Title
Price regulation for waste hauling franchises in California: an examination of how regulators regulate pricing and the effects of competition on regulated markets

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Publication Date
2011-06-24

UNIVERSITY OF CALIFORNIA, MERCED

Price Regulation for Waste Hauling Franchises in California: An examination of how regulators regulate pricing and the effects of competition on regulated markets

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Social and Cognitive Sciences

by

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ABSTRACT OF THE DISSERTATION

Price Regulation for Waste Hauling Franchises in California:

An examination of how regulators regulate pricing and the effects of competition on regulated markets

by

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Doctor of Philosophy

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In over 80% of California cities, waste disposal services are provided by private companies operating under monopoly franchises granted to them by local jurisdictions. In all cases, the franchise-granting entity – usually a city – sets waste disposal prices. This dissertation examines the methods used by cities to set prices, the motivation of city/regulators in using these particular methods, whether these methods are successful in keeping prices close to marginal costs and – when they are not successful – why this is so. What will be shown is that in setting prices, cities seldom use competitive bidding.

Instead, cities have developed a complex set of metrics and algorithms to routinely adjust prices, which are termed “price adjustment systems.” Using a model based on the work of Stigler and Peltzman, it will be argued that these price adjustment systems are not examples of “regulatory capture” but instead reflect the actions of a benign regulator endeavoring to align prices as closely as possible to the franchisee's costs. Finally, commercial waste disposal prices set by cities will be compared to those set in competitive markets. It will be further argued that the wide variation in franchised commercial pricing, relative to market rates, correlates with the competitive waste hauling environment in the area where the franchise-granting city is located. The more competitors that are present, the lower the rates. In other words, even regulated markets can be “contestable” in the Baumolian sense, and as in competitive markets, the presence of potential competitors has the effect of minimizing prices.

Introduction

Throughout California the collection, processing and disposition of garbage, rubbish and (since the 1980s) recyclables is primarily provided by private companies operating under locally-granted government monopolies.

These monopoly arrangements take many forms. A single firm may provide the whole panoply of waste-related services: pickup, disposal, invoicing and customer support. Alternatively, a city may contract with a private firm to pick up garbage but handle the billing itself. Some monopolies cover both residential and commercial accounts; in other cases, cities split these services between different companies. Monopolies may be granted to multiple companies which each service a particular neighborhood or area of a city. And the monopoly-granting entity may not be a city at all; sometimes counties are the grantors; occasionally it may be a special waste district.

But no matter what form the arrangements take, they all have one feature in common. *In every case, prices are set by the monopoly-granting government entity*. *How* cities set these prices, *why* they set them in the manner they choose, and the (surprising) results of *their price-setting efforts* are the subjects of this dissertation.

For the purpose of this work, all government-granted waste hauling and disposal monopolies will be referred to as “franchises.” Technically, some of these arrangements are not actually franchises; they perhaps are better categorized as “contracts,” “grants” or “licenses.” But in the parlance of city government and the waste industry (and in most of the relevant economic and public administration literature), these are usually identified as franchises, which makes this the designation that will be used.

For economists, there are three reasons to examine regulated price systems and these will form the foci of this study of California waste hauling franchises. The first reason is that investigating and analyzing price-setting for waste hauling franchises provides an opportunity to explore *how cities – as regulators – really regulate prices*. As Chapter 1 will demonstrate, much of the literature on price regulation is highly theoretical and divorced from the day-to-day decision-making of regulators. This study will drill down into the "stuff" of price-setting: what data (or metrics) do regulators utilize to calculate prices; why and how are these data and metrics selected; and what are the actual mechanics of price-setting.

The second reason to study pricing under franchised waste hauling monopolies is to explore *why regulators set prices as they do*. This is a critical question: at the core of many economists' debates on regulation lies the issue of *motivation*. Do regulators forward the well-being of consumers? Do they maximize their own interests? Do they work at the behest of the regulated industry? Levering off the information on "how" regulators regulate, a model of regulatory behavior will be developed, showing what city/regulators are trying to maximize (and minimize) when they set prices.

In this regard, price setting under regulation is of particular interest. Although there are many examples of regulation without government price setting (e.g., professional licensing), when a specific monopoly is granted to a single entity and all other entry is barred by statute, prices are almost always set by some regulatory body. Therefore, if the government regulator is truly acting for the benefit of the regulated party (allowing, as it is often assumed, the regulated party to extract monopoly rents from consumers), this should be manifested in how prices are set.

The final reason to study California waste hauling franchise is *to evaluate how well price regulation works, and – where it works poorly (i.e., where prices are set at exorbitantly "inefficient" levels) – determine why this is the case*. In most regulated markets, this is an impossible task. However, a unique feature of the California waste disposal market is the existence – in parallel with government-granted franchises – of a large, flourishing open market where prices are set in near-perfect competition. These free-market prices will be used to evaluate how successful price regulation is. And they will also help establish what essential – and unpredictable – feature is necessary to facilitate cities to set prices at near-market rates.

This dissertation will be divided into five chapters. The first is a literature review. I will survey the scholarly work in both economics and public administration on the four topics relevant to our study: 1) waste services; 2) franchising; 3) price regulation theory (all three being critical to the first question of how regulators set waste hauling prices); and, finally, 4) the economic theory of regulation (crucial to understanding why cities set prices as they do). What will become clear is that all these articles and books, while useful, do not specifically address the three issues here: how city regulators set waste hauling prices; why they do it this way; and how successful this regulated pricing-setting is.

Chapter 2 will present the primary source materials used in this work. This is a stand-alone chapter because of the unfamiliar and somewhat confusing nature of these data. A small amount of the information used here comes from waste haulers, waste and recycling publications and the State of California. However, most is provided by cities and represents the whole range of agreements, regulations and ordinances that govern waste hauling. Because the data are mixed, explicating exactly what this data is and how it will be treated is critical. In addition, part of the chapter will provide some basics about the waste hauling industry. This too is critical because, as will be shown, the peculiar nature of one particular type of commercial service – "roll-off" – offers a unique insight into the effectiveness of price-setting for waste services. Finally, there will be a detailed presentation of the highly variable commercial roll-off rates in California and the differences in the structure of the waste hauling marketplace between the San Francisco Bay Area and the Los Angeles basin. Information about rates and market structure will be critical in the arguments developed in Chapters 4 and 5.

Chapter 3 will present the "nuts and bolts" of regulated price-setting. This information will be used to develop important facts about waste hauling franchises in California, facts which will prove critical in our analysis of how prices are set. In particular: 1) California waste hauling franchises are *not* a species of privatization; 2) the waste hauling franchisee almost never changes; and 3) bidding – a central feature of regulatory theory – plays at most a trivial role in setting waste hauling prices.

Instead it will be shown that rather than bidding, cities developed rate setting processes, which over time became institutionalized. One of these processes is best described as "*routine*." It is a rule-based "price-setting system" with well-defined metrics and methods for adjusting rates. These systems are at the heart of how regulators regulate pricing. The other process is "*special*," meaning it occurs when haulers specifically petition the city for a rate adjustment.

The information developed in Chapter 3 about routine systems will be used in Chapter 4 to explicate the motivations of city/regulators with regards to price setting. Using Stigler's and Peltzman's (SP) classic works on the economic theory of regulation, the characteristics of price adjustment systems under the states of "regulatory capture" and "benign regulation" will be developed. These characteristics will then be compared to the real-world state of affairs from Chapter 3 to provide an understanding of city/regulators' actual motivations in setting prices, which, it will be shown, closely resemble those of a benign regulator endeavoring to set prices close to the franchisee's marginal costs.

But if all cities utilize similar price adjustment systems, and if city/regulators are generally attempting to set prices correctly (near the franchisee's marginal costs), what accounts for the wide variation in commercial pricing presented in Chapter 2? Addressing that question will be the subject of the final chapter. Again using SP's analysis, a theory will be developed that will argue that the source of this variability lies in the least likely place for a *regulated* monopoly: within the *competitive* structure of the regional waste hauling market itself. In fact, I will establish a heretofore unknown – and heterodox – notion: that even in highly-regulated, government-granted monopolies, the level of "contestability" is the critical factor keeping prices at near-market levels.

Chapter 1: Literature Review

Academic literature on how waste hauling franchises emerged and developed and how their prices are set is functionally non-existent. However, a body of work relevant to the topic does exist. First, over the past 30 years, there has emerged a fairly extensive scholarship on *waste disposal pricing systems*, especially as these systems affect participation in recycling programs. Second, there is both a very old and a fairly recent literature on *government-granted franchises*. Recent work on franchises has seen scholars in economics and (especially) public administration explore why governments elect to contract out certain services and the success of these contracting-out decisions. (A small portion of this work specifically deals with waste disposal franchises, including studies from the '70s and '80s arguing that government-granted contracts are the lowest-cost alternative for waste collection when compared to either municipal services or private firms.) Finally, there exist two robust literatures on *price regulation theory* and on the *economic theory of regulation*. The former focuses on establishing the theoretical underpinnings of effective price setting by regulators; the latter explores why regulation takes place, the nature of regulatory "capture" and the ultimate effects of regulation.

Although there is nothing in the literature that specifically addresses our primary questions of how and why government – when regulating franchised waste haulers – actually set prices, they do offer valuable insights into the waste disposal franchises, the methods of price setting and the effects of regulation to provide direction to this study. We will examine all four categories of work below.

1.1 Pricing of Waste Disposal Services and the "Recycling Revolution"

Work on the optimal pricing systems for residential solid waste services (there is *absolutely* no work done on commercial services) first appears in the 1960s (Hirsh, [1965]). Slightly later, Vernon Smith (1972) wrote a prescient piece advocating recycling and developing a pricing model that endeavors to explain under what circumstances waste generators will divert. Smith's work represents an old style of framing the problem, looking to encourage recycling by using a Pigouvian system of "environmental 'user taxes'" on packaging materials (then under consideration in Congress). He concludes with the need to use the charges collected under this system to support the value of recycled materials.

Academic work on waste disposal pricing does not really flower until the late 1980s and early 1990s, when the "recycling revolution" is taking hold. Most waste-related scholarly work in this area concerns modeling residential waste disposal decision-making and analyzing the effects of "unit pricing" (or as it is known in the industry, pay-as-you-throw or PAYT systems) on the levels of waste diversion. By way of background, before the 1980s it was commonplace to charge residents a fixed annual fee for waste disposal, a fee usually buried in local income or property taxes. With marginal cost for disposal = \$0, there was no incentive for residents to minimize garbage generation. For this reason, communities across the nation began testing and in some cases implementing PAYT systems. Most of these systems require residents to be charged either on a per bag basis or by the size and number of trash containers that are put out for collection.

Kinneman and Fullerton's (1999) simple model describing residential behavior in the garbage vs. recycling decision-making is representative of what appears in this literature. Residents will make disposal decisions to maximize the following utility function: u = u(c) = c[g,r], where c[g,r] represents various combinations of garbage and recycling consistent with a particular level of consumption, subject to a budget constraint of $y = p_c c(g,r) + p_g g + p_r r$. Under this decision-making process, however, households may "fail to internalize the full social costs of their disposal decisions," i.e., do too little recycling (1999, p. 4). Fullerton and Kinneman (2000) expand on this model in later papers, with the implicit intention of guiding policymakers toward developing the optimal systems to encourage recycling.

Most scholarly work analyzes, in one form or another, the effects of PAYT on recycling rates. Skumaz (1989), Jenkins (1993) and Miranda, Evans, Blume and Roy (1994) document positive results for PAYT on recycling for various communities, although they rely on aggregate community data rather than data for individual households. Hong and Adams (1999) and Van Houtven and Morris (1999) provide more precise looks at individual cities (Portland, OR and Marietta, GA respectively). They too find increased recycling. However, all studies note the necessity of providing an attractive recycling option in conjunction with PAYT systems (echoing Smith's work from 37 years earlier). Calcott and Walls (2000) develop a theoretical justification for the need to augment user fees with taxes and other recycling-support methods.

Most of these studies document the relative success in encouraging recycling if cities and/or waste haulers bill for services on a PAYT system, although with caveats as to the ultimate explanations of their findings, such as the presence of "free" curbside recycling programs. (Several studies, for example, found an increase of illicit disposal [called "fly dumping" in the waste industry] when user fees are implemented.)

For the purposes of this work, these issues are not directly applicable. No article addresses how rates are set; they only provide evidence that, in general, charging consumers on a PAYT basis increases the percentage of materials recycled, assuming the presence of attractive recycling options. (Interestingly, most franchises in California charged their customers on a PAYT basis before the recycling revolution took hold.) The conclusion, therefore, is that this literature has little to do with how franchises evolved and how, in fact, rates are set.

1.2 Literature on Government-granted Franchises

Work on government-granted franchises initially appears in the first two decades of the 20th century, then reappears in the 1960s and continues to today. These time periods coincide with two distinct epochs in the history of American local government: the expansion of municipal responsibilities in the late 19th and early 20th century and the movement to "privatize" municipal services that emerged mid-century.

The work of the early 20th century is documentary rather than analytic. In fact in many cases it is bibliographic (e.g., Stevens, *A Bibliography of Municipal Utility Regulation*, 1918). Meyers, in his description of franchised services in New York City (*History of Public Franchises in New York City*, 1900), provides a broad-brush history of franchises since the 18th century. Most of these government-granted franchises are transportation-related (municipal railroads, bridges, ferry services and the like). Later, they become tied to more modern utilities. *The Book of Franchises* (1910), prepared by the San Francisco Board of Supervisors, provides a similar look at San Francisco franchises. Again the primary focus is transportation. However, the book does mention what I believe is the first "waste disposal" franchise, which was granted to the F. E. Sharon Company to "cremate" garbage. (After a dispute, the City required the company to install an accurate scale and set what we today would call a "tipping fee" of 60¢ per ton.)

