

COMPETITIVE BIDDING FOR THE EARLY U.S. AIRMAIL ROUTES

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This paper considers early efforts to award airmail routes to private contractors through franchise bidding. I evaluate the franchise bidding process relative to alternative regulatory forms focusing on the effects of competition on prices, contracting issues and the incumbency advantage. The existing empirical literature on franchise bidding has focused on cable television services and the role franchise-specific fixed investments play in determining the efficacy of a priori bidding schemes. In contrast to cable, the airmail contracts involved few franchise-specific capital investments, so holdup problems should have been less prominent. While I show both that airmail routes with more competition had lower prices and that franchise bidding gave the contractors incentives to expand demand for the new service, I also show that the original airmail operators gained incumbency advantages even in the absence of franchise-specific investments.

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1. INTRODUCTION

Recently, governments around the world have stepped up their efforts to turn over the ownership and operation of commercial activities to the private sector. A number of the privatized industries still have some natural monopoly segments. If productive efficiency is to be preserved through single-company operation, the monopolist must be subject to some level of pricing oversight in order to protect allocative efficiency. One solution is for the government to regulate the monopolist directly, either subjecting it to a price cap or fixing prices at the monopolist's costs plus a return. This paper explores an example of another regulatory arrangement—franchise bidding—in which the natural monopoly franchise is awarded to the firm offering to provide the service at the lowest price. The example is from the early development of airmail services in the U.S.

The idea of using airplanes to carry the mail took shape in the late 1910s. Initially the government provided the service, mainly employing pilots and planes used in World War I. Beginning in 1926, the Post Office began to solicit bids from private contractors for the exclusive right to carry airmail over specified routes. The initial contracts were issued for a period of four years, but none of the original routes were actually re-opened to bidding. By 1930, the four-year contracts were replaced with longer ten-year contracts and the payments to the airlines were determined by a cost-plus formula developed by the Postmaster General. In February 1934, President Roosevelt canceled all existing airmail contracts because of allegations of fraud in the final two auctions. Attempts to have the Army provide airmail service failed, so in May 1934, the routes were put out to competitive bid again. This paper describes the first round of airmail auctions, the evolution towards cost-plus regulation that followed and the second round of bidding.

The early airmail route auctions provide evidence on theories of franchise bidding. Demsetz (1968) pointed out that even in situations where a natural monopoly provider is efficient, the benefits of competition could be realized if potential suppliers have to compete for the right to be an exclusive service provider. The supplier who is able to offer customers the lowest price will be awarded the service at that price. If providers simply bid for the right to be a monopolist (instead of bidding the retail price), the firm that could best take advantage of the monopoly position would win and charge the monopoly price. Auctions where firms bid prices avoid the allocative inefficiency losses associated with monopoly pricing. Riordan and

Sappington (1987) and others (see *e.g.*, Laffont and Tirole, 1993, chapters 7-8) have formalized some of the aspects of franchise bidding. They show, for instance, that auctions can encourage firms to reveal information about their costs, avoiding the adverse selection and moral hazard problems typically associated with regulation.

Several authors have questioned the efficiency properties of franchise bidding schemes. Telser (1969) suggested that firms would end up charging prices equal to average costs instead of marginal costs. Williamson (1976) articulated a number of problems with franchise bidding and illustrated them with examples from the CATV award process in Oakland, CA. He pointed out the tradeoff between awarding long-term contracts that would encourage winners to invest in making their franchise award valuable and awarding short-term contracts that subject the incumbents to competition more often. He also noted the possibility that franchisees will engage in *ex post* opportunistic behavior once they have been awarded the contract.

This paper uses information on the bids for the airmail routes to analyze how well the bidding process achieved the efficiency goals that Demsetz and others described and to what extent it was subject to the problems articulated by Williamson and others. I describe five aspects of franchise bidding for the airmail contracts. First, I address the fact that an auction requires the government to choose a potential provider using a single, scalar score. In the case of the airlines, contracts were awarded to the bidder submitting the lowest price, provided that the bidder met certain quality requirements. The quality requirements may have been too stringent, suggesting that the government needlessly rejected low bidders, although the government did not end up paying significantly more for airmail because of these mistakes. Second, I analyze the bids submitted in the airmail auctions, focusing on how the number of competitors affected bidding. I show that auctions that involved more bidders did have lower prices.

Third, I discuss aspects of the contract execution focusing on the incentives that the contracts provided to expand demand for the service and to invest in route-specific assets. Fourth, I discuss contemporary accounts of why the bidding process was quickly replaced by a cost-plus regulated pricing system. The decision to extend the lives of the initial contracts appeared to be motivated more by the political goals of the Postmaster General and less by his intention to encourage the contractors to make efficient investments in route-specific assets. Finally, I analyze the second round of bidding, focusing on how the presence of incumbents affected the auction outcomes. I show that the incumbents won routes at higher prices,

apparently by driving out potential bidders.

Beginning with Williamson (1976), nearly all existing empirical work on competitive bidding has focused on the cable television industry (see, *e.g.*, Zupan, 1989a, 1989b, 1989c; and Prager, 1990). Cable systems involve large, city-specific, fixed investments, so auctions for cable franchises are particularly prone to the opportunistic behavior described by Williamson. Also, since cable is franchised at the local level, distinguishing provider behavior from local government officials' preferences (for instance, to have a competitive bidding arrangement for franchising in the first place) is difficult. Analyses of cable are also complicated because retail prices have been regulated for much of the 1970s and 1980s. The airmail auctions were all run by the United States Post Office (and were almost all under the same Postmaster General) and the main capital investments, the airplanes, were basically fungible assets. In light of the apparently favorable conditions for franchise bidding, it is interesting to consider the rapidity with which the auctions were replaced by cost-plus regulation.

This paper proceeds by summarizing the existing theoretical and empirical literature on franchise bidding. Section 3 describes the airline industry in the late 1920s. Section 4 analyzes the airmail contracts, focusing on the five aspects of franchise bidding enumerated above. Section 5 provides concluding thoughts.

2. Existing Literature on Franchise Bidding

Demsetz has become so widely associated with the notion of franchise bidding that it is sometimes described as "Demsetz competition." His 1968 article came out at the end of a decade in which a number of scholars questioned the efficacy of commission regulation of utilities. The article considers a number of the conventional economic arguments for regulation, including the idea that natural monopoly industries left to their own devices will charge monopoly prices. The most enduring point of his article was the suggestion that franchise bidding could introduce the benefits of market competition to industries with natural monopoly characteristics. Demsetz admitted that the efficacy of franchising rested on, "two important assumptions: (1) The inputs required to enter production must be available to many potential bidders at prices determined in open markets... (2) The cost of colluding by bidding rivals must be prohibitively high."

Others have elaborated on the shortcomings of franchise bidding, most extensively Williamson (1976) (see also Williamson, 1985). Williamson spells out seven factors that he

believes should be considered in deciding between franchise bidding and direct regulation. He says, “[a]mong the relevant factors to be considered in evaluating alternative modes of organizing natural monopoly are the following: (1) the costs of ascertaining and aggregating consumer preferences through direct solicitation; (2) the efficacy of scalar bidding; (3) the degree to which technology is well-developed; (4) demand uncertainty; (5) the degree to which incumbent suppliers acquire idiosyncratic skills; (6) the degree to which specialized, long-lived equipment is used; and (7) the susceptibility of the political process to opportunistic representations and the differential proclivity, among modes, to make them” [p. 75]. I will summarize the ensuing discussion of both Demsetz and Williamson’s points in terms of the five aspects of franchise bidding considered in the empirical section.

Using Auctions as a Selection Mechanism

Williamson’s points (1) and (2) both address the fact that with a priori bidding, the contracting agency must choose one provider before any of the potential suppliers have begun producing the product about which they are bidding. The agency also must condense all the information about the suppliers to a scalar bid. For anything but the most basic, homogenous product, this requires aggregating across several attributes of the goods potential providers are offering. Regarding Williamson’s point (1), Posner (1972) had claimed that the franchising agency could obtain information about consumers’ valuations of bidders offering different types of service or products of differing quality levels by having the bidders pre-solicit customers (*i.e.* getting customers to sign up for their service ahead of time). He suggests awarding the exclusive franchise right to the company that obtains commitments guaranteeing the highest revenue (see p. 115). As Williamson points out, though, Posner’s suggestion has a number of problems, among them that it will not necessarily pick the outcome that maximizes social welfare and that consumers may not be willing or able to evaluate services in the abstract.

A number of authors have considered the difficulty involved in developing mechanisms to rank firms offering multi-dimensional services. For example, Bushnell and Oren (1994) discuss auctions for electric generating plants that weight both declared fixed and variable costs. If variable costs are then used to dispatch plants, bidders must have the incentive to bid their true variable costs. Bushnell and Oren show that only certain aggregation schemes encourage efficient strategies on behalf of the bidders. Goldberg (1977) provides a general discussion of the

difficulties involved in structuring a competitive bidding process, discussing the costs involved in putting together bids and the likelihood that bids will convey competitively sensitive information about the bidders.

The Effect of the Number of Bidders on Prices

The heart of Demsetz' franchise bidding proposition is that competition for the franchise contract will serve the same role as competition to provide the product. One basic prediction following from Demsetz' idea is that the more competition there is for the franchise, the lower the winning contract price will be, all else equal. Standard auction theory describes the role that the number of bidders is likely to have on the winning bid in different types of auctions. First, the relationship between the number of bidders and the winning bid depends on whether or not bidders' costs are private. In a pure independent private values auction, theoretical work has shown that the winning bid will be monotonically decreasing in the number of bidders. In a pure common value setting, however, the Winner's Curse is aggravated the more bidders there are, so the winning bid is likely to be positively correlated with the number of bidders when there are a large number of bidders. As Demsetz pointed out, it is also important to take account of the extent to which there is likely to be collusion between the bidding firms.

Contract Length, Execution and Renewal

Williamson's points (5) and (6) are at the heart of the hold-up arguments that have characterized much of the debate over franchise bidding. If the incumbent supplier has some advantage (either because he has acquired special skills or has installed long-lived capital), he may have an advantage in the subsequent rounds of franchise bidding and be able to win the contract at a price above his costs. Posner (1972) has countered this claim by asserting that the long-lived assets can be sold to an entrant (see also Demsetz (1968) p. 62). Williamson points out that the small numbers bargaining game between the owner of the fixed capital and a winner in subsequent contracting rounds may be inefficient. Also, if the original franchising contract is long-term, the firm or the franchising agency may seek to take advantage of the other parties' idiosyncratic investment either to renegotiate the contract under more favorable terms or to negotiate for favorable treatment of unforeseen contingencies.

While the hold-up problem is usually formulated in terms of the specificity of physical capital, Williamson also points to the importance of human capital. This can be harder to transfer.

Although he does not mention this, one way in which the incumbent gains an advantage is in forming relationships with the contracting authorities, and, perhaps, convincing them that they are uniquely qualified to carry out the job. Williamson only elaborates on point (7), the political susceptibility of the process, to point out that regulation often has a tendency, “to assert ancillary powers,” and expand the scope of activities over which it operates. The existing empirical work all but ignores the incentives and actions of the regulatory agencies.

Under franchise bidding, contractors have incentives both to minimize their own costs and to expand demand for the service that they are providing. As Williamson points out, the best institutional mode for dealing with the natural monopoly problem in one industry at a given point in time may not be the best either for another industry or for the same industry at a different stage. For instance, the adoption rate of a new service like airmail could be influenced considerably by the quality of service the contractors provided and any steps they took to promote their service. By contrast, Engel et al. (2001) consider alternatives to franchise bidding in the context of highway franchising, where they claim much of the demand uncertainty is, “beyond the control of the franchise holder” [p. 995]. Also, all else equal (specifically, assuming that fixed investments are minimal), in an industry where the production technology is changing rapidly, franchise bidding may be preferred to regulation because subsequent bidding rounds allow the contracting agency to acquire new information about how industry costs have evolved.¹

Several authors have considered what the optimal franchise-bidding scheme would look like if firms have private information about their costs both before and after the bidding takes place. There is asymmetric information after the bidding in Riordan and Sappington’s (1987) model because only then do firms learn their true costs (for instance, after they begin construction). Laffont and Tirole (1993) (see chapters 7-10) posit moral hazard on the part of the firm. Both authors consider schemes which both select the best firm at the initial bidding stage and that induce the winning firm to produce at socially efficient levels (given the firm’s capability). A winning firm reports two signals to the regulator: its initial bid and its cost. The regulator offers the firms a menu of contracts that specify the relationship between its initial bid and subsequent cost report

¹ At a general level, the discussion about the role of uncertainty mirrors the discussion about what form of contract maximizes the efficiency of the regulatory mode. If demand and costs are completely static and there is no uncertainty about them, it could be efficient to have a single auction, the winner of which would be the sole supplier for eternity.

and, not only the prices they will be allowed to charge consumers, but also the subsidy or lump sum transfer they will be awarded by the agency.

The results are not directly relevant to the empirical example I consider because, in the airmail contracts, only prices are bid and there was no lump sum transfer. The two-stage process modeled by both Riordan and Sappington and Laffont and Tirole highlights the general point that the contractors' decisions after the bidding affect their performance.

Existing Empirical Literature

Starting with Williamson, the great majority of the empirical literature on franchise bidding has focused on the cable television industry.² Because cable TV involves highly idiosyncratic, long-lived assets, the potential for ex-post hold-up problems is high. Nonetheless, both Zupan (1989a) and Prager (1990) find evidence suggesting that franchise bidding for cable TV has been somewhat successful and subject to fewer contracting problems than expected. Zupan (1989c) also finds little evidence that incumbents are getting better deals in contract renewals.

Zupan (1989a) uses results from a randomly drawn survey of 66 cable operators, as well as various anecdotes from the trade press, to assess how well various components of the franchising process worked. He shows, for instance, that the local franchising bodies sometimes award contracts to operators who offer non-price concessions (such as channels for use by local officials), suggesting that franchises are not always awarded to the bidder offering the lowest price to consumers. In support of the efficacy of franchising, he provides evidence suggesting that prices are below monopoly levels and that ex-post hold-up is not important. Some of the more sanguine results he claims, however, are open to different interpretation. For instance, he finds that a dummy variable indicating that a local board is not regulating basic rates is positively correlated with cable prices and takes this as evidence that prices are generally below monopoly levels. Since regulation is necessary to lower prices, this is not necessarily an endorsement of pure franchising schemes. Also, since he has as many separate local franchising boards as observations, it is hard to separate the boards' decision not to regulate prices (e.g., in high costs areas, this may be a way to

² See, also, Ekelund and Ford (1997), who consider Edwin Chadwick's analysis of the funeral industry in England in the 1840s. This was probably the original industry to be recommended for franchise bidding.

lure bidders) from the firms' pricing decisions. By contrast, the same Postmaster General ran all the airmail auctions.

Prager (1990) looks at eight different measures of the extent to which the cable companies upheld their commitments (e.g., whether or not construction was delayed). She finds, among other things, that localities that decided to chose a cable company through competitive bidding were more likely to be dissatisfied with the execution of the contract by the franchising company. As discussed above, however, the decision to franchise may be correlated with other aspects that affect the outcome of the contract.

Because the existing empirical work has focused on cable television, much of the attention has been devoted to issues related to opportunism surrounding the large, franchise-specific investments. A number of the attributes of franchise bidding suggested by Demsetz, Williamson and others remain untested (or at least undocumented). There is no empirical evidence on the cost and demand discovery attributes of franchise bidding, or on the incentives of the regulatory or franchising agency.

3. Airmail in the 1920s³

The first regularly scheduled airmail service began on May 15, 1918 with both northbound and southbound flights between Washington, DC and New York City. The 218-mile trips were made with one re-servicing stop in Philadelphia. While the schedule was for daily flights, only about 75 percent of the flights actually went through during the first two weeks. (The most famous mishaps were on the first northbound flight, which was delayed 17 minutes because mechanics had forgotten to put gas in the plane. The pilot then got lost, following the Chesapeake Bay in nearly a full 360 degrees arch, and ended up heading south instead of north.) In the beginning, the service was a joint venture between the Army and the Post Office and was designed to provide training for military pilots. The Post Office, disappointed with the performance of the Army trainees, took over full operation of airmail by August 1918 and employed experienced, civilian pilots.

Early planes were not much faster than rail, so one of the Post Office's first priorities was to develop regular service between New York City and San Francisco in order to take advantage of

³ This section draws from several secondary sources, including David (1934), Spencer (1941), Lipsner(1951) and Davies (1972).

the relative speed and efficiency of air delivery relative to train. The last leg of the service, from Omaha to San Francisco began in September 1920 and the first contiguous transcontinental trip was made in February 1921. That trip took 33.5 hours, and flying speeds averaged 104 miles per hour.

Early attempts to offer a special airmail service at a higher rate than first class mail attracted too little volume to cover the cost of airmail. So, from 1919 to 1924 planes were used to supplement the rail transport of first class mail. In July 1924, by which time coast-to-coast service was fully operational, a special airmail rate was put in effect, charging 8 cents an ounce per zone over which the letter was carried. (There were three zones, based on flights between New York and Chicago, Chicago and Cheyenne and Cheyenne and San Francisco.)

Legislative Chronology

Proponents of government control of airmail were in the minority almost from the start. Even the Post Office saw government operation as a temporary solution, and only intended to demonstrate that carrying mail by air was possible before passing it over to private contractors. The first bill providing for carriage of mail by private parties was introduced in December 1921 (Spencer, p.29). Finally, in February 1925, the Kelly Act was passed providing for contract carriage. It had three provisions. First, airmail postal rates were increased to 10 cents an ounce per zone. Second, it authorized the Postmaster General to contract with private parties to carry the airmail over certain routes for compensation not to exceed four-fifths of the mail receipts along the route. Third, as a concession to potential contractors who wanted to ensure they had sufficient revenues, the Kelly Act allowed the Postmaster General to contract for transportation of first class mail.

The first advertisement for bids was issued on July 15, 1925 and listed eight routes. Of the 19 bids received, 11 were eliminated because they did not satisfy the criteria set out by the Post Office. Only six routes were contracted for, four of them with no competition. Of the other two, one was awarded to the higher bidder on the grounds that he was better able to perform the service and the other received two equal bids for the maximum amount. (David 66) Table 1 summarizes information on all 32 of the routes that were auctioned between 1925 and 1930.

The Kelly Act was amended in June of 1926 to address several operating glitches. First, allocating payments to the contractors based on a fraction of the mail revenue proved

administratively burdensome. Among other things, revenue from letters that traveled along the routes of multiple contractors had to be divided between the contractors. The maximum contractor payment of four-fifths of the revenue was replaced with a maximum of \$3 per pound for the first 1,000 miles. Slight increments were allowed for longer routes. Airmail customers were still paying 8 cents an ounce for each zone the letter covered, so the 1926 amendment served to dissociate the amount the government collected for airmail letters from the contractors' revenue. Contractors still made more money the more mail they carried, but after the 1926 amendments, they could increase their volume either by advertising to the public or by lobbying the government for lower airmail rates. They took the latter tack within the year. Heeding contractors' complaints that they were not making enough money, the Post Office instituted a flat 10 cents per ounce airmail rate in February 1927.

The Kelly Act was amended again in 1928, lowering the postage to 5 cents per ounce. The more significant change in the 1928 amendment, however, was to replace the contracts awarded through the competitive bidding process with route certificates for all contractors who had successfully operated for 2 years. The rates the contractors would be paid were to be "negotiated" with the Postmaster General. While the Postmaster General lobbied for route certificates with indefinite lives, the bill was passed only after a re-writing that imposed 10-year lives. The amendment was premised on the idea that the contractors, in their negotiations with the Postmaster General, would agree to lower payments, since the airmail rate reduction generated almost a 100 percent increase in volume. The negotiations between the contractors and the Postmaster General floundered. The legislation forbade the Postmaster General from raising compensation rates on unprofitable routes, and since most contractors operated more than one route, they argued that they should continue being paid at high rates along the profitable ones to compensate them for the unprofitable routes. They also wanted to be subsidized with airmail for losses associated with carrying passengers. The failure of the negotiations necessitated the next phase of legislation.

The Watres Act, passed at the end of April 1930, abandoned all pretense of amending the Kelly Act and departed from it along several dimensions. For one, it permitted the Postmaster General to raise compensation rates. There were also several overt efforts to subsidize passenger lines.⁴ The basis for contractor compensation was changed from pounds of mail carried to space-

⁴ The idea was to "develop a habit of air travel" (David, p. 99).

mile, although the details of the compensation were left to the Postmaster General to determine. In other words, contractors were compensated for the miles flown and the amount of space *available* to carry mail, regardless of whether it was full of mail. The legislation called for small payments to passenger lines even if they never carried mail. The Postmaster General argued that contracts should be awarded by negotiation with him to avoid cutthroat competition, but the Watres Act eventually passed and stipulated competitive bidding. The Act also gave the Postmaster General the authority to consolidate and extend routes.

By May 1930, the Postmaster General had devised a rate formula to calculate the space-mile compensation rate for each route. Under the formula, payments were based on factors that affected costs along each routes (e.g. if the route involved flying through fog or at night), the capacity the planes had to carry passengers, and whether the plane had a two-way radio or multiple engines. This formula was used to calculate the space-mile rate, but the Postmaster General determined how much space he would compensate each carrier for. One airline official called the rate formula a joke, claiming that the Postmaster General adjusted the space requirements so that he could pay airlines whatever he wanted (Spencer, p. 47). Less vehement detractors noted that the Postmaster General was essentially “a one-man public utility commission” (Spencer p. 43).

Only two routes were put out to bid after the Watres Act. The contracts were awarded after a meeting in 1930 between the Postmaster General and the four major carriers—American Airways, Eastern Air Transport, United Aircraft, and Transcontinental & Western Air. This meeting came to be known as the “Spoils Conference” as the participants were said to have decided which airlines would bid for the last two routes and what they would bid. In reaction to the Spoils Conference, Congress began investigating the competitive bidding procedure.

In 1931 and 1932, the Post Office began spending well in excess of its airmail appropriations. Airmail demand was down significantly because of the Depression, and since all the airlines had adopted two-way radios and multiengine planes, compensation rates had increased. Also, potential entrants were arguing that the Postmaster General’s practice of extending old routes rather than putting new ones out to competitive bidding stymied their attempts to get into the lucrative airmail delivery business.

On February 9, 1934, the new Postmaster General (Farley) canceled all contract routes on allegations of fraud and collusion involving the last two awards. The most straightforward explanation for the cancellation is that it culminated the Congressional inquiry into the Spoils

Conference. Others contend that the Postmaster General finally buckled under pressure from would-be entrants who were frustrated by the Postmaster General's proclivity to expand the routes of existing contractors rather than put new routes out to bid. The Army Air Services began to deliver the airmail, although their performance over the next couple months was dismal. (There were twelve fatal crashes within the first two and one-half months). In the beginning of May 1934, the routes were put out to competitive bidding again. The contracts awarded were designed to be temporary, 3-month contracts. The first advertisement for the second-round bidding was on March 30, 1934. The contracts were extended several times, and the winners of them were flying the same routes in 1938, when the Civil Aeronautics Act established the Civil Aeronautics Board.

The Development of Air Transport

To summarize the pace of development of the airmail system, Figure 1 plots the mileage of airmail routes covered each year between 1918 and 1932 and Figure 2 plots the pounds of mail carried along CAM 2 (the Chicago-St. Louis route) by month for 1927 to 1931. (Note that the number of pounds carried is meaningless before 1925 because planes carried some first class mail). Both figures display the rapid growth in airmail service over the period, suggesting that the early bidders faced a different industry than companies that bid after several years of service.

Figure 2 also highlights the effects of two specific events. First, in the month after Lindbergh's historic transatlantic crossing in May 1927, mail volumes almost doubled. This both reflected the publicity his flight brought to airmail (Lindbergh had actually been among the first pilots for CAM 2, and had the distinction of surviving two near crashes in the span of two months) as well as the efforts of the more industrious contractors to use his flight to promote airmail. Some contractors encouraged people to send airmail letters in recognition of the flight (Berg, 1998). The second notable increase in airmail volumes occurred after the rates were lowered from 10 cents per ounce to 5 cents per ounce in August 1928. Volumes on all routes nearly doubled.

Various technological advances made in the 1920s and early 1930s reduced the cost and increased the speed and reliability of flying. Night flying was made significantly safer once lights were installed along the routes. Even with night aids, flying was dangerous and expensive. Probably the most significant reduction in crashes was achieved with the adoption of two-engine planes, which began in the late 1920s.

Since franchise bidding is useful in situations where it is desirable to have a single company perform a service, it is worth commenting on whether airmail delivery had natural monopoly characteristics. Throughout the time period I consider, planes were carrying a lot less mail than they could. During one Congressional hearing, an airmail executive said, “[t]he cost of flying, up to a certain limit, doesn’t change with volume. We are running planes from Dallas to Chicago capable of carrying a thousand pounds. We have never had more than 200 to carry in them,” (H.R. 7213 & 8337, p.29). There is reason to believe that the limits to space were less binding than the limits to weight. This suggests that given the schedules the Post Office wanted the contractors to keep, it made sense to have at most one plane flying each route. Firms also made route-specific investments. For instance, carriers incurred some expenses in developing emergency landing fields along their routes. Also, since pilots’ primary navigational equipment was their sight, familiarity with the routes was important. Pilots were generally salaried employees of the contractors, without any ownership interest in the companies.

4. Assessing the Airmail Auctions as a Franchise Bidding Scheme

In this section, I consider five aspects of the franchise bidding process. In each subsection, I describe the effects franchising had on the way in which airmail delivery evolved and I also comment on the extent to which alternative regulatory arrangements, including direct regulation and state operation and ownership might have led to different results.

Using Auctions as a Selection Mechanism

Using an auction to pick a service provider forces the procuring agency to develop a one-dimensional parameter by which to compare bidders. Whether the service will be provided by a state-owned company, a company chosen through franchise bidding or a company that will be subject to direct regulation, the government must develop some forecasts about what consumer demand for the service is likely to be. For instance, if a differentiated product will be provided, the government must decide a priori whether to contract for multiple goods and which characteristics to include. In some ways, therefore, whatever the final regulatory structure, the government faces uncertainty about how much and what types of service to contract for. At the same time, auctions impose strict rules about weighting the attributes of the various bidders. An auction framework also frequently prohibits negotiations between the providers and the government, which prevents

the government from using information about the population of providers to re-evaluate its requirements.

Winners of the airmail auctions were determined purely on the basis of their bids, although the Postmaster General had a number of explicit quality requirements and screened bidders that did not meet them. The requirement that bidders violated most often was that the bids include a surety bond. For routes let before the end of 1927, bidders were required to submit \$2,000 bonds (the transcontinental legs, CAM 17 and 18, were exceptions, requiring \$25,000 bonds), but for later bids the bond value increased to anywhere from \$10,000-\$25,000. Other requirements, such as that the contractors use US manufactured planes, reflect the link between airmail service and the development of aerial military capabilities.

Generally, the Post Office specified exactly how many flights per day it wanted and where the stops should be. This simplified comparisons across potential providers, although at best it meant the government had to rely on its own information about potential demand in different cities and did not have input from the bidding companies. At worst, this allowed politics to dictate which cities had airmail service. Several contemporary accounts suggest that Congressmen lobbied heavily for airmail service into their constituencies. For instance, CAM 27, which began in Bay City, Michigan and made seven stops before ending in Chicago, apparently stopped in every Michigan congressional district. Since the appropriations for airmail were constantly in question, decisions were no doubt susceptible to political pressure.

There was some variability in how tightly the bid solicitations dictated the terms of the contracts. For example, the government did not specify whether the end point for CAM 29 would be Laredo or Brownsville. (The route was supposed to connect with service to Mexico, and presumably the route into Mexico had not yet been worked out.) Also, the advertisement for CAM 20 said that the successful bidder could commence service over part of the route first if it was “advantageous from a traffic standpoint.” Generally, however, the variations across routes in the quality requirements were small, and since all contractors were under the jurisdiction of the same body, they largely faced the same risks over the non-contractible contingencies.

There were several examples where bidders offered to provide a different service than the one for which the government was requesting bids. For instance, some bidders quoted very low prices to carry the first class mail in addition to the airmail. The government consistently ruled out bids for anything but the advertised service. It is possible that the unorthodox bids could have

lowered the government's costs of delivering first class and airmail, although it is hard to verify this empirically without more information on the rates charged for rail transport of first class mail.

Assessing the effects of the Post Office's bidding conditions involves determining the extent to which there were either carriers that were excluded that would have been able to provide the service at satisfactory levels at a lower price or carriers that were awarded contracts that turned out to be insufficient. In the 33 auctions listed in Table 1 (excluding CAMs 12-first round, 33 and 34), only 80 percent of all submitted bids were considered acceptable, and only 58 percent of the bids submitted in the first two years were acceptable. Of the rejected bids, four companies involved in six auctions were rejected in one auction and later accepted in an auction for another route. One company, General Airways System, was rejected on CAMs 1-3 but later accepted as viable on CAM 9, although it was not the lowest bidder for that route. On CAMs 1 and 3, General Airways was lower than the winning bidder, suggesting that the government's strict quality requirement may have forced it to pay too high a rate. Of the other three companies with rejected bids, none were the lowest bidder when rejected although all three went on to win subsequent contracts.

Ideally, I would like to assess not only whether the government rejected bidders that would have performed satisfactorily but also whether the existence of the screening criteria (*e.g.* the bonding requirement) discouraged companies that would have been satisfactory from bidding. Without that information, it is hard to draw firm conclusions, although aside from General Airways, which never won a contract, the criteria did not seem to exclude obviously capable bidders. It is also possible that the Post Office's delineation of viable and nonviable bidders was influenced by other factors, such as the desire to confer favors on certain bidders – though there were no allegations of that kind of motivation.

On the flip side, there were several cases where a bidder was awarded a contract and then could not successfully fulfill it (*e.g.* CAMs 9 and 16). It is impossible to assess the costs this imposed absent much more detailed information on the costs associated with the erratic service unsuccessful contractors provided until they gave up. Only in one case, however, did the government have to re-solicit bids.

Competitive bidding also opens the possibility of collusion. One example of collusion was detected in the airmail auctions. It was discovered that in CAM 12, Colorado Airways paid off the

other bidder to withdraw its lower bid. The auction was nullified and a second round of bids was solicited.

The Effect of the Number of Bidders on Prices

There are two distinct ways in which the prices paid by the government could have depended on the number of bidders. First, if the bidders were asymmetric, and faced different costs of delivering mail along the same routes, then having more bidders increases the chances that one of them will have particularly low costs. Second, for bidders with given cost structures, the presence of other bidders may have affected their bidding strategies. For instance, bidders may have bid more aggressively as expected competition from other bidders increased.

The first mechanism described assumes that the bidders had different costs, suggesting an independent private value (IPV) setting. There were also important components to the routes that were unknown to all bidders yet affected their likely profits equivalently, such as the volume of airmail likely to travel on the route, or the difficulty of flying over the route. Theoretical work has shown that in an IPV setting, the winning bid will be monotonically decreasing in the number of bidders. The relationship is less distinct in a common value setting as the incentive to shade bids to avoid the winner's curse increases with the number of known bidders.

The information structure of the airmail auctions suggests that the affiliated value setting is probably most relevant, and unfortunately, it is difficult to characterize the equilibrium in such a setting. It is also unclear whether the bidders for the airmail routes had any idea how many other bidders there would be. In 13 of the auctions (all of which were auctions with more than one bidder), bids were submitted that had very low chances of winning and which the Postmaster General later declared as nonviable bidders. For instance, there were bids that were above the government reservation price or bids that were not accompanied by the requisite bond. That suggests that at least some bidders did not know how many other bidders there were. Because a model of an affiliated value auction with unknown numbers of bidders would be extremely complex, I chose not to estimate a structural model based on a specific theoretical framework. Instead, I present various statistics that bear on the relationship between the number of bidders and the outcomes of the auctions.

Raw correlations suggest that the winning bid was significantly lower when there were more bidders. The correlation coefficient between the winning bid and the number of viable

bidders across all the auctions listed in Table 1⁵ is -0.63 . Table 2 reports results from several cross-auction regressions that attempt to control for factors affecting costs along the routes. The specifications in columns (i)-(iv) use the winning bid as the dependent variable. The first specification uses the actual number of bidders (viable and nonviable) and the last three use the number of viable bidders. In all four specifications, the coefficient on the number of bidders is negative and it is significant in all but the instrumental variables specification. The magnitudes suggest that doubling the number of bidders reduces the winning bid by at least 30 percent. The cost variables, designed to capture the effects of the length of the route ($\ln(\text{Miles})$) and the number of stops ($\ln(\text{Stops})$), are all generally insignificant.

Because there were more bidders in the later auctions, the specification in column (iii) includes a linear year trend. The coefficient on the number of bidders is reduced substantially, but it is still negative and significant. There are a number of reasons to suspect a relationship between time, cost-reducing technological developments and entry, so the functional form of this specification must be considered carefully. If I add a dummy variable that is equal to one in all auctions conducted after two-engine planes became available,⁶ it is negative and significant, although if I add a linear month trend, the coefficient is no longer as significant.

The coefficients on the number of bidders in specifications (i)-(iii) must be interpreted with care since entry could be correlated with expectations about running airmail along a certain route. The government had set a reserve price and there were costs associated with putting together a bid. In no case was it strictly binding for the winning bidder (i.e., someone always won) but this may have affected the number of bidders (except that nonviable people sometimes submitted bids that were above reserve price). To account for the possibility of an omitted route-specific variable positively correlated with the winning bid and negatively correlated with the number of bidder, I instrumented for the number of bidders using the fraction of the labor force in agriculture in the city in which the route originated.⁷ Since crop-dusting was the other major use for airplanes in the

⁵ CAMs 12 (original), 33 & 34 are excluded because of suspected collusion and CAM 31 is excluded because the bid was denominated in units that are not comparable to the rest of the bids.

⁶ Two-engine planes were much safer and therefore much cheaper to operate, even if any added airmail capacity went unused. They first became available in the summer of 1926.

⁷ Information on farming intensity was collected from the 1930 Census. Two of the cities (Elko and Pasco) were so small that the city-level employment numbers were not reported. For these, I used the

1920s, this instrument is correlated with the number of airplanes and trained pilots available in an area.⁸ The coefficient on the number of bidders actually becomes more negative (higher in absolute value), the opposite of what we would expect if there were an omitted variable, although it is so imprecisely estimated that I cannot rule out that the coefficient on the number of bidders is actually positive.

In principle, the second effect through which the number of bidders could affect the winning bid – that bidders will behave more aggressively in auctions involving more competitors – can be tested directly by analyzing all of the bids submitted. Column (v) and (vi) of Table 2 reports results from specifications that regress all 95 bids submitted on route characteristics, including the number of bidders. The coefficients in column (v) were estimated using OLS, while the coefficients in column (vi) are based IV using the same instrument for the number of bidders described above. In both specifications, the coefficient on the number of bidders is negative, although it is quite imprecisely estimated in the IV specification. In an unreported specification, I estimated a specification identical to the one reported in column (v) that also included bidder fixed effects.⁹ In all there were 49 entities (some of the bidders were companies, some were individuals who presumably intended to organize as a company if they won the route) and 16 of them bid on more than one route. Western Air Express bid on the largest number of routes, six, winning two (CAM 4 and 12) and losing the rest. The coefficient on the number of bids is negative and significant at the fourteen-percent significance level. These results suggest that at least part of the reason that the number of bidders depresses the winning bid is an increase in the competitiveness.

Contract Execution

One of the main impetuses for using private contracts to deliver the airmail was to provide bidders with incentives to expand the demand for the new service. Early bills that proposed contracting out airmail services were defeated because they guaranteed contractors a certain

state level agriculture employment instead.

⁸ The coefficient on the percent of the labor force in agriculture in the first stage of the specification in column (iv) was .027 (.011).

⁹ Information on the name of the losing bidder was available for only 11 out of the 33 auctions. Summary statistics on this subset of the data do not differ markedly from the full data set, so the subsample is most likely representative.

amount of mail by allowing them to carry the first class mail and left them with no incentive to promote airmail (David, pp. 56-7). Bidders had more incentives than the government to market airmail since they could not as easily ask Congress for appropriations to cover operating shortfalls.

The Appendix reproduces a letter to the Post Office from one of the early contractors that details the contractor's efforts to expand demand. The company was posting advertisements and hiring "solicitors" to make personal calls on businesses to explain the advantages of airmail and to leave them with several airmail envelopes.

The contractors also used less orthodox means to increase their volumes. By mid-1928, after the first and second amendments to the Kelly Act, contractors were paid by the pound of mail carried rather than the fraction of postal revenue and postage rates were down to 5 cents per ounce for the first ounce and 10 cents per ounce for additional ounces. Under the new rates, airmail postage would never exceed \$2.00 per pound, even though some contractors were paid as much as \$3.00 per pound to carry the mail. That encouraged many of the contractors to use the mail themselves. There were reports of contractors sending spare parts and other heavy objects to one another and to themselves via airmail (see Post Office Appropriations Bill for 1931, pp. 243-44). Others marketed exceptionally heavy Christmas cards. What began as an attempt simply to ease the administration of the contractors' revenue eventually had real adverse consequences on the efficiency of contract execution. Direct regulation and state operations allow for more flexibility in dealing with unforeseen contingencies. As Williamson (1976, p.82) pointed out, parties to franchising contracts often adhere to the letter rather than the spirit of contracts.

Contract Length

Williamson and others have pointed out that short-term contracts ensure that incumbents do not become entrenched whereas long-term awards provide contractors with incentives to invest in the franchise. The original airmail contracts were set for four years to coincide with, "the life of specialized airmail flying equipment and the time necessary to set up an operating organization and to amortize organization expense" (David, p.59). Longer duration contracts were not discussed, and the airline industry advocated multi-year over one-year contracts.¹⁰ None of the original

¹⁰ Supporting the four-year contract, one airline representative testified that, "[n]o one could afford to go out and buy planes and engines, establish hangars, and so on, for a period of one year. The Postmaster General could be allowed to contract for a period or, say, four years..." (H.R. 6942 & 7064, p.6).

contracts were put out to bid again, and as the original contracts were due to expire, the Postmaster General argued that all contractors in good standing should be awarded route certificates with infinite lives to replace their original contracts. He suggested that the terms of the contracts be renegotiated with him. Eventually, legislation was passed that converted the original contracts to ten-year route certificates and left any rate renegotiation up to the Postmaster General.

As their contracts were due to expire, the representatives from the airmail companies argued that they needed a longer-term commitment from the government before they could invest in new equipment.¹¹ Also, they wanted extensions to their original contracts so they could recoup past losses.¹² The Postmaster General argued that allowing existing contractors to continue would “stabilize the industry.”

After the Postmaster General’s attempts to negotiate rates for the route certificates failed, the contractual arrangement between the Post Office and the contractors evolved into what was essentially a cost-plus regulatory scheme with the passage of the Watres Act in 1930. Several factors explain this progression. Most importantly, very few if any of the original contractors had made money operating the airmail routes in the first four years. All of them argued that with a few more years to operate, they could be earning healthy profits to cover past losses. Williamson (1976, p. 81) notes that government agencies are often loath to admit having made mistakes. The route certificates suggest a corollary hypothesis: that agencies are reluctant to force contractors to admit that they had made mistakes by bidding too little for the contracts. While franchise bidding is designed to find the contractors who can provide the service at the lowest cost, unforeseeable contingencies sometimes leave the contractors with substantial profits or substantial losses. This does not necessarily reflect a failure of the bidding process, and in fact, if bidders anticipated that the government would not help them cover losses, they might have bid less aggressively since their expected profits would be lower.

¹¹ I have found no discussion of the point that contractors could sell the planes if they lost their contract, although one airline representative told Congress that, “[i]f we don’t use these airplanes in the business of carrying mail, we have no other use for them” (H.R. 7213 & 8337, p.30).

¹² Paul Henderson, the general manager of National Air Transport told Congress that, “[w]e have operated for almost two years. We have lost perhaps \$300,000 on it. We know it is going to get better, but we would like to make our service better over that line. I would like to buy some new airplanes as soon as I can, but if we are going to be out of the business at the end of the next two years I don’t suppose I could justify the purchase...” (H.R. 7213 & 8337, p.33).

The Post Office also argued that putting the routes out for bid again would unnecessarily destabilize the industry by introducing ruinous competition between the aviation companies and by potentially permitting less reliable parties to take over the contracts. The agency's conviction that the incumbents were considerably more reliable than other companies suggests that the relationship the incumbents had with the agency was valuable. Even though there were few fixed capital investments, the incumbents' relationship with the Postmaster General may have conferred enough of an advantage, in this case, that the Postmaster General argued that contracts should be extended indefinitely.

The Watres Act, which permitted the Postmaster General to set rates under the route certificates based on the space in the planes and the miles flown, granted considerable power to the agency. To the extent the Postmaster General foresaw those developments, he may have argued for the abandonment of franchise bidding to expand his powers. Aside from the ability to disqualify bidders, the strict structure of franchise auctions leaves very little discretion with administering agency.

Contract Renewal

One of the main critiques of the franchise bidding process is that the beneficial effects of competitiveness are eroded after the first round of bidding as incumbents who have made fixed investments gain advantages over other bidders. Conveniently, after the airmail contracts were canceled in February 1934 under allegations of fraud and collusion, they were re-let by competitive bidding in May 1934.¹³ The routes were longer than those the contractors had been flying previously, so all the cities that had been served by the 34 routes summarized in Table 1 were covered by fewer routes (making more stops) and service was expanded to 18 cities, such as Jacksonville, Florida and Fargo, North Dakota. For the purposes of this analysis, I considered a firm an incumbent if it had flown a route that departed from at least one of the endpoints and that headed a substantial distance in the direction of the other endpoint.¹⁴ Ten of the eleven routes on

¹³ In what has been described as an attempt to save face, the government forbade any of the participants in the Spoils Conference from bidding in the second-round auctions. To get around that exclusion, the four participants renamed themselves as American Airlines, United Airlines, Eastern Airlines and Trans World Airlines.

¹⁴ Many of the routes with incumbents had both of the same endpoints.

which the incumbent did not bid covered ground that had not previously been served by airmail, so there was no potential incumbent. On only one route did the incumbent decide not to bid (American Airlines for the New Orleans-Houston route).¹⁵ These eleven routes provide a useful depiction of the auction process without an incumbent.¹⁶

Table 3 summarizes characteristics of the second-round routes by category: at the top of the table, routes on which the incumbent bid are compared to the 11 routes with no incumbents, while at the bottom, the 21 routes that had incumbents are divided between those the incumbents won and those on which the incumbents bid but lost. The ex ante characteristics (length and number of stops) of the 21 routes involving incumbents were similar to the other 11 routes. As the last column of Table 3 demonstrates, the means for these variables are statistically indistinguishable. On average, there was one more nonincumbent bidder on the routes without incumbents, so the mean number of total bidders (nonincumbent plus incumbent) on the two types of routes was almost identical. The winning bids on the two types of routes were also quite similar.

The bottom of Table 3 tells a different story: the routes that incumbents won differed markedly from those they lost. They faced significantly less competition: on eight of the twelve routes they won, the incumbent faced no competition. Of the routes with no incumbents, there was only one with a single bidder. The routes won by incumbents were considerably longer than the routes where they were not the highest bidder. This may have reflected the fact that prior operating experience was more valuable along longer routes. As a result of the lack of competition, higher-cost operating conditions or both, the incumbents won their routes at considerably higher prices.

Table 4 considers the relationship between the presence of an incumbent and bidding, allowing the incumbency effect to work both directly and indirectly through the number of bidders. The specification in columns (i)-(iii) were run on all bids submitted on the 32 routes.¹⁷ Columns

¹⁵ This is in contrast to the bidding decisions analyzed by Hendricks and Porter (1988) for drainage leases on the Outer Continental Shelf. They find that firms with leases on adjoining tracts, who they hypothesize are better informed, did not bid on almost 20 percent of the tracts.

¹⁶ If I were to use a broader definition of incumbent that included any company that had previously flown somewhere in the country, only one route (Boston-Burlington, which had only one bidder) involved no incumbent companies, so it is impossible with this data to characterize the effect facing an incumbent company had on de novo entrants.

¹⁷ Very similar results obtain when the sample is limited to non-incumbents.

(i)-(ii) were estimated using OLS and column (iii) uses IV.¹⁸ The variable “Incumbent in Round” is only equal to one for non-incumbents. These specifications demonstrate that having an incumbent in the round caused other bidders to submit lower bids (i.e. bid more aggressively), but that a substantial part of the effect worked by simply increasing the number of bidders on the route. The presence of an incumbent could lower the average bids of non-incumbent bidders in two ways, either by causing a given bidder to bid more aggressively or by dissuading non-incumbents with high costs from bidding, effectively truncating the distribution of bids relative to auctions with no incumbents.¹⁹ Specifications similar to column (ii) that included bidder fixed effects yielded very imprecisely estimated coefficients on all variables, including “Incumbent in Round”, possibly suggesting that the latter effect is more important.²⁰ The specifications in columns (iv) and (v) suggest that incumbents paid more for routes with similar length and number of stops, but that the main reason they were able to do so is because they faced little competition on some routes.

Cumulatively, these results suggest that incumbents had an advantage, the main source of which was the ability to prevent competitors from entering particular auctions.²¹ The fact that the incumbents went on to win these auctions at higher prices than other comparable auctions suggests that some potential entrants may have regretted their decision to stay out.

¹⁸ As above, the instrument for the number of bidders was the fraction of the labor force employed in agriculture as of the 1930 Census. Interestingly, agricultural employment is a much better predictor of the number of bidders for routes that did not involve incumbents, so in the first stage, I let the coefficient on agricultural employment vary depending on whether an incumbent was in the round or not.

¹⁹ If incumbents are more likely to have lower costs than non-incumbents, then more aggressive bidding in the presence of incumbents is evidence of the effect described by Arozamena and Cantillon (1999). They show that a firm that invests to shift its cost distribution down will face more aggressive bidding from its rivals.

²⁰ Of the 40 total bidders, 19 submitted bids on more than one route. American Airlines bid on 16 routes, the largest number. It was the incumbent along only 7 of the 16 routes.

²¹ Milgrom (2004) describes a similar situation in bidding for the spectrum auctions in Southern California: Pacific Bell, California’s regional telephone company publicly committed to winning the license. As a result, it faced very little competition and acquired the license for a bargain price (see pp. 210-11).

5. Conclusions

This paper considers early government efforts to use private companies to deliver airmail in order to revisit some of the issues associated with franchise bidding. Even though airmail delivery was not characterized by significant franchise-specific capital investments, I show that the incumbent operators gained significant advantages. First, the Postmaster General successfully lobbied against putting the original contracts out for re-bidding and granted the original contractors ten-year extensions to their contracts. Second, when the Post Office was forced to put the airmail routes out to bid a second time, the incumbents won routes at significantly higher rates than non-incumbents. Paradoxically, the concluding paragraphs of Williamson (1976) mention postal service as an example where franchise bidding is more likely to be efficient.

Lessons from the early airmail services can be useful to understanding other franchise-bidding schemes that are being used to award monopoly rights. In Argentina, for instance, investments in new electricity transmission facilities are awarded to the party that offers the lowest annual usage charge (Gómez-Ibáñez and Rodríguez-Paradina, 1999).

On a side note, this paper provides historical perspective on the airline industry. By the end of 1930 American Airlines had the southern transcontinental mail route with flights through Dallas, TWA had a mid-continent route with flights through St. Louis and United had a northern route with flights through Chicago. All three airlines have had hubs in those cities at the end of the 20th century. Also, legislative debates about how to finance airmail services and whether or not airmail payments should subsidize passenger traffic eventually led to the Civil Aeronautics Act of 1938, creating the Civil Aeronautics Board (CAB) which regulated the airline industry for the next forty years.

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Table 1: Bidding by private companies on major US airmail routes, 1925-1930

Route	CAM ¹	Date Bids Due	Bids Received	Viable Bidders	Winning Contractor	Rate (\$/lb)
Boston-New York	1	Sep. '25	4	1	Colonial Air Transport	3.00
Chicago-St. Louis	2	Sep. '25	3	1	Robertson Aircraft Corporation	2.53
Chicago-Fort Worth	3	Sep. '25	2	1	National Air Transport	3.00
Salt Lake City-Los Angeles	4	Sep. '25	3	1	Western Air Express	3.00
Elko,NV-Pasco, WA	5	Sep. '25	1	1	Varney Air Lines	1.28
Detroit-Cleveland	6	Nov. '25	1	1	Ford Motor Co.	1.08
Detroit-Chicago	7	Nov. '25	1	1	Ford Motor Co.	1.08
Seattle-Los Angeles	8	Sep. '25	3	1	Pacific Air Transport	2.81
Chicago-Minneapolis	9	Dec. '25	3	3	Charles Dickenson	1.80
2 nd Award	9	Sep. '26	1	1	Northwest Airways	2.75
Atlanta-Miami	10	Jan. '26	3	1	Florida Airways	3.00
Cleveland-Pittsburgh	11	Mar. '26	1	1	Pennsylvania Air Lines	3.00
Cheyenne-Pueblo ²	12	Oct. '27	1	1	Colorado Airways	3.00
2 nd Award	12	Oct. '27	9	9	Western Air Express	0.83
Philadelphia-Washington ³	13	Jul. '26	1	1	Philadelphia Rapid Transit Air Service	3.00
Detroit-Grand Rapids	14	Jul. '26	2	1	Stout Air Services	3.00
Philadelphia-Norfolk	15	Sep. '26	1	1	Philadelphia Rapid Transit Air Service	3.00
Cleveland-Louisville	16	Jul. '27	3	2	Kaess Aircraft Engineering Corporation	2.20
2 nd Award	16	Oct. '27 ⁴	4	4	Continental Air Lines	1.22
New York-Chicago	17	Mar. 27	4	2	National Air Transport	1.24

Chicago-San Francisco	18	Jan. '27	4	3	Boeing Airplane Co.	3.00
New York-Atlanta	19	Feb. '27	1	1	Pitcairn Aviation	3.00
Albany-Cleveland	20	Jul '27	4	4	Colonial Western Airways	1.11
Dallas-Galveston	21	Jul. '27	2	2	Texas Air Transport	2.89
Dallas-Laredo	22	Jul. '27	3	3	Texas Air Transport	2.89
Atlanta-New Orleans	23	Aug. '27	6	5	St. Tammany-Gulf Coast Airways	1.75
Chicago-Cincinnati	24	Aug. '27	3	1	Embry-Riddle	1.47
Atlanta-Miami	25	Nov. '27	3	3	Pitcairn Aviation	1.46
Great Falls-Salt Lake City	26	Dec. '27	3	3	National Parks Airways	2.47
Bay City, MI-Chicago	27	Apr. '28	3	3	Thompson Aeronautical Corp.	0.89
St. Louis-Omaha	28	Apr. '28	4	4	Robertson Aircraft Corp.	0.78
New Orleans-Laredo	29	May '28	6	6	St. Tammany-Gulf Coast Airways	1.00
Chicago-Atlanta	30	Jun. '28	6	5	Interstate Airlines	0.78
Chicago-Lake Front (Grant Park Ramp)	31	Jun. '29 ⁴	1	1	Curtiss Flying Service	\$15/trip
Pasco-Seattle	32	Aug. '29	4	4	Varney Airlines	0.09
Atlanta-Los Angeles	33	Aug. '30	1	1	Southwest Air Fast Express (passenger) and Robertson (airmail)	
New York-Los Angeles	34	Aug. '30	2	2	Transcontinental Air Transport and Western Air Express	

Source: U.S. Post Office Department (1932) Air Mail Contracts.

¹ CAM stands for Contract Air Mail and was the designation used for the airmail routes.

² The original contract was invalidated after it was discovered that the winner had agreed to pay the other bidder to withdraw its bid.

³ Canceled and succeeded by CAM 15.

⁴ This is the date that the contract was signed. No advertisement in Air Mail Contracts.

Table 2: The relationship between the number of bidders and bidding, 1st round

Dependent Variable:	ln(winning bid)				ln(bid)	
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
ln(# of Actual Bidders)	-.56 (.17)					
ln(# of Viable Bidders)		-.68 (.17)	-.28 (.18)	-1.19 (1.06)	-.30 (.09)	-.31 (.25)
ln(Miles)	.05 (.13)	.06 (.10)	.09 (.12)	.01 (.17)	-.06 (.09)	-.06 (.09)
ln(Stops)	.24 (.21)	.29 (.17)	.27 (.18)	.60 (.51)	.37 (.17)	.37 (.22)
Year Trend			-.35 (.23)	.06 (.40)		
Estimation Method	OLS	OLS	OLS	IV	OLS	IV
N	33	33	33	33	95	95
R ²	.19	.37	.49		.16	

Note: Robust standard errors in parentheses. Standard errors in specifications (v) and (vi) adjusted for serial correlation within a CAM. Data includes all routes reflected in Table 1 except for CAMs 12 (original), 33 & 34, which were excluded because of suspected collusion, and CAM 31, which was excluded because the rate was denominated in different units. All information is from U.S. Post Office Department (1932). The variable “stops” counts the origin and destination cities as stops.

Table 3: Second round auctions: route characteristics by group

Group:	Incumbent Present	No Incumbent	Difference (T-statistic)
Number of Non-Incumbent Bidders	2.1 (2.6)	3.1 (1.5)	-1.0 (-1.4)
Miles ('000's)	.9 (.7)	.8 (.4)	.1 (.6)
Number of Stops	8.0 (3.8)	9.1 (3.7)	-1.1 (-.8)
Winning Bid (\$/lb)	.27 (.10)	.24 (.08)	.03 (1.0)
N	21	11	

Group:	Incumbent Won	Incumbent Lost	Difference (T-statistic)
Number of Non-Incumbent Bidders	1.2 (2.6)	3.3 (2.3)	-2.2 (2.0 [*])
Miles ('000's)	1.1 (.8)	.7 (.3)	.5 (1.8 [*])
Number of Stops	8.9 (4.5)	6.7 (1.9)	2.3 (1.5)
Winning Bid (\$/lb)	.32 (.09)	.21 (.07)	.11 (3.3 ^{***})
N	12	9	

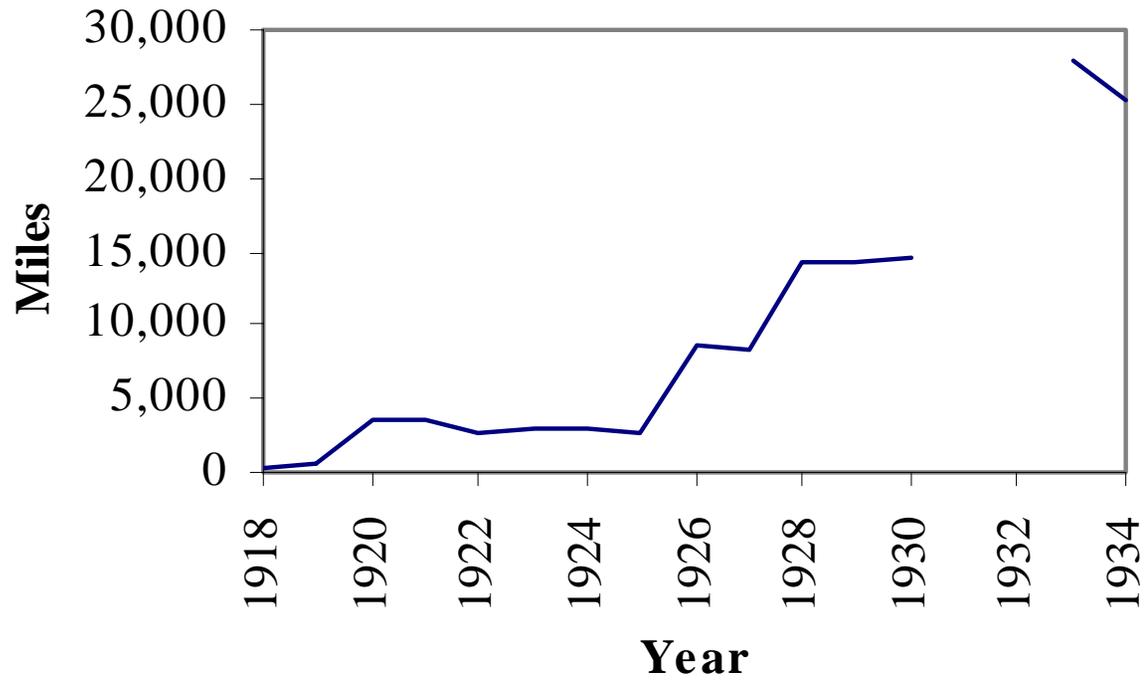
Note: The cells in the first two columns report the means (standard deviations) of the variables within the group. The third column reports the difference in the means and the t-statistic from the two-sided test that the means are zero. ^{*} significant at 10%; ^{**} significant at 5%; ^{***} significant at 1%

Table 4: Second round auctions: bidding

Dependent Variable:	ln(bid)			ln(winning bid)	
	(i)	(ii)	(iii)	(iv)	(v)
ln(# of Bidders)		-.17 (.04)	-.27 (.15)		-.41 (.06)
ln(Miles)	.10 (.05)	.06 (.05)	.04 (.07)	-.17 (.18)	-.04 (.10)
ln(Stops)	-.24 (.08)	-.30 (.08)	-.34 (.10)	.15 (.24)	-.20 (.18)
Incumbent in Round	-.17 (.08)	-.09 (.09)	-.03 (.08)		
Incumbent				.42 (.14)	.09 (.08)
Estimation Method	OLS	OLS	IV	OLS	OLS
N	99	99	99	33	33
R ²	.09	.17		.25	.60

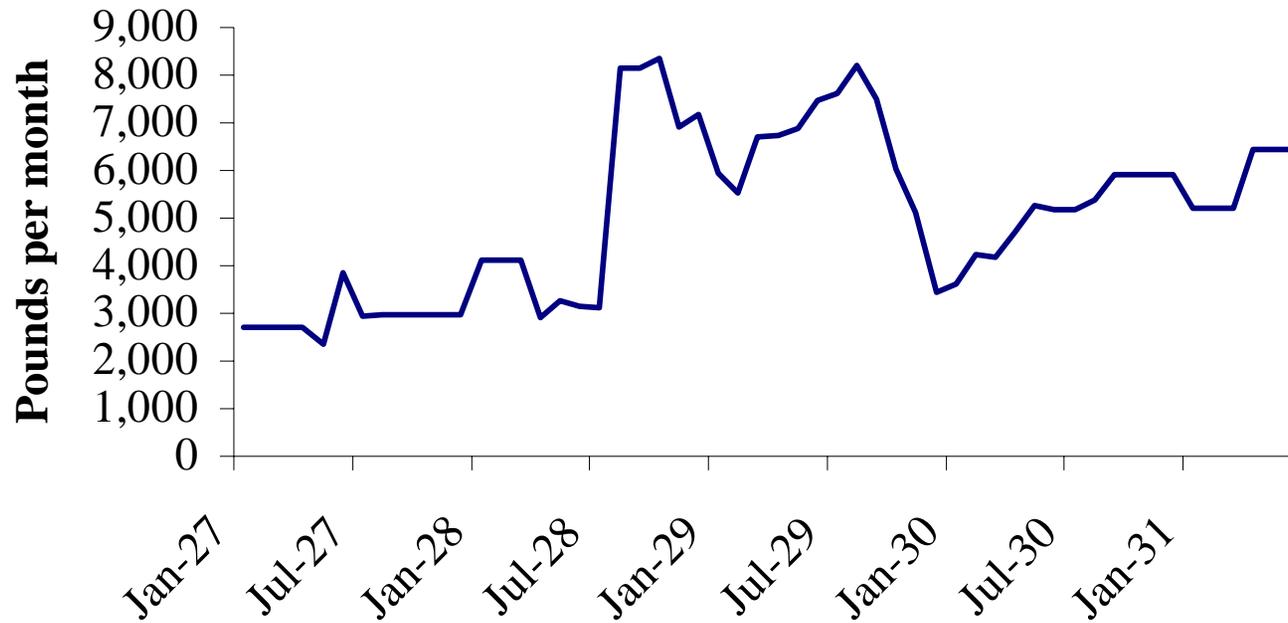
Note: Robust standard errors in parentheses. Standard errors in specifications (i)-(iii) adjusted for serial correlation within a CAM. Specifications (iv) and (v) only include winning bids. All information from original bid sheets, verified with secondary sources. The variable “Stops” counts the origin and destination cities as stops. A firm is considered an incumbent if it had flown a route that departed from at least one of the endpoints of the new route and that headed a substantial distance in the direction of the other endpoint. The variable “Incumbent in Round” is equal to zero for incumbents.

Figure 1: Airmail Route Mileage: 1918-1934



Source: *Aviation*, October 5, 1929 [1918-1929], Spencer (1942) [1930, 1933-1934].

**Figure 2: Pounds of Airmail Carried—Chicago-St. Louis (CAM2)
1927-1931**



Source: *Aviation*, various issues.

Appendix

Following is a letter from the Robertson Aircraft Corporation to Second Assistant Postmaster General Glover:

Anglum, MO
June 2, 1926

Mr. W. Irving Glover,
2nd Ass't. P.M. General,
Washington, D.C.

My dear Mr. Glover:

We have been operating now for a month and a half, and we have spent several thousand of dollars in advertising, and have sent letters to all the larger users of air mail and the Post Office Department here has been doing their part, and the amount of air mail tonnage we get out of St. Louis as a results or all this work is 1,200 letters per day.

We have found that wide publicity as well as direct advertising helps a whole lot, but we have found that it is necessary to make a personal call on the larger users of air mail, and explain in detail the location of the special air mail boxes, postal rates and leave with them a few air mail envelopes and air mail schedules.

Greater St. Louis, which boasts of a population of a million people, is quite a big problem to canvas although we are doing this every day with our limited force of four solicitors. We hope to put on half dozen more solicitors in the next few days. Our operating deficit for last week was \$1400.00, and the week before was \$1500.00, after deducting the \$1000.00 guarantee that the St. Louis banks give us. We believe that we have our costs down to rock bottom and that is 70¢ per mile, and our operating cost for the week, which is 5 days, is \$2100.00.

Our operating record for last month was pretty good, as the report sent you will bear out. We have left nothing unturned to stimulate air mail business out of St. Louis, and we have operated a sufficient length of time to be under the impression that if the St. Louis Chicago contractor air line cannot be operated at a profit, and we wish to go on record that some assistance in one way or another from the Federal Government or the Post Office Department show be given the contractors because it is impossible to operate successfully and profitably from air mail revenue alone.

We read some days ago that a Bill was introduced in Congress to pay the contractor \$3.00 per pound, and we have figured this out and it really will be a big advantage to the contractors, and we hope that it will become a Law, and will be retro-active from the beginning.

Yours very truly,

/signed/ Wm. B. Robertson,
President, Robertson Aircraft Corporation