent retailers. Such a large number of actors makes successful collusion unlikely. Furthermore, unless all manufacturers opt for RPM, dealers have an incentive to cheat on their own collusion by favoring the products of the non-RPM manufacturers.

The manufacturer collusion theory has its theoretical problems, as well. If a manufacturer wishes to cheat on the cartel, it need simply not enforce the RPM price. Even if the retail price is enforced, the manufacturer can gain an edge over its competitors in the promotion of its product just by lowering the wholesale price to the dealer. Also, Overstreet (1983) finds the majority of RPM cases occurring in industries with relatively low four firm concentration ratios. Attempts at collusion in these relatively competitive industries is, again, unlikely to succeed in the long run.

Recent empirical work by Ippolito (1988) helps confirm the theoretical shortcomings of the collusion theories of RPM. By examining information contained
in private and government legal cases alleging RPM between 1976 and 1982, she found that the collusion theories are possible explanations for no more than 15 percent of all the cases filed, and for a smaller portion of the private cases. Moreover, virtually all of the cases seem to be consistent with one or more of the service-enhancing theories of RPM, of which Telser’s argument is one. However, at least 30 percent of the cases are inconsistent with Telser’s pre-sale services, yet consistent with other types of special services. It is to these types of services that I now turn.

Recognizing that many of the instances in which RPM is utilized are not characterized by tangible pre-sale services, Marvel and McCafferty (1984), building on the signalling work of Spence (1973) and the quality standards results of Leland (1979), expanded the realm of special services subject to free riding by introducing the notion that dealer quality certification is also prone to the kinds of free rider problems described by Telser. They propose a scheme of retailing where the dealer serves as the consumer’s agent in ascertaining the quality or fashionability of products or brands. If the fact that a reputable retailer deigns to carry a particular brand signals to consumers that this brand is of high quality, then consumers can learn this information without necessarily purchasing the product at the particular quality certifying retailer. In such a retailing environment, discount retailers can free ride on the quality certifying expenditures of more reputable retailers. Without some mechanism to protect dealer investment in quality certification, such investments will be underprovided or not provided at all. RPM is one such protective measure.

Manufacturers who wish to protect their dealers’ investments in pre-sale services or quality certification are not, however, constrained to imposing minimum retail prices. Another remedy available to the manufacturer is the granting to a dealer of an exclusive territory (ET). One role an ET can play is to isolate a retailer from competition with all
other retailers. The removal of all rival retailers eliminates entirely the service free
riding problem.

Any potential anticompetitive theory for exclusive territories can be dismissed even
more readily than those proposed for RPM. Since, by definition, only one retailer
exists, exclusive territories cannot facilitate retailer collusion. Furthermore, the
manufacturer has a strong interest in promoting downstream competition. Any output
restriction downstream will reduce the derived demand for the upstream product. By
granting an ET, a manufacturer purposely confers market power on its dealers.
Because this action by itself necessarily reduces manufacturer profits, it must be the
case that the territorial restrictions create more than offsetting benefits to the
manufacturer in one form or another.

Although some argue that the effects of RPM and ET are identical\(^5\), they clearly are
not. For example, granting a retailer an exclusive territory obviously invites him to
mark the retail price up to the monopoly level, a move which is clearly counter to the
manufacturer’s interest. The profits accruing to the dealer granted an ET could
conceivably be recouped by the manufacturer by supplying at marginal cost and then
charging the dealer an upfront franchise fee equal to the discounted stream of
subsequent expected monopoly profits. Indeed, many of the leading current analyses
of vertical restraints include this as an option open to the manufacturer. Franchise fees,
and for that matter any other kinds of upfront payments, however, are not subgame
perfect, and therefore do not constitute credible commitments of the part of the payment
receiver - in this case, the manufacturer. Once the potential monopoly profits have been
turned over to the manufacturer in the form of the franchise fee, the manufacturer has

\(^5\) See, for example, Posner (1976, 1981). In the latter, Posner argues quite convincingly for
identical legal treatments for ET and RPM (as well as other forms of restricted distribution) - namely,
per se legality.
an incentive to act opportunistically, supplying its dealer network instead at a wholesale price in excess of marginal cost. For this reason, as well as others mentioned in the introduction, the model I develop later in this paper will not include any type of upfront payment as a viable option open to the manufacturer.\textsuperscript{6}

Several authors maintain additional differences between the effects of RPM and ET. Steiner (1985) argues that exclusive territories are less flexible dynamically than RPM because industrywide RPM has a tendency to collapse completely when a few important manufacturers abandon their price floors. He posits a sort of prisoner's dilemma scenario whereby a Nash equilibrium exists when all manufacturers impose RPM. This Nash equilibrium is not, however, the cooperative solution. Eventually, he argues, a manufacturer will be able to attract sufficient demand through advertising or other promotional activities and, at that point, the manufacturer withdraws its RPM program. This, in turn, entices the remaining retailers to abandon RPM and the industry rapidly evolves to one of free trade. Why one manufacturer would suddenly find advertising superior to dealer services is not explained.

Comanor (1987) notes that exclusive territories eliminate all intrabrands competition whereas RPM eliminates only price competition between the dealers. Thus, he argues, unless the manufacturer stimulates its dealers in some other additional fashion, dealers under ET are less likely to supply the service efforts desired by the manufacturer than they are under RPM. However, as I show later, some residual free riding can still survive under RPM. Not all sales necessarily need occur at the dealer with the highest service level. Hence, to the extent that dealers have control over their service level, the residual free riding that is present under RPM but absent under ET tends to reduce the

\textsuperscript{6} There nonetheless does exist a burgeoning franchise literature. See, for example, Caves and Murphy (1976), Rubin (1978), Klein (1980), and Blair and Kaserman (1982).
incentive of the dealer to supply the services under RPM relative to the ET situation. This effect works in the opposite direction as the effect argued by Comanor.

In addition to these works where only exclusive territories and RPM are either examined in isolation or in comparison solely to one another, recently many other authors have constructed analyses where RPM and ET are but two entries on an entire menu of potential vertical restrictions open to the manufacturer. These models typically examine the circumstances, under varying assumptions, for which combinations of the different vertical restraints are optimal for the manufacturer.

Mathewson and Winter (1984) consider a list of four potential vertical restrictions (resale price maintenance, exclusive territories, minimum quantity quotas, and franchise fees) to repair a retail environment fraught with three potential externalities. The first externality, dubbed the vertical externality, arises when a retailer does not consider the per unit profit accruing to the manufacturer when the wholesale price exceeds the marginal cost of production. A horizontal pecuniary externality exists when one retailer raising its retail price confers benefits on its rival retailers through the positive cross price elasticity of demand. Finally, when a retailer undertakes advertisements, which Mathewson and Winter assume can only be performed by retailers, neighboring retailers benefit, due to the spillover effects of advertising. This final horizontal externality reduces the incentive for an individual retailer to advertise.

The authors determine minimally sufficient sets of vertical restraints which remedy different combinations of the externalities. One surprising result of the analysis is that the authors conclude that exclusive territories are never implemented when advertising spillovers are present. To the extent that advertising spillovers are akin to free riding on special services, a relationship the authors, in fact, acknowledge, this is a striking result. Their explanation of this conclusion is that in their model the role of exclusive
territories is to correct for the horizontal pecuniary externality, which occurs when one retailer fails to consider the effects its pricing policy will have on its neighbors. Notwithstanding this potential use for territories, that territorial restriction can never be used to combat the horizontal free riding problem is completely counter to both the conventional wisdom expressed in many leading industrial organization textbooks\(^7\) as well as the rationale frequently opined by the Courts in vertical restraint litigation.

There are a number of additional problems with the Mathewson and Winter approach. As mentioned earlier, franchise fees, one option they assume open to the manufacturer, are not sub-game perfect. Any type of upfront payment from one party to another is not a credible commitment by the receiving party concerning any future action. Consequently, any analysis of ET augmented by franchise fees underestimates the problem exclusive territories presents to the manufacturer. Secondly, although Mathewson and Winter do consider entry by retail firms, in essence calculating a retailer zero profit equilibrium, they assume that the spillover effects of advertising are independent of the number of retail firms in the market. That is, the disincentive on the part of a retailer to advertise is no more severe with hundreds of rival retailers than with a single competing retailer. Thus entry does not diminish the incentive of any particular retailer to advertise. In contrast, the approach I take acknowledges that the free riding component can plausibly increase with the number of rival retailers.

Rey and Tirole (1986) examine the manufacturer’s choice of vertical restraints in a slightly different context. They assume that the list of available options open to the manufacturer includes any combination of RPM, ET, and franchise fees. They consider the manufacturer’s choice in an environment of uncertainty, either over retail

\(^7\) See Scherer and Ross (1990), pp.558-562, or Carlton and Perloff (1990), pp.766-767.
demand or retail cost or both. Furthermore, they grant the retailer informational superiority over the environment in which it operates. When the manufacturer is risk neutral but retailers are risk averse, the authors find that ET makes better use of decentralized information than does RPM because it allows the retailer to adjust prices to changing local conditions. RPM, on the other hand, exhibits perfect insurance against demand uncertainty because of the predetermined retail price.

The equilibria calculated in the model exhibit zero retailer profit, so entry is implicitly assumed. The analysis does have shortcomings, however. For example, the authors include franchise fees as a viable option open to the manufacturer, notwithstanding the credibility problems associated with them, as outlined above. Also, the authors explicitly ignore any potential free riding effects of promotion or other selling efforts, focusing instead on the delegation problem under incomplete information. In fact, advertising and any other types of promotion are completely ignored in the model. This results in free trade being preferred to any combination of vertical restraints in a number of scenarios involving uncertainty and retailer risk aversion. Finally, to the extent that dealers carry more brands than manufacturers produce, the assumption that manufacturers are risk neutral while retailers are risk averse is somewhat peculiar.

In their paper introducing the notion of quality certification, Marvel and McCafferty (1984) consider a model of retailing where the product in question is distributed through retailers of various quality or service levels. They assume, in fact, that sales are uniformly distributed across retailers of varying service indices. These service levels, however, are treated as exogenous. Retailers are assumed unable to respond to manufacturer actions or to otherwise further their interest by altering their own service levels. The highest service level in retail equilibrium is determined by a zero profit
condition. Retailers with lower service levels, and therefore lower costs, thus enjoy positive profits. One might expect the presence of profits at these low service levels to invite entry by other low service retailers. This process of entry is discussed in some detail, but is not part of the RPM model.

In a subsequent paper, Marvel and McCafferty (1986) alter their model by assuming that, if a product is distributed by retailers of varying service levels, all sales of the product would go to the retailer with the highest service level. Thus the free riding problem disappears. Only one service level exists in equilibrium. This symmetric equilibrium, however, is inconsistent with many real retailing environments where products are distributed through both discount retailers and full service retailers.

In contrast, the model I have chosen to develop is asymmetric in that the retail sector is comprised of retailers of two types - high service dealers who compete in service and low service, discounting retailers who compete in price. A zero profit retailing equilibrium distinguishes my model from that of Klein and Murphy (1988), where a stream of quasi-rents accruing to retailers exists in equilibrium. In addition, the model I develop below makes the simplifying assumption of perfect symmetric information, so that the problems addressed by Rey and Tirole are not present. I model in some detail the free riding effect on special services, which is different than the approach taken in Marvel and McCafferty (1986). I place the choice of service level under a high service retailer's control. This approach differs from that in the Marvel and McCafferty (1984) model. I further disallow the manufacturer from requiring any type of fixed up-front payment from its dealers, on the grounds that such payments are not credible commitments. This requirement distinguishes my retailing scenario from those of Mathewson and Winter, as well as Rey and Tirole, where franchise fees are considered a viable option open to the manufacturer. The modeling framework I
develop leads to all equilibria being characterized by uniform retail prices. Uniform retail prices also eliminate the horizontal pecuniary externality problem addressed by Mathewson and Winter.

The body of empirical work which relates to my study is much smaller, due at least in part to the relative paucity of data concerning vertical restraints issues generally. Perhaps the most often cited work is that by Overstreet (1983). In addition to listing relatively detailed information, including other alleged vertical restraints, about all 68 RPM cases resolved by the Federal Trade Commission (FTC) between July 11, 1965 and December 1982, Overstreet uses the information to make some generalizations about the types of industries in which RPM most frequently occurs. He finds a remarkable similarity between the distribution of markets in which RPM cases occurred and the distribution of all manufacturing industries, suggesting that the FTC’s RPM enforcement efforts reflect a somewhat random selection process. In particular, over half the cases involve firms operating in industries with four firm concentration ratios of less than 0.4. This, again, casts doubt on the theory that RPM is used predominantly to facilitate manufacturer collusion. Overstreet also reproduces a table initially published in Herman (1959) outlining the industrial distribution of fair traded merchandise of 175 firms in 1954.

The other, and final, substantive source of empirical data on RPM is an FTC follow-up study to Overstreet by Ippolito (1988). She also documents information contained in both private and government cases which alleged the use of RPM between 1976 and 1982, a period during which RPM has always been per se illegal. As mentioned before, her conclusions cast substantial doubt on the merit of the collusive theories for RPM and, at the same time, lend meaningful support to the special services free riding theories of RPM, such as those advanced by Telser (1960) and Marvel and
McCafferty (1984). Ippolito also summarizes the types of additional vertical restrictions alleged in these cases.

