Discussion Paper

Producer-driven Supply Chains for Inter-war Entertainment Radio: Were Dealers ‘Over-sold’ on Marketing?

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Abstract
We examine early supply chains for entertainment radio sets. Manufacturers sought to coordinate down-stream distribution to maximise profits and create barriers to entry. Lacking the market power of auto manufacturers, they developed cooperative strategies using authorised distributors and dealers who were incentivised to follow the manufacturer’s policy. This included home demonstration – which dealers increasingly perceived to benefit only the upstream value chain. Our analysis indicates that while dealer revenue from direct selling was largely negated by increased costs, it constituted one of several barriers to entry, which underpinned the competitive advantage of the specialist dealer.

Keywords
supply chains, barriers to entry, marketing, performance, radio industry

JEL Classifications
L1, L40, N8

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Introduction

Marketing new consumer durables to the American public during the early twentieth century involved the coordination of downstream distribution by leading manufacturers. In some cases, such as Singer sewing machines, manufacturers integrated forward into retail distribution.¹ In others, such as autos, producers assumed considerable control over franchised dealership networks. Meanwhile for products that relied heavily on door-to-door selling, such as vacuum cleaners, manufacturers often co-operated with independent retailers - while undertaking most marketing activities directly, on their behalf. A classic example was Hoover's pioneering of the ‘resale plan’, under which door-to-door salesmen nominally worked for a local retailer, despite being trained, supervised, and paid by Hoover.²

This article looks at early distribution networks for home radios. Unlike autos or white goods, this market was characterized by much greater uncertainty of demand for new models and considerable risks of sudden obsolescence; both largely reflecting the rapid pace of technical change in the industry. Moreover, the need for frequent after-sales service at the consumer’s home required very large numbers of outlets, in close proximity to customers. Leading manufacturers thus coordinated distribution via developing links with independent wholesale and retail distributors, who were assigned exclusive dealerships and provided with various incentives to follow the company’s marketing policy.

Dealers increasingly perceived that the level, and mix, of marketing activities advocated by the manufacturers was not optimal from their perspective. Door-to-door canvassing presented a particular grievance; many retailers found that this acted to boost sales, but not profits, while incurring significant managerial problems in monitoring and motivating their salesmen. Furthermore, the small catchment areas of typical radio retailers proved unsuitable for directly employed outside sales forces, whose efficient utilization required a much larger territory than most stores could efficiently service.

We examine the distribution systems developed by leading radio manufacturers (particularly the market leader, RCA); the ways in which they coordinated marketing with wholesale and retail distributors; and the growing divergence between the policies recommended by the manufacturers and retailers’ perceptions of what actually constituted their optimal marketing policy. We then test whether radio retailers were persuaded to take on an inefficiently high level of direct sales and other promotional activities, using store-level returns to a 1928 survey of radio retailers’ operating costs and profits. Finally, the paper discusses how technical changes in radio design initiated during the depression served to undermine existing value chains and,
particularly, the specialist radio dealer, transforming radio into, essentially, just another electrical appliance purchased over the counter.

Manufacturers’ initial approach to radio equipment marketing

The launch of entertainment radio at the start of the 1920s was followed by a boom in equipment sales, unprecedented in speed for any high-ticket household durable. The proportion of American households with radios rose from less than 1 per cent in 1922 to 16.0 per cent in 1926, 45.8 per cent in 1930 and 67.3 per cent in 1935; by which time a significant number of households owned more than one set. Ownership greatly outpaced the diffusion of much longer-established appliances such as vacuum cleaners and washing machines, reflecting radio’s role as a ‘counter-status luxury’, with utility varying inversely with income (as higher income groups have more substitutes for its entertainment services). Rapid diffusion occurred despite radios being initially very expensive and often requiring costly external antennae to pick up the early broadcasting stations, plus frequent servicing to keep them in working order.

Initially, demand was dominated by amateur radio enthusiasts and home-constructors; homemade sets out-numbering factory-made receiver sales until 1925. However, manufacturers soon began to develop a market for complete, branded, sets and turned their attention to developing effective distribution systems. These required efficient sales organisations to promote this new product at local level through a variety of channels; a supply of parts for a product which required very frequent replacement of components; an effective after-sales service organisation; and the provision of instalment credit for what was initially a very high-ticket durable.

Value chains are useful devices for analysing the coordinating mechanisms governing the design, production, and marketing of consumer durables. In particular, they identify both the key players involved in organising the sequence of activities that brings the good to the consumer in a particular format, quality, and price and the ways in which their actions impact on the nature of competition and the distribution of profits at each stage of the production and distribution process. The value chain literature identifies two typical governance forms – producer-driven chains – coordinated by key manufacturers (typically those commanding strategic technologies), and buyer-driven chains - coordinated by firms responsible for final distribution. Buyer-driven chains tend to be more common in labour-intensive industries, while consumer durables involving new technologies are generally dominated by producer-driven chains.
In producer-driven chains key manufacturers typically take responsibility for assisting the performance of both their suppliers and distributors. By taking on this co-ordinating function, manufacturers dominate marketing and are able to capture a disproportionate share of profits via their control over branding and design. However, each stage of the value chain is likely to benefit from participation (compared to un-coordinated market competition), as by coordinating downstream activities the lead firm can both add value to these stages and impose some barrier against new entrants.

Much research on producer-driven value chains for new consumer durables during this period has focused on the U.S. automobile sector, where, as Tedlow noted, manufacturer-dealer relations were ‘marked by often bitter conflict.' Leading auto producers used their considerable market power over dealers to impose franchise contracts, which could be cancelled with little if any notice and without which continued activity in the sector was often not possible. This in turn assisted them in pressuring firms into both accepting close monitoring and coordination of their activities and in taking on various costs, which they would otherwise have borne directly. Examples include shipping stock that was either excess to dealers’ requirements, was sent at the end of the production year for that model, or was packed with accessories; and pressure to use manufacturers’ retail finance facilities.

While autos was a highly oligopolistic sector, the three leading manufacturers being largely insulated from competition in volume markets owing to strong scale economies, radio developed much greater competition in all price ranges. Radio Corporation of America (RCA), initially looked set to dominate this sector, obtaining what was believed to be a radio patent monopoly, under a U.S. Navy-sponsored initiative to unify American radio patents in a single domestically-owned concern. However it proved unsuccessful in using its domination of intellectual property rights to block competition - despite considerable efforts to do so. RCA initially marketed radios produced by the two main firms that pooled their patents for its formation - General Electric and Westinghouse. Yet a failure to successfully coordinate production, together with some loopholes in the exclusivity of key patents it controlled, resulted in RCA gaining less than a quarter of the receiver market during 1922-27; while anti-trust threats and political pressure increasingly tempered the power of its patents as an entry barrier.

However, its continued technical leadership and strong position in the tube and components markets enabled it to retain its status as the largest radio equipment producer and leading set manufacturer by value.

Radio manufacture became a relatively fragmented industry compared to autos; as late as 1940 the largest receiver manufacturer accounted for only 14.4 per cent of sales and the largest three
controlled just 37.4 per cent of the market. Vigorous competition between dozens of significant radio manufacturers, together with rapid technical obsolescence in this new and rapidly growing sector, gave rise to a near-universal strategy of annual model changes. Moreover, demand for new models proved highly unpredictable, owing to the speed of innovation and the intensity of competition. These conditions had important implications for the downstream value chain, on account of both the weaker market power of individual manufacturers and the impracticality of manufacturers looking to dealers to hold their inventory over the slack season.

Demand for radios, like that for cars, was highly seasonal. In autos General Motors (GM) successfully pioneered a strategy of building up massive inventories in their winter slack season, underpinned by a distribution strategy whereby their dealers carried the stocks. Franchised dealerships were required to hold GM inventory on their premises, the retailer’s costs in turn being covered by finance companies who carried their inventory loans and purchased their retail instalment sales contracts; many being linked to auto manufacturers, as subsidiaries or by contract. However, given the unpredictability of demand and the failure of the leading firms to dominate the market sufficiently to prevent competitors making their new models obsolete or unattractive, this strategy proved impractical in radio. Weaker market power also prevented control via GM’s system of franchise contracts subject to termination without notice, as dealers could turn to other radio brands.

Manufacturers responded to the high uncertainty of demand for new models and strong seasonality of demand for existing ones by using labour-intensive production systems, which were flexible with regard to the scale of production, but did not offer substantial scale economies. Meanwhile economies of scope were obviated by many components being externally sourced from specialist firms.

Co-ordinating the supply chain

The industrial organisation literature on vertical control suggests that the optimal level of retailer promotional and services activities, from the manufacturer’s perspective, is typically higher than from the perspective of the dealer (who has to bear the costs). Specifying a level of their provision in dealer contracts is problematic – as enforcement would require more precise measurement that is not normally practicable. This moral hazard problem is typically overcome by offering retailers appropriate incentives (or credible threats), to raise provision to the manufacturer’s optimum. Lacking the market power to enforce retailer conformity primarily
through the threat of ‘exit’ (as in autos), radio manufacturers relied heavily on ‘voice’, employing strategies of cooperation and incentives.20

Major radio manufacturers typically organised their down-stream supply chain via independent wholesalers, who were given exclusive territories and in turn served independent dealers. However, through co-operative and co-ordinated advertising; dealer educational activities; and a variety of other assistance with marketing and credit provision, manufacturers sought to develop strong relationships with dealers. In return for this support, dealers were expected to follow their marketing policy and to prioritise their brand over the others they stocked for activities such as door-to-door canvassing, window displays, or customer recommendation.

David Sarnoff of RCA played a pioneering role in the development of producer-led value chains in radio, devoting considerable attention to establishing an effective set distribution network and educating dealers on how to market this new product.21 During 1922 and 1923 Sarnoff spent much time addressing conventions of jobbers and retailers in the electrical goods and musical instrument trades, or writing articles for their journals. His proposed distribution model proved remarkably prescient, foreshadowing most major trends in radio retailing during the 1920s. Sarnoff emphasised that the enthusiast home-constructor era was temporary and that radios would soon be sold as an entertainment device and a piece of furniture, rather than a machine. Distributors were told that their function was to sell: ‘a device which has a very important bearing on our home life, for its sphere is one of culture, education and entertainment... somewhat of the characteristics of the phonograph and other musical instruments... which is not a mere electrical utility but which also provides entertainment and enlightenment of a high order.’ To achieve this, retailers should provide:

an attractive store to fit in harmoniously with the accustomed methods of selling musical instruments... the adoption of intensive selling practices, such as special demonstrations, demonstrations in the home, a reasonable amount of local advertising, and inauguration of all those special methods, which have been found valuable in other business in carrying on intensive selling campaigns.22

Sarnoff urged dealers to make their stores attractive to women and employ salesmen who understood that women should be sold to on the basis of appearance, simplicity of operation, and value for money. This might involve window displays showing home scenes with the radio taking pride of place in the living room; separate salesmen to deal with radio hams and mainstream customers; and crews of ‘outside’ salesmen, who would arrange home trials through door-to-door canvassing, to break down sales resistance and inertia (including fears that radios
would be too complicated to operate). He also emphasised the need for time payment schemes to increase affordability.

Most major manufacturers, including RCA, Crosley, Zenith, and Atwater Kent, adopted a distribution policy based on assigning territories to appointed wholesale distributors, who in turn supplied only authorised dealers (who nevertheless typically also sold other makes of radio). Some manufacturers, such as RCA, assigned sales quotas to each wholesaler. A minority operated their own wholesale branches, while large retail customers such as mail-order houses, chain stores, and department stores often placed their orders directly with the manufacturer. By limiting local competition, authorised dealerships constituted a ‘carrot’ to encourage dealers’ conformance with the manufacturer’s retail model. For example RCA, which moved to authorised dealerships in 1926, had the following requirements: a well-located store, with a well-appointed showroom providing booths for sound quality demonstration; the use of window displays to promote their product; an ‘energetic’ sales organization; adequate servicing facilities; and ‘An advertising policy which is as liberal as the dealer’s circumstances will permit.’

Authorised distributors were rewarded with discounts from list prices that grew significantly over the 1920s. In August 1922 RCA offered dealers 25% discounts for orders up to $499 and 33.3% for larger orders, while their wholesales received a 46% discount (figures that were broadly in line with a December 1922 estimate for the sector as a whole). Discounts were subsequently raised; by February 1928 RCA dealers and wholesalers received discounts of 40 and 52.5% respectively. Dealers still had to be persuaded to hold significant stocks, given that market conditions often led to reductions in list prices, which eroded the value of their inventory and thus provided an incentive for under-stocking. RCA addressed this via a price protection policy; in the event of list price reductions, distributors and dealers were refunded the difference between the old and new price on each unsold set. Zenith achieved the same goal via a policy of no price reductions (underpinned by a conservative production strategy, relative to distributors’ orders) to avoid dealers having to worry about suddenly finding that their sets, ‘are worth fifty cents to the dollar.’

Maintaining capacity production was problematic in industries subject to strong seasonality and annual model changes – factors which had led GM to experiment with demand forecasting and, from the middle of 1924, to require statistical reports from dealers at 10-day intervals. Zenith’s spectacular success from the mid-1920s was attributed to their introduction of a production and inventory planning system, based on distributors’ purchase commitments - updated quarterly. By facilitating price stability, the system was also said to have built loyalty among their distributors and dealers.
RCA Victor (the radio division formed after the merger with Victor Talking Machine Co.) introduced a production control plan from the autumn of 1930. Distributors were required to secure sales reports from each of their dealers and collate them into weekly reports for RCA. By summer 1931 distributors were also required to provide estimates of their expected requirements, in an effort to reduce the interval between RCA’s materials purchase and use to 60 days (compared with 120-180 days in 1929). However, problems of coordinating production and sales persisted throughout the 1930s. In addition to production, or market volatility, problems, an RCA review identified cases where they had over-sold dealers on likely sales, or where some smaller distributors had responded to RCA’s ‘pressure selling’ by accepting larger stocks than they could move. RCA’s activities in this area thus proved of limited benefit from a production coordination perspective and of some difficulty to their down-stream value chain.

An extensive volume of information also flowed downstream from manufacturers to distributors and dealers, via bulletins, national and regional sales conventions, and in-house journals. For example Crosley Radio Corporation was producing the *Crosley Radio Weekly* by January 1924, later replaced by the *Crosley Broadcaster*. In addition to informing distributors and dealers about their general activities, these included information on marketing assistance available from the company; letters from dealers (generally supporting the company’s marketing policy); and articles extolling the merits of activities such as direct selling.

Supporting dealers was seen as an important means of developing strong relationships, fostering retailer loyalty to their brand and retail policy. One important tool, cooperative advertising, appears to have become popular towards the end of the decade, as shown by the advertising spend data for RCA in Table 1, below. This included a plan under which RCA paid half the costs of dealers’ direct mailings featuring their products. Crosley had initiated support for direct mailing by the start of the 1928/29 season, dealers being offered a set of three customer mailings for each potential customer, delivered to the dealer stamped and addressed for 15c, which they were advised to use in conjunction with a door-to-door sales campaign.

RCA’s co-operative advertising appears to have grown considerably over the depression. By the autumn of 1931 RCA Victor operated a system whereby they and the local distributor each paid 25 per cent of a dealer’s print advertising costs, providing certain conditions were met (including that at least 50 per cent of total advertising space was used to illustrate RCA merchandise and that the RCA Victor name featured at least as large as that of the store). For major accounts, such as chain stores, RCA offered to meet 50 per cent of advertising costs, for expenditures up to 5% of the chain’s purchases.
Manufacturers also engaged in extensive advertising support activities for dealers, including the provision of ‘ready-made’ newspaper ads on which dealers could add their own details. Other aids included billboard posters; window display material; store interior displays; electric signs, and advertising novelties. Some also provided sales training. For example, by 1925 De Forest’s sales department was running a radio salesmanship and service correspondence course, which around 800 dealers had completed, involving a combination of home study and discussion meetings among relevant staff in each store.

Manufacturers also sought to coordinate their own customer advertising with that of their dealers. As Table 1 shows, direct space advertising over 1923-29 was equivalent to around 5.3 per cent of RCA’s sales revenue and accounted for two thirds of its advertising expenditure. Adverts typically emphasised key product characteristics, with an emphasis on the technical superiority of their new sets. By 1927 RCA was supplementing its national magazine advertising with newspaper advertising in major cities, while urging its distributors to encourage dealers in these communities to arrange tie-in promotions, such as set demonstrations. A more direct link between their advertising and set demonstrations was established in April 1928, when RCA launched the ‘RCA Demonstration Hour’, broadcast each Saturday at 2.30 EST, over approximately thirty stations. This enabled retailers to demonstrate a quality music programme (of the type generally broadcast in the evenings) during business hours. This initiative was later repeated, using RCA’s emerging National Broadcasting System network.

The radio dealer

By the mid-1920s radio was becoming a mass-market product. A 1926 Radio Retailing survey estimated that the American radio audience had grown to 20,000,000, listening to 5,000,000 receivers, while the total 1925 retail value of radio equipment sales was estimated at $450 million and the average cost of a receiver at $80.00. Some 31,000 radio retailers and 1,000 wholesalers were estimated to serve around 2,000 manufacturers. An alternative estimate, for January 1927, put the number of radio retailers at 29,000, selling sets supplied by 2,550 manufacturers, via 985 wholesalers and distributors.

Despite the rapidly growing market, there was significant dealer mortality. The National Electrical Manufacturers Association sponsored a Department of Commerce survey of dealers (defined as any retailer who carried an average stock of $500 or more in radio merchandise), covering the three quarters from October 1st 1927. Over 31,000 dealers were identified in each
quarter, with over 1,000 identified in a given quarter having gone out of business by the next quarter – suggesting an annual failure rate of about 13 per cent. Dealers were required to carry significant stocks of expensive and rapidly depreciating equipment. A 1930 national survey found that retailers typically stocked around five different brands of radio and that stocking an excessive range of makes contributed to failures, by accentuating risks associated with stock obsolescence. Given that in 1933 the largest nine radio set manufacturers were said to account for 74 per cent of industry turnover, a typical store would thus stock around half the leading brands.

Problems of depreciating stocks were accentuated by strong demand seasonality. The 1930 survey found that 39 per cent of business was conducted over the October-December quarter, compared to only 16 and 17 per cent respectively for the April-June and July-September quarters. A number of dealers turned to supplementary lines, principally electrical appliances, to reduce seasonal fluctuations. Dealers also faced problems with trade-ins, which were estimated to account for at least 40 per cent of radio sales by the late 1920s. These both lowered margins and gave the retailer the dilemma of either selling used radios in competition with new stock or disposing of trade-in sets - either at a total loss, or at a price which would make only a small contribution to the trade-in value. Yet they also provided a means for dealers to engage in price competition, without opening flouting manufacturers’ list prices.

Business risks were further accentuated by the need for credit sales. Radios were relatively expensive household durables in the 1920s. As Table 2 shows, the average 1924 unit price of a home radio was around $67.00, to which had to be added the cost of four or five tubes (sold separately), each costing around three dollars, plus batteries and other accessories. As radios became grander and more complex, prices rose further, peaking at $133 in 1929 (again, net of tubes). Not surprisingly, credit facilities rapidly became integral to retail success.

In 1928 RCA reported estimates that approximately 70 per cent of radios were sold on deferred payments; while an estimate for 1930 put the figure at 75 per cent; on a par with other high-ticket consumer durables. Of 33 dealers surveyed by the Department of Commerce in 1930, only one conducted business on a cash-only basis, while the remaining 32 made an average of 80 per cent of radio sales on credit. Most financed deferred payments using their own funds or bank loans, only 21 per cent relying exclusively on a finance company. The most common terms involved a 10 per cent down payment with the balance payable monthly over 10-12 months, typically at 6 per cent annual interest.
Several manufacturers arranged credit plans for their dealers. For example, by September 1928 RCA was advertising a plan run by Commercial Investment Trust, which provided dealers with an immediate advance of 90 per cent of the un-matured face value of their paper, less a discount charge. The remaining 10 per cent was then deducted from the final payment on the contract. Under this scheme the only cost to the dealer was the service charge, which could be passed on to the purchaser by adding 0.5 per cent per month to the cash price. Unlike in autos, where dealers claimed to be coerced into using sales finance companies tied to manufacturers, even facilities promoted by the set-makers typically involved independent finance companies. This reflected the weaker market power of individual manufacturers in radio and the impracticality of dealers holding large inventories, given highly unpredictable obsolescence. However, the absence of manufacturer-tied credit removed a potential source of cyclical demand stabilisation. One justification for tied finance in autos was that it would be maintained during hard times, when independent finance companies might tighten provision. Indeed, during the depression the availability of radio commercial time-payment paper tapered off, becoming practically non-existent by 1932 according to Radio Retailing. Dealers were thus forced to finance credit provision directly, which gave better-capitalised firms a competitive edge. It was not until the mid-1930s that finance companies again began to show interest in this sector.

Taking radio to the prospect’s home

Canvassing was already a proven sales method for phonographs and was quickly adopted by the nascent radio industry. By the mid-1920s it had become common for dealers to engage in door-to-door selling, typically offering to set up a radio in the home and leave it for several days on trial. This was a relatively novel innovation - Harold Barger argued that free home trial was not a widely-used sales device prior to World War I; except for pianos and sewing machines (and even here it was not in general use). However, home demonstrations had a number of important attractions for radio – it allayed fears that operation might prove too complex, or that reception would be too weak, and had the further advantage of introducing the family to the entertainment available from the radio over a period of several days. The viability of home demonstrations was boosted from around 1924 by technical developments that obviated the need for an outside aerial. Buyers often perceived home demonstrations as a good way of testing a set’s performance, though from the dealer’s perspective it was seen primarily, ‘as a lever to accelerate the normal process of the realization of the need… - to stimulate desire.’ It also avoided price comparison with cheaper models, boosting the sale of large console sets.
A nationwide 1925 *Radio Merchandising* survey found that 38 per cent of radio dealers in the USA and Canada used door-to-door canvassing. J.J. Moore, the Radio Dept. manager of New Orleans department store Maison Blanche, stated in 1925 that the most important factor in radio sales was home demonstration, followed by price and service. A 1929 *Radio Retailing* article suggested that most radio dealers employed at least two outside salesmen full-time, with more recruited for special campaigns. Where merchants supervised their own salesmen, a straight commission of 15 per cent or less (with salesmen paying their own expenses) was considered most satisfactory.

Major radio manufacturers vigorously promoted door-to-door selling. For example, in February 1929 *The Crosley Broadcaster* informed dealers that, ‘During 1928 the sale of Crosley sets was built up to record-breaking proportions by means of home demonstration.’ Yet the independent trade journals were receiving a growing correspondence from dealers arguing that direct sales were of limited, if any, long-term attraction for them. Dealers found direct selling difficult to manage, expensive, and – given the rapidly growing proportion of replacement sales - a high cost means of fighting for people who were already in the market, rather than creating a new market. One problem was that the minimum efficient scale for direct selling- a team of four or five salesmen working collectively from a single vehicle – would require a much larger geographical area for year-round employment than the catchment area of most dealers. The main exceptions were large traders such as department stores, though these were said to follow conservative selling policies, often eschewing outdoor canvassing. Personnel problems represented another key obstacle; a 1930 survey noted that, ‘many store managers have found it impossible to secure men who are intelligent and sufficiently aggressive... More than two-thirds... definitely stated that the problem of securing the right type of men... was continually bothering them.’

By the late 1920s Victor’s Talking Machine Division was seeking to address these problems by establishing an outside sales organisation in each of their wholesalers, that would be put at the disposal of successive dealers for short periods of intensive selling. Where circumstances warranted, the wholesaler might turn over one or two experienced salesmen to the dealer on a permanent basis. It was anticipated that this would boost sales both directly and by encouraging retailers to intensify their own direct sales efforts. The ‘Victor Resale Plan’ followed the broad outlines of established resale plans in other industries, such as vacuum cleaners, with the manufacturer running the direct sales effort and the dealer being responsible for itinerary, instalment credit, and paying a 10 per cent commission on sales (which, together with a further 2.5 per cent commission from the wholesaler, would fully finance the programme). Based on
experience in the South, crews of five salesmen were expected to close 30 sales per week (10 radiograms and 20 radios). They would be remunerated via a drawing account of $30 per week against 5 per cent commission and all expenses. Another major radio manufacturer, Atwater Kent, was recommending a broadly similar plan by 1929, based on deploying seven salesmen for intensive campaigns of three or four weeks, followed by the permanent retention of two or three to continue the work. However, such manufacturer-organised direct selling plans do not appear to have become firmly established before the depression curtailed such activity.

A 1928 Radio Retailing national survey of 109 dealers found that around 40 per cent of sales were made through canvassing, with those groups of firms undertaking the highest, and lowest, sales being most reliant on canvassers. The survey was pessimistic regarding the value of direct sales, concluding that: ‘outside selling is more costly to the merchant and that its percentage cost is not reduced through increased volume to a figure comparable with the cost of inside selling.’ In other words, those firms that relied heavily on outside selling had a higher total expense ratio, which had to be balanced by a higher gross margin to maintain net profits.

Scepticism intensified during the depression. As an Albany dealer noted, ‘Too often... this makes money for everybody concerned except the dealer.’ Returns were said to be reduced by opportunistic ‘joy riders’, who obtained a series of sets from various dealers on home demonstration with no intention of purchasing. One Atlanta dealer was reported to have found that each unsuccessful demonstration cost $15 (when factors such as damage to cabinets and tube replacements were included), while only one in three resulted in a sale. The resulting costs (including at least $5 for each successful sale) wiped out almost all dealer profit. A March 1930 Radio Retailing survey of 1,000 dealers broadly corroborated these figures; each successful, and unsuccessful, home demonstration being found to cost $4.51 and $13.43 respectively.

Did dealers over-invest in direct sales?

The publication of establishment-level summaries for the 109 dealers who provided their 1928 cost and revenue data to Radio Retailing makes it possible to assess whether dealers’ perceptions regarding the poor cost-effectiveness of intensive canvassing were justified. The survey, in conjunction with the Federated Radio Trade Association and the National Association of Music Merchants, covered a particularly prosperous year for radio, 1928 (described as the most profitable year to date). Comparison with an earlier, 1926, survey of 42 dealers, indicated that average net profit had increased by 3.3 per cent of sales between the two years, to 8.2 per cent. The 109 dealers whose returns were tabulated had sales varying from $900 to $40,000 and
totalling $7.2 million. The sample was said to be well balanced geographically and to cover all
types of outlet dealing in radio. However there appears to be some bias towards larger firms
(who would be in a better position to produce the necessary accounting data); dealers in the
survey had average net sales of $66,184, while Census data for 1929 show average net sales of
$52,769 for radio and musical instrument stores and $28,625 for radio and electrical shops (or
$35,030 for both).

Despite a rise in average net margins from 4.9 per cent per cent in 1926 to 8.2 per cent in 1928,
the survey was surprisingly pessimistic. It noted that the increase was driven by higher gross
margins (boosted by lower stock obsolescence during a year of vigorous demand), while costs
had actually increased between the two surveys, by 0.8 per cent of net sales. The report singled
out rising selling costs as the chief problem. These had risen from 9.4 to 12.0 per cent of net
sales, in contrast to publicity expenses, which had actually fallen from 5.1 to 3.3 per cent (which
the survey’s author viewed as a more sensible figure, achieved partly through an expansion in
manufacturers’ co-operative advertising). Rising selling costs were, in turn, attributed to
increased door-to-door canvassing.

The survey included information on net retail sales; costs of merchandise sold; gross margin
(sales minus cost of merchandise sold); and expenses – divided into functional categories.
These included occupancy (rent, light, heat, water, etc.); where the property was owned by the
retailer, they were asked to calculate a notional rent, based on 6 per cent of the cost of land and
buildings, together with depreciation at 2.5 per cent of building costs. Selling expense involved
the costs of the sales force, selling-related stationary, other miscellaneous selling expenses,
delivery costs (including depreciation on equipment at 40% of cost); and demonstration
expenses. Publicity expenses included advertising, circulars, and window dressing.

We examine the hypothesis that radio manufacturers pushed retailers with whom they were
linked into unattractively high levels of selling expenditure (from the retailer’s perspective). To
do so we compare the relative impact of publicity and selling expense on retailers’ gross and net
profits. Qualitative evidence suggests that retailers benefited from publicity expenditures but
that high selling expenditures – associated with the use of an outside sales force, were less
effective and may even have reduced profits. On the other hand both selling and publicity were
seen to have positive impacts on profits before deduction of retailers’ costs, unequivocally
benefiting the manufacturer and wholesaler.

We estimate the differential impacts of publicity and selling on net profits and gross margins for
a cross-section of 100 retailers, as shown in Table 3. The estimates are derived using
Generalised Least Squares and are transformed in log-form to enable the coefficients to be interpreted as marginal effects. Given a view among some dealers that door-to-door sales reduced the need for a well-located store, we also include occupancy expenses as a control variable in both estimations. Column 1, showing the determinants of net profit, illustrates that the return for publicity expenditure was more than two and half times greater than for selling, assuming that the coefficient of selling, which is insignificantly different from zero, is consistently estimated. In contrast, when we compare the differential impact of publicity and selling on gross margins, in Column 2, we find that the return to selling was about 40 per cent higher than for publicity spend. In both cases the results are well determined, being significant at the 1% level. Occupancy expenditure similarly shows a markedly greater return on net margin than that for selling expense, despite having a lower return on gross margin.

One caveat with this methodology is that higher profits or gross margins may impact on promotional expenditures. This endogeneity issue not accounted for and may lead to estimates that are biased upward. The typical approach employed in the literature is to use instrumental variable methods with time lags and other exogenous variables. Unfortunately, as the data are cross-sectional, there are no candidates for instruments. While it would be preferable to be able to account directly for potential endogeneity bias, we argue that this is less of a concern for our analysis, for two reasons. First, we are interested in examining the relative impact of promotional and selling expenses. If higher profits or gross margins do lead to higher expenditures, it would seem likely they would do so on both promotional and selling expenses. Second, because our findings show large and very well determined differentials between the two forms of sales promotion, the extent of bias would need to be extremely large. Previous studies suggest that the bias is relatively modest in the context of well-determined results. For example, at the lower end, a study of UK department stores in the 1930s suggests a bias of less than 5 per cent, while work in the US found that in the absence of instrumentation the coefficients on own advertising are roughly 20 per cent higher.

Even taking the promotional coefficient as being 20 per cent higher, and assuming no bias in the relationship between net profit and selling, this would still mean that publicity had more than double the impact on net profits than selling expenditure. The analysis thus indicates that direct sales was particularly successful in boosting gross margins, thus benefiting the manufacturer and wholesaler, but offered lower returns than advertising or better premises for the retailer, once its high relative costs are deducted.
However, while door to door selling may not have advantaged the retailer - compared to a situation where all local dealers abstained from canvassing (given a fixed retail structure) - it does appear to have acted as a significant barrier to entry. Canvassing was a specialist activity, with significant minimum costs for dedicated staff and vehicles, which were most efficiently employed in teams operating on a full-time (though perhaps temporary) basis. By reducing the pool of customers who purchased radios via conventional shopping, direct sales thus restricted the potential customer base for vendors who were not prepared to take on these costs. Moreover, authorised dealers for major radio brands had a competitive advantage in canvassing, as heavy manufacturer advertising boosted brand recognition and was often coordinated with dealer direct sales campaigns – thus increasing the likelihood that the salesman would receive a positive reception. Thus, by deterring entry from dealers outside strong manufacturer-driven supply chains, canvassing may have been of greater benefit to the specialist radio retailer than was evident from its contribution to net margin.

The depression, the ‘midget’, and the transformation of radio value chains

The depression and its aftermath witnessed a dramatic decline for the specialist radio retailer. Despite a rise in U.S. radio output from 4.44 million sets in 1929 to 6.03 million in 1935, employment in the ‘household appliances, radio dealers’ Census classification had fallen by 34.8 per cent, to 71,971. Dollar sales by stores in this group had declined by 53.4 per cent (compared with 32.2 per cent for all store sales); while the number of dealers had fallen by 26.3 per cent.89 This was the product of technological changes that transformed radio from an expensive, bulky, product, requiring frequent servicing, to a cheaper portable appliance.

‘Midget’ radios first appeared in California in 1929, produced by firms outside the mainstream radio industry. Their rapid success facilitated entry into radio manufacturing, threatening the established industry structure. The midget’s appeal was based on compact size and low price, while their performance initially did not meet accepted industry standards. Nor were profit margins equivalent to what dealers had been accustomed to. Yet they rapidly proved popular. The early midgets sold at $49.50, whereas the minimum price for console radios was around $100.00.90 Midget sales experienced rapid growth over the depression, accounting for an estimated 60 per cent of all radios sold between 1st December 1932 and 1st May 1933.91 During the 1930s their weight and cost declined sharply (eventually retailing from under $10.00), while performance improved. An innovation initially widely viewed as a ‘depression product’ dominated unit sales by the end of the decade.92 Midgets also took the lead in styling, appearing
in distinctive modern cabinets, often using coloured Bakelite. Meanwhile the radio market was experiencing a general trend towards lower unit prices, as shown in Table 2.

Midget sets represented a major shock to established dealers. Many initially welcomed them as a means of drumming up new business during the depression by attracting customers who either could not afford a conventional set, had small apartments, or wanted an additional receiver. Yet the product characteristics that drew in this new custom also served to transform radio retailing from a specialist activity, requiring home delivery and servicing; deferred payments; and showrooms worthy of a prestige piece of household furniture, into a ‘cash and carry’ business, accessible to most general goods retailers.

By reducing the need for home servicing, deferred payments, and product-specific store facilities, the midget removed the key differentiating advantages of the specialist dealer. Moreover, as models have shelf lives of several years, rather than the annual model changes characteristic of conventional radios, the specialist retailer’s skills of managing rapidly depreciating inventory commanded less of a premium. Ironically, the innovation which removed the need for the most troublesome aspects of the dealer’s activities, home demonstrations and stock management, acted to restructure supply chains in favour of distribution through general retailers, involving more arms-length relationships with radio manufacturers.

**Conclusion**

Radio manufacturers sought to coordinate down-stream supply chains so as to maximise their own profits and create barriers to entry that would benefit the chain as a whole. Lacking the market power over dealers of leading auto firms, they developed cooperative strategies, based around some limitation in points of sale, to authorised dealers who were given assistance with various aspects of marketing in return for pursuing policies consistent with those of the manufacturer. One key policy was door-to-door selling, which constituted an important means of overcoming consumer resistance and inertia during the early-mid 1920s, when sets were perceived as complex and expensive and the market was characterised by a public that generally had little or no experience of this classic experience good. However, as the decade progressed, dealers became increasingly aware that their peers often found this to be a problematic and high cost sales device. The perceived interests of the manufacturer and retailer thus began to diverge – a result confirmed by our empirical analysis of the differential impacts of direct sales on gross and net profits.
However, it was the weakness, rather than strength, of manufacturers’ control over dealers, that undermined pre-depression radio value chains. During the depression leading US radio firms were unable to resist the launch of the midget radio format, in contrast to British manufacturers, who were largely successful in blocking its introduction throughout the 1930s (via a black-list of retailers who stocked midget sets - which was perfectly legal in the absence of any effective British anti-trust legislation). American dealers - faced with competition from distress sales of surplus stock and enjoying legal protection against such industry-wide coercion - accepted this new entrant, apparently unaware that the characteristics of portability and cheapness that made it so attractive would soon undermine their key competitive advantages. Thus by the mid-1930s the specialist radio retailer was in severe decline and the console radio format had lost considerable market share to small, cheap, sets that did not require their product-specific skills.
Table 1: RCA’s advertising expenditure as a percentage of sales, 1923-29

<table>
<thead>
<tr>
<th>Year</th>
<th>Space (%)</th>
<th>Sales Promotion (%)</th>
<th>Co-operative (%)</th>
<th>Broadcast (%)</th>
<th>Total (%)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1923</td>
<td>3.78</td>
<td>3.11</td>
<td>0.00</td>
<td>0.00</td>
<td>6.89</td>
<td>536,387</td>
</tr>
<tr>
<td>1924</td>
<td>2.59</td>
<td>1.65</td>
<td>0.00</td>
<td>0.00</td>
<td>4.24</td>
<td>1,058,640</td>
</tr>
<tr>
<td>1925</td>
<td>5.30</td>
<td>2.59</td>
<td>0.00</td>
<td>0.00</td>
<td>7.89</td>
<td>1,595,772</td>
</tr>
<tr>
<td>1926</td>
<td>7.01</td>
<td>2.95</td>
<td>0.00</td>
<td>0.00</td>
<td>9.96</td>
<td>2,257,859</td>
</tr>
<tr>
<td>1927</td>
<td>5.40</td>
<td>1.78</td>
<td>0.17</td>
<td>0.30</td>
<td>7.65</td>
<td>1,783,365</td>
</tr>
<tr>
<td>1928</td>
<td>4.47</td>
<td>2.20</td>
<td>0.00</td>
<td>0.47</td>
<td>7.13</td>
<td>2,556,828</td>
</tr>
<tr>
<td>1929</td>
<td>9.57</td>
<td>3.10</td>
<td>1.02</td>
<td>0.66</td>
<td>14.35</td>
<td>3,294,191</td>
</tr>
<tr>
<td>Total</td>
<td>5.29</td>
<td>2.30</td>
<td>0.17</td>
<td>0.24</td>
<td>7.99</td>
<td>13,083,037</td>
</tr>
</tbody>
</table>

Source: Hagley, 2069/2/2, data sheet on RCA advertising expenditure, n.d., c. 1930.

Notes: Total sales figure for 1923 excludes tubes. Total sales for 1925 excludes $913,139 of component parts supplied to Brunswick and Victor, as attribution between firms not known.
Table 2: Sales of home radio apparatus in the United States (units and dollar values), 1922-34

<table>
<thead>
<tr>
<th>Year</th>
<th>All equipment Value</th>
<th>Radio sets* Value</th>
<th>Radio tubes Unit Price</th>
<th>Parts** Value</th>
<th>Batteries*** Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>60,000,000</td>
<td>100,000</td>
<td>5,000,000</td>
<td>6</td>
<td>40,000,000</td>
</tr>
<tr>
<td>1923</td>
<td>136,000,000</td>
<td>250,000</td>
<td>15,000,000</td>
<td>4</td>
<td>75,000,000</td>
</tr>
<tr>
<td>1924</td>
<td>358,000,000</td>
<td>1,500,000</td>
<td>100,000,000</td>
<td>3</td>
<td>100,000,000</td>
</tr>
<tr>
<td>1925</td>
<td>430,000,000</td>
<td>2,000,000</td>
<td>165,000,000</td>
<td>2</td>
<td>65,000,000</td>
</tr>
<tr>
<td>1926</td>
<td>506,000,000</td>
<td>1,750,000</td>
<td>200,000,000</td>
<td>2</td>
<td>80,000,000</td>
</tr>
<tr>
<td>1927</td>
<td>425,600,000</td>
<td>1,350,000</td>
<td>168,750,000</td>
<td>2</td>
<td>68,000,000</td>
</tr>
<tr>
<td>1928</td>
<td>690,550,000</td>
<td>3,281,000</td>
<td>388,000,000</td>
<td>2</td>
<td>50,400,000</td>
</tr>
<tr>
<td>1929</td>
<td>842,548,000</td>
<td>4,438,000</td>
<td>592,068,000</td>
<td>2</td>
<td>30,500,000</td>
</tr>
<tr>
<td>1930</td>
<td>500,951,500</td>
<td>3,827,800</td>
<td>332,198,000</td>
<td>3</td>
<td>23,510,000</td>
</tr>
<tr>
<td>1931</td>
<td>309,270,000</td>
<td>3,420,000</td>
<td>212,040,000</td>
<td>1</td>
<td>14,100,000</td>
</tr>
<tr>
<td>1932</td>
<td>196,000,000</td>
<td>2,620,000</td>
<td>124,860,000</td>
<td>1</td>
<td>11,000,000</td>
</tr>
<tr>
<td>1933</td>
<td>212,000,000</td>
<td>3,806,000</td>
<td>130,899,000</td>
<td>1</td>
<td>10,400,000</td>
</tr>
<tr>
<td>1934</td>
<td>235,000,000</td>
<td>4,084,000</td>
<td>150,880,000</td>
<td>1</td>
<td>9,200,000</td>
</tr>
</tbody>
</table>


Notes: Based on Radio Retailing data, shown at retail values. * Excludes cost of tubes. ** 1930 and 1931 figures are estimates. *** Data for 1922-29 are for dry batteries only. Data for later years also include storage batteries and air cells.
Table 3: Determinants of net profit and gross margin (GLS estimates: n=100)

<table>
<thead>
<tr>
<th></th>
<th>Net profit</th>
<th></th>
<th>Gross margin</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>z-stat</td>
<td>Coefficient</td>
<td>z-stat</td>
</tr>
<tr>
<td>log Publicity</td>
<td>0.348 **</td>
<td>(2.17)</td>
<td>0.247 ***</td>
<td>(4.84)</td>
</tr>
<tr>
<td>log Selling</td>
<td>0.135</td>
<td>(0.74)</td>
<td>0.344 ***</td>
<td>(5.13)</td>
</tr>
<tr>
<td>log Occupancy</td>
<td>0.226</td>
<td>(1.10)</td>
<td>0.309 ***</td>
<td>(4.07)</td>
</tr>
<tr>
<td>Constant</td>
<td>2.809 ***</td>
<td>(4.53)</td>
<td>2.711 ***</td>
<td>(7.72)</td>
</tr>
</tbody>
</table>


Notes: ***p<0.01; **p<0.05. Coefficients are marginal effects. White corrected z-statistics in parentheses.
Figure 1: ‘Realizing the need’ via home canvassing and demonstration, as visualised by *Radio Retailing* in 1930


13Maclaurin, *Invention & Innovation*, p. 146.


21For details of Sarnoff’s life and work see Sobel, *RCA*.


23Hagley, Sarnoff, Publicity, Box 1, File B1F20, David Sarnoff, ‘Radio and the Electrical Dealer’ draft article for publication in *Journal of Electricity*, 16 April 1923.

24Hagley, Sarnoff, Publicity, Box 1, Folder BIF 8, ‘Radio’ informal address by David Sarnoff, before Electrical Supply Jobbers Association, 26 May 1922.


28Smithsonian, Lemelson Center Archives, Clark collection [hereafter Smithsonian, Clark] 55, 239/1, Circular from E.E. Bucher, General Sales Manager, RCA, to authorised Radiola Dealers, 18 Jan. 1926.
30Smithsonian, Clark 55, box 97, RCA Sales Dept. Retail Dealers Discount Schedules.
31Smithsonian, Clark 55, 108/2, circular from E.A. Nicholas, Manager, Radiola Division, RCA, to all RCA Radiola Distributors, 3rd Dec. 1928.
32Speech by Paul Klugh to annual meeting of Zenith stockholders, 25 June 1930, cited in Cones and Bryant, Zenith Radio, p. 92.
34Cones and Bryant, Zenith Radio, p. 25.
35Hagley, 2069/9/41, circular to RCA Victor distributors by Roy A. Forbes, 15 October 1930.
40Smithsonian, Clark 55, Box 97, Memorandum to all RCA Radiola Distributors, 9 Oct. 1929.
41Crosley Broadcaster, 1st November 1928, p. 13.
46Smithsonian, Clark 55, Box 97, RCA circular to all RCA Radiola distributors, 8 Jan. 1927.
47Smithsonian, Clark 55, 108/2, Circular to all RCA Distributors and Dealers from J.L. Ray, Sales Manager, 18 April 1928.
48Smithsonian, Clark 55, Box 97, Circular to RCA Radiola Distributors, Eastern District., 30 Nov. 1929.
50Ibid, p. 472.
55Your Sales Program for 1929,” Radio Retailing (February 1929), 36-7.

Ibid., pp. 388-390.

Finance Companies Re-enter the Field,’ *Radio Retailing* (October 1935), 20.


Harold Barger, *Distribution’s Place in the American Economy since 1869* (Princeton, 1955); p. 32.


“Speciality selling” – the answer to sales slumps’, *Radio Retailing* (March 1929), 44-6.


S.J., “Expenses, 29.5%, Profit, 8.2%”.

Gross Margins were found to be substantially smaller than the discounts from selling prices received by retailers. They were reduced by trade-in’s; sets sold at below original list price (including obsolescing stock or, occasionally, stock where the manufacturer had cut the list price); and by breakages and returns.

Survey schedule, published in *Radio Retailing* (July 1929), p. 83. In addition administrative, servicing and other costs were recorded.

Of the 109 firms in the full sample, seven do not have information on publicity expenditure and one has no information on occupancy.