The study of franchises was re-energized in the period from 1960 – 2000 with the emergence of the privatization movement: turning over certain municipal services to private contractors, whose contracts are awarded through a competitive bidding process. Privatized services are assumed to provide higher-quality, lower-cost alternatives to municipal services; the idea is that the bidding process (and the possibility of losing the franchise) acts as would standard market forces, inducing providers to keep costs low and service quality high. Ironically, a significant portion of this work focused on the newest franchised service, cable television – a service which was almost never provided by a municipality and therefore cannot be considered "privatized." Also, as was pointed out above, there is relatively little work on waste hauling franchises. By way of illustration, Kent, Opperdahl and Stephens, *Municipal Franchising and Regulation* (1974), remains a primary source for the early history of cable television. Yet by their own admission, their work on waste hauling franchises is severely limited (see especially pp. 291 – 313).

Specific articles on franchises are best organized into three categories. By far the largest body of work – and the primary focus of the public administration literature – evaluates the ways municipalities use private firms to provide essential services and measures (by compiling survey data) the efficacy and issues of contracting out. Within this category are a few articles specifically about contracting out waste services. A second category – dominated by the work of economists – concentrates on the methods of bidding franchises. Here, more often than not, the primary interest is the cable industry; there is nothing specifically about bidding waste hauling franchises. Finally, there is a small subgroup of articles (again by economists), comparing the costs of waste services under franchise contracts to both municipal collection and private services.

It should be noted that most articles find privatization a positive development and – in that spirit – it is not surprising that those evaluating waste hauling pricing find government-granted monopoly franchises the lowest-cost method of collecting wastes.

1.2.1 Evaluating the Efficacy of Contracting Out Government Services

This literature relies on surveys of local governments to evaluate how well privatization is working and to determine under what circumstances issues arise. Ferris and Graddy (1986) attempted to model why cities contract out certain services and found contracting out to be prevalent in what they call "public works," which includes residential solid waste. These services are characterized by "tangible outputs" and "a good availability of private firms." Feiock, Clinger, Shrestha and Dasse (2007) came to somewhat similar conclusions 20 years later, when they examined the circumstances under which governments successfully privatize services. Their interest is in transaction costs (they rely on the work of Oliver Williamson among others, whose article on bidding cable TV services we will explore in detail below). They find the higher the transaction costs (as measured by turnover in administrative personnel), the less likely governments will contract out services. However, "private goods" (which have similar characteristics to Ferris and Grady's public works and includes waste services) "are optimal candidates for contracting out unless the contracting costs and uncertainties are too prohibitive."

Pack (1989) surveyed 15 cities to provide evaluations of why they contract out certain services (only one of the cities contacted, Phoenix, was asked about waste hauling). All said cost containment through the bid process was critical for their choice to contract out, and all asserted that savings had been achieved. A later survey conducted four years later confirmed that – in the main – cost savings continued, but not universally and not without quality and reliability issues.

Lopez-de-Silanes, Shleifer and Vishny (1997) model the sources of privatization versus public provision of services. Using surveys of 3,042 counties, they determine which of 12 services were provided by outside contract and then regress this information against a variety of dummy variables used to represent clean government (such as state laws mandating merit systems in hiring), unionization, and the presence of tight budget constraints. They found that contracting out is more prevalent where clean government laws are strong and public-sector unions are weak.

Specific work on the contacting out of residential waste hauling services can be found in Savas (1978, 1981) and follow-up work by Ammons and Hill (1995), Williams (1998) and Shetterly (2000). Savas – who conducted the first major survey of municipal waste hauling arrangements in 1970 – focuses his attention on public-private competition, cities which retain a municipal hauling operation but also grant franchises to private firms. (Savas calls these "competitive systems" to distinguish them from cities where waste disposal is provided either by the municipality alone or by private contractors.) In his 1978 paper, Savas develops a typology for describing these arrangements. In his more extensive 1981 work, Savas sets the historical context of the development of these public-private relationships, noting that municipal waste hauling replaced private disposal in the 19th century as cities – wishing to ensure efficient, proper and reliable waste disposal – felt it necessary to develop municipal disposal operations. However, in the 20th century, cities – now saddled with the costs of providing these services – sought to mitigate these costs by enrolling private firms in their waste disposal efforts. Competitive systems, in Savas' view, offer unique advantages over both municipally-provided waste hauling and private franchises: first, they reduce monopolistic behavior by private contractors or government employees; and second, they provide the local government a yardstick by which to benchmark performance. Savas looked at six cities (Akron, Kansas City, MO, Minneapolis, Montreal, New Orleans and Oklahoma City), comparing their specific methods of organizing waste hauling services and finding all but Minneapolis failing to take full advantage of the benefits of a competitive arrangement. Ammons and Hill found that, 14 years later, five of the six cities continued these competitive arrangements (New Orleans eliminated its municipal service altogether) and all five reported lower-than-expected cost increases in waste collection (below both CPI and national averages).

Williams (1998) provides a somewhat contrarian view of the benefits of contracting out waste services. Surveying hundreds of municipalities, he found levels of satisfaction with government-provided services being comparable to (and sometimes exceeding) the satisfaction with waste services that are contracted out. Shetterly (2000) surveyed municipalities about contract design and contractor performance. He found that including penalties for non-performance increased collection costs, although other aspects of contract design (sealed bid, length of contract) had less clear outcomes.

1.2.2 Bidding Franchise Services

The benefits of privatization turn in part on successfully bidding out monopoly contracts. Demsetz in his classic paper (1968) postulated that bidding out a monopoly contract could act as a substitute for rate regulation. Since then, many scholars have examined bidding to 1) determine optimal bidding methods (Riordan and Sappington [1987]); 2) uncover the limitations of bidding (Williamson [1976]; Sappington and Stiglitz [1986]); and 3) evaluate the results of competitively bid contracts (see, for example, Prager, [1990], who found limited opportunistic behavior by cable franchisees after the contract was awarded).

The Sappington and Stiglitz paper and follow-up work by Riordan and Sappington should be treated in tandem. The former, "Privatization, Information and Incentives," might best be understood as a tonic to the privatization enthusiasms of the period. Sappington and Stiglitz offer what they call the fundamental privatization theorem: "that with the appropriately designed auction, public production cannot improve upon private production" (1986, p. 368). Much of their pessimism about privatization is due to perceived inadequacies of the bidding process. Riordan and Sappington follow with a theoretical treatment of how to award monopoly franchises that would maximize consumer surplus. Their proposal calls for "menu contracting," with the highest bidder paying the largest franchise fees, but also earning the opportunity to earn a production subsidy contingent on both actual production costs (established *ex ante*) and a price set by the regulator.

Practically, as will be shown in the discussions of price regulation under monopoly waste hauling franchises, this model has very limited application. One major issue is its *one-shot* price-setting system, whereas in real life the price-setting is an ongoing process. Also, there are numerous practical issues. Saying, “[T]he winning bidder . . . learns marginal production cost, and makes a report . . . about a realized production parameter. Next, the regulated price is established and production occurs . . .” (1986, p. 378) is facile in the extreme. To their credit, Riordan and Sappington openly recognize that their model “does not address some of the important practical objections to monopoly franchising raised by Oliver Williamson (1976).”

It is to these “practical objections” of Oliver Williamson that we now turn. His 1976 article about bidding out the cable franchise for the City of Oakland has become somewhat of a classic in the literature associated with New Institutional Economics (NIE). As befitting the spirit of NIE (see Williamson [2000]), its major concern is transaction costs. Williamson critiques franchise bidding schemes in what he calls a “finer microanalytic detail than has been done previously.” Williamson is specifically taking on those scholars (Demsetz and Richard Posner [1971] in particular) advocating bidding franchises as a successful antidote to the problems associated with regulating public utility services. The concept is that the bid process itself replaces a sometimes clumsy regulatory process to keep a monopolist’s prices low and quality high.

Half the Williamson paper addresses these issues on a general basis. He points out that there are three methods of bidding out franchises: once-for-all; incomplete long-term contracts; and recurrent short-term contracts. Once-for-all contracts that are complete (all contingent claims are accounted for) are “impossibly complex to write, negotiate and enforce.” Once-for-all contracts that are incomplete are, in fact, similar to incomplete longer-term contracts. These suffer from (most importantly) future uncertainties, along with execution issues and problems of monitoring performance. Recurrent short-term contracts suffer from problems with maintaining bidding parity between the incumbent and future bidders (due primarily to equipment and human capital issues).

Since, as Williamson notes, most cable franchises are incomplete long-term arrangements, his case study of Oakland’s bidding out of its cable franchise is designed to illustrate the limitations of this particular process. Williamson then spends the second half of his paper relating this history of bidding out the cable TV franchise in Oakland, beginning in 1969. It is not necessary to recount the exact problems that occurred in this process (there were many, including cost overruns, unforeseen price adjustments, problems with completion of the system, and financial problems with the original winner which led to a joint venture with one of the losing bidders). “The upshot is,” as Williamson writes, “franchise bidding for CATV conducted and executed under conditions of uncertainty has dubious properties” (1976, p. 101). The problems ultimately required the governing agency to “adopt a regulatory posture,” thus derailing the supposed advantages of franchised bidding over regulation argued by Demsetz.

For the purposes of this work, there are two significant aspects to Williamson's work. First, waste hauling franchises can all be categorized as incomplete and long-term; Williamson's delineation of the problems with these contracts due to uncertainty is especially trenchant (this issue will return in Chapter 3 when the question of how prices are regulated is discussed). Secondly, Williamson's method of actually investigating the real-world history of a franchise and all the concomitant decision-making challenges and resolutions will be ours as well, except on a much larger scale, in terms both of the numbers of franchises we will investigate and in the timeframes we are considering.

1.2.3 The Comparative Price Advantage of Franchised Waste Hauling

In Kemper and Quigley (1976), Stevens (1978), Franklin and Stevens (1981), and Dubin and Navarro (1988), economists compare costs under government-provided waste services, government-granted monopolies (franchises), and private companies operating in a competitive environment.

The largest study of this kind is done by Stevens, who uses Savas' data from 340 areas, fairly equally divided between municipal providers, franchises and competitive markets. The data comes from surveys and extensive interviews to make sure the information is reliable. Actual cost data were obtained from cities (wages, fuel, depreciation), while revenue data from private contractors are transformed into costs using the assumption that marginal cost = price. Cost data are then regressed against a variety of variables, which allows Stevens to draw conclusions about sizes of service areas and types of service. Most significant for our purposes is her conclusion that waste disposal contracts (government-granted monopolies where the billing and collection functions are provided by the municipality itself) provide the lowest cost delivery of waste hauling services to residential customers. In a later paper (Franklin and Stevens, [1978]), these findings are reiterated based on a study of 77 cities. Stevens speculates that these low costs enjoyed by franchised waste haulers over firms in a competitive market system are due to “non-exclusive market areas and responsibility for billing costs inherent only in the competitive structure.”

Dubin and Navarro accept the above findings and then – using much the same cost data as Stevens (for 241 cities) – regress costs against a variety of geographic, demographic, political and labor variables to determine why – if monopoly contracts are indeed the lowest cost system of waste disposal – cities opt for either for municipal service or an open, competitive market. They find significant correlations between type of services and political attitudes, Democratic cities tending toward municipal services while Republican cities favoring competitive arrangements. Also, the percentage of unionized households was significant in this decision, with Dubin and Navarro arguing that rent-seeking behavior by unions pushes cities toward municipal service.

A few comments are necessary about the validity of these studies and their relevance to this work. One is that all these scholars finesse cross-community comparison issues by looking at city size, household density, local weather and relative size of the hauling operation in terms of number of packer trucks. All good to a point, but none addresses equally important issues of infrastructure (e.g., road quality) and topography (e.g., hills, etc.) that bear mightily on collection costs. Also, there is an unarticulated assumption that the only variation in equipment between providers is the number of trucks. This fails to address the potential significant variations in types of trucks and – most tellingly – in collection vessels. The 1970s were a transition period from metal trash cans to today's plastic carts (Toter introduced its first automatic systems in the US in the late 1960s). Again, these may have large impacts on collection costs and are unaddressed here.

Of course, the most obvious criticism of Stevens' work lies in equating price per service (charged by private sector firms) with marginal cost. Stevens notes that often only a single private firm provides residential waste collection in a given city. It is quite conceivable that these firms have local pricing power and have set their rates above their marginal costs. That would certainly undermine her conclusions.

For purposes of this study, these works actually generate compelling questions. If one assumes the firms with monopoly waste contracts are the low-cost providers – over even municipal operations, which should enjoy similar marketing and billing cost advantages – this superior performance must arise either from either 1) a successful bidding process; or 2) ongoing incentives to keep costs down. Regarding the first, as Williamson argues (and Dubin and Navarro recognize in a footnote), bidding contracts is far from a seamless, perfect process. In the face of uncertain bidding procedures, how are these optimal results achieved?

As for the second point, waste disposal contracts are not rebid frequently. Once established, they tend to be very long term. During the life of these contracts, regulators adjust prices, not costs. The implication, therefore, is that price-setting – the subject of this study – plays an integral role in cost containment. Whether the price-setting regimes which will be studied do, indeed, induce firms to be more efficient and to minimize costs must certainly be investigated.

1.3 Price Regulation Literature

In reviewing the theoretical work on price regulation, there is a general recognition among scholars – including most theorists – that much of this work is impractical to implement due to historical, institutional, political and informational factors that impact actual decision-making by regulators about prices. In discussing this "optimal regulation," Schmalensee (1989) noted, "the literature . . . thus provides real regulators little help in devising or comparing 'good' regimes that could be implemented in practice" (1989, p. 418). Five years later, Laffont (1994), after a detailed review of advances in regulatory theory – especially in dealing with informational issues – wrote, "In practice regulatory rules are subject to various kinds of constraints beyond the informational constraints studied here: political constraints, transactional constraints in particular. It is therefore quite unlikely that the theory will be developed able to compare to the normative performance of various second-best regulations …" (1994, pp. 531 – 532). (Laffont cites as an example of these second-best regulations a simple "linear rule" developed by Schmalensee, which will be discussed below.) More recently Armstrong and Sappington (2006), after a long and detailed presentation of various regulatory regimes, conclude,

> The fact that information, technology, instruments and institutions all matter in the design of regulatory policy implies that the best regulatory policy typically will vary across industries, across countries and over time. Thus, despite our

> focus . . . on generic principles that apply in a broad array of settings, institutional details must be considered carefully when designing regulatory policy for a specific institutional setting (2006, p. 1685).

That said, theoretical literature on price regulation can provide some useful insights into the pricing problem, which will help frame (and, it is hoped, better understand) how government regulators really regulate prices for waste hauling franchises. Theoretical work on optimal price regulation has a pedigree that stretches across the 20th century up to the present day. Ramsey's classic paper dates from 1927.

In this literature, three critical features recur. First, the regulator is assumed to be benevolent. A more precise expression of this benevolence is that the regulator seeks to maximize either the consumer surplus or – if he is concerned with the regulated firm as well – the total surplus (Armstrong and Sappington describe the problem as maximizing $S + \alpha R$, where S is the consumer surplus and R is the rent or net profit of the firm, with the size of the fraction α [0,1] indicative of the regulator's preference of consumer surplus over rent).

A second recurrent feature is that the regulator possesses some important piece of knowledge, usually regarding the firm's cost or the demand function it faces (or various subcategories of these). Although much of the literature addresses issues of uncertainty (about costs, effort, demand, etc.), there always remains some critical piece of information that the regulator can utilize in the price-setting exercise. And, finally, it is assumed the regulator has a variety of instruments at its disposal (taxes, subsidies, etc.) to further its regulatory goals.

To take examples from the literature, the goal of the Ramsey-Boiteux pricing rule is to maximize total surplus using both demand and cost functions to solve the optimization problem. (As Laffont noted, "The informational burden on the regulator is enormous and explains why this type of regulation has never been used even in the nationalized Électricité de France ruled by M. Boiteux" [1994, p. 400]). Loeb and Magat (1979) offer a very clever solution to price regulation, where "the utility chooses its own price and the regulatory agency subsidizes the utility on a per unit basis equal to the consumer surplus at the selected price." For the system to work, the regulator and utility both must know the demand curve facing the firm, which – behaving rationally – selects a price = marginal cost, thus assuring that an efficient quantity of service is provided. Baron and Meyerson (1982) also employ a subsidy to capture the surplus; the subsidy is structured based on a cost parameter that the firm is induced to surrender honestly in order to enjoy the full benefits of the subsidy.

In "Good Regulatory Regimes," Schmalensee recognizes the practical limitations of much theoretical treatment of optimal regulatory regimes, primarily due to "the inability of real regulators to tax or subsidize regulated firms." Instead he develops a "good regulatory regime" based on a simple linear relationship, $P = \rho + \gamma(C-\alpha) = \rho + \gamma(\varepsilon-\delta)$, where ρ is the base price, γ is a cost sharing fraction, α is expected costs known to both the firm and regulator, ε is unforeseen price shocks and δ is managerial effort. The regulator "announces" ρ and γ, the firm chooses δ and ε is eventually "revealed" to the firm, thus enabling the regulator to observe C and solve for P, the new price. As simple as this linear equation is, Schmalensee notes later that "maximization with respect to S [consumer surplus] or W [total welfare] with respect to γ

and ρ is not feasible." He proceeds to provide several numerical examples of various best linear regimes. He concludes with several lessons about regulatory schemes, including ". . . most important, static models cannot be confidently relied on for quantitative guidance in the real, dynamic world" (1989, p. 435).

What is most interesting about Schmalensee's linear model is its similarity to the methods that government regulators use when adjusting prices for franchised waste haulers. Much price-setting involves working with some given base price and making ongoing adjustments to it. The challenge is to identify what metrics (or proxies) the regulator uses for ε and δ and how and why it elects particular values for those numbers and for what Schmalensee calls the cost-sharing factor, γ (in Chapter 3 these will be referred to as "mitigation factors").

There is a second category of work on regulation and pricing that approaches the issue from an entirely different perspective. It begins with the fact that most real-world price regulation in the U.S. (especially for telecommunications) was – until the 1980s – rate of return (RORR) on capital. The basic idea is quite simple and can be summed up in this equation, $\sum pq$ = Expenses + sB, where revenues cover expenses + provide for a return (s) on the rate base (B), which is a measure of the firm's total investment. Prices are set to assure the utility's investors a fair return on their capital, which is implicitly understood to be the minimum amount necessary to convince investors to offer their capital to the regulated firm rather than pursue other investment opportunities.

Sappington (2000) provides an excellent summary of the problems with RORR pricing and popular recent "incentive regulation" alternatives, specifically the use of price cap regulation (PCR). Besides the obvious question of what constitutes a "fair return," some of the other RORR problems that Sappington and others have identified include: 1) limited incentives for innovation and cost reduction (since reductions in costs lead ultimately to reductions in revenues); 2) over-capitalization to increase returns (see Averech and Johnson [1962]; 3) the high cost of regulation (the main problem being what constitutes a fair return and measuring the rate base); and, finally 4) excessive risk borne by consumers if costs increase.

Incentive regulation – most particularly the use of some type of price cap – was designed to address these issues. In theory, PCR provides incentives for cost reduction and innovation (since the firm retains the benefits of these reductions), reduces technological distortions, and shifts risks from the consumers to the regulated firm. In practice, however, PCR creates its own problems, most notably that prices can diverge significantly from costs, thus reducing aggregate welfare. Other issues such as deterioration in quality of service to save money are also present. (See Loube [1995] on inefficiencies under a PCR regime.)

Setting price caps requires a regulatory agency to specify both a maximum price and methods to adjust that price based on a predetermined formula. Sappington presents two critical features of these formulas, the X factor – which captures anticipated improvements in productivity in the particular industry – and Z factors, which are exogenous shocks that have a financial impact outside the firms' control. In addition, some adjustment formulas include inflation factors. Finally, PCR can also include some "yardstick" regulation, in which adjustments can be made based on comparisons with similar firms. Most importantly for the purposes of this dissertation, these features of

PCR, like Schmalensee's linear model, will appear in our future examinations of price-setting formulae used by the regulators of franchised waste services.

1.4 The Economic Theory of Regulation and Pricing

If the theoretical literature on price regulation can be described as addressing "how" prices are (or should be) regulated, over the past 50 years a parallel literature has developed, which discusses the "why" of regulation. Of course economists from Adam Smith onward have theorized about government regulation. But until the last half of the 20th century, the predominant notion is what is often referred to as the "normative analysis as a positive theory" (or NPT), which posits that regulation (including price regulation) is the justifiable response to market failures, primarily the existence of "natural monopolies" and (to a lesser degree) negative externalities.[1] (NPT is actually more a hypothesis than a theory, since it does not provide a clear description of the mechanism by which regulation emerges, only that it "should emerge" to address some market failure.) The primary problem with NPT has proven to be a lack of systematic testing – besides the simple fact that a significant number of highly regulated industries in the mid-20th century (most notably in the transportation field) did not seem to be candidates for regulation under the NPT requirements.

Questions regarding the justification for government involvement in certain markets pointed to alternative motives for and methods of regulating. The most notable

[1] See both Peltzman, Noll, and Levine (1989) and Viscusi, et.al, (2004), pp. 390 – 397, for summaries of various approaches to the regulatory problem.

alternative to the NPT is the "economic theory" (ET) of regulation, which tries to establish well-defined economic motives for political/regulatory behavior. Although earlier scholars touched on these issues, the standard "start-date" for ET is Stigler's "The Theory of Economic Regulation" (1971). This article and the follow-up (and more theoretical) work by Peltzman (1976) form the basis of what is often called the "Chicago" school of ET. The underlying rationale is simple: politicians and regulators are assumed to be self-interested maximizers; the goal of the economist, therefore, is to determine what maximization problem the politician/regulator is solving.

The Stigler article provides one of the earliest and probably the most significant formulation of this theory. As he notes early on in his piece, "the central thesis of this paper is that, as a rule, regulation is acquired by the industry and is designed and operated for its benefit" (1971, p. 3). The model of government/industry behavior is simple to understand. "Political systems are rationally devised and rationally employed" (1971, p. 4). Stigler identifies four benefits that the state can provide business: monetary subsidy [uncommon]; control over entry (such as a franchise); limits on substitute goods; and price fixing. Government provides these benefits to industry in exchange for the "two things a [political] party needs: votes and resources" (1971, p. 12). Infrequent voting and the high cost of acquiring information about specific issues leaves the political field open for highly motivated and well-funded entities such as industries to affect government processes to their benefit.

Most of Stigler's evidence is anecdotal but extensive (in the early 1970s there were many major industries, such as oil and gas and the airlines, which clearly benefited from regulation and offered prime examples of his thesis). For specific examples of his model of regulatory behavior, he offers a somewhat less-than-convincing look at the weight restrictions on trucks and professional licensing procedures. In neither of these cases (nor in the examples he cites), does he look specifically at price-setting methods.

Peltzman (1976) provides a stronger theoretical underpinning to Stigler's work, with his most notable insight being the balancing of consumer benefits (low price) and producer profits ("the marginal political product of a dollar of profits must equal the marginal political product of a price cut" [1976, p. 223]). Peltzman's extension of his analysis to the regulated price structures for two distinct economic groups will be relevant in Chapter 4's discussion of city/regulators' motivations and goals. However, waste hauling, as will become apparent, provides an interesting twist on the 2-group issue, one not anticipated by Peltzman. His two groups, while exhibiting "cost and/or demand differences" are "scattered" amongst one another (1976, p. 232). In waste hauling, there exist two *absolutely* distinct groups of customers: residents and businesses, each with absolutely different service needs (and therefore pricing structures), demand functions and, most significantly, political clout. How regulators would be expected to handle pricing to these two groups (within the rubric of Stigler/Peltzman) and how they in fact do will be the primary subject of Chapter 4.

Many scholars have built on the Stigler/Peltzman model in analyzing regulatory behavior. Most of this work involves decisions to regulate, rather than the specific subject of this dissertation, which is pricing and price setting. In fact, there is almost nothing in ET literature about the actual *setting of prices*. There is a small body of work on the impact of regulation on prices. This too is limited because, as was alluded to in the Introduction, there are few parallel systems of regulated and unregulated prices. What scholarly work does exist provides interesting models of how to evaluate different price systems.

Somewhat ironically, one of the earliest and most interesting study of prices in parallel regulated and unregulated markets comes from Stigler himself (with Claire Friedland) in an article entitled “What Can Regulators Regulate: The Case of Electricity” (1962). Their goal is to measure whether regulation (as defined by the presence of state regulatory commissions) affects pricing (they also look at changes in market capitalization under regulation). The period they examine is from 1912 – 1937; as regards pricing, they are unable to find any “significant effects of regulation” (1962, p. 11). They attribute this result to an “absence of long run monopoly power” and informational deficiencies on the part of the regulatory body.

What is most interesting is the method they use to compare regulated and unregulated prices. They regress the log of the price of electric power against several independent variables including a population statistic (U), cost price (p_F), proportion of power from hydroelectric sources (H), per capital income (Y), and a dummy variable (0,1) whether a state is not or is regulated.

$$\log p = a + b \log U + c \log p_F + dH + e \log Y + fR$$

A similar albeit more detailed model will be utilized in Chapter 5 to compare regulated and unregulated commercial waste hauling prices.

There are, as noted above, a limited number of examples of using ET to specifically study prices. Most scholars who do begin with Stigler/Peltzman as their theoretical lodestone and then employ an analytical procedure similar to Stigler/Friedland. To take one example, Paul (1982) tests whether physicians’ incomes are higher in states where licensing boards are controlled by the medical profession as compared to those states where the board is controlled by the governor. Paul measures the income differential as $2856 in 1976 dollars and determines that the nature of regulatory control is a statistically significant factor in this differential. Another example can be found in DeLorme, Kamerschen and Thompson (1992), who use a similar analysis to determine the importance of political influence in pricing variations between residential and industrial customers of nuclear-generated electricity.

1.5 Final Thoughts on the Literature; Its Lessons and Directions

As was noted at the beginning of this chapter, there is nothing in the literature specifically about the development of waste hauling franchises and how waste hauling prices are set by local government regulators. There is, however, much that is valuable, primarily in the explicit and implicit lessons provided by the literature on price regulation.

Explicitly, the Schmalensee linear pricing model and the methods used to adjust price caps (inflation, Z factors, yardsticks) will play a crucial role in organizing and understanding how real-life regulators modify franchise waste hauling prices.

Implicitly, however, the literature provides even more valuable lessons. The first lesson is the importance of identifying the information the regulator *realistically* has available to make his price-setting decisions. All the price regulation literature deals with the question of informational uncertainty; in fact, in regulating prices, information is the most potent constraint on decision-making. One can discuss demand functions, cost functions and parameters and price elasticity. For city/regulators, these are not normally available. Identifying what data they have access to will be critical in determining how they set prices.

A second valuable lesson comes from Oliver Williamson. His use of the actual historical record of the bidding of Oakland's cable television service provides a road map with which to address the problem of how regulators really regulate the pricing of waste services. However, Williamson uses the story of the CATV bid narrowly, to critique Demsetz's and others' theoretical considerations on bidding franchises. The goals here are different and more far-reaching. The information from the franchise records will be employed, on the one hand, to identify the actual systems used by cities to regulate waste hauling prices, and then, on the other, to evaluate the real-world effectiveness of those systems. This will be the subject of this work's third chapter.