This concludes the discussion of the relevant literature. I move now to a presentation of the economic model, beginning with the model's framework and assumptions.
Chapter III

The Model

III.1 The Modeling Framework

I consider a monopolist manufacturer of a single good distributed through a retail sector in a single isolated market. When competition does not dictate retailer behavior, the manufacturer is modeled as a Stackelberg leader with respect to its dealers. The retail sector, I assume, is characterized by dealers of two types. There exists a large number of potential high service retailers, each of whom has the ability to determine its own level of service. I denote the service level selected by a representative high service retailer by $s_h$. I assume in addition that there exists a large potential pool of discounting, low service retailers, each with a positive but arbitrarily small fixed service level, $s_0$.\(^1\) This service level also constitutes the lower bound on $s_h$. In essence, $s_0$ denotes that minimal level of service necessary to carry the product. To make the analysis interesting, I will assume that $s_0$ is strictly less than that level of service which any high service retailer will optimally choose to offer in any of the equilibria I consider. Service

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\(^1\) The assumption that low service level is fixed whereas the high service level is endogenous merits some explanation. I posit a discounter environment similar to a warehouse stocked with a wide variety of products, where it would be prohibitively costly for the retailer to install for a single product the types of retail services of interest here. The high service retailer, however, is viewed either as a specialty store, where service levels are more easily adjusted, within some range, or a retail establishment which has already devoted sufficient space and resources to the display and/or presentation of the product in question so as to allow alteration relatively easily.
is assumed to be a fixed cost to all retailers, as service provision is independent of the number of units sold\(^2\). The cost per unit of service is denoted by \(\gamma\).

A retailer of either type is assumed to face zero marginal costs of distribution\(^3\) and the manufacturer to face a constant marginal cost of production, \(c\). In addition, I assume that the manufacturer can costlessly transmit the product in question to its retail network.\(^4\) This cost structure applies only to the product of interest here and does not represent the retailer’s total cost of operation. Retailers of either type may costlessly and instantaneously enter or exit the retail market.

It is important to understand the nature of service free riding under this cost structure. Although I assume them to be zero for expositional reasons, any positive marginal service expenditures are not subject to free riding. Marginal service costs can be covered readily by retailers through the retail margin. Furthermore, since each retailer must offer a fixed level of service of at least \(s_p\), only those fixed service costs in excess of \(s_p\) are subject to free riding.

Manufacturer demand, I assume, depends negatively on the retail price, \(P_r\), and positively on the highest service level, \(s\), of all retailers carrying the product, \(Q = f(P_r, s)\). Aggregate demand depends on the highest service level of all retailers carrying the product, rather than some other measure of services provided, such as the average service level, because of the ability of consumers to freely ride on retailer services. When free riding on services occurs, consumers opt to freely consume only

\(^2\) The assumption that service costs are fixed is consistent with most of the literature, including both Marvel and McCafferty works (1984 and 1986). It is not, however, without its critics. See, for example, Scherer and Ross, pp. 547, 555 and the references cited therein.

\(^3\) This assumption is not restrictive. It is employed solely to simplify the ensuing algebraic calculations.

\(^4\) Alternatively, one might assume a positive but constant unit cost of distribution, \(\delta\). Under this substitute assumption, since the marginal cost of distribution is constant and each and every unit sold must be distributed through the retail sector, one could merely replace the marginal cost of production with \(c + \delta\). The remainder of the analysis would not change.
the highest available service level. The exact nature of this free riding process is
described in more detail in the next section.

For analytical convenience, I assume a constant elasticity market demand function of
the following form:\(^5\)

\[ Q = f(P_r, s) = P_r^{-\alpha} s^\beta \quad \alpha, \beta > 0 \]

Note also that demand is assumed to be independent of the number of retailers
carrying the product, provided, of course, that this number is positive.

I assume that the services of interest here are of the kind subject to free riding as
previously described. Furthermore, I assume that these services cannot be offered by
the manufacturer. Rather, they must be performed by the retailers\(^6\). Quality certification
services, for example, cannot be provided by manufacturers. A manufacturer claim that
its product is of high quality or fashionability does not carry the same credibility with
consumers as does a similar statement from a retailer with a reputation for carrying high
quality brands.

In order to induce these services, the manufacturer must undertake some measure to
protect high service dealers's investments in service if it (the manufacturer) wishes to
lure high service retailers into the retail marketplace. I consider RPM and ET as two
possible alternatives. Should the manufacturer opt for RPM, I allow for the possibility
of entry by either high service retailers, low service discounting retailers, or both. I
choose to analyze the process of entry separately so as to isolate the effects of each entry
type.

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\(^5\) The results are substantively unchanged for any constant elasticity market demand function which
is multiplicatively separable in \(P_r\) and \(s\).

\(^6\) The manufacturer cannot purchase these services directly from retailers because to monitor the
quantity and quality of services dealers provide is prohibitively costly.
I consider also the options of free trade and vertical integration. Vertical integration dominates in the view of the manufacturer all other options and is included in the analysis primarily as a benchmark to which the other scenarios are compared.

III.2 Consumers and the Share Function

I consider only an isolated market. One can imagine, for example, a geographically remote city. All trade in the model is constrained to occur within this market. Retailers of both types, as well as the body of potential consumers, are assumed to be uniformly distributed throughout this geographical market.\(^7\) Although this may bring to mind a location model in the spirit of Hotelling (1929) or Salop (1979), the focus of my analysis lies elsewhere. I will therefore assume zero transportation costs within the geographical market in question. In a situation where consumers face retailers with common service levels and retail prices, I assume the decision as to which retailer to patronize is made by random selection.

The assumption of zero transportation costs within the market in question assures that each scenario I consider must, in equilibrium, be characterized by uniform retail prices. Consumers would balk at any retailer charging a higher price, proceeding instead costlessly to a retailer offering a lower price.\(^8\)

\(^7\) The market in question could be the linear or circular city popular in the product differentiation literature (see Tirole (1989), pp. 279-285 or Salop (1979)) or, more generally, any two dimensional area within which the retailers and consumers are uniformly distributed. In any event, the maximum distance from one point within the isolated market to any other point within the same market is assumed to be much less than the distance between any point within the market of interest and any other point within the closest neighboring market.

\(^8\) Note that this holds even if the retailer charging the higher price also offers a higher service level. In such a situation, nothing prevents the consumer from visiting the high service retailer, freely consuming the services offered there, but going elsewhere to actually purchase the product at the lower price.
The product being distributed is assumed to have a life cycle denoted by $\lambda$. That is, consumers purchase the product $\lambda$ distinct times before the product is altered in some form. After every $\lambda$ purchases the product is revamped, improved, or otherwise changed. Necessarily, $\lambda \geq 1$.\(^9\)

The one-time value per product cycle to consumers of the service offered by high service retailers is assumed to exceed the negligible transportation costs to any high service retailer. Once these services have been consumed, however, services for the remaining purchases of the product life cycle are worthless to the consumer. It is not until the subsequent product cycle that the services again become valuable. Once a consumer has learned how to operate a product through a product demonstration, for example, any additional demonstrations would be worthless until the product were changed in some way.\(^{10}\) Quality certification services also fit this description.

Since, as argued above, the retail sector will be characterized by uniform retail prices, each consumer will make his or her first purchase at a high service retailer in order to consume the services offered there, provided that the high service retailer chooses a service level in excess of that offered by the discounters. The remaining $(\lambda - 1)$ purchases per product cycle will be evenly distributed among all the retailers, since, for these purchases, service is not a concern to consumers. Thus, the fraction of total sales per product cycle of length $\lambda$ accruing to each of $m$ high service retailers, when there

---

\(^9\) Technically, $\lambda$ could be less than 1 if the manufacturer changed the product more frequently than consumers purchased it. However, since consumers in this model are homogeneous, it would make no sense to incur the expense of changing the product if those alterations induced no additional sales.

\(^{10}\) This assumes that the information contained in such a demonstration does not significantly depreciate in the consumer's mind.
exist in addition n low service retailers, \( r_h(\lambda, m, n) \), is given by

\[
r_h(\lambda, m, n) = \frac{\frac{1}{m} + \frac{\lambda - 1}{n+m}}{\lambda} = \frac{\lambda m + n}{\lambda m(m+n)} , \quad \lambda \geq 1 \quad (1)
\]

It is straightforward to show that \( r_h(\lambda, m, n) \) declines in all of its arguments. As \( \lambda \) increases, for example, the portion of total sales made without regard to service increases, which, in turn, implies a smaller percentage of sales being consummated at high service retailers. Note also from (1) that \( r_h(1, m, n) = 1/m \). If the product of concern changes with each and every purchase, a consumer will always purchase from the high service retailer closest to his or her location.\(^\text{11}\)

The share of total sales accruing to each of \( n \) discount retailers, \( r_i(\lambda, m, n) \), can then be calculated by

\[
r_i(\lambda, m, n) = \frac{1}{n} \left[ 1 - m r_h(\lambda, m, n) \right] = \frac{\lambda - 1}{\lambda (m+n)} , \quad \lambda \geq 1 \quad (2)
\]

Of course, \( r_i(1, m, n) = 0 \). Also, \( r_i(\lambda, m, n) \) decreases in \( m \) and \( n \), but increases in \( \lambda \). As the product’s life cycle increases, a larger percentage of sales takes place without regard to service, implying that the percentage of total sales occurring at each of the \( n \) discount retailers increases.

With the model’s framework defined, I move now to an analysis of the various vertical structures. I begin with the benchmark case of vertical integration.

### III.3 Vertical Integration

Under vertical integration, the manufacturer distributes its product through a single retail outlet. Such a scenario is most efficient for the manufacturer in that it minimizes service expenditures. I assume that the vertically integrated firm has the ability to select

\(^{11}\text{The special case of } \lambda = 1 \text{ coincides with the original Telser (1960) analysis.}\)
the level of service it supplies at its retail establishment. Since the manufacturer and the retail establishment are part of the same economic entity, there is no wholesale price as such. Rather, the manufacturer must determine the optimal retail price and service level.

Thus, the manufacturer’s problem is

$$\max \Pi_m = (P_r - c) P_r^\alpha s_h^\beta - \gamma s_h$$

(3)

where \(P_r\) denotes the retail price and \(s_h\) the service level. The first order conditions to this problem are given by

$$\frac{\partial \Pi_m}{\partial P_r} = s_h^\beta [P_r^\alpha - \alpha (P_r - c) P_r^{\alpha - 1}] = 0$$

(4)

and

$$\frac{\partial \Pi_m}{\partial s_h} = \beta (P_r - c) P_r^\alpha s_h^{\beta - 1} - \gamma = 0$$

(5)

Solving (4) and (5) simultaneously yields\(^{12}\)

$$P_r^\text{vi} = \frac{\alpha - c}{\alpha}$$

(6)

and

$$s_h^\text{vi} = \left[ \frac{\beta (\alpha - 1)^{\alpha - 1}}{\gamma \alpha^\alpha c^{\alpha - 1}} \right]^{1/\beta}$$

(7)

Second order conditions include the stipulation that \(\beta < 1\). In addition, from equation (6) it is clear that the problem requires that \(\alpha\), the absolute value of the price elasticity of demand, be greater than 1.\(^{13}\) These conditions on \(\alpha\) and \(\beta\) must, in fact,

\(^{12}\) The solutions under vertical integration, as well as all the other vertical structures I consider, are summarized in tables 4 and 5 in appendix B.

\(^{13}\) This condition on \(\alpha\) comes from the usual restriction that marginal revenue (MR) at the optimum be positive. My assumed market demand function yields a total revenue (TR) expression given by \(TR = Q^\alpha s^\beta\) which implies \(MR = \frac{\partial TR}{\partial Q} = \frac{\alpha - 1}{\alpha} Q^{\alpha - 1} s^\beta\). Since \(\alpha\) must, by construction, be positive, MR is positive only for \(\alpha > 1\).
hold for every scenario I consider. Equation (6) also indicates that the retail price is the usual monopoly markup over the marginal cost of production. As one would expect, the service level increases as $\beta$ increases, i.e. as aggregate demand becomes more responsive to service provision. The retail price is, however, independent of $\beta$.

Manufacturer profits under vertical integration can be calculated by substituting the results of (6) and (7) into (3) and performing some algebraic manipulations.

\[
\Pi_m = \left[ \frac{\beta \gamma^\alpha c^{-\gamma}}{\gamma^\beta (\alpha - 1) c^{-\gamma}} \right]^{\frac{1}{1-\beta}} (1 - \beta) > 0
\]  

Manufacturer profits are strictly positive, since $\beta < 1$.

Under this model's construction, vertical integration is always optimal for the manufacturer because the interests of the retailer are perfectly coincident with those of the manufacturer. Nevertheless, there may exist circumstances under which vertical integration is not possible or practicable. This may be due to contractual difficulties, the increasing cost of management and oversight, or economies of scope in distribution which are impossible for the manufacturer of a single product to fully exploit. While a thorough examination of these and other potential hurdles to vertical integration is beyond the scope of this analysis, I nevertheless consider under the current framework other vertical arrangements open to the manufacturer. Should vertical integration prove in fact to be unmanageable, the manufacturer may select from the alternative options to whose analyses I now turn. I examine first free trade.

III.4 Free Trade

Under free trade, the manufacturer determines only a wholesale price. The retail price and service level are determined in the retail sector. Recall the assumption that the
low service, discounting retailers compete in retail price. Any discounter who drops its retail price even marginally below that offered by rivals will garner all sales. Therefore, discount retailers continue to undercut each other’s retail price until a single low service retailer sets a retail price which just allows it to earn zero economic profit. The high service retailers, by contrast, are assumed to compete in service provision. Furthermore, because the share function is discontinuous, each high service retailer has an incentive to provide a level of service just slightly above that offered by its rivals.

Consider, for instance, one of \( m > 1 \) high service retailers, each supplying a common level of service, who distributes the manufacturer’s product in conjunction with \( n \) discounting retailers. Should this high service retailer raise its service level negligibly, it would become the sole high service retailer distributing with, in essence, \( m+n-1 \) low service retailers. The increase in this retailer’s share of aggregate output would be

\[
\Delta r_n(\lambda, 1, n + m -1) - r_n(\lambda, m, n) = \frac{\lambda + m + n -1}{\lambda (m + n)} - \frac{\lambda m + n}{\lambda m (m + n)}
\]

\[= \frac{m-1}{\lambda m} > 0 \text{ for } m > 1\]

In addition, a high service retailer who increases its service level by \( \varepsilon \) beyond that offered by the other high service retailers shifts out aggregate demand, while only increasing its service costs by \( \gamma \varepsilon \). The result of this service competition among the potential high service retailers is that high service retailers continue to raise their service levels until a single high service retailer offers a level of service which just allows it to earn zero economic profit.

Under free trade, then, a single discounter determines the retail price in an environment with a single high service retailer, who, itself, determines the service level. The manufacturer, in turn, uses the retail price and service levels which obtain from
competition among dealers to select the optimal wholesale price. The service level is generated by the following zero profit condition for a single high service dealer distributing with one discounter: \(^{14}\)

\[
\Pi_h = (P_r - P_w) P_r^{-\alpha} s_h^{\beta} \frac{\lambda + \frac{1}{2}}{2 \lambda} - \gamma s_h = 0 \tag{9}
\]

This expression defines the high service level as a function of the wholesale price, selected by the manufacturer, and the retail price, which results from the price competition between the discounters.

\[
s_h(P_r, P_w) = \left[ \frac{1}{\gamma} P_r^{-\alpha} (P_r - P_w) \frac{\lambda + \frac{1}{2}}{2 \lambda} \right]^{1-\beta} \tag{10}
\]

The retail price is determined by a zero profit condition for the single low service retailer.

\[
\Pi_1 = (P_r - P_w) P_r^{-\alpha} \left[ s_h (P_r, P_w) \right]^{\beta} \frac{\lambda - \frac{1}{2}}{2 \lambda} - \gamma s_0 = 0 \tag{11}
\]

Substituting equation (10) into the above and combining like terms transforms the zero profit condition on the single discounter into

\[
\Pi_1 = (P_r - P_w)^{1-\beta} P_r^{-\alpha (1-\beta)} \left( \frac{\lambda + \frac{1}{2}}{2 \lambda} \right)^{\beta (1-\beta)} \frac{\lambda - \frac{1}{2}}{2 \lambda} - \gamma s_0 = 0 \tag{12}
\]

This expression defines the chosen retail price as a function of the wholesale price, \(P_r(P_w)\), or, equivalently, the wholesale price as a function of the retail price.

\[
P_w(P_r) = P_r - P_r^2 \frac{2 \lambda \gamma - \left( \frac{s_0}{\lambda + 1} \right)^{1-\beta}}{\lambda \cdot 1}\tag{13}
\]

Given the service level as a function of the wholesale and retail prices (equation (10)) and the retail price as a function of the wholesale price, \(P_r(P_w)\), the manufacturer's

\(^{14}\) The share function (1) is evaluated for \(m = n = 1\).
problem is to maximize its profit by selecting the optimal wholesale price.

\[
\max_{P_w} \Pi_m = (P_w - c) [P_{r_i}(P_w)]^{-\alpha} [s_n(P_{r_i}(P_w), P_w)]^\beta
\]  

(14)

The manufacturer's problem can be rewritten as one where it selects an optimal retail price when the wholesale price as a function of the retail price is as governed by (13).

This transformation turns the manufacturer's problem into

\[
\max_{P_r} \Pi_m = [P_r^{-\alpha} - c P_r^{-\alpha} - \frac{2\lambda \gamma}{(\lambda + 1)^{\beta}} (\frac{s_0}{\lambda - 1})^\delta (\frac{s_0}{\lambda - 1})^\delta](\frac{s_0 (\lambda + 1)}{\lambda - 1})^\delta
\]

(15)

The first order condition is

\[
\frac{\partial \Pi_m}{\partial P_r} = [ (1 - \alpha) P_r^{-\alpha} + \alpha c P_r^{-\alpha - 1} ] (\frac{s_0 (\lambda + 1)}{\lambda - 1})^\delta = 0
\]

(16)

Solving (16) yields

\[
P^*_r = \frac{\alpha c}{\alpha - 1}
\]

(17)

The retail price under free trade is exactly the same as that under vertical integration.

Substituting the result of (16) into (10) and (13) reveals that

\[
s^*_n = (\frac{\lambda + 1}{\lambda - 1}) s_0
\]

(18)

and

\[
P^*_w = \frac{\alpha c}{\alpha - 1} - \frac{2\lambda \gamma}{(\lambda + 1)^{\beta}} (\frac{\alpha c}{\alpha - 1}) (\frac{s_0}{\lambda - 1})^\delta
\]

(19)

The high service level observed under free trade is a simple markup over the level of service offered by the discounter. Furthermore, the markup decreases in \(\lambda\). As the life cycle of the product being distributed increases, the residual free riding problem is exacerbated, which causes the high level of service offered to decline.
Finally, substituting equation (17) into equation (15) reveals that manufacturer profits under free trade are given by

$$\Pi_m^{\text{PT}} = \frac{1}{\alpha - 1} \left[ c - \frac{2 \lambda \gamma s_0}{\lambda - 1} \right]$$

(20)

A straightforward comparison of (20) to (8) indicates that manufacturer profits under free trade are strictly less than those under vertical integration.

The above conclusions form the following proposition, which summarizes the results under free trade.

**PROPOSITION 1:** Relative to vertical integration, free trade is characterized by the same retail price, a lower level of service, and lower manufacturer profits.

### III.5 Exclusive Territories

Should the manufacturer opt to distribute its product through an exclusive territory, I assume that it merely grants to a single high service retailer the exclusive right to distribute the product in question. The manufacturer does not, therefore, elicit retail price and service level bids from prospective high service retailers. I also assume that the manufacturer places no upper limit on retail price (or, equivalently, minimum quota on quantity) on the single high service retailer. This assumption can be justified at least in part on informational grounds. Since under ET the manufacturer has control over solely the wholesale price, the selection of ET over RPM with the resultant loss of retail price control would most likely occur if the manufacturer lacks information specific to the retail market.footnote{15 Finally, as argued earlier, I am ruling out the use of a franchise fee

footnote{15} Furthermore, if a maximum retail price were used to combat the double marginalization problem, one would expect to see ET more frequently employed in connection with maximum RPM than minimum RPM. This is not consistent with the data. In the RPM cases listed in Ippolito (1988), the percentage of RPM cases also alleging some form of territorial restriction was actually smaller for maximum RPM cases than for minimum RPM cases. Specifically, roughly 32 percent of the
by the manufacturer on the grounds that such up-front payments are not sub-game perfect and, as such, do not constitute credible commitments on the part of the manufacturer.

Given these assumptions, then, the high service retailer's problem under ET becomes

$$\max \Pi_h = (P_r - P_w) P_r^{-\alpha} s_h^{\beta} - \gamma s_h$$

$$s_h, P_r$$

(21)

The first order conditions are given by

$$\frac{\partial \Pi_h}{\partial P_r} = s_h^{\beta} [P_r^{-\alpha} - \alpha(P_r - P_w) P_r^{-\alpha - 1}] = 0$$

(22)

and

$$\frac{\partial \Pi_h}{\partial s_h} = \beta(P_r - P_w) P_r^{-\alpha} s_h^{\beta - 1} = 0$$

(23)

Solving these two equations simultaneously yields a retail price and service level, each of which is a function of the wholesale price selected by the manufacturer. These reaction functions in the wholesale price are

$$P_r(P_w) = \frac{\alpha}{\alpha - 1} P_w$$

(24)

and

$$s_h(P_w) = \left[ \frac{\beta(\alpha - 1)^{\alpha - 1} P_w^{1 - \alpha}}{\gamma^\alpha} \right]^{\frac{1}{1 - \beta}}$$

(25)

maximum RPM cases also included a charge of territorial restrictions. The corresponding figure for the more prevalent minimum RPM cases is 40 percent.
The manufacturer's problem is to choose the optimal wholesale price, given the above information about how the high service retailer will respond with a retail price and a service level. The manufacturer's problem is thus

$$\max_{P_w} \Pi_m = (P_w - c) \left[ P_r(P_w) \right]^{-\alpha} \left[ s_h(P_w) \right]^\beta$$

where $P_r(P_w)$ and $s_h(P_w)$ are defined by the reaction functions (24) and (25) respectively. Making these substitutions and combining like terms transforms the manufacturer's problem into

$$\max_{P_w} \Pi_m = \frac{\alpha}{\alpha - 1} \cdot \frac{1}{\alpha - 1} \left[ P_w \right]^{\alpha(1 - \beta)} \left[ \frac{P_r}{\gamma} \right]^{\beta(1 - \beta)} \left[ P_w \left( 1 - \frac{1}{\alpha - 1} \right) \right]^{\alpha(1 - \beta)} \left[ (P_w - c) + \frac{\beta}{(1 - \beta)} P_w \left( 1 - \frac{1}{\alpha - 1} \right) \right] = 0$$

(26)

The first order condition is

$$\frac{\alpha}{\alpha - 1} \cdot \frac{1}{\alpha - 1} \left[ P_w \right]^{\alpha(1 - \beta)} \left[ \frac{P_r}{\gamma} \right]^{\beta(1 - \beta)} \left[ P_w \right]^{\alpha(1 - \beta)} \left[ (P_w - c) + \frac{\beta}{(1 - \beta)} P_w \left( 1 - \frac{1}{\alpha - 1} \right) \right] = 0$$

(27)

which, after substantial simplification, yields

$$P_w^{ET} = \frac{\alpha - \beta}{\alpha - 1} c$$

(28)

The retail price and high service level under exclusive territories can be calculated by substituting (28) into (24) and (25) respectively.

$$P_r^{ET} = \frac{\alpha (\alpha - \beta)}{(\alpha - 1)^2} c$$

(29)

and

$$s_h^{ET} = \left[ \frac{\beta (\alpha - 1)^{2(\alpha - 1)}}{\gamma \alpha^c \alpha^c (\alpha - \beta)^{(\alpha - 1)}} \right]^{\frac{1}{1 - \beta}}$$

(30)
A direct comparison of (29) to (6) and (17) reveals that the retail price under ET is higher than the common retail price observed under free trade and vertical integration. This "double marginalization" occurs because under ET the retailer is granted monopoly pricing power and consequently raises the retail price accordingly. Also, a comparison of (30) to (7) shows that the service level under ET is less than that under vertical integration. Under ET, the retailer ignores the profits bestowed on the manufacturer, through the \((P_w - c)\) wedge, from increased service levels. This vertical externality, not present under vertical integration when the economic interests of the distributional arm are coincident with those of the manufacturer, is an additional cost the manufacturer must bear should it opt to distribute its product through exclusive territories.

The per unit retail margin can be determined by differencing (29) and (28).

\[
P_r^{ET} - P_w^{ET} = \frac{\alpha - \beta}{(\alpha - 1)^2} c
\]

Of final concern are profits accruing to the manufacturer. Manufacturer profits can be calculated by substituting (28) into (26).

\[
\Pi_m^{ET} = \left[ \frac{\beta^\beta (\alpha - 1)^{\alpha - 1} \cdot \beta}{\gamma^\beta \cdot \alpha^\alpha \cdot c^{\alpha - 1} (\alpha - \beta)} \right] \frac{1}{1 - \beta} (1 - \beta) > 0
\]

Although positive, a comparison of (32) to (8) reveals that manufacturer profits under ET are strictly less than those under vertical integration. As argued above, this is a consequence of both a retail price above the optimal level as well as an under-provision of services. Also, a comparison of (32) to (20) shows an ambiguous ordering of manufacturer profits under ET and free trade. From the manufacturer's perspective, free trade avoids an excessive retail price, but entails even more of a service deficiency. The result is an ambiguous comparison of manufacturer profits under ET and free trade.
These results allow me to conclude the discussion of exclusive territories with the following proposition:

**PROPOSITION 2:** Relative to vertical integration, exclusive territories are characterized by a higher retail price, a lower level of service, and lower manufacturer profits.

III.6 RPM: pre-entry\(^{16}\)

I begin the analysis of RPM by assuming initially that the distribution system is comprised of one high service retailer and one discounter.\(^{17}\) I do not assume, at the outset, that the single high service dealer competes with other high service retailers in the level of service it decides to offer. Instead, I defer discussion of this scenario to section III.7.2, where I consider the consequences of service competition among high service retailers separately. Here, I merely assume that the sole high service retailer chooses its optimal service level, given the wholesale and retail prices set by the manufacturer.

The high service retailer’s problem is thus

\[
\max_{s_h} \Pi_h = (P_r - P_w) P_r^{-\alpha} s_h^{\beta} \frac{\lambda + 1}{2 \lambda} - \gamma s_h \tag{33}
\]

\(^{16}\) This section implicitly assumes that \(\lambda\) is strictly greater than 1. If \(\lambda = 1\), all sales would be made at high service retailers. If only a single high service retailer existed, as this pre-entry section assumes, no price discipline would be imposed in the retail sector. The results would mimic those of exclusive territories. Alternatively, if a large pool of potential high service retailers could compete for the right to carry the product, the results would parallel those of section III.7.2, which incorporates entry by high service retailers, evaluated at \(\lambda = 1\). It is interesting to note that the latter would completely coincide with the vertical integration result. With no discounters, there is no residual free riding problem, and with potential high service entrants bidding up service levels, the vertical externality also vanishes.

\(^{17}\) This configuration is not without merit to the manufacturer. A single discounter minimizes the residual free riding problem while still inflicting sufficient price discipline on the high service retailer.
The first order condition is
\[
\frac{\partial \Pi_m}{\partial s_h} = \beta \left( P_r - P_w \right) P_r^{-\alpha} s_h^{\beta - 1} \frac{\lambda + \frac{1}{2 \lambda}}{\lambda} - \gamma = 0
\]  
\hspace{0.5cm} (34)

Upon rearrangement, this first order condition generates an expression for the service level which, in essence, is a reaction function of the retail and wholesale prices selected by the manufacturer.
\[
s_h(P_r, P_w) = \left[ \frac{\beta}{\gamma} P_r^{-\alpha} \left( P_r - P_w \right) \frac{\lambda + \frac{1}{2 \lambda}}{\lambda} \right]\frac{1}{\gamma^{1-\beta}}
\]  
\hspace{0.5cm} (35)

The manufacturer’s problem is then to select optimal wholesale and retail prices, given the way in which the high service retailer will respond in setting its service level.
\[
\max \Pi_m = (P_w - c) P_r^{-\alpha} [s_h(P_r, P_w)]^\beta
\]
\[P_r \text{, } P_w\]

The reaction function, \(s_h(P_r, P_w)\), is defined by (35). Substituting this expression into the above transforms the manufacturer’s problem into
\[
\max \Pi_m = \left( \frac{\beta (\lambda + 1)}{2 \lambda \gamma} \right) P_r^{-\alpha(1-\beta)} (P_w - c) P_r^{-\alpha(1-\beta)} (P_r - P_w)^{\beta(1-\beta)}
\]
\[P_r \text{, } P_w\]

The first order conditions are
\[
\frac{\partial \Pi_m}{\partial P_r} = \left( \frac{\beta (\lambda + 1)}{2 \lambda \gamma} \right) (P_w - c) \left[ \frac{\beta}{1 - \beta} P_r^{-\alpha(1-\beta)} (P_r - P_w)^{\beta(1-\beta)} \right] - \frac{\alpha}{1 - \beta} (P_r - P_w)^{\beta(1-\beta)} P_r^{-\alpha(1-\beta)} = 0
\]  
\hspace{0.5cm} (37)
\[ \frac{\partial T_m}{\partial P_w} = \left( \frac{B}{2 \lambda \gamma} \right)^{\frac{B(\alpha - 1)}{\beta(1 - \beta)}} P_r^{\alpha(1 - \beta)} \left[ (P_r - P_w)^{\beta(1 - \beta)} - \frac{\beta}{1 - \beta} (P_r - c) (P_r - P_w)^{\beta(1 - \beta) - 1} \right] = 0 \] 

Solving (37) and (38) simultaneously results in

\[ P_w^{\text{rpm}} = \frac{\alpha - \beta}{\alpha - 1} \frac{c}{\beta} \]  

and

\[ P_r^{\text{rpm}} = \frac{\alpha - \beta}{\alpha - 1} \frac{c}{\beta} \]  

The wholesale price under RPM is the same as that under ET. The retail price under RPM is equivalent to that under free trade, as well as that under vertical integration. The result of a common retail price under both free and fair trade is consistent with the results obtained in Marvel and McCafferty (1986). I find that this retail price is also equal to the globally optimal retail price exhibited under vertical integration. Also, it is interesting to note that, even though RPM and ET are characterized by different retail prices, the wholesale price is the same under both restraints.

The per unit retail margin under RPM is determined by differencing the expressions in (39) and (40).

\[ P_r^{\text{rpm}} - P_w^{\text{rpm}} = \frac{\beta}{(\alpha - 1)} \frac{c}{\beta} \]  

A comparison of (41) to (31) indicates that the per unit retail margin is larger under ET than under RPM. Also, as \( \beta \) increases, the retail margin under RPM increases whereas the retail margin under ET declines. Under RPM, where it controls both the
wholesale and retail prices, the manufacturer designs the retail margin in such a way that as aggregate demand becomes more responsive to service, the incentive on the part of the high service retailer to expand service provision increases. Under ET, however, the manufacturer has no direct control over the retail price and hence the incentive structure of the retail margin is lost.

The service level chosen by the high service retailer can be calculated by substituting (39) and (40) into (35).

$$s_h^{rpm} = \left[ \frac{b^2 \left( \frac{\alpha - 1}{\alpha^a c^{a-1}} \right) \lambda + 1}{2 \lambda} \right]^{1 - \beta}$$  \hspace{1cm} (42)

A comparison of (42) to (7) reveals that the high service level under RPM is unambiguously less than that under vertical integration, due to the aforementioned vertical externality as well as the presence of residual service free riding. While one might expect the high service level under RPM also to be less than that under ET, since ET is subject to only the vertical externality, that is not necessarily the case. A comparison of (42) to (30) indicates that the high service level under RPM is less than that under ET if and only if

$$\frac{\beta \lambda + 1}{2 \lambda} < \left( \frac{\alpha - 1}{\alpha - \beta} \right)^{a-1}$$  \hspace{1cm} (43)

Both sides of (43) are strictly less than one. The reason for the ambiguity is straightforward. RPM suffers from residual service free riding, which tends to reduce the high service level under RPM. Working in the opposite direction is the fact that the retail price is lower under RPM. The lower retail price increases the marginal
effectiveness of service provision under RPM. Whether service levels under RPM are larger or smaller than those under ET depends on which of these two effects dominates.

It is also relatively straightforward to show that the high service level under RPM declines as \( \lambda \) increases. As the product's life cycle increases, the service free riding component likewise increases, which, in turn, causes the high service retailer to optimally respond by reducing its service level.

Profits accruing to the manufacturer under RPM can be calculated by substituting (39) and (40) into (36).

\[
\Pi_{m}^{\text{rpm}} = \left[ \frac{\beta^{\rho} (\alpha - 1)^{\alpha - 1}}{\gamma^{\rho} \alpha c^{\alpha - 1}} \frac{1}{\lambda^{\rho + 1}} \right] \frac{1}{(1 - \beta)} > 0
\]  

(44)

A comparison of (44) to (8) shows that manufacturer profits under RPM are strictly less than those under vertical integration. Comparing (44) to (20) and (32), manufacturer profits under free trade and exclusive territories respectively, reveals an ambiguous ordering. Note, however, from (44) that manufacturer profits under RPM increase as \( \lambda \) decreases, i.e. as the product's life cycle shrinks. Thus, while vertical integration under my model is always preferable for the manufacturer, RPM is more likely to be preferred by the manufacturer to free trade and exclusive territories as the product of interest becomes shorter lived.

Profits for the high service retailer under RPM can be computed by substituting

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18 This result is dependent on the particular form of the aggregate demand function. Even though the retail price will always be higher under ET, this could, in general, increase, decrease, or leave unchanged the marginal effectiveness of service relative to RPM. For example, it is easy to show that for the monotonic transformation \( Q = \ln(P_{r}^{x}, S_{r}^{x}) \), the marginal effectiveness of service is independent of the retail price. The main results of the analysis do not depend on the manner in which retail price affects the service level selection.
(39), (40), and (42) into (33).

\[ \Pi_h^{nm} = \left[ \frac{\beta^{1+\beta} (\alpha - 1)^{\alpha - 1}}{\gamma^\beta \alpha^\gamma c^{c - 1}} \left( \frac{\lambda + 1}{2 \lambda} \right) \right]^{\frac{1}{1-\beta}} (1 - \beta) > 0 \]  \hspace{1cm} (45)

Profits to the high service retailer are strictly positive under RPM prior to entry.

Profits for the discount retailer are calculated by substituting (39), (40), and (42) into

\[ \Pi_l = (P_r - P_w) P_r^\alpha s_b^b \frac{\lambda - 1}{2 \lambda} - \gamma s_0 \]

Performing these substitutions yields

\[ \Pi_l^{nm} = \left[ \frac{\beta^{1+\beta} (\alpha - 1)^{\alpha - 1}}{\gamma^\beta \alpha^\gamma c^{c - 1}} \left( \frac{\lambda + 1}{2 \lambda} \right) \right]^{\frac{1}{1-\beta}} \left( \frac{\lambda - 1}{2 \lambda} \right) - \gamma s_0 \]  \hspace{1cm} (46)

Because \( \lambda > 1 \), the first term is necessarily positive. Positive profits to the discount retailer are assured for sufficiently small \( s_0 \) and/or sufficiently small \( \gamma \).

Since profits of the high service retailer were strictly positive, one might expect that additional high service retailers would, should they exist, desire to enter the retail marketplace. Discounter profits may also be positive, which may lead to discounter entry, as well.

III.7 RPM: post-entry

Entry in this model can take one of three forms: by discounters alone, by high service retailers alone, and by retailers of both types. I will analyze each type of entry separately so as to isolate its specific effects. As the model will suggest, it may in certain circumstances be optimal for the manufacturer to refuse to deal with additional retailers, especially when the manufacturer is unable to tell a retailer's type \textit{a priori}. 
III.7.1 Entry by Discounters

If entry is costless and if the discounters are homogeneous, as I have assumed, entry by other low service retailers continues until discounter profits are driven to zero. In this environment, the single high service retailer retains the ability to set its optimal service level, although this service level will be a function of \( n \), the number of discounters distributing the product. The number of discount retailers are, in turn, determined by a zero profit condition on discounter profit. Once the manufacturer understands how the discounters and the high service retailer will respond, it (the manufacturer) determines the optimal wholesale and retail prices.

The number of discounters, \( n \), is determined by a zero discounter profit condition\(^{19}\).

\[
(P_r - P_w) \alpha_s h^\beta h^\alpha \frac{\lambda - 1}{\lambda (n + 1)} \gamma s_0 = 0
\]

This, in turn, implies

\[
\frac{\lambda + n}{\lambda (n + 1)} = \frac{1}{\lambda} + \frac{\gamma s_0}{(P_r - P_w) \alpha_s h^\beta}
\]

The problem facing the high service retailer is given by

\[
\max_{s_h} \Pi_h = (P_r - P_w) \alpha_s h^\beta h^\alpha \frac{\lambda + n}{\lambda (n + 1)} \gamma s_h
\]

Substituting the expression in (48) into the above transforms the high service retailer’s problem into

\[
\max_{s_h} \Pi_h = (P_r - P_w) \alpha_s h^\beta h^\alpha \frac{1}{\lambda} \gamma (s_h - s_o)
\]

---

\(^{19}\) I am obviously ignoring any integer problem here. More precisely, the number of discounters, \( n^* \), would be the largest \( n \in N \) such that \((P_r - P_w) \alpha_s h^\beta h^\alpha \frac{\lambda - 1}{\lambda (n + 1)} \gamma s_0 \geq 0 \) and \((P_r - P_w) \alpha_s h^\beta h^\alpha \frac{\lambda - 1}{\lambda (n + 1)} \gamma s_0 \leq 0 \).
The first order condition is

\[
\frac{\partial \Pi_h}{\partial s_h} = \beta (P_r - P_w) P_r^\alpha s_h^{\beta - 1} \frac{1}{\lambda} - \gamma = 0
\]  

(51)

This first order condition implies the following service level reaction function of the wholesale and retail prices selected by the manufacturer.

\[
s_h(P_r, P_w) = \left[ \frac{\beta}{\gamma} P_r^\alpha (P_r - P_w) \frac{1}{\lambda} \right]^{\frac{1}{1 - \beta}}
\]  

(52)

The manufacturer's problem is still to select the optimal wholesale and retail prices, given what this implies about a service level selection.

\[
\max \Pi_m = \frac{(P_w - c) P_r^\alpha [s_h(P_r, P_w)]^\beta}{P_r, P_w}
\]  

(53)

Now \( s_h(P_r, P_w) \) is as specified by the reaction function of equation (52). Making this substitution turns the manufacturer's problem into the following function of only the wholesale and retail prices:

\[
\max \Pi_m = \left( \frac{\beta}{\gamma} \right)^{\beta(1 - \beta)} \frac{P_r^{\alpha(1 - \beta)}}{(P_w - c) P_r^{\alpha(1 - \beta)} (P_r - P_w)^{\beta(1 - \beta)}}
\]  

(54)

\[
P_r, P_w
\]

The first order conditions are

\[
\frac{\partial \Pi_m}{\partial P_r} = \left( \frac{\beta}{\gamma} \right)^{\beta(1 - \beta)} \left( \frac{P_r^{\alpha(1 - \beta)}}{(1 - \beta)(P_r - P_w)^{\beta(1 - \beta) - 1}} \right) - \frac{\alpha}{(1 - \beta) (P_r - P_w)^{\beta(1 - \beta)}} P_r^{\alpha(1 - \beta) - 1} = 0
\]  

(55)
\[
\frac{\partial \Pi_m}{\partial P_w} = \left( \frac{\beta}{\lambda^\alpha} \right) P_r^{\alpha(1-\beta)} \left[ \frac{(P_r - P_w)R(1-\beta)}{(1 - \beta)(P_r - c)(P_r - P_w)} \right] = 0
\]

(56)

Solving these two first order conditions simultaneously reveals that\(^{20}\)

\[
P_r^{\text{RPM}} = \frac{\alpha}{\alpha - 1} c
\]

(57)

and

\[
P_w^{\text{RPM}} = \frac{\alpha - \beta}{\alpha - 1} c
\]

(58)

Entry by discounter affects neither the retail nor wholesale price. The high service retailer's service level can be determined by substituting (57) and (58) into (52).

\[
S_h^{\text{RPM}} = \left[ \frac{\beta^2 (\alpha - 1)^{\alpha - 1}}{\gamma \alpha^\alpha} \frac{1}{c^{\alpha - 1}} \lambda \right]^{-\beta}
\]

(59)

Comparing (59) to (42) indicates that the post-entry service level is less than the corresponding pre-entry level. Furthermore, recall that increasing \(\lambda\) reduced service levels before entry. This is also true post-entry, as witnessed by the result in (59). In fact, the ratio of pre-entry to post-entry service levels is given by

\[
\frac{S_h^{\text{RPM}}}{S_h} = \left( \frac{\lambda + 1}{2} \right)^{\frac{1 - \beta}{2}}
\]

(60)

This ratio is unambiguously greater than one for \(\lambda > 1\) and moreover increases in \(\lambda\). As \(\lambda\) increases, the service free riding problem becomes worse. This condition is

---

\(^{20}\) I have chosen to delineate the RPM results by labelling pre-entry values with lower case superscripts and post-entry results with upper case superscripts.
further exacerbated, however, as more discounterers enter the retail marketplace. Thus, as λ increases, service levels are reduced more after discounter entry than before.

Manufacturer profits after discounter entry can be determined by substituting (57) and (58) into (54).

\[
\Pi_{m}^{\text{RPM}} = \left[ \frac{\beta (\alpha - 1)}{\gamma \alpha^\alpha \sigma^\beta} \lambda^{\frac{1}{1-\beta}} \right] (1 - \beta) > 0
\]  

(61)

A comparison of (61) to (44) reveals that entry by discounterers alone reduces manufacturer profits. Discounter entry worsens the residual free rider problem, causing the high service retailer to reduce its service level, which, in turn, constricts aggregate demand and therefore shrinks manufacturer profits. Finally, manufacturer profits decline as λ increases. This result is consistent with the pre-entry conclusion.

These results for discounter entry allow me to conclude this discussion with the following proposition:

**PROPOSITION 3:** *Entry by discounterers affects neither the wholesale nor retail price, but, by inflaming the residual free riding problem, results in lower service levels and manufacturer profits.*

### 3.7.2 Potential Entry by High Service Retailers

If only high service retailers enter the retail marketplace, the competition among them must focus on the level of services provided, since the RPM precludes price competition. Furthermore, as argued before, because the share function is discontinuous each high service retailer has an incentive to provide a level of service just slightly above that offered by its rivals. The result of this service competition among the potential high service retailers is that high service retailers continue to raise their service levels until a single high service retailer offers a level of service which just allows it to
earn zero economic profit. This level of service is determined by the following zero
profit condition for a single high service retailer:21

\[(P_r - P_w) P_r^{-\alpha} s_h^b \frac{\lambda + 1}{2 \lambda} - \gamma s_h = 0\]  \hspace{1cm} (62)

This equation implies a service level which is a function of the wholesale and retail
prices selected by the manufacturer.

\[s_h(P_r, P_w) = \left[ \frac{P_r^{-\alpha} (P_r - P_w)}{\gamma} \frac{\lambda + 1}{2 \lambda} \right]^{\frac{\lambda}{\lambda - \beta}}\]  \hspace{1cm} (63)

The manufacturer's problem is to maximize its profits by selecting the optimal
wholesale and retail prices, given the above information of what those selections will
imply about a service level.

The manufacturer's problem is thus

\[
\max_{P_r, P_w} \Pi_m = (P_w - c) P_r^* [s_h(P_r, P_w)]^g
\]

where \(s_h(P_r, P_w)\) is defined by equation (63). Substituting (63) into the above turns the
manufacturer’s problem into the following function of only the wholesale and retail
prices:

\[
\max_{P_r, P_w} \Pi_m = \left( \frac{\lambda + 1}{2 \lambda \gamma} \right)^{g(1-\beta)} (P_w - c) P_r^{-\alpha(1-\beta)} (P_r - P_w)^{g(1-\beta)}
\]  \hspace{1cm} (64)

---

21 Here, the share function (1) is still evaluated for \(m = n = 1\).
The first order conditions are

\[
\frac{\partial \Pi_m}{\partial P_r} = \left( \frac{\lambda + 1}{2 \lambda \gamma} \right) (P_w - c) \left[ \frac{\beta}{1 - \beta} P_r^{-\alpha(1 - \beta)} (P_r - P_w)^{\beta(1 - \beta) - 1} \right]
\]

\[- \frac{\alpha}{(1 - \beta)} (P_r - P_w)^{\beta(1 - \beta)} P_r^{-\alpha(1 - \beta) - 1} = 0 \tag{65}\]

and

\[
\frac{\partial \Pi_m}{\partial P_w} = \left( \frac{\lambda + 1}{2 \lambda \gamma} \right) P_r^{-\alpha(1 - \beta)} \left[ (P_r - P_w)^{\beta(1 - \beta)} \right]
\]

\[- \frac{\beta}{(1 - \beta)} (P_w - c) (P_r - P_w)^{\beta(1 - \beta) - 1} = 0 \tag{66}\]

Solving these equations simultaneously yields

\[
P_{r}^{\text{RPM}} = \frac{\alpha - 1}{\alpha} c \tag{67}\]

and

\[
P_{w}^{\text{RPM}} = \frac{\alpha - \beta}{\alpha - 1} c \tag{68}\]

Entry by high service retailers changes neither the retail nor the wholesale price. The level of service offered can easily be determined by substituting (67) and (68) into (63).

\[
s_{h}^{\text{RPM}} = \left[ \frac{\beta (\alpha - 1)^{\alpha - 1}}{\gamma} \frac{\lambda + 1}{2 \lambda} \right]^{\frac{1}{1 - \beta}} \tag{69}\]

A comparison of (69) to (42) and (59) indicates that entry by high service retailers alone results in a higher level of service offered than that present before any entry occurs.
and also that after discounter entry. The ratio of the pre-entry service level to that observed after entry by high service retailers is given by

\[
\frac{S_{h,\text{rpm}}}{S_{h,\text{RPM}}} = \beta
\] (70)

which is, of course, less than one. Entry only by high service retailers completely eliminates the vertical externality and, in addition, since only one discounter is present, minimizes the horizontal externality. Consistent with the previous RPM results, the service level declines in \( \lambda \).

Finally, manufacturer profits can be calculated by substituting (67) and (68) into (64).

\[
\Pi_m^{\text{RPM}} = \left[ \frac{\beta^\beta (\alpha - 1)^{a-1}}{\gamma^\beta \alpha^a \epsilon^{a-1}} \left( \frac{\lambda + 1}{2 \lambda} \right)^{1-\beta} \right] (1 - \beta) > 0
\] (71)

A comparison of (71) to (44) indicates that entry by high service retailers increases manufacturer profits by eliminating the aforementioned vertical externality. Also, consistent with the previous results, manufacturer profits decrease as \( \lambda \) increases.

These results for entry by high service retailers allow me to conclude this discussion with the following proposition:

**PROPOSITION 4**: Entry by high service retailers affects neither the wholesale nor retail price, but, by eliminating the vertical externality, results in higher service levels and manufacturer profits.

**III.7.3 Entry by both Discounters and High Service Retailers**

The final entry possibility is that discounters enter the retail marketplace and high service retailers compete in services to be the sole high service supplier. The level of
service selected by the high service retailer is determined by a zero profit condition for a single high service retailer and \( n \) discounter.\(^{22}\)

\[
(P_r - P_w) P_r^{-\alpha} s_h^\beta \frac{\lambda + n}{\lambda(n + 1)} - \gamma s_h = 0
\]  

(72)

This implies a service level which is a function of the wholesale and retail prices, as well as \( n \), the number of discounter supplying in the retail market.

\[
s_h(P_r, P_w, n) = \left[\frac{P_r^{-\alpha} (P_r - P_w) \frac{\lambda + n}{\lambda(n + 1)}}{\gamma} \right]^{-\frac{1}{\beta}}
\]

(73)

The number of discounter is determined by the zero profit condition on discounter entry (equation (47), which, recall, implies equation (48)). Making this substitution into (73) yields the following expression in \( s_h \), where the arguments of \( s_h \) have been suppressed:

\[
s_h = \frac{P_r^{-\alpha} (P_r - P_w)}{\lambda \gamma} s_h^\beta + s_0
\]

(74)

This polynomial equation in \( s_h \) cannot be readily solved. Recall, however, that \( s_0 \) is positive but arbitrarily small. An approximate solution for \( s_h \) can thereby be found by assuming that \( s_0 = 0 \). Applying this assumption to (74) yields the following approximate solution for \( s_h \).

\[
s_h(P_r, P_w) = \left[\frac{P_r^{-\alpha} (P_r - P_w)}{\gamma} \frac{1}{\lambda} \right]^{-\frac{1}{\beta}}
\]

(75)

The manufacturer's problem, then, is to select a profit maximizing wholesale and retail price, understanding how these selections will influence the level of service. The

\(^{22}\) The integer problem, once again, is ignored. See note 19, supra.
The manufacturer's problem is thus

$$\max \frac{\Pi_m}{P_r, P_w} = \left( P_w - c \right) P_r^{\gamma} \left[ s_h(P_r, P_w) \right]^\beta$$

where $s_h(P_r, P_w)$ is defined by equation (75). Substituting (75) into the above turns the manufacturer's problem into the following function of only the wholesale and retail prices:

$$\max \frac{\Pi_m}{P_r, P_w} = \left( \frac{1}{\lambda \gamma} \right)^{\beta(1 - \beta)} \left( P_w - c \right) P_r^{\alpha(1 - \beta)} \left( P_r - P_w \right)^{\beta(1 - \beta)}$$

(76)

The first order conditions are

$$\frac{\partial \Pi_m}{\partial P_r} = \left( \frac{1}{\lambda \gamma} \right)^{\beta(1 - \beta)} \left( P_w - c \right) \left[ \frac{\beta}{(1 - \beta)} P_r^{\alpha(1 - \beta)} \left( P_r - P_w \right)^{\beta(1 - \beta) - 1} \right] = 0$$

(77)

and

$$\frac{\partial \Pi_m}{\partial P_w} = \left( \frac{1}{\lambda \gamma} \right)^{\beta(1 - \beta)} P_r^{\alpha(1 - \beta)} \left[ \beta \left( P_r - P_w \right)^{\beta(1 - \beta)} - \frac{\beta}{(1 - \beta)} \left( P_w - c \right) \left( P_r - P_w \right)^{\beta(1 - \beta) - 1} \right] = 0$$

(78)

Solving these two equations simultaneously yields

$$P_r^{\text{RPM}} = \frac{\alpha - c}{\alpha - 1}$$

(79)

and

$$P_w^{\text{RPM}} = \frac{\alpha - \beta}{\alpha - 1} c$$

(80)
When entry occurs by both discounters and high service retailers the wholesale and retail prices remain unchanged. Substituting these results into (75) indicates that the level of service offered after joint entry is given by

$$s_2 = \left[ \frac{\beta}{\gamma} \frac{(\alpha - 1)^{\alpha - 1}}{\lambda} \right]^{\frac{1}{1 - \beta}}$$

(81)

A comparison of (81) to (59) and (69) indicates that entry by both types of retailers results in a higher service level than that which occurs if only discounters enter, but a level less than that which results from entry by high service retailers alone. The comparison between (81) and the level of service prior to entry reveals an ambiguous ordering. However, consistent with all RPM results, the level of service offered with joint entry decreases with $\lambda$.

Finally, manufacturer profits can be determined by substituting (79) and (80) into (76).

$$\Pi_m^{RPM} = \left[ \frac{\beta}{\gamma} \frac{(\alpha - 1)^{\alpha - 1}}{\lambda} \left( \frac{1}{\lambda} \right)^{\frac{1}{1 - \beta}} \right] (1 - \beta) > 0$$

(82)

A comparison of (82) to (61) and (71) indicates that joint entry results in a level of manufacturer profits strictly less than that under high service retailer entry alone, but a level in excess of that under discounter entry. Furthermore, a comparison of (82) to (44) reveals an ambiguous ordering between manufacturer profits before and after joint entry. Entry by discounters inflames the residual service free riding problem. However, the competition in services spawned by potential high service entrants eliminates the vertical externality. Whether profits increase or decrease with joint entry depends on which of these two effects dominates. Specifically, entry by both types of
retailers increases manufacturer profits if

\[ \beta \frac{\lambda + 1}{2} < 1 \]  

(83)

It becomes more likely that entry by both types of retailers will increase manufacturer profits for small \( \beta \) and \( \lambda \). However, employing RPM is an indication that aggregate demand is quite responsive to dealer services. This implies a high, rather than a low, \( \beta \). In the very conservative case of \( \lambda = 2 \), a sufficient condition for joint entry to decrease manufacturer profits is \( \beta > 2/3 \), which seems quite plausible. Hence, it is perhaps more likely that the condition in (83) will not hold and thus that joint entry will reduce manufacturer profits. Should the manufacturer be unable to distinguish retailer types \textit{a priori}, this suggests that a refusal to deal policy would be optimal for the manufacturer under RPM.

An examination of the cases detailed in Ippolito (1988) suggests that limited distribution in conjunction with RPM is indeed frequently employed by manufacturers. In fact, over 40% of the federal and state RPM cases filed between 1976 and 1982 also include some form of territorial or customer restrictions.\(^{23}\) It should be noted, however, that although the manufacturer may strive to limit distribution of its product, transshipment from one market to another may render such attempts futile. Therefore, the most general case is perhaps the current one, when entry by either type of retailer is completely uninhibited.

Now that RPM has been analyzed under all possible entry scenarios, the following

proposition contrasts the RPM results to those of vertical integration.

**PROPOSITION 5**: Relative to vertical integration, RPM is characterized by the same retail price and, provided \( \lambda > 1 \), a lower level of service and lower manufacturer profits.

Finally, a comparison of (83) to (32), manufacturer profits under ET, indicates an ambiguous ranking. Manufacturer profits under RPM with joint entry will exceed those under ET if

\[
\frac{(\alpha - 1)^{a-\beta}}{\alpha - \beta} < \frac{1}{\lambda^\beta}
\]

It becomes more likely that RPM with joint entry will dominate ET as \( \lambda \) and \( \beta \) get smaller. A small \( \lambda \) implies that residual free riding will be less of a problem. Also, recall from (29) that the retail price under ET is higher than those under the various forms of RPM and furthermore declines with \( \beta \). Therefore, the smaller is \( \beta \) the larger is the retail price under ET, which, of course, makes ET relatively less attractive to the manufacturer.

These conclusions provide a potential empirical link between the characteristics of a given product and the method by which its manufacturer is likely to distribute it. The results suggest that products which change often relative to consumer purchase frequency are more likely to be distributed using RPM. The manufacturers of more static products, which do not change often relative to consumer purchasing frequency, on the other hand, are more likely to protect their dealers' investments in services with exclusive territories. As aggregate demand becomes more responsive to dealer service provision, it becomes more likely, in the most general case, that ET will be selected over RPM.
The following proposition summarizes not only these results, but the thrust of the entire analysis as well:

**PROPOSITION 6:** *It becomes more likely that the manufacturer will opt for RPM over ET as the life cycle of the product being distributed becomes smaller and as aggregate demand becomes less responsive to dealer service provision.*

This completes the modeling portion of the dissertation. In the next section, I attempt to empirically test these hypotheses using data gleaned from vertical restraint litigation.
Chapter IV

Evidence from Litigation on the Incidence of Vertical Restraints

The previously described model predicts that manufacturers of products with relatively long life cycles are more likely to distribute their products using exclusive territories, whereas the manufacturers of products with comparatively short life spans are more apt to protect their dealers' services using RPM. Although the availability of data in vertical restraints issues is notoriously limited, it is possible to test the above hypothesis by examining the kinds of products found in RPM and territorial restriction litigation. Ippolito (1988) has painstakingly cataloged all 203 cases involving some allegation of vertical price fixing listed in the Commerce Clearing House's "Trade Cases" (CCH Cases), a systematic compilation of reported antitrust and trade litigation from federal and state courts, filed between 1976 and 1982. Included in many of these cases are also allegations of territorial and/or customer restrictions. The information contained within these cases, as well as some additional cases described below, can be used to investigate the relationship between the nature of the product being distributed and the manufacturer's choice of vertical restraint. These data, then, permit a test of the main hypothesis generated by the model of the previous chapter.
Because of the diversity of the litigation involved in the cases in the Ippolito listing, each case was reviewed to determine if the vertical restraints alleged were actually employed. Since vertical price restraints are per se violations of the antitrust laws, any case resulting in a not guilty verdict or in a summary judgment finding for the defendant was not included in my RPM sample.\(^1\) Also, any case involving a franchise arrangement was excluded, since franchise relationships differ fundamentally from the vertical relationships of interest here.\(^2\) Since only minimum RPM can be used to protect dealer service investments, all maximum RPM cases were excluded from the RPM sample. In a number of instances, the price setting was actually horizontal, rather than vertical. These cases were not included in my RPM samples. Finally, a few cases involved challenges to state regulations mandating minimum retail prices. These cases were also excluded from the RPM groupings.

Each case which remained was classified into one of three vertical restraints categories - RPM only, RPM with exclusive territories, or territories only.\(^3\) Furthermore, the product in question can be classified according to product life cycle, or \(\lambda\), into one of two groupings - high \(\lambda\) or low \(\lambda\). This latter classification is somewhat more problematic, for a number of reasons. Whether a product is of high or low \(\lambda\) depends crucially on who the customer is. A product such as a personal

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\(^1\) A breakdown of the cases according to groupings I describe here is described in detail in appendix A.

\(^2\) For example, franchise arrangements usually involve the transmission of a marketing or business plan from franchisor to franchisee and are typically characterized by some type of promotional activity undertaken by the manufacturer. The franchisee also often carries solely the product(s) of the franchisor. In the type of vertical relationship which is of concern here, the services are provided downstream rather than upstream, and the downstream entity will typically handle the products of many manufacturers. For more on franchise relationships, see Klein (1980), Rubin (1978), or Blair and Kaserman (1982).

\(^3\) Any case which was excluded from the RPM sample for any of the above reasons but which also included allegations of territorial restrictions was a potential territories only case. Many of the RPM filters (horizontal territorial restrictions, regulation challenges, etc.) were also applied to these potential territories cases to ascertain legitimacy.
computer would certainly have a low $\lambda$ if the vertical restraint were placed on the retailer (in which case the customer is the final consumer), but a high $\lambda$ should the vertical restraint be placed on a distributor or wholesaler (in which case the customer is the retail dealer). Consequently, to determine whether each case should be considered of high or low $\lambda$, it was necessary to return to the individual cases themselves and ascertain whether the restraint was at the wholesale or retail level. All cases in which the restraints were placed at the wholesale or distributor level can be considered high $\lambda$ cases, since the customer (the retailer) presumably buys often and in significant volume. Cases in which the restraint was at the retail level involved deeper analysis. A product for which the vertical restraint was imposed at the retail level is of low $\lambda$ if it is purchased infrequently (e.g. surfboards or stereo equipment) or if it has a significant style or fashion component (e.g. clothing or cosmetics) where service is likely to be an important factor in each purchase decision, or where dealer quality certification is likely to be involved. Alternatively, a product at the retail level is of high $\lambda$ if it is purchased relatively frequently and if service and/or quality certification is unlikely to be an issue (e.g. milk or newspapers).

Since Ippolito focused exclusively on RPM cases, her tabulations did not include cases in which only territorial restriction was alleged. To include these cases in my sample, it was necessary to return to the CCH Trade Cases listing and examine all cases filed between 1976 and 1982 which involved some allegation of territorial restriction, but no mention of vertical price fixing. In this time period, 25 additional non-franchise cases were filed which involved the use of exclusive territories as a vertical restraint at either the wholesale or retail level. This supplemental sample was then divided into cases involving products of high and low $\lambda$, according to the guidelines discussed.
above. These cases in combination with the cases gleaned from Ippolito's listing constitute the data source for the empirical section of the dissertation.

Use of information contained in litigated cases as a data source is subject to some important caveats, concerning, for example, the conditions under which the litigated sample of cases is representative of all instances in which the practice in question is employed. Ippolito (1988) has already addressed these considerations for the use of RPM. Of additional concern here is the differing legal treatments to which RPM and territorial restrictions are subject, since the same source of information is being used on the incidence of both RPM and exclusive territories. Throughout the entire period of the sample (1976 - 1982) the practice of RPM was a per se violation of the antitrust laws. However, during this period, the legal standard to be applied to non-price vertical restraints changed. Between 1967 and 1977 the legal treatment of exclusive territories was governed by the Schwinn decision. In Schwinn, the court strangely held that any territorial restriction imposed on a dealer once the manufacturer had parted title with the product was a per se violation of the antitrust laws. However, should the manufacturer distribute the product on a consignment basis, territorial restrictions were to be judged on a rule of reason basis. It is arguably plausible that relatively few manufacturers distributed their products with this type of consignment system. This implies that for the first two years of the Ippolito sample the legal treatments of RPM and exclusive territories were roughly equivalent.

The odd distinction by distributional method was finally eliminated by the court with its 1977 decision in Continental TV, in which the court established a global rule

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4 Specifically, see pp. 25-35.
6 Continental TV v. GTE Sylvania, 433 U.S. 36 (1977)
of reason approach to territorial restrictions. The implication with respect to this study of this decision is that, from 1977 to 1982, the majority of the sample period in use here, RPM and exclusive territories were subject to different legal treatments. This then raises the question of whether this asymmetry in legal standards will bias the cases found in the CCH listing, since the more lenient rule of reason test applied to exclusive territories cases might imply that a larger percentage of instances in which this practice is actually employed will not lead to litigation.

For the cases listed in Ippolito, it seems unlikely that the rule of reason standard will tend to induce fewer allegations of exclusive territories. If the plaintiff is going to go to the expense to file an allegation of RPM, the marginal cost of also alleging territorial restriction, should it have occurred, would presumably be small. Hence, any bias in the cases found in Ippolito is likely to be small.

However, the sample of cases found directly from the CCH Trade Cases listing do not include an allegation of RPM. In instances where only exclusive territories are employed, it seems plausible that the plaintiff is less likely to bring suit, since he or she faces a more difficult, and perhaps more costly, task in proving illegal activity, due to the more lenient rule of reason standard applied to non-price vertical restraints. However, even though the percentage of instances in which the restraint is used that leads to litigation is likely to be smaller for exclusive territories than for RPM, there is no apparent reason why the non-litigated territories cases should encompass products with a different distribution of \( \lambda \) than the products found in the litigated cases. This suggests that, for this particular type of analysis, there should be no bias introduced because of the different legal treatments attached to exclusive territories and RPM.7

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7 One might also argue that, even in the event that the differing legal treatments does introduce bias into the sample selections, the cases which are litigated are likely to constitute the extreme
IV.1 The Data

Tables 6 through 10, found in appendix B, summarize the data gleaned from the cases listed in Ippolito (1988).

Table 6 lists the cases and products in which the only vertical restraint employed was minimum RPM and for which the product being distributed is deemed to be of low $\lambda$. Obviously, for all these cases, the RPM was employed at the retail level.

Table 7 lists the cases and products in which the only vertical restraint employed was minimum RPM and for which the product being distributed is deemed to be of high $\lambda$. The level in the distribution chain in which the RPM was levied is also included.

Table 8 lists the cases and products in which the only vertical restraint employed was territorial restriction and for which the product being distributed is deemed to be of high $\lambda$. The level in the distribution chain in which the RPM was levied is also included.

There were no cases in the Ippolito listing in which the only vertical restraint employed was territorial restriction and for which the product being distributed is deemed to be of low $\lambda$.

Table 9 lists the cases and products in which both minimum RPM and exclusive territories were employed and for which the product being distributed is deemed to be of low $\lambda$. Obviously, for all these cases, the vertical restraints were employed at the retail level.

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8 Instances in which the practices in question are employed. These are the cases which are most likely to influence policy and thus the statistics which I calculate are still of interest.

8 For citations to the cases listed in tables 6 through 10 see the listing in Ippolito (pp. A-28 to A-53).
Table 10 lists the cases and products in which both minimum RPM and exclusive territories were employed and for which the product being distributed is deemed to be of high $\lambda$. The level in the distribution chain in which the vertical restraints were levied is also included.

Tables 11 and 12, also found in appendix B, summarize the cases which were uncovered directly from the CCH Trade Cases listing and which involve only territorial restrictions.

Table 11 lists the cases and products for instances in which the product being distributed is deemed to be of low $\lambda$. Also included is a CCH paragraph reference for each case. Obviously, for all of these cases, the territorial restriction was placed at the retail level.

Table 12 lists the cases and products for instances in which the product being distributed is deemed to be of high $\lambda$. Also included are a CCH paragraph reference for each case and the level in the distribution chain in which the territorial restriction was levied.

**IV.2 Testing for Dependence**

The number of cases which fall into these various categories can be used to test the hypothesis that the life cycle of the product, $\lambda$, is independent of the vertical restraint imposed by using nonparametric statistical methods. Combining the counts of the Ippolito cases with the counts of the cases found directly in the CCH Trade Cases, the following contingency table, expressed as table 1, is derived.
Table 1
Contingency Table

Vertical Restraint

<table>
<thead>
<tr>
<th></th>
<th>RPM only</th>
<th>RPM and Territories</th>
<th>Territories only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low $\lambda$</td>
<td>42</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>High $\lambda$</td>
<td>6</td>
<td>17</td>
<td>41</td>
</tr>
</tbody>
</table>

These data can be used to calculate a $\chi^2$ test statistic. For the above counts, $\chi^2 = 61.3$. Thus, the hypothesis that $\lambda$ is independent of vertical restraint can readily be rejected at even the $\alpha = 0.001$ level.

Some of the litigation listed in tables 6 - 12 involve multiple cases against the same firm. If duplicate cases involving the same company with the same restraint are excluded from the sample, the contingency table becomes the following, expressed as table 2.

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9 See Mendenhall, et. al., pp. 556-561.
Table 2
Contingency Table
Excluding Duplicate Cases

Vertical Restraint

<table>
<thead>
<tr>
<th></th>
<th>RPM only</th>
<th>RPM and Territories</th>
<th>Territories only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low $\lambda$</td>
<td>40</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>High $\lambda$</td>
<td>5</td>
<td>17</td>
<td>38</td>
</tr>
</tbody>
</table>

For these numbers, $\chi^2 = 58.7$. The hypothesis that $\lambda$ is independent of vertical restraint can still be readily rejected at even the $\alpha = 0.001$ level.

To better quantify the relationship between $\lambda$ and the vertical restraint selected by the manufacturer, the phi coefficient\textsuperscript{10}, $\rho$, was calculated on the following 2x2 contingency table. The phi coefficient is a measure of how strongly low $\lambda$ products are correlated with RPM and high $\lambda$ products are correlated with exclusive territories.

\textsuperscript{10} See Conover, pp. 182-187.
Table 3
2x2 Contingency Table
Excluding Duplicate Cases

<table>
<thead>
<tr>
<th>Vertical Restraint</th>
<th>RPM only</th>
<th>Territories only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low $\lambda$</td>
<td>40</td>
<td>3</td>
</tr>
<tr>
<td>High $\lambda$</td>
<td>5</td>
<td>38</td>
</tr>
</tbody>
</table>

For these data, $\rho = 0.82$. One can conclude, then, that the use of RPM is associated with low $\lambda$ products, while the use of territories is associated with products of high $\lambda$.

In summary, the data available from litigation strongly support the main hypotheses generated by the model. The life cycle of the product appears to be extremely important in the determination of the manner in which the product will be distributed. Manufacturers of products with short life spans are overwhelmingly likely to protect the services provided by their dealers with resale price maintenance. The producers of products that are longer lived, alternatively, are much more likely to distribute their wares using exclusive territories.
Chapter V

Conclusion

I have determined wholesale and retail prices, service levels, and manufacturer profits under vertical integration, free trade, exclusive territories, and resale price maintenance in a retail model characterized by heterogeneous dealers. A common retail price entails under vertical integration, free trade, and RPM. Only ET engenders an elevated retail price. These pricing results cast additional doubt on the court's current per se illegality standard for vertical price restraints. Service levels are always less than those under vertical integration\(^1\), due to some combination of a vertical externality, whereby retailers ignore profits bestowed on the manufacturer from increased service levels, and residual free riding on services. While vertical integration is unambiguously the most profitable structure for the manufacturer in this model, the profit ordering of the remaining options is ambiguous. These results are summarized in table 4.

Entry under RPM may take one of three forms: by discounters alone, by high service retailers alone, or by retailers of both types. Entry of any type leaves both the wholesale and retail prices unchanged. Entry by discounters reduces the level of service and manufacturer profits by exacerbating the residual free riding problem. Potential entry by high service retailers, by eliminating completely the vertical

\(^1\) Provided \(\lambda > 1\).
externality, raises service levels and manufacturer profits. Joint entry affects service levels and manufacturer profits ambiguously, since, although the vertical externality is erased, the horizontal externality worsens. Under plausible assumptions, however, joint entry is more likely to reduce manufacturer profits, implying that a refusal to deal policy would likely be adopted by the manufacturer. The entry results are summarized in table 5.

Although the manufacturer profit ordering under free trade, ET, and RPM is uncertain, RPM becomes a more attractive alternative to ET for the manufacturer as the life cycle of the product being distributed shrinks. This hypothesis was tested using information from vertical restraints litigation filed between 1976 and 1982. The data strongly support the hypothesis and thereby convincingly show that the life cycle of a manufacturer's product is an important determinant of the manner in which that manufacturer will choose to protect his dealers' investments in service. These results thereby show that an empirical link exists between a product's characteristics and the method by which that good is likely to be distributed.

This analysis could conceivably be extended by incorporating dynamic effects. To the extent that the services provided by dealers take the form of information, over time consumers gradually become better informed and thus the value they place on dealer services declines. In terms of the present model, $\lambda$ may be thought of as a function of time, $\lambda(t)$. When the product is introduced, service is relatively important to consumers, residual free riding is likely to be inconsequential, and the manufacturer would be likely to distribute its product using RPM. However, over time, service becomes less critical, residual free riding increases, and the manufacturer may choose to provide territorial protection to its dealers. Furthermore, as an informed customer pool places less value on services, an opportunity arises for a rival to enter and offer a
similar product sans service at a lower retail price. If consumers no longer value service, the incumbent manufacturer, and its dealers, must compete with the entrant on price alone. This extension could address the fears of those who argue that RPM raises retail prices by forcing on consumers services which they do not necessarily value. Should services offered by incumbent retailers be worthless, entry and the resultant price competition should force the incumbent to abandon a minimum RPM program.
Appendix A - Description of the Data
Of the 203 RPM cases listed in Ippolito (1988), 94 were used in my sample, because of legitimate use of RPM, ET, or both. The remaining 109 cases were excluded for a variety of reasons.

Because RPM was a *per se* violation of the antitrust laws during the entire period in which the Ippolito cases were filed, any case resulting in a not guilty verdict or a summary judgement for the defendant was not included in my RPM sample. Any case excluded on these grounds in which an additional allegation of territorial restriction was levied was further examined to determine whether or not to include it in the territories only sample. 61 cases resulted in not guilty verdicts or summary judgements for the defendant and were furthermore not instances of territorial restriction. These 61 not guilty/summary judgement cases are listed in table 13.¹

In many of the cases found in the Ippolito listing the relationship between the manufacturer and the retailer was one of franchisor-franchisee. Franchise arrangements differ fundamentally from the sort of vertical relationship between manufacturer and retailer of interest in this study. Franchise agreements typically entail the transfer of a marketing or business plan, generated by the franchisor at the franchisor’s expense, from franchisor to franchisee in exchange for some type of up-front franchise fee. In addition, the franchisee can usually expect, in return, some form of promotional activity to be undertaken by the franchisor. Also, the franchisee often deals only in the product or products of the franchisor’s manufacture. In contrast, the type of vertical relationship of concern here is typically characterized by service provision or promotion downstream rather than upstream. This, indeed, is the source of the free rider problem in the first place. Also, the retailer in the kind of relationship envisioned here generally

¹ For citations to these cases, see Ippolito (1988), pp. A-28 - A-53.
handles the products of multiple manufacturers. Therefore, because of the fundamentally different nature of franchise relationships, all cases involving franchise agreements were excluded from both the RPM and the ET samples. Table 14 lists 14 of the 27 franchise cases contained within the Ippolito listing. The remaining 13 franchise cases are included in table 13 and are delineated by the "(F)" following the case title.

The cases listed in Ippolito include allegations of both minimum RPM and maximum RPM. Since only minimum RPM can be used to combat the free rider problem and to encourage the provision of services by dealers, all maximum RPM cases were excluded from my RPM sample. Maximum RPM cases which included an allegation of territorial or customer restrictions were, however, potential territories only cases. Of the 28 maximum RPM cases which did not include a legitimate use of exclusive territories, 12 are listed in table 15. The remaining 16 maximum RPM cases are included in table 13 and are delineated by the "(Max)" at the end of each case title.

A number of the RPM allegations actually involved horizontal price restrictions, across manufacturers and/or dealers. In a few instances, additional allegations of territorial restrictions were also horizontal in nature. Any case in which the restraint was horizontal rather than vertical was excluded from the relevant sample. For the RPM listing, 15 cases involved horizontal price setting. 14 of these 15 cases are listed in table 16. The remaining case is included in table 15, and is delineated by the "(H)" following the case title.

In some cases, the litigation actually arose out of a challenge to state, county, or municipal regulations mandating minimum prices. There were 10 cases involving regulation challenges which were not included in the RPM sample. Table 17 lists 6 of
these; the remainder are included in table 13, where they are delineated by the "(R)" following the case title.

Finally, two cases were excluded for miscellaneous reasons. One involved the opinion of a state attorney general about RPM and therefore affected all products offered by retailers in the state. A second case actually alleged price stabilization behavior, rather than resale price maintenance. The two cases are listed in table 18.
Appendix B - Tables
### Table 4 - Model Results

<table>
<thead>
<tr>
<th></th>
<th>Vertical Integration</th>
<th>Free Trade</th>
<th>Exclusive Territories</th>
<th>RPM: pre-entry</th>
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<td>[ P_r ]</td>
<td>[ \frac{\alpha}{\alpha - 1} c ]</td>
<td>[ \frac{\alpha}{\alpha - 1} c ]</td>
<td>[ \frac{\alpha(\alpha - \beta)}{(\alpha - 1)^2} c ]</td>
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<td>[ P_w ]</td>
<td>[ \frac{\alpha}{\alpha - 1} c - \frac{2\lambda \gamma}{(\lambda + 1)^{\alpha \lambda}} \alpha \alpha c^\alpha \left( \frac{s_0}{\lambda} \right)^{1-\beta} ]</td>
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<td>[ \frac{\alpha - \beta}{\alpha - 1} c ]</td>
<td>[ \frac{\alpha - \beta}{\alpha - 1} c ]</td>
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<tr>
<td>[ s_h ]</td>
<td>[ \left[ \frac{\beta (\alpha - 1)^{\alpha - 1}}{\gamma \alpha \alpha c^{\alpha - 1}} \right]^{1-\beta} ]</td>
<td>[ \frac{(\lambda + 1)}{\lambda - 1} s_0 ]</td>
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<td>[ \Pi_m ]</td>
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### Table 5 - Model Results

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<td>$\frac{\alpha - \beta}{\alpha - 1} c$</td>
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<td>$s_h$</td>
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<td>clothing</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Jaymar-Ruby, Inc.</td>
<td>men's clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa v. CESH Corp.</td>
<td>swine confinement systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levi Strauss &amp; Co. v. Federal Pants Co.</td>
<td>clothing</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>California v. Levi Strauss</td>
<td>clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Clinique Laboratories</td>
<td>cosmetics</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FTC v. Towle Manufacturing Co.</td>
<td>silverware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Darvel, Inc</td>
<td>casual clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Totes, Inc.</td>
<td>umbrellas, rubber footwear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Tingley Rubber Corp.</td>
<td>rubber footware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharon Sez, Inc. v. Interco</td>
<td>women's clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennessee v. Levi Strauss</td>
<td>clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wagner &amp; Sons v. Appendagez</td>
<td>clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California v. Morris-Tait Assoc.</td>
<td>stereo equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Palm Beach Co.</td>
<td>men's clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US v. Under Sea Industries</td>
<td>diving equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruce Drug v. Hollister Inc.</td>
<td>medical goods</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>California v. Sanyo Electric Inc.</td>
<td>stereo equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Onkyo USA Corp</td>
<td>audio equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTC v. Germaine Monteil Cosmetiques</td>
<td>cosmetics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US v. E.I. Dupont de Nemours</td>
<td>paint</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

source: Ippolito (1988)
### Table 7
RPM only - high $\lambda$

<table>
<thead>
<tr>
<th>Case</th>
<th>Product</th>
<th>Restraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillips v. Crown Central Petroleum</td>
<td>gasoline</td>
<td>retail</td>
</tr>
<tr>
<td>Minnesota v. Sloneker Milk Co.</td>
<td>milk</td>
<td>wholesale</td>
</tr>
<tr>
<td>Colorado v. James Bean Distilling Co.</td>
<td>liquor</td>
<td>retail</td>
</tr>
<tr>
<td>Alaska v. Texaco, Inc.</td>
<td>gasoline</td>
<td>retail</td>
</tr>
<tr>
<td>Wisconsin v. Marigold Foods</td>
<td>milk</td>
<td>retail</td>
</tr>
<tr>
<td>Minnesota v. Marigold Foods</td>
<td>milk</td>
<td>retail</td>
</tr>
</tbody>
</table>

source: Ippolito (1988)

### Table 8
ET only - high $\lambda$

<table>
<thead>
<tr>
<th>Case</th>
<th>Product</th>
<th>Restraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knutson v. Daily Review, Inc.</td>
<td>newspapers</td>
<td>retail</td>
</tr>
<tr>
<td>Clairol Inc. v. Boston Disc. Center of Berkeley Inc.</td>
<td>hair products</td>
<td>retail</td>
</tr>
<tr>
<td>Gelardi Corp. v. Miller Brewing Co.</td>
<td>beer</td>
<td>wholesale</td>
</tr>
<tr>
<td>Newberry v. Washington Post</td>
<td>newspapers</td>
<td>retail</td>
</tr>
<tr>
<td>Hardin v. Houston Chronicle</td>
<td>newspapers</td>
<td>wholesale</td>
</tr>
<tr>
<td>Jacobson &amp; Co. v. Armstrong Cork Co.</td>
<td>ceiling products</td>
<td>wholesale</td>
</tr>
<tr>
<td>Naify v. McClatchy Newspapers</td>
<td>newspapers</td>
<td>wholesale</td>
</tr>
<tr>
<td>Santa Clara Valley Dist. Co. v. Pabst Brewing Co.</td>
<td>beer</td>
<td>wholesale</td>
</tr>
<tr>
<td>Cermuto, Inc. v. United Cabinet</td>
<td>kitchen cabinets</td>
<td>wholesale</td>
</tr>
<tr>
<td>Kestenbaum v. Falstaff Brewing</td>
<td>beer</td>
<td>wholesale</td>
</tr>
<tr>
<td>Del Rio Dist. Inc. v. Adolph Coors Co.</td>
<td>beer</td>
<td>wholesale</td>
</tr>
<tr>
<td>Reno-West Coast Dist. Co. v. Mead Corp.</td>
<td>paper goods</td>
<td>wholesale</td>
</tr>
<tr>
<td>Auburn News Co. v. Providence Journal Co.</td>
<td>newspapers</td>
<td>retail</td>
</tr>
<tr>
<td>Carlson Machine Tools Inc. v. American Tool, Inc.</td>
<td>machine tool lathes</td>
<td>wholesale</td>
</tr>
<tr>
<td>JBL Enterprises Inc. v. Jhirrmanck Enterprises Inc.</td>
<td>cosmetics</td>
<td>wholesale</td>
</tr>
<tr>
<td>Mesirow v. Pepperidge Farms</td>
<td>bakery products</td>
<td>wholesale</td>
</tr>
<tr>
<td>Kolling v. Dow Jones &amp; Co.</td>
<td>newspapers</td>
<td>wholesale</td>
</tr>
<tr>
<td>Maykuth v. Adolph Coors Co.</td>
<td>beer</td>
<td>wholesale</td>
</tr>
<tr>
<td>Mendelovitz v. Adolph Coors</td>
<td>beer</td>
<td>wholesale</td>
</tr>
</tbody>
</table>

source: Ippolito (1988)
Table 9
RPM and ET - low $\lambda$

<table>
<thead>
<tr>
<th>Case</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitchford v. PEPI, Inc.</td>
<td>scientific instruments</td>
</tr>
<tr>
<td>FTC v. Levi Strauss and Co.</td>
<td>casual clothing</td>
</tr>
<tr>
<td>FTC v. Nikko Electric Corp. of America</td>
<td>audio equipment</td>
</tr>
<tr>
<td>FTC v. Medalist Industries, Inc.</td>
<td>tennis &amp; ski clothing</td>
</tr>
<tr>
<td>Blackwelder Furniture Co. v. Seilig Mfg. Co.</td>
<td>furniture</td>
</tr>
<tr>
<td>California v. CBS Inc.</td>
<td>musical instruments</td>
</tr>
<tr>
<td>Eastern Scientific Co. v. Wild Heerbrugg Instruments</td>
<td>scientific instruments</td>
</tr>
<tr>
<td>Eibner v. Sony Corp. of America</td>
<td>dictating equipment</td>
</tr>
<tr>
<td>FTC v. Performance Sailcraft, Inc.</td>
<td>sailboats</td>
</tr>
<tr>
<td>Kahn Music Co. v. Baldwin Piano &amp; Organ Co.</td>
<td>pianos</td>
</tr>
<tr>
<td>US v. Cuisinarts, Inc.</td>
<td>food processors</td>
</tr>
</tbody>
</table>

Source: Ippolito (1988)

Table 10
RPM and ET - high $\lambda$

<table>
<thead>
<tr>
<th>Case</th>
<th>Product</th>
<th>Restraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>US v. Scott Aviation Division</td>
<td>artificial breathing devices</td>
<td>wholesale</td>
</tr>
<tr>
<td>US v. Quaker State Oil Refining</td>
<td>oil products</td>
<td>both</td>
</tr>
<tr>
<td>FTC v. Rubbermaid, Inc.</td>
<td>rubber household products</td>
<td>wholesale</td>
</tr>
<tr>
<td>General Beverage Sales Co. v. East Side Winery</td>
<td>wine</td>
<td>wholesale</td>
</tr>
<tr>
<td>Continental Distributing v. Somerset Importers, Inc.</td>
<td>liquor</td>
<td>wholesale</td>
</tr>
<tr>
<td>Freed Oil Co. v. Quaker State Oil Refining Corp.</td>
<td>motor oil</td>
<td>both</td>
</tr>
<tr>
<td>FTC v. Shaklee Corp.</td>
<td>household &amp; personal goods</td>
<td>wholesale</td>
</tr>
<tr>
<td>Companie Nouvelle des Parfumes D'Arsay v. D'Arsay Perfumes</td>
<td>perfume</td>
<td>wholesale</td>
</tr>
<tr>
<td>H.L. Moore Drug Exchange v. Eli Lilly &amp; Co.</td>
<td>prescription drugs</td>
<td>wholesale</td>
</tr>
<tr>
<td>Schwimmer v. Sony Corp. of America</td>
<td>electronic equipment</td>
<td>wholesale</td>
</tr>
<tr>
<td>FTC v. The Hartz Mountain Corp.</td>
<td>pet supplies</td>
<td>retail</td>
</tr>
<tr>
<td>Spray-Rite Service Corp. v. Monsanto Co.</td>
<td>agricultural chemicals</td>
<td>wholesale</td>
</tr>
<tr>
<td>Texas v. Scott &amp; Fetzer Co.</td>
<td>vacuum cleaners</td>
<td>wholesale</td>
</tr>
<tr>
<td>Hawes Office Systems v. Wang Laboratories, Inc.</td>
<td>wordprocessing equipment</td>
<td>wholesale</td>
</tr>
<tr>
<td>Blake Associates, Inc. v. Omni Spectra, Inc.</td>
<td>electronic parts</td>
<td>wholesale</td>
</tr>
<tr>
<td>Valley Liquors Inc. v. Renfield Importers Ltd.</td>
<td>liquor</td>
<td>wholesale</td>
</tr>
<tr>
<td>Martin Ice Cream v. Chipwich</td>
<td>ice cream</td>
<td>wholesale</td>
</tr>
</tbody>
</table>

Source: Ippolito (1988)
### Table 11

**ET only - low \( \lambda \)**

<table>
<thead>
<tr>
<th>Case</th>
<th>CCH Ref.</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muenster Butane, Inc. v. Stewart Co.</td>
<td>64,163</td>
<td>televisions</td>
</tr>
<tr>
<td>Rice Tire Co. v. Michelin Tire Corp.</td>
<td>63,249; 63,720</td>
<td>automobile tires</td>
</tr>
<tr>
<td>T'ai Corp. v. Kalso Systems, Inc.</td>
<td>61,798</td>
<td>&quot;Earth&quot; Shoes</td>
</tr>
</tbody>
</table>


### Table 12

**ET only - high \( \lambda \)**

<table>
<thead>
<tr>
<th>Case</th>
<th>CCH Ref.</th>
<th>Product</th>
<th>Restraint</th>
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</thead>
<tbody>
<tr>
<td>Red Diamond Supply, Inc. v. Liquid Carbonic</td>
<td>63,825</td>
<td>industrial gases</td>
<td>wholesale</td>
</tr>
<tr>
<td>Tennessee ex rel. Leech v. Bi-Rite Foods, Inc.</td>
<td>64,073</td>
<td>grocery products</td>
<td>retail</td>
</tr>
<tr>
<td>Bangor Punta Corp. v. Marine Distributors, Inc.</td>
<td>64,006</td>
<td>sailboats</td>
<td>wholesale</td>
</tr>
<tr>
<td>Crown Paint Co. v. George Bankston, Jr.</td>
<td>64,304</td>
<td>paint</td>
<td>wholesale</td>
</tr>
<tr>
<td>Copy-Data Systems v. Toshiba America, Inc.</td>
<td>64,343</td>
<td>copying machines</td>
<td>wholesale</td>
</tr>
<tr>
<td>Abadir &amp; Co. v First Mississippi Corp.</td>
<td>64,180</td>
<td>urea</td>
<td>wholesale</td>
</tr>
<tr>
<td>Hamilton Supply Co. v. Glenmore Distilleries Co.</td>
<td>63,187</td>
<td>alcoholic beverages</td>
<td>wholesale</td>
</tr>
<tr>
<td>First Beverages, Inc. v. Royal Crown Cola Co.</td>
<td>63,162</td>
<td>soft drinks</td>
<td>wholesale</td>
</tr>
<tr>
<td>Yogurt on Wheels v. Beatrice Foods Co.</td>
<td>63,190</td>
<td>soft-frozen yogurt</td>
<td>retail</td>
</tr>
<tr>
<td>Crowley v. Braden Industries, Inc.</td>
<td>63,134</td>
<td>windmills</td>
<td>wholesale</td>
</tr>
<tr>
<td>Ohio-Sealy Mattress Mfg Co v. Duncan</td>
<td>63,307; 64,882</td>
<td>mattresses</td>
<td>wholesale</td>
</tr>
<tr>
<td>Westpoint Pepperell, Inc. v. Rea</td>
<td>63,341</td>
<td>carpet</td>
<td>wholesale</td>
</tr>
<tr>
<td>McDill v. McDonald Cooperative Dairy Co.</td>
<td>62,959</td>
<td>milk</td>
<td>wholesale</td>
</tr>
<tr>
<td>Chalmers v. Eaton Corp.</td>
<td>62,942</td>
<td>fork-lift trucks</td>
<td>wholesale</td>
</tr>
<tr>
<td>Lupia v. Stella D’Oro Biscuit Co., Inc.</td>
<td>62,343</td>
<td>bakery products</td>
<td>wholesale</td>
</tr>
<tr>
<td>Dougherty v. Continental Oil Co.</td>
<td>62,224</td>
<td>gasoline</td>
<td>wholesale</td>
</tr>
<tr>
<td>McClainey Newspapers v. Noble</td>
<td>60,905; 61,495</td>
<td>newspapers</td>
<td>retail</td>
</tr>
<tr>
<td>Akron Tire Supply Co. v. Hofmann</td>
<td>61,222</td>
<td>wheel balancing eqpt.</td>
<td>wholesale</td>
</tr>
<tr>
<td>Skoda v. A&amp;W Distributing Co.</td>
<td>61,090</td>
<td>root beer</td>
<td>retail</td>
</tr>
<tr>
<td>Wisdom Rubber Industries v. Johns-Manville Sales</td>
<td>61,016</td>
<td>irrigation pipe</td>
<td>wholesale</td>
</tr>
<tr>
<td>Lamps, Inc. v. Adolph Coors Co.</td>
<td>60,991</td>
<td>beer</td>
<td>retail</td>
</tr>
<tr>
<td>Mitchell v. US Surgical Corp.</td>
<td>60,879</td>
<td>surgical staples</td>
<td>retail</td>
</tr>
</tbody>
</table>

### Table 13

**Not Guilty/Summary Judgement Cases**

- Merit Motors, Inc. v. Chrysler
- Sargent-Weich Scientific Co. v. Ventron Corp.
- World-Wide Volkswagen Corp. v. Autobahn Motors Co.
- Call Carl, Inc. v. BP Oil Corp. (F)
- FLM Collision Parts v. Ford Motor (Max)
- Allen v. Oil Shale Corp.
- BP Oil v. Park Stations, Inc.
- Garrett's v. Farah Manufacturing
- Krutinger v. Mead Foods, Inc.
- Weight Watchers of Rocky Mountains v. WW International (F, Max)
- Workman v. State Farm Mutual Auto Insurance (Max)
- Keener v. Sizzler Family Steak Houses (F, Max)
- Kramer Motors, Inc. v. British Leland Motors, Inc. (F)
- Belk-Avery, Inc. v. Henry I. Siegel Co.
- Biatt v. Lorenz-Schneider, Inc.
- Canadian American Oil Co. v. Union Oil Co. of California
- Haden Co. v. Johns-Manville Sales Corp.
- Hardwick v. Nu-Way Oil Co.
- Krehl v. Baskin-Robbins Ice Cream Co. (F, Max)
- NJ Guild of Hearing Aid Dispensers v. Long (R, Max)
- Quality Discount Tires v. Firestone Tire & Rubber (F)
- Universal Lite Distributors v. Northwest Industries, Inc.
- Whims Appliance Service, Inc. v. General Motors Corp. (Max)
- Aladdin Oil Co. v. Texaco, Inc.
- Carr Electronics Corp. v. Sony Corp. of America
- Comfort Trane Air Conditioning v. Trane Co.
- Fine Paper Cases
- Highspire v. UKF America
- Marty's Floor Covering Co. v. GAF Corp.
- Morrison v. Nissan Motor Corp. (F)
- Pure Water Resources v. Consolidated Foods Corp. (Max)
- Sweeney & Sons, Inc. v. Texaco Inc.
- Wedgewood Investment Corp. v. International Harvester Co. (F)
- Alloy International Co. v. Hoover-NSK Bearing Co.
- FTC v. Russell Stover Candies
- Heir v. Degnan (R)
- Koerner & Assoc., Inc. v. Aspen Labs, Inc.
- Sausalito Pharmacy v. Blue Shield of California (Max)
- Arizona v. Arizona License Beverage Association (R)
- Baste v. Lubrizol Corp.
- CUSCO v. Certain-teed Products
- City of NY v. Toby's Electronics (Max)
- Janush v. U-Haul Co. of Detroit
- Medical Arts Pharmacy v. Blue Cross & Blue Shield (Max)
Table 13 - continued

Meits v. Clark Oil & Refining (Max)
Mulhearn v. Rose-Neath Funeral Home, Inc.
Murphy v. White Hen Pantry (F, Max)
Roesch v. Star Cooler Corp.
Rogers v. Consolidated Distributors, Inc.
Westgo Industries v. W.J. King
AAA Liquors, Inc. v. Joseph E. Seagrams & Sons, Inc. (Max)
Battipaglia v. NY State Liquor Authority (R)
Conway v. Bulk Petroleum Corp.
Feldman v. Health Care Service Corp. (Max)
Levikoff v. General Motors (F)
Olympic Distributors, Inc. v. Perkins Co.
Parsons v. Ford Motor Corp. (F)
White v. Hearst Corp (Max)
Clippard Instrument Laboratory v. Norman Equipment Co.

Table 14
Franchise Cases

Mailand v. Powerine Oil Co.
Perry v. Amerada Hess Corp.
Kane v. Martin Paint Stores, Inc.
Matarazzo v. Friendly Ice Cream
FTC v. Amway
Mt. Vernon Sundat, Inc. v. Nissan Motor Corp. in USA
Salineyer v. Seven-Up Co.
NJ v. Lawn King, Inc.
Kahn Music Co. v. Baldwin Piano & Organ Co.
Uniroyal v. Jetco Auto Services
NY v. Lawn-A-Mat Chemical & Equipment Corp.
Delaware v. Russell Stover Candies
Massachusetts v. Russell Stover Candies
Androit v. Quickprint of America
Table 15
Maximum RPM Cases

Milonas v. Amerada Hess Corp. (F)
Davison v. Crown Central Petroleum Corp. (H)
Denton v. Fairfield Publishing
Roberts v. Exxon Corp.
Vane v. Amerada Hess Corp.
Crown Central Petroleum Corp. v. Brice
Karkell v. Blue Shield of Massachusetts
Aronst v. American Oil Co.
Michigan Association of Psychotherapy Clinics v. Blue Cross
Yentsch v. Texaco, Inc.
Young v. Jo-Ann's Nut House (F)
Wardell v. Certified Oil Co.

Table 16
Horizontal Price Fixing Cases

US v. R & G Sloane Manufacturing Co.
Reiter v. Sonotone Corp.
US v. Great Western Sugar Co.
Colorado v. Torbuc Corp.
FTC v. Appliance Dealers Cooperative
US v. Areofin Corp.
US v. Joseph Schlitz Brewing Co.
Ballo v. James S. Black Co.
Olsen v. Progressive Music Supply, Inc.
General Cinema Corp. v. Buena Vista Distribution
NY v. Queensboro Farm Products
NY v. Elmhurst Milk & Cream Co.
### Table 17

**Regulation Challenge Cases**

- Rice v. ABC Appeals Board
- California Retail Liquor Dealers v. Mideal Aluminum Inc.
- Messetti Associates v. State Liquor Authority
- Serlin Wine & Spirit Merchants v. Healy
- ABC Board of Kentucky v. Taylor Drug Stores, Inc.
- Enrico’s, Inc. v. Rice

### Table 18

**Miscellaneously Excluded Cases**

- Louisiana Attorney General Opinion (all products)
- New Mexico v. Naus (price stabilization)
List of References


Herman, E. S. “A Statistical Note on Fair Trade.” *Antitrust Bulletin* 4, 1959, 583-584.