Thirdly, to understand price setting, it is clearly important to ferret out regulators' motivations. Is price-setting, as suggested by the ET work of Stigler and Peltzman, an exercise in vote maximization, regulatory capture or some combination of this or other variables? One of the goals of this work is to establish what city/regulators are really trying to optimize in making their pricing decisions. This will be the subject of Chapter 4.

Finally, Stigler/Friedland's method of evaluating prices will be useful in the final chapter, when regulated and unregulated commercial waste hauling prices will be compared and the sources of their differences linked ultimately to the competitive structures of their particular hauling markets.

Chapter 2: Data Sources and Basic Waste Hauling Facts

The history and pricing methods presented in Chapter 3 and the analyses in Chapters 4 and 5 utilize a wide variety of data, the sources of which are detailed below. In addition, a basic familiarity with waste hauling, plus an understanding of commercial roll-off service pricing and the overall structure of the California waste industry, are necessary to follow the arguments of the three chapters that follow. That information is also presented in this chapter.

2.1 Data Sources

The major source of the information in this dissertation is documentary evidence collected from California cities, the documents being primarily franchise agreements and (literally) the thousands of addenda, amendments, ordinances, agenda items, letters, memos, rate sheets and insurance certificates attached to these agreements. A small portion is quite old (at least for California), extending back to the 19th century. The rest of the information comes from the last 50 years and much of it pertains to agreements, pricing, regulations and methods currently in effect.

One of the challenges in analyzing this information is its complete lack of uniformity. This is not surprising; data from municipalities are often "messy," since cities are inherently diverse in terms of population, geography, history, density, economy, government and politics. And, of course, there will always be differences in the quantity and quality of the data which cities are willing or able to provide. Where one city emails 500 pages of documents extending backwards to the city's incorporation date, an adjacent city can locate only its current franchise agreement or rate sheet, while a third city provides nothing.

With regard to waste disposal, a further source of this "messiness" is the fact that all these relationships are *sui generis*, the products of *local* governments and *neighborhood* waste haulers combining – in the distant past and in relative isolation from other cities – to establish franchises. Over the years, as franchises evolved, these initial differences evolved with them and became institutionalized.

Despite the diversity of source material, important data have been culled from the information that these cities provided. In addition, critical waste hauling rate information has been collected from waste haulers throughout the state. Specifically, the information to be used in this work is as follows:

Franchise Agreements/Rate Adjustment Systems – 96 complete franchise agreements were provided by cities. From these agreements, "rate adjustment systems" were extracted. The list of cities which provided this information can be found in Appendix C;

Current Rates – the primary source for the commercial rates are 56 cities which included current commercial rate sheets in their information submissions. Commercial rates for 21 other franchised cities were provided by waste haulers. All are found in Appendix D. In addition, Republic Services, Waste Management, Athens Disposal and Atlas Disposal provided commercial hauling rates for the major California unregulated markets (San Diego, Los Angeles, San Jose and Sacramento County);

Historical Rates – 14 cities provided historical rate information, which allowed for comparisons between price increases and local CPI indices. These are listed in Appendix D;

Hauler Information – as presented below, and for the purposes of the analysis in Chapter 5, waste haulers are classified as "national," "regional" and "local," depending on whether they have more than one non-contiguous franchise under their control. National and regional haulers are listed in Appendix E. The source for this information is the waste haulers' web sites;

Historical Information – the historical information cited in Chapters 3 and 5 are all taken from specific packages of information provided by cities. These are detailed in Appendix B. In addition, specific historical information is footnoted in order to reference the specific document from which the information is taken.

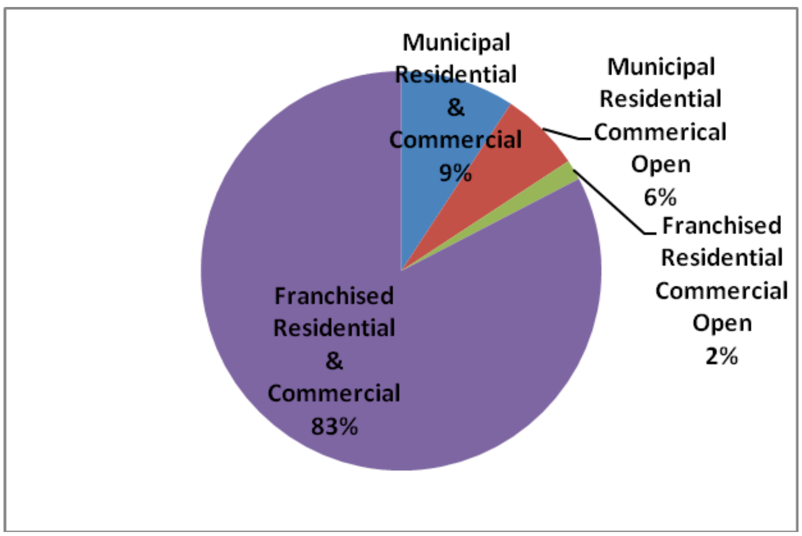
Besides information provided by cities and waste haulers, CalRecycle (formerly the California Integrated Waste Management Board) is the source for data regarding landfill fees and city-specific recycling services (specific documents are footnoted). Data utilized in the analyses in Chapter 5 regarding population, per capita income and per capital sales tax paid are provided by the US Department of the Census. Finally, information on political affiliation by city comes from the State of California, Department of Voter Registration.

2.2 The Size of the Franchised Waste Hauling Universe and the Sample Utilized

As noted in the Introduction, most waste disposal services provided to Californians are done so under franchised arrangements. Below is a chart of the waste hauling arrangements for 184 large and midsized cities in the state, which are home to 80% of Californians. Graph 1 demonstrates that franchise waste hauling arrangements clearly predominate in California.

GRAPH 1

Waste Hauling Arrangements in 184 California Cities



Source: Data in Appendix A.

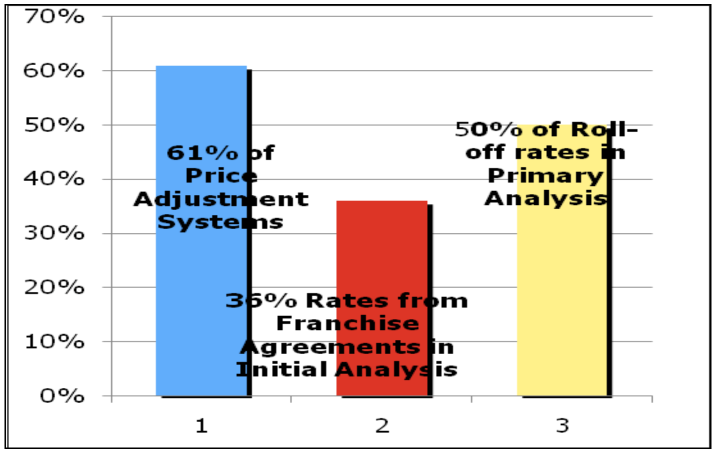
Of these 184 cities, 17 provide both residential and commercial waste services themselves. In 13 cities – including Los Angeles, San Diego, Fresno and Long Beach and most of the cities in Sacramento County – the municipal government provides residential services, while businesses and other non-residential operations are left to contract out for commercial waste hauling in the open market. It should be noted that there is no evidence that cities where today municipal services predominate ever had any type of franchised services. Rather, these services date back to the cities' earliest responses to the problems posed by waste disposal. (See especially *Municipal Franchising and Regulation*, Chapter 3, and Savas [1981].)

As is apparent from the above chart, municipal waste hauling is relatively anomalous in California. By far the most popular method of waste collection is through some type of government-granted monopoly. Of the 184 cities listed in Appendix A, 84% provide residential waste services under franchised arrangements. Almost all (82%) provide commercial services under franchises; the lone exceptions are San Jose and the Central Coast cities Camarillo and Santa Maria, which use franchises for residential service but leave the commercial service unregulated.

For the purposes of this study, the "universe" is these 154 franchised cities. Out of this universe, three different samples will be used. First is the sample of cities' "price adjustment systems," which will play a critical role in Chapters 3 and 4. Ninety-six cities provided information about these systems, which represents 62% of the universe. In Chapter 5, analyses of price levels against various variables will be presented. The initial regression will use 56 cities (36% of the universe), and the second regression (which will support the finding in the first) uses rates from 77 cities (50%).

GRAPH 2

Size of the Rate Samples Relative to the California Waste Hauling Universe



Source: Appendices A and D.

Although in absolute terms 96, 56 and 77 are not large numbers, as portions of the small universe of major urban and suburban California cities, these number are representative samples.

2.3 Basic Waste Hauling Facts: Residential and Commercial Services

It is useful to clarify what is meant by "residential" and "commercial" waste services, since these categories of service will be referred to below and will play critical roles in the analyses of Chapters 4 and 5. "Residential" refers to waste services provided to individuals and families in their private residences, primarily single-family homes. "Commercial" means waste services provided to what are clearly commercial enterprises – markets, malls, office buildings, retailers, restaurants, factories, warehouses, gas stations, garages, hotels and the like – plus other large-scale albeit non-commercial operations such as schools and hospitals. (Multi-family residential developments, specifically apartment buildings and condominium complexes, are normally classified as commercial operations, although on occasion they are included as residential properties, or, in a few cases, as their own unique category for billing purposes.)

This residential/commercial distinction has important ramifications for companies providing waste disposal services, since the type of equipment required to service residential and commercial waste generators is decidedly different. Residential services usually consist of relatively small containers (metal trash cans in the past; plastic carts today) with capacities of 20 – 90+ gallons. Since World War II, the type of truck used to empty these containers was first “rear-end load” (REL); crews tipped the containers into a hopper on the back of the truck, where materials were compacted into the truck body. In almost all California cities, these trucks have given way to automated side-load vehicles which can sweep down a residential street, automatically grab a plastic cart and tip it into the truck without the driver (no longer are there crews) having to leave his or her cab.

Because commercial operations usually generate far more waste than private residences, containers must be larger to be efficient. Dumpsters that are 2, 3, 4 and 6 cubic yards are a common sight behind California businesses (for comparison purposes, 1 cubic yard = 201.97 gallons). In the past, like residential waste services, these were emptied using crews and REL trucks. However, most modern waste companies use front-end load (FEL) trucks and a single driver. These trucks have large front forks that stab the container, lift it over the cab and dump the materials into an open hopper just behind the driver. (All FEL dumpsters in the US, no matter the capacity, are 72” wide, thus allowing a single truck to service any size container.)

In addition, there are still larger containers called *debris boxes* or *roll-off boxes*. These, on average, are 20 to 40 cubic yards in size, although smaller boxes ("low boys") can be used for especially dense, heavy material, such as concrete. Roll-off boxes are a common site at any construction site. A single dedicated vehicle, called a roll-off truck, services one box at a time. The box is pulled onto the back of the truck, taken to the disposal facility and emptied. Roll-off trucks also pick up large *trash compactors*, which are commonly used by most major retailers, supermarkets, hospitals, large hotels and other commercial operations that generate significant quantities of waste.

2.4 Commercial Roll-off Services and Pricing

Commercial roll-off services, which were described in the paragraphs just above, provide a special set of price information that will prove invaluable in the analyses of franchised waste hauling in chapters 4 and 5. The pricing for roll-off services facilitates overcoming one of the great challenges facing anyone interested in studying regulated pricing: finding market-based prices to use as benchmarks to evaluate the regulated price system. To compare market- with regulated-pricing requires, first, a (near) perfectly-competitive market; and, second, confidence that the products or services priced are comparable to those provided by the regulated party. In practice, this is difficult. Few perfectly-competitive markets exist under any circumstances. When a market is regulated, it is even less likely that a parallel "free market" exists from which scholars can evaluate prices.[2]

Fortunately, commercial roll-off prices provide the opportunity to evaluate prices set under regulatory processes with prices set in a (nearly) perfectly-competitive market. First, as will be discussed in Chapter 3, although there are functionally no competitive markets for residential waste hauling in California, a robust open market in commercial waste disposal exists, because in certain large locales – the cities of Los Angeles, San Jose, San Diego and Fresno and most of Sacramento County – commercial hauling services are provided by private companies, while a municipality or private franchisee collects residential waste. The presence of market-based pricing in commercial waste hauling provides the possibility of comparing regulated with unregulated prices.

Of course, near-perfect competition requires markets to have certain characteristics, such as many buyers and sellers, undifferentiated products and easy entry and exit. In addition, one must be cognizant of the presence of economies of scale, which could skew price comparisons between unregulated and regulated markets. As noted above, one standard commercial service – dumpster pickup – is primarily provided by front-end-load (FEL) trucks operating on *pre-established* routes. Therefore, the size of a service area or the customer base (i.e., an entire city under a franchise) could affect the cost of providing this service. For this reason, FEL services cannot be seen as nearly perfectly competitive.

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[2] Stigler/Friedland actually accomplishes this task by examining electricity rates at a time when both private and regulated electricity providers existed.

Roll-off waste services, however, are ideal for comparative work, whether it is between open and franchise markets or between two different franchises. That is because these services are preformed on a *one-off basis;* a truck is dispatched to the customer's location, pulls the container (or the entire self-contained compactor) onto itself, drives it to the facility for dumping, empties it and then returns the box, receiver container or compactor to the customer's location.

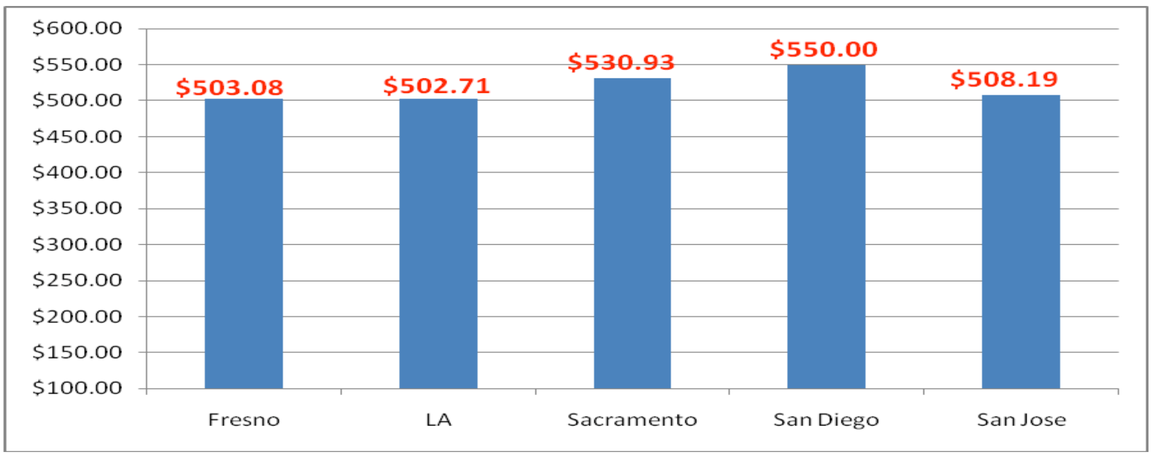
Clearly this is a commodity service; one truck and driver is much like another (assuming the trucks are operational and the driver is licensed, competent and insured). Also, because this is a one-off service, there are no routing advantages available, which eliminate the possibility of scale economies. In textbook fashion, there are only fixed costs (trucks and the "yard" where vehicles are domiciled) and variable costs (the driver, support staff, fuel, insurance, and disposal fees). Although a larger organization may be able to spread SGA expenses over a bigger fleet of trucks, this is of limited advantage, which is why, in major unregulated markets such as Los Angeles, dozens of small and miniscule companies aggressively "take on" large firms in the roll-off marketplace.

Given the nature of roll-off services, one would expect that throughout California, competitive market prices for these services would be similar, since the cost for trucks, drivers, diesel fuel, support services and insurance are very similar throughout the state. The only possible wildcard is disposal fees (called "tipping fees" in the industry). However, thanks to competition, roll-off firms have a strong incentive to seek out the lowest disposal prices for their customers, which serves to minimize tipping fee differences across the state.

The result is that market rates for roll-off services fall within a tight range, whether the purchaser is in San Diego or Sacramento. Graph 3 lists market rates for servicing a 40-cubic yard (a common size) compactor container with 8 tons of materials.

GRAPH 3:

Competitive Market Prices for Hauling a 40-Cubic Yard Compacted Container with 8 Tons of Materials



Source: Based on a survey of 16 actual waste hauling customers in San Diego, Los Angeles, Fresno, and Sacramento Counties, the City of San Jose and prices provided by Republic Waste Services.

The slightly elevated rates in Sacramento and especially San Diego are due solely to slightly higher tipping fees in those areas[3]. However, in general all these rates are in close enough proximity to one another that we can be confident a statewide average market rate exists and it is $518 per pickup.

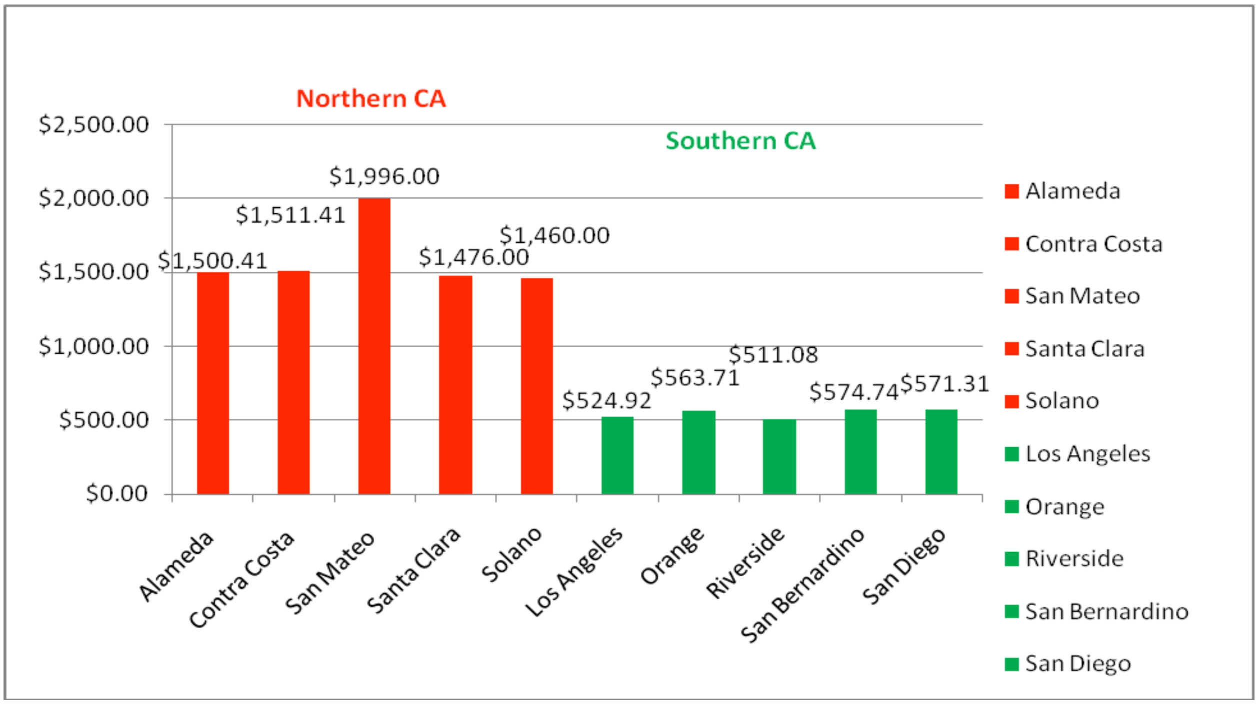
Having established a market rate under near-perfect competition for roll-off services, the question is: how do these prices compare to a similar service provided under

[3] San Diego's major city landfill charges $50 per ton, which is higher than the average landfill rates in California.

franchises? Graph 4 displays average prices for the same service provided by a selection of 52 franchised waste haulers in the Los Angeles Basin and the San Francisco Bay Area:

GRAPH 4:

The Average Price to Haul a 40-Cubic Yard Compacted Container with 8 Tons of Materials in Northern and Southern California by County



Source: Appendix D.

This huge disparity in the pricing for roll-off services between franchises in Northern and Southern California will be central in the analyses of city/regulators' motivations in Chapter 4. In Chapter 5, an explanation for this disparity will be developed, based on the differences in the waste hauling market structures in the two areas of the state.

2.5 Waste Hauling Market Structures in the San Francisco Bay Area and the Los Angeles Basin

In general, there are far more waste haulers in the southern part of California than in the north. In addition, the mix of haulers is very different south to north. To understand the distinct mixes of haulers, it is useful to divide waste hauling companies into three categories – national, local and regional.

National, as the name implies, means waste hauling companies doing business throughout the United States. For our purposes, there are only two national players: Waste Management (Waste) and Republic Services (Republic). Historically, two companies began the great national consolidation of waste companies in the 1960s: Waste Management and Browning Ferris Industries (BFI). Smaller nationwide companies later emerged to challenge these, including USA Wastes, Allied Wastes and Republic. Beginning in the late ‘90s, USA Wastes merged with Waste Management creating the current “Waste Management”; Allied bought BFI, which in turn was recently purchased by Republic. Both Waste and Republic are multi-billion dollar companies with strong presences in Northern and Southern California

Local haulers are mom-and-pop operations doing business in a single city or location (two or three contiguous cities). There are many examples of these haulers, especially in the Bay Area, such as Pleasanton Garbage (Pleasanton, Alameda County), East Bay Sanitary (El Cerrito, Contra Costa County), South San Francisco Scavenger (South San Francisco, San Mateo County) and Specialty Garbage (Sunnyvale, Santa Clara County). These companies have long histories with their particular cities (with franchised relationships extending back 50 years or more) but do nothing outside these cities' (or contiguous cities') boundaries.

Regional haulers are the most interesting. For the purposes of this dissertation, these are defined as haulers with more than one waste franchise in *non-contiguous* cities. This definition is used in order to emphasize their ability to offer services beyond a single city.

In the San Francisco Bay Area, there is only one truly regional hauler, Recology, formally Norcal Waste Systems. Their bastion is San Francisco, where they were created out of the merger of the two longtime monopoly providers of waste services in the City, Golden Gate Disposal and Sunset Scavenger. They also have franchises throughout Northern California.

Conversely, Southern California is the home of many well-established regional haulers, such as Athens, Calmet, Edco, Crown and CR&R. These companies are only found in Southern California, but they have strong presence throughout the area, each holding dozens of franchise relationships in Los Angeles, Orange, San Diego, San Bernardino and Riverside counties.

The chart below illustrates the different market situation between Northern and Southern California. Six areas are compared, three in the LA region (GREEN) and three in the Bay Area (RED). The franchise holders are divided into national, regional and local; if a dominant hauler exists in the area, this is listed in the far right column. The number of franchises held by the hauler in the particular sample area is listed in the parentheses to the right of its name.

TABLE 1

National, Regional and Local Haulers by County

County (or area)	Sample Cites	National Hauler	Regional Hauler	Local Hauler	Dominant
Los Angeles	25	Waste (8) Republic (1)	Athens (5) Burrtec (1) Calmet (3) CONSL (3) CR&R (1) Crown (1) EDCO (1) Phoenix (1)	None	None
Orange	15	Waste (4) Republic (2)	CR&R (4) EDCO (1) Rainbow (2) Taormina(2)	None	None
Riverside/San Bernardino	10	Waste (5)	Burrtec (2) CR&R (1) EDCO (1) Taormina (1)	None	None
Alameda	10	Waste (6) Republic (1)	None	ACI (2) PLSTN (1) Amador (1)	Waste
Contra Costa	15	Republic (10) Waste (1)	None	Concord Dis (3) East Bay(1)	Republic
San Mateo	10	Republic (9)	None	South SF (1)	Republic

Source: Appendix D and individual franchise agreements listed in the Primary Sources.

Clearly, Southern California, from a waste hauling perspective, is far more “competitive” than Northern California. In the former, there are many different haulers who can offer franchised services and no one hauler with a dominant position in the area. In Northern California, there are far less haulers and one often dominates an entire area.

The explanation for these highly distinct expansion and consolidation patterns found in each region is topological. The San Francisco Bay Area is divided by several significant topological features: San Francisco Bay (between Marin County, San Francisco and Alameda County), the East Bay Hills between Alameda and Contra Costa Counties and separating Contra Costa County into “west” and “central/east” sections and the Sacramento River, separating Solano County from Contra Costa.

It is not surprising that local waste haulers, as they looked for acquisitions where economics of scale could provide savings, would expand locally. Transportation costs are central to hauling efficiency. These natural features provide (nearly) insurmountable barriers to broad, cross-county, non-contiguous acquisitions and expansions.

The lone exception is the "South Bay," which runs from San Francisco down through San Mateo and Santa Clara counties. Here, the peculiar market position of Recology is critical. Although technically a regional hauler, because of its unique base of business (in San Francisco), its size and financial wherewithal, Recology is more akin to a national hauler rather than a regional one (it is the nation's 5th largest waste hauler). No other comparably large California city has granted a single franchise to a waste hauler (Los Angeles and San Diego have municipal services; San Jose franchises residential service but leaves commercial hauling competitive). During its period of rapid acquisition in the 1970s and 1980s, Recology – along with BFI (now Republic Services) and Waste Management – proceeded to carve up the South Bay between them. In 2006 Waste Management abandoned the South Bay and sold its assets to Recology. This left two major haulers in dominant positions, with a few local hauler retaining individual city franchises.

In the Los Angeles basin, the situation is quite different. Although both Republic Services and Waste Management have strong presences, the broad expanse that makes up the LA basin allowed local haulers to enjoy economics of scale in acquiring other operators outside their immediate area of operation. This has created a market situation where no one hauler is dominant and dozens of regional companies operate franchises in different counties.

Chapter 3: Franchised Waste Hauling in California; a Brief History and Salient Facts

This chapter will provide this dissertation with its factual foundation. It includes (1) a brief history of franchised waste hauling in California; and (2) a detailed presentation of current pricing systems in nearly 100 California cities.

The historical portion of this chapter will concentrate on franchises created in the post-World War II period in California. Most of the cities considered here were incorporated after 1945, although a few older cities, where it is known with confidence when the franchise began and what waste hauling arrangements preceded it, are also included. The goal, in these cases, is to have as complete a picture as possible of how waste disposal was handled from the franchise award up to the present, thus providing us with a relatively consistent set of data points. This will not in the main be a narrative history – what will predominate is a compilation of facts about these particular franchises presented in chart form – although there is a short narrative section outlining several older cities' franchising history. These narratives are included to provide a richer "feel" for how franchises emerge and evolve.

One major purpose of this history is to correct two notions about California waste disposal franchises which grow out of the literature review in Chapter 1. The first notion is that franchises are a species of "privatization." Rather, it will be argued there are almost no examples in California of a well-established municipal waste collection service being supplanted (or augmented) by a private one. In all the cities in the historical portion of this chapter, franchises either were imposed – often by a newly-incorporated city – on what was previously an unregulated waste disposal market, or the franchise evolved slowly out of ordinances that first mandated sanitary disposal of wastes and then later licensed private waste haulers to collect these materials.

The second incorrect notion is that franchises are the product of – and are regulated by – some form of competitive bidding, as described by Demsetz or Riordan/Sappington (bidding holding a dominant place in the theorizing about privatized services and their putative pricing advantages). However, it will be shown that, in fact, bidding has a trivial role in California waste hauling franchise regulation. Early in their history, cities seldom used bidding to award franchises; even today, as contracts have grown in sophistication, bidding is only infrequently employed to alter these arrangements. And although over the past thirty years, bidding has played a role in awarding a few relatively-recent franchises – especially in “new cities” that came into existence during the last two decades – even in these cases, after the initial bid is accepted and the franchise awarded, very few future contract bids take place.

Dispelling these notions about waste hauling franchises facilitates focusing on the critical data about prices and price-setting, adjustment mechanisms and institutionalized price adjustment systems. While these data are highly disparate, they should be sufficient to accomplish these two major goals:

1) Identify the information cities use in regulating prices; and
2) Use this information to determine why regulators behave as they do in Chapter 4.

3.1 A Brief History of Waste Hauling Franchises

The early historical record of franchises is, to say the least, spotty. However, anecdotal evidence indicates that franchises began emerging and taking form in the first half of the 20th century (as was noted in the first chapter, San Francisco granted a waste "cremating" franchise to F.E. Sharon in 1910). San Francisco began licensing haulers shortly after the 1906 earthquake. By the early 1930s, these small licensees began combining, ultimately forming two larger hauling entities, the Scavengers Protection Association (SPA) and the Sunset Scavenger Company[4]. The former serviced the eastern half of San Francisco and the latter handled the western portion (often referred to by San Franciscans as "the Sunset"). By agreement with the city, these two entities became the only authorized waste haulers in San Francisco. In 1965, SPA became Golden Gate Disposal and then, in 1983, NORCAL Solid Waste. In 1987, NORCAL acquired Sunset. NORCAL (now named Recology) remains San Francisco's franchised hauler for both commercial and residential services.

In 1885 the City of Livermore (Alameda County) passed its first waste ordinance, mandating the removal of "filth" for sanitation reasons[5]. In 1927, the first ordinance specifically related to waste disposal was passed, defining garbage, rubbish and waste matter and setting regulations requiring proper disposal[6]. By 1956, they were accepting "bids" for hauling licenses, but – interestingly – these had no impact on disposal rates, because the City had already set rates, which were published in the ordinance as well.

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[4] See Recology History at www.recology.com/profile/history.htm.
[5] City of Livermore. Ordinance XXIX, Section I, Fifth Paragraph (Sanitary Regulations). July 6th, 1885.
[6] City of Livermore. Ordinance No. 146. April 25th, 1927.

The bids were really applications by local haulers for licenses[7]. By the 1970s, a single hauler – Livermore Disposal – had emerged and been awarded the franchise. They remain the franchised waste hauler for the City, albeit today as a division of Waste Management.

Modesto (Stanislaus County) enacted its first waste ordinance in 1911[8]; in 1932 it too began licensing haulers and in 1936 it established its first set of common hauling rates[9]. In 1955 Modesto began limiting the number of licenses[10]; in '71 it granted specific territories to Sanders Garbage, Airport Garbage, Orange Line and Modesto Garbage. These companies (or their corporate descendents) remain in operation to this day[11].

Midway Sanitation District (MSD) was created in 1939 in Orange County in an area that today includes Placentia, Buena Park, Garden Grove and Westminster[12]. Citizen groups working with the County agreed to an assessment of 5¢ - 6¢ per $100 property valuation, primarily to fund sewers and related projects. As noted in its founding documents (Article 5, Powers of District), MSD was responsible "to make and enforce all necessary and proper regulations for the removal of garbage.[13]" MSD issued a franchise to a local hauler, who in the 1960s became CR&R. Although most of the original cities

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[7] City of Livermore. Ordinance No. 338. March 19th, 1956.
[8] Modesto Municipal Ordinance #14 N.S. (12/27/1911).
[9] Modesto Municipal Ordinances #430 N.S (12/14/1932) and #521 N.S. (5/13/1936).
[10] Modesto Municipal Ordinance #30 C.S. (6/8/1955).
[11] Modesto Municipal Ordinance #71-753 - #71-756 (8/9/1971).
[12] "Formation of Sanitary District Being Discussed," *Stanton News*, Thursday, July 14, 1938.
[13] "Minutes Excerpt" from the January 3rd, 1939 meeting of the Midway Sanitary District.

in the District left it after incorporating in the 1950s, Westminster continued under its jurisdiction and CR&R remains the franchised hauler[14].

Anaheim (Orange County) was incorporated in 1881, but remained a small, primarily rural city, most famous as part of a 1945 Jack Benny radio schtick ("Anaheim, Azusa and Cucamonga"). Hauling was unregulated until just after World War II. Then, in the wake of the postwar population boom, the city granted two franchises. One went to Warren Jaycox to collect waste from the rapidly expanding residential population. The other was granted to G. V. Taormina to service the downtown business area[15]. The awards were made without bidding (both parties instead "pitched" the city on their services). Rate adjustments took place on an ad hoc basis: each provider would request via letter an increase, offering various justifications such as unforeseen collection problems, new equipment acquisitions, revenue shortfalls or personal hardship. The nature of how these franchises operated is captured below in an excerpt from a plaintive, and grammatically casual, letter sent to the Anaheim City Council by Mr. Taormina in 1956. Threatened by some nameless competitors, whom he claimed "want to break me" by servicing accounts less expensively, Taormina appealed to the City Council to look beyond mere money in making their decision.

> Six years ago I had to rent to house my wife and one son, today six years later, I own my own home and am a proud parent of three children. . . . So you can see how the tremendous growth of Anaheim, has effected a mere rubbish man as I. My little part of this growth can be wiped out over night by one quick decision from you, the trusted Council. I want and need this contract very badly. But I can only go so far, after all, my family does have to eat to survive.[16]

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[14] See MSD "Addendum to Agreement," November 21st, 1994.

[15] Agreement between the City of Anaheim and Warren Jaycox, dated September 1st, 1950 and the Agreement between City of Anaheim and C.V. Taormina and Wm. Stephian, dated May 1st, 1951.

[16] Letter to Anaheim City Council from Mr. Taormina, attached to the Waste Disposal Contract, June 27th, 1956.

In the end Taormina retained the contract. There was no formal bid, but he did cut his prices to the city (for a time) to keep the business.

During the 1960s and 70s, Jaycox and Taormina continued to provide their services. As Anaheim grew, they did too, adding trucks and employees. In 1982, Jaycox was sold to Anaheim Disposal. They reverted back to Taormina Industries in 1990. They remain the franchise holder to this day.

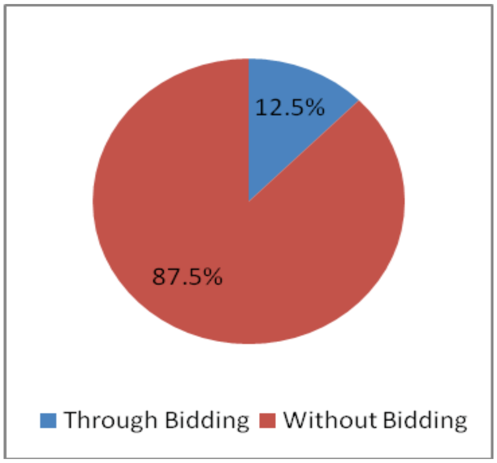
North of San Diego is an area called Lemon Grove (because of its citrus farms). It was serviced almost completely by a local waste hauler, Thomas and Sons, from the 1940s well into the 70s. In 1977, when Lemon Grove (San Diego County) finally incorporated, it selected as its franchised waste hauler EDCO, the company that grew out of Thomas and Sons[17]. As has been the case in all the cities reviewed above, EDCO remains the franchise holder to this day.

Although each of these stories is unique in its details, common patterns are apparent (slow evolution; no bidding; franchisee stays in place over time). These patterns can be demonstrated more dramatically for franchises awarded after 1945, especially in the suburbs created after World War II. Graphs 5 – 8 below summarize the history of 40 cities where near complete knowledge of what the city did regarding waste disposal is available. (See Appendix B for details.) Where we have documentation from the cities' incorporation date, we are dealing with the original franchise. In others, the earliest franchise document available is used.

[17] Resolution No. 152, "Resolution of the City Council of the City of Lemon Grove authorizing the Mayor to Sign the Solid Waste Franchise Agreement," October 1st, 1978.

GRAPH 5

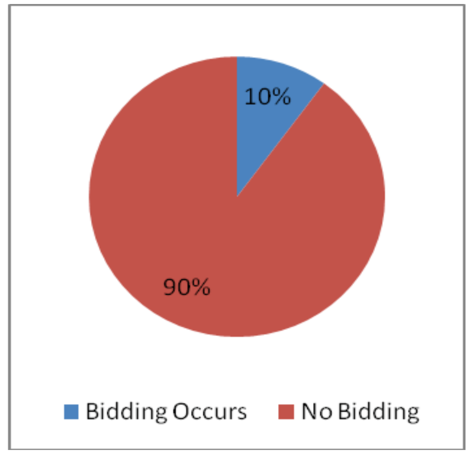
Percentage of Franchises
Awarded through Bidding



Source: Data in Appendix B.

GRAPH 6

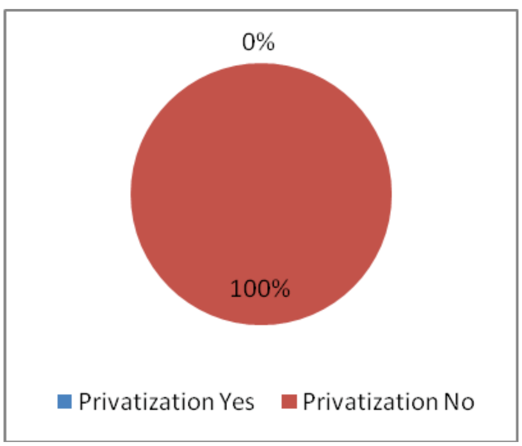
Percentage of Franchises Where Bidding
Occurs during the Agreement



Source: Data in Appendix B

GRAPH 7

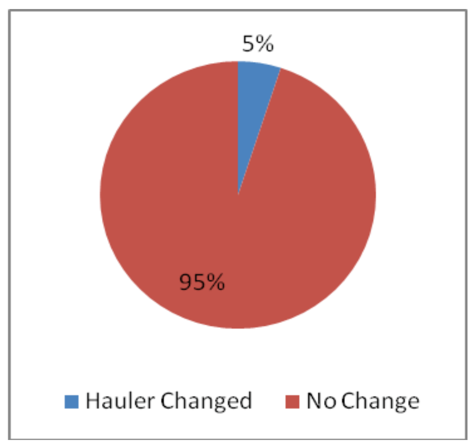
Percentage of Franchises
That Are Examples of Privatization



Source: Data in Appendix B.

GRAPH 8

Percentage of Franchises Where the
Waste Hauler Changes



Source: Data in Appendix B.

These historical data tell a story of franchising that is remarkably consistent. Of the 40 franchises in the survey, only five (5) were awarded through bidding (12.5%), the first being Laguna Beach in 1977. Otherwise, franchises appear to have been awarded on a strictly informal basis. The method seems to have consisted of inviting in a local hauler in to provide the service.

Further, bidding plays a trivial role in the ongoing operation of the franchise. Over the life of these franchises, in only four cases (10%) did the city rebid the franchise.

Also, where we have the original franchise (20 cities), there are absolutely no examples of classic privatization: exchanging a municipal service with a private one. All the cities where we have information from incorporation either *began with an entirely new franchise arrangement* or granted a franchise to the private company that was then servicing their residents through a contract with their county[18].

But what is most interesting is that – after decades of operation – only 5% of the franchisees changed; 38 of the 40 cities listed here still have the same waste hauler in place! Often these are new corporate owners. The most common cause for this is that the local hauler was purchased by one of the majors[19] in the huge industry consolidation that began in the late 1960s. But the franchise has remained with the original entity.

Taken together, this information provides strong support that the centerpiece of much regulatory discussion of privatization – bidding – is not in play here. In almost all these cases, the franchises are simply automatically renewed by the cities.

Reflecting on the constancy of the city/waste hauler relationship, it may be added parenthetically that there is documentary evidence – often found in the Recital portion of the franchise agreement – which shows satisfaction on the part of cities with their waste haulers' services. To illustrate, in 1954 the then-newly-incorporated city of Lakewood

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[18] The sole example of privatization I have uncovered is the City of Lodi (San Joaquin County) in 1987.

[19] Waste Management and BFI began the industry consolidation in the late 1960s. Other major players that emerged were USA Wastes, Allied and Republic. USA Wastes and Waste Management merged in 1998 and operate under the "Waste" name. Allied merged with BFI in 1999; Republic purchased Allied in 2008.

(Los Angeles County) entered into a franchise relationship with local hauler BZ Disposal Services. Forty-nine years later, with the retirement of the last original owner, the city approved the sale of the assets of BZ Disposal to EDCO, another local hauler (see the Lemon Grove paragraph, above). This statement, in the second paragraph of the Recitals section of the June 10th 2003 Assignment Agreement, is both heartfelt and touching.

> The CITY has had a long standing and successful relationship with Alex Zadekian and the late Richard Zadekian, the principal owners of BZDISPOSAL SERVICES INC as well as with Martin Simonoff Manager of said BZ. BZ has provided solid waste collection services within the CITY and to its residents and commercial establishments since 1954 and during the years has provided a high-degree, trouble-free service to the CITY. However after these many years of providing faithful services to the CITY Alex Zadekian wishes to retire from the solid waste collection and disposal business and has made arrangements to sell BZ DISPOSAL to EDCO WASTE SERVICES LLC hereinafter referred to as CONTRACTOR
>
> Like BZ, the CONTRACTOR is a family-owned company which has an excellent reputation in the waste collection industry providing good customer service and community relations.
>
> As a condition of the assignment by Alex Zadekian to the CONTRACTOR, the CONTRACTOR has agreed to include Martin Simonoff as their key man in the operation of the business within the community and to continue the business under the name of BZ DISPOSAL[20]

Given the long-term tenure almost all franchised haulers enjoy, from the perspective of these cities, these firms – even in new corporate form – do a good job. The cities, therefore, are happy to continue renewing the contract.

It is important to remember that although almost all these relationships remain in place, none are static. The recycling revolution that began in the 1980s required waste haulers to expand services. This became more urgent when the State of California passed AB 939 in 1989, the law mandating cities recycle a certain percentage of the waste stream (25% by 1995 and 50% by 2000, although there are caveats in these

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[20]City of Lakewood, "Assignment of Agreement for Solid Waste Collection," June 10th, 2003.

requirements). Cities soon were pushing their franchisees to create recycling programs and to provide methods of measuring waste diversion. This led to an expansion of the services provided by franchised haulers and to major additions to franchise agreements.

But an equally important source of change – one that predates recycling mandates – is the subject of this dissertation: *the setting of waste disposal prices*. In most early franchises, prices appear to be set without extensive evaluation by the city. One assumes that prices then were current market rates but this is only conjecture. Where pricing is mentioned in the documents that exist, it is simply a given. It will be referred to as *Ur*-pricing (using the German prefix that means both "primitive" and "original"). As the word implies, the exact origin is obscure, but it becomes the baseline for future price adjustments.

What is known for certain is that franchisees began petitioning cities for price increases almost from the beginning of these contracts. Early on, cities – in the face of these requests – began rewriting franchise agreements to require full disclosure of all operating costs. Today, *all franchise agreements require full disclosure of costs by the franchisee to the regulatory body*.

It is not, therefore, surprising that cities – confronting requests for price increases from their franchised hauler – began, over time, to institutionalize methods of adjusting prices, including these methods in franchise agreements or in special amendments to those agreements. Today *every franchise agreement has a section or an appendix which details how these price-setting methods work.*

In almost all cases, these methods include two processes for setting prices, each which will prove critical in understanding how city/regulators regulate. The first process will be called “routine.” It establishes systematic, rule-based algorithms with clear modalities to make price adjustments on a periodic basis.

The second process is called “special.” As the name implies, these are not periodic, rule-based (mostly), automatic adjustments. Rather, a hauler must petition a city for a specific change, justified by extensive documentation. In the scholarly literature on price regulation, these are often referred to as “Z” costs (see Sappington, 2000, p. 34).

The remainder of this chapter will describe these routine processes because – as they are rule-based – they can, in fact, be described. These routine processes – which will be called *price adjustment systems* – will be of critical importance in Chapter 4 for determining the motivations of city/regulators.

Special petitions – by their very nature – are unique and cannot be easily described. They too, however, are very critical and will be at the heart of Chapter 5, where how successful cities are in regulating prices when compared to the competitive marketplace will be evaluated.

Returning to routine price adjustment systems, the information in Table 2 below illustrates how they are structured. Generally, a primary index (such as CPI or PPI) is used to adjust rates, but with the index’s full effect on prices cushioned in some manner. For example, Antioch (Contra Costa County) only adjusts waste hauling prices by an amount equal to 60% of the value of CPI and further caps the adjustment at 5%. Artesia (Los Angeles County) weights the adjustment to impact only 75% of the price (assumed to cover the actual hauling costs), while changes in “tipping fees” (garbage disposal costs) are calculated separately and applied to 25% of the price. Atascadero (San Luis Obispo County) both caps the index adjustment (like Antioch) and applies this adjustment to the hauling cost portion of the price (like Artesia). Auburn (Placer County) and Benicia (Solano County) use neighboring cities' prices to hold down price changes.

TABLE 2

Sample of Franchised Waste Hauling Price Adjustment Systems

CITY	Primary Adjustment Index	Specific Mitigation Factors	Index Weight	Tip Fees (weights)	Fuel (weights)	Selected Critical Formula	Yardstick
Antioch	CPI, SF	60%, <5%	none	none	none		
Artesia	CPI, LA	none	75%	25%	none		
Atascadero	CPI, LA	<5%	exclude tip $	% of tip fees	none		
Auburn	CPI, CA	<4%	none	none	none		Auburn Placer Clients
Benicia	CPI, SF	<5%	none	none	none		Solano Cities

Source: See Appendix C.

Out of the 154 California cities with franchises listed in Appendix A, 96 cities provided detailed responses regarding their particular franchise agreements (62%, a reasonable sample). Of these 96 respondents, 87 have some type of institutionalized method for adjusting prices (see Appendix C). In addition, four cities – Concord (Contra Costa County), Martinez (Contra Costa County), Modesto (Stanislaus County), and Vallejo (Solano County) – use an outside consultant to evaluate rate increases. Documents provided by these consultants show they too use similar "systems" in determining rate adjustments. Therefore the vast majority of cities – 96% (91/96) – regulate waste disposal prices using some sort of established pricing system. This should provide a high degree of confidence that this form of price adjustment system is the primary routine method which cities use to set franchised waste disposal pricing. (Only 5 of the 95 cities – Hollister, La Mesa, Lemon Grove, Rancho Cucamonga and Rocklin – do have not systematized price adjustments and rely solely on petitions of the hauler for rate changes and individual evaluations by city staff to determine if a price adjustment is necessary.)

Finally, regarding how commercial rates are adjusted, it was noted above that residential and commercial waste services are entirely different. This would allow regulators, if they were so inclined, to create a completely separate system for adjusting commercial rates. Interestingly, this appears not to be the case. *In 95% of cities these systems are applied evenly to both residential and commercial rates.* Even in cases where there are two distinct franchisees providing residential and commercial services respectively – under two completely separate agreements – the adjustment systems are exactly the same. We will explore the significance of this fact extensively in Chapter 4.

3.2 Price Adjustment Systems and Schmalensee's Good Regulatory Regimes

It is useful at this point to return to Schmalensee's "good regulatory regime." Recall his equation, $P = \rho + \gamma(C-\alpha) = \rho + \gamma(\varepsilon-\delta)$, where ρ is the base price, γ is a cost sharing fraction, α is expected costs known to both the firm and regulator, ε is unforeseen price shocks and δ is managerial effort. Schmalensee offered ways for the regulator to solve this equation that would maximize total surplus, but ultimately conceded the limitation of this model ". . . in the real, dynamic world." By that comment, one understands the need for regulators to actually make determinations about these variables in their "real, dynamic world."

Price adjustment systems are similar to Schmalensee's model, but with certain practical variations to make them workable. Like Schmalensee's ρ, an original price is given. In many cases these are grounded on the *Ur*-pricing established in the beginning of the franchise. The ε – shocks – is transformed into the various indices and other factors that the city utilizes to allow ρ to adjust. Finally, the γ which Schmalensee calls a "cost sharing factor" is what here will be termed "mitigation factors." These are various ways to mitigate the impact of rising costs.

"Mitigation factor" is actually a more precise expression than cost sharing because it includes a broad array of strategies to mitigate the effect of price adjustments. The third column of Table 2 above refers to "Specific Mitigation Factors" which directly limit the adjustment indices using either a price cap or fixed percentage. In addition cities use other methods to limit price adjustments, such as weighting the impact of the indices on prices or limiting its impact to a portion of the prices only. Another example of this type of strategy: the use of "yardsticks" – collection costs at nearby cities – to constrain disposal prices. Covina (LA County), Diamond Bar (Orange County), Elk Grove (Sacramento County), Escondido (San Diego County) and Orange (Orange County) eschew Specific Mitigation Factors in their price adjustment systems but employ yardsticks to a similar end. All of these methods – caps, percentages, weighting, limiting the portion of prices that can be adjusted and yardsticks – are not technically cost sharing factors. However, they do function to tamp down price changes and therefore have a cost sharing feature. For that reason, "mitigation factors" will be the term of choice for all methods used by cities to mitigate price increases.

What is most interesting about mitigation factors is *why do they exist*? Why do cities, almost universally, feel compelled to mitigate routine price adjustments? In Chapter 4 it will be argued that the existence of mitigation factors provides a major insight into the regulatory process.

Regarding shocks (ε), Schmalensee says – rather vaguely – that ε is eventually "revealed" to the firm. In a price adjustment system, that revelation takes place in the form of easily measurable and readily obtainable *objective metrics* such as CPI and PPI indices, fuel costs and tipping fees. Linking ε to an objective standard provides a second crucial clue to how regulators regulate, and this too will be examined fully in Chapter 4.

There is one comment worth making regarding "objectivity" in metrics. In *Cost and Choice* (1957), James Buchanan observed, "Cost is subjective. It exists in the mind of the decision-maker and nowhere else" (1957, p. 115). Buchanan's point underscores the fact that the city regulator – even armed with full cost information provided by the hauler – will have a difficult time evaluating the series of choices that costs imply (only the franchisee can do that). A price adjustment system, using measurements that are easily obtained and about which all parties – the city, the franchise and any disinterested third party – can agree, solves this conundrum.

3.3 Final Words about This Information and Modeling Regulators' Behavior

At this point, it is useful to summarize what has been presented before taking the next step toward modeling the behavior of regulators of franchised waste hauling. The scholarly literature emphasizes the importance of privatization and competitive bidding in the development and regulation of franchises. It is now clear neither played a major role in the emergence, award and evolution of California waste hauling franchises, nor in how prices are regulated. None of the franchises examined here were corrective responses to inefficient government services. Rather, all were preceded by unregulated waste hauling markets, or municipally-granted hauling licenses or another government- (normally a county-) granted franchise. And only a few franchises were awarded via competitive bidding. Most appear to be products of early "handshake" agreements with local haulers. Finally, during the life of franchises, cities seldom bid out contracts and change haulers. Once ensconced in a franchise, the hauler is virtually never dislodged.

Regarding pricing, over time almost all cities adopt institutionalized methods to set rates. These methods include two distinct processes: routine changes made using rule-based price adjustment systems; and special adjustments, which require haulers to petition for increases, supported by the necessary documentation to justify an increase.

Chapter 4 will use these routine price adjustment systems to further explore rate setting for waste hauling franchises. And three elements of these systems – objective metrics, mitigation factors and the undifferentiated treatment of residential and commercial pricing – will provide essential clues to understanding the motivations of city/regulators when they regulate these types of prices.

Chapter 4: Using Routine Price Adjustment Systems to Understand Regulators' Motivations

A central issue in the economic theory of regulation is regulatory capture: the idea that political-regulatory systems bestow benefits on regulated parties to the detriment of other interested organizations and the public at large. This issue is especially germane to the problem of how city/regulators set prices for waste hauling services. Do they make adjustments primarily to benefit the producers of these services – the franchised waste haulers – or is their motivation more benign, such as providing the optimal prices to the consumers of waste disposal services? The goal of this chapter is to develop an understanding of what city/regulators are trying to accomplish in developing the price-setting regulatory structures. In developing this understanding of price-setting, *the only criterion is that it must be consistent with the facts at hand.*

These facts are the methods institutionalized by cities to set prices for waste hauling franchises, which were presented in Chapter 3. These methods were found to consist of two distinct processes. One process was "special": the franchisee's ability to petition the city for specific price changes. In Chapter 5 it will be shown that these special requests play an outsized role in both the variability and the efficiency of the price-setting system. However, because city/regulators can only *react* to these petitions, special requests offer limited insights into city/regulators' price-setting motivations.

The second process is the development of price adjustment systems: rule-based, regular methods for setting prices. These use (1) objective cost-based metrics; and (2) mitigation factors; and are (3) applied evenly to both residential and commercial pricing. The city is a *proactive* actor in designing and approving these systems. Therefore, it can be reasonably inferred that the critical features of these systems will provide insights into the utility of the city/regulators who developed them.

Below, two distinct models will be developed. One will be the optimal "capture" model for waste hauling franchises, emphasizing the implications of regulatory capture for price-setting. Specifically, it will address the question of how a franchised waste hauling market would look if city/regulators were captured by the franchisee and primarily interested in maximizing his benefits. The second will construct an "un-captured" market, with a completely different set of price-setting implications. These will then be compared to the actual systems seen in the California waste hauling market.

4.1 Using Stigler/Peltzman to Design a Price-setting System under Capture

In Chapter 2, the foundational work of the Economic Theory of Regulation (ET) was discussed. Using the insights of Stigler and especially Peltzman (SP), a model will now be developed of what a franchised waste hauling system should look like if the regulators were "captured" by the franchisee, the waste hauler.

In adapting SP to California waste hauling franchises, it is essential to recall that the ultimate price regulators are *elected politicians*, specifically mayors and city council members. These are political actors; therefore, in developing a model of captured regulatory behavior, Stigler's insight that they seek "votes and resources" applies. Stigler saw capture taking place because voters participated infrequently in elections and the cost of acquiring information about the deleterious effects of regulation was high. This left the field open for small, well-organized industries to capture government regulators and exploit their regulations for their own benefit.

Peltzman provides theoretical rigor to Stigler's insights. In his basic model, Peltzman describes a world of "consumers and producers." The politician/regulator balances the producer's desire for high profits (increasing his wealth) with the consumer's desire for low prices. As Peltzman puts it, "the formal problem for the successful regulator then is to maximize . . . the Lagrangian," $L = M(p, \pi) + \lambda(\pi - f(p, c))$ where M is majority of support, p = price, π = profits, and f(p, c) is the profit/cost function. Peltzman's solution yields:

$$-M_p/f_p = M_\pi$$

"This says that the marginal political product of a dollar of profits (M_π) must equal the marginal political product of a price cut ($-M_p$) that also costs a dollar in profits (f_p is the dollar profit loss per dollar price reduction)" (1976, p. 223). Peltzman then provides a graphical description of the solution of this problem (see Figure 1, below):

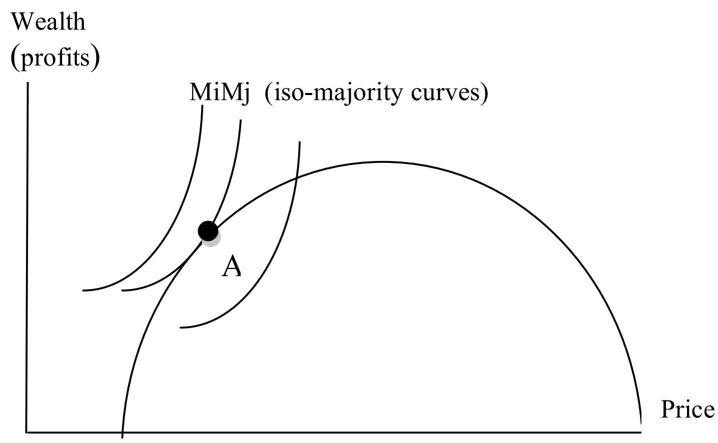

FIGURE 1

Iso-Majority Curves

M_iM_i are “iso-majority” curves. “Political equilibrium occurs at tangency (A) between the profit hill and an iso-majority curve” (1976, p. 223).

Peltzman recognizes that this model points in two potential analytical directions, “the appropriate political power function (the shape of M_iM_i) or . . . effects of changes on underlying constraints.” Peltzman chooses to explore the latter issue, noting, “I set aside the question of who gets what share of the spoils to focus on the implications of the results that spoils will in fact be shared” (1976, p. 223). For the rest of his article he examines how, for example, changes in demand will affect the distribution of benefits between producers and consumers (and between groups of consumers).

The task here is different: it is to determine, given the facts at hand, whether in the routine methods used to set waste hauling prices, there are indications that city/regulators are captured by the waste hauler. This requires examining more closely the “shape of M_iM_i” or, more precisely, the *slope* of the iso-majority curves to determine the level of responsiveness to price changes (in terms of support) that city/regulators are likely to expect from their various constituent groups.

In terms of how the slope of M_iM_i is to be regarded, Peltzman provides guidance: “On this formulation, pure ‘producer protection’ can be rational only in the absence of any marginal consumer opposition to higher prices (M_iM_i are horizontal) and pure ‘consumer protection’ requires no marginal support for higher profits” (1976, p. 223).

Figure 2 below represents the differences in the iso-majority curves between “consumer protection” (tangency at Point A’) and “producer protection (tangency at Point A’’):

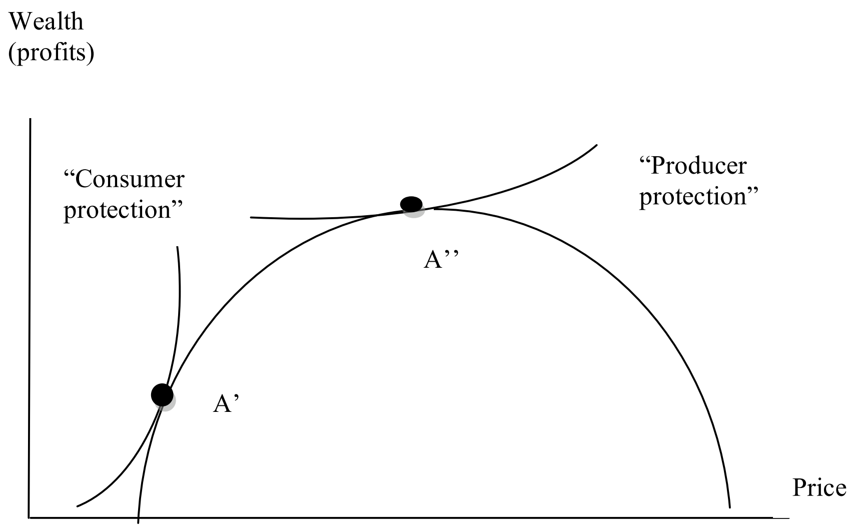

FIGURE 2

Vertical and Horizontal Iso-Majority Curves

To use Peltzman's analysis to better understand the specific structure of the franchised waste hauling arena, two changes will be made to his model. First, the vertical axis will be labeled "wealth" rather than "profits." (Peltzman himself uses "wealth" initially and then moves to "profits.") This allows the analysis to apply to both haulers and consumers: as prices rise, the wealth (in the form of profit/revenues) for haulers increases (as tracked by Peltzman's profit tree). However, using the notion of wealth provides a more meaningful dimension with which to represent the consumers' iso-majority curves.

Second, rather than using the narrow notion implied in iso-*majority* (with its clear connotation of voting), this will be expanded to be called iso-*support* curves. This allows the analysis to include both voting (primarily the purview of residential waste customers) and non-voting support.

A simple analysis of iso-support curves provides insights into the slope, which is after all a measure of responsiveness to price increases.[21] Beginning with the function:

$Q_{support} = Q(W,p)$ (1)

and differentiating, one arrives at:

$dQ = \delta Q/\delta W \, dW + \delta Q/\delta p \, dp$ (2)

Equating dQ to 0 (as an *iso*-support curve) and recognizing that the two partial derivatives represent the marginal product (MP) of wealth and price in terms of generating support, the slope of the iso-support line is:

$dW/dp = -MP_P/MP_W$ (3)

MP_P is critical here. It represents the marginal product of price in terms of support. With MP_P in the numerator, the equation demonstrates that when the slope is steep, the marginal product of price – in terms of generating a specific quantity of support – is very high. This is consistent with Peltzman's observation that the slope of the M_iM_i curve is indicative of the consumers' support (or opposition) to price/profit increases. The steeper the curve, the stronger the opposition to price increases. This fits nicely with the notion of capture advanced by Stigler, where it is assumed that consumer reaction is muted or non-existent (due to the high cost of acquiring information, low voter turnout, infrequent elections, etc.). In the analysis used here, the particular circumstance described by Stigler would lead to a low MP_P, making M_iM_i relatively horizontal and allowing the regulator, working at the behest of the regulated firm, to raise prices (and

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[21] This is similar to common analysis for isoquants in basic production theory and the derivation of marginal rates of technical substitution.

increase the regulated firm's wealth) without meaningful opposition. (This would be very consistent with the regulatory circumstances analyzed by Stigler in his article.)

The value of Peltzman's model is that it provides a basis for understanding what price-setting for franchised waste hauling would look like under a capture scenario. Recall from Chapter 2 that waste hauling is actually two completely distinct markets: residential and commercial. These markets are absolutely separate, with different price structures, types of services, even vehicles used for pickups. From a price-setting perspective, the regulator can set prices for residents without any regard for the prices set for commercial accounts.

The implication, in terms of Peltzmanian iso-support curves, is that the city/regulators face two distinct sets of curves, one for residents and another for businesses. If city/regulators are captured, and are thus attempting to set prices to maximize profits for the hauler (i.e., set higher prices), they must balance this goal against the potential opposition from two separate constituencies: residents *and* businesses. In other words, the rational regulator must "solve the Lagrangian" for two distinct classes of consumers, finding two points of tangency between acceptable prices and support. This, in turn, requires awareness of the slope of the M_iM_i curves. Are they nearly vertical – implying, as Peltzman noted, a low toleration for high prices and therefore substantial political risks if prices are increased – or are they closer to the horizontal, which will allow the city/regulators to raise prices with relative impunity (the situation described by Stigler in his famous article)?

Of course a perfect solution to this problem is not possible. But from the perspective of a politician/regulator contemplating price adjustments, what matters is to estimate the slope of iso-support curve, which means – following the definition above – estimating the impact that price adjustments (MP_P) will have on support.

SP provide insights – usually implicit and qualitative – as to what can be expected in the formulation of these iso-majority curves. In discussing capture, Stigler notes, "The political decision process has as its dominant characteristic infrequent, universal (in principle) participation . . . . The voter's expenditure to learn the merits of individual policy proposals and to express his preferences . . . are determined by the expected costs and returns" (1971, p. 11). Peltzman echoes Stigler when he writes: "In the case of particular issues, the voter must spend resources to inform himself about the implications for his wealth and which politician is likely to stand on which side of the issue . . . . A second major limit . . . arises from cost of organization" (1976, p. 211).

In determining the slope of iso-support curves, these observations can be distilled down into the following three categories: (1) cost for information; (2) cost of organizing; and (3) cost of voting itself. The task of politician/regulators is to estimate the costs involved here and determine the slope of the iso-support curves for both residential and commercial customers.

To formalize SP's observations for better utilization in this analysis, two changes will be made. "Voting" and "organizing" represent what will here be called "opposition," the former being the primary purview of the residential customers and the latter belonging primarily to businesses. This is a sensible step, since residents' primary method of withdrawing support is voting, while businesses – which are few in number – have little voting power, but do provide (or withdraw) support by organizing opposition. Also, a final factor will be added to this formulation – not found in SP – which is "avoidance" (A), which represents the cost to avoid the effects of the price increase. Examples of avoidance for a resident would be shifting materials to a "free" recycling program; a business passing the increased disposal costs onto its customers is another.

The iso-support function relative to prices, therefore, is:

$Q_{support} = Q(-I, -O, A)$, (4)

Where I = cost of information, O = cost of opposition and A = cost of avoiding the price increases. I and O are negative because as the costs to consumers of information-gathering and mounting an opposition *increase,* responding to price changes (e.g., withdrawing support) *decreases*. A is positive because as the cost to avoid price changes increase, responding to price changes (e.g., withdrawing support) *increases* as well. Taking the total differential:

$dQ = -(\delta Q/\delta dI)*dI – (\delta Q/\delta O)*dO + (\delta Q/\delta A)*dA$ (5)

Each term on the right side of Equation 5 includes the marginal costs (MC) of acquiring information (MC_I), mounting opposition (MC_O) and avoiding price increases (MC_A).

Equation 5 provides valuable information about the nature of iso-support curves. The term on the left is the marginal product of price changes relative to support, which was identified as the primary factor in the slope of the iso-support curve. The terms on the right demonstrate that the responsiveness (e.g., opposition) to price increases *declines* as the marginal costs of both information-gathering and mounting an opposition *rise*. Conversely, as the marginal costs of avoiding price increases *rise*, responsiveness (e.g., opposition) to price increases *rises* as well. This is consistent with Stigler's insight because – applying this model to his analysis – the high costs of information and opposition flattens the iso-support curve, thus enabling captured regulators to provide benefits to the regulated party.

From the city/regulators' perspective, the situation regarding these marginal costs for residential and commercial waste customers is decidedly different (see Table 3):

TABLE 3

Residential and Commercial Marginal Costs for Information, Opposition and Avoidance

	MC Information	MC Opposition	MC Avoidance
Residential	~0	~0 (High)	High
Commercial	~0	Extremely High	~0

Source: Analysis in Text.

For residents, the marginal cost of information gathering is functionally 0, since the price changes appear on their bills. (Stigler, who sees these costs as "high," was undoubtedly picturing an entirely different regulatory landscape, such as a tariff, where specific knowledge of the tariff itself and its impact are extremely difficult to uncover.)

MC_O – the marginal cost of opposing price increases – is complex for residents. Certainly, the cost of political action (e.g., organizing, attending meetings and working for candidates) is high. But the marginal cost of voting is quite low, at least for regular voters. In California, 48%[22] of voters participate regularly in all elections, including municipal. For these voters in particular, the cost of opposing a price increase at the ballot box is near 0; *they are voting no matter what the issues are.*

[22] See particularly, Hajnal and Lewis, "Municipal Institutions and Voter Turnout in Local Elections," *Urban Affairs Review,* May, 2003, pp. 645 – 668.

Of course, most voters cast ballots based on a complex array of issues and preferences. However, for a rational politician, the risk that a voter could withdraw support over a single issue is significant simply because it is so easy – i.e., inexpensive – to do so. Since this analysis concerns the perceptions of politician/regulators, the low MC_O for residents will predominate.

Conversely, for residents, the marginal cost of avoiding price increases is high, given the limited options available (recycling, waste reduction), which are expensive both in terms of time required for implementation and in personal effort involved. (The difficulty of avoiding price hikes is reflected in that the demand for waste services is almost perfectly inelastic[23].) With the negatively-signed terms in the above equation functionally 0 and the positive term high, the marginal product of price in terms of support is high, thus yielding a steep slope for the iso-support curve for residents.

For commercial customers, the situation is nearly the opposite. While information costs are similar (near 0), the cost of opposition – which for businesses is manifested not particularly in voting but rather in organizing political action – is exceedingly high (hiring lobbyists, deploying attorneys, contributing to campaigns, etc.). This is especially true relative to waste disposal costs, which represent a small portion (<5%) of expenses[24]. In addition, businesses have easier methods of avoiding price increases, by passing them on to customers (businesses know their competitors face the same price increases), adjusting services (such as moving to compaction over loose pickups) and developing aggressive recycling program. That makes MC_A close to 0 as

[23] See particularly, Porter, *The Economics of Waste*, 2002.
[24] In the U.S. Census survey entitled "Estimated Detailed Operating Expenses for U.S. Retail and Accommodation and Food Service Firms by Kind of Business: 2007" all utilities except electricity account for, on average, 5% of expenses. Waste disposal is one of several utilities in this group.

well. With avoidance costs far lower, and opposition costs high (which are negatively signed), the MP_P/Commercial < MP_P/Residential, thus creating a relatively flat iso-support curve, as shown in Figure 3 below, with very different points of tangency (A_{res} and A_{com}) with the profit hill:

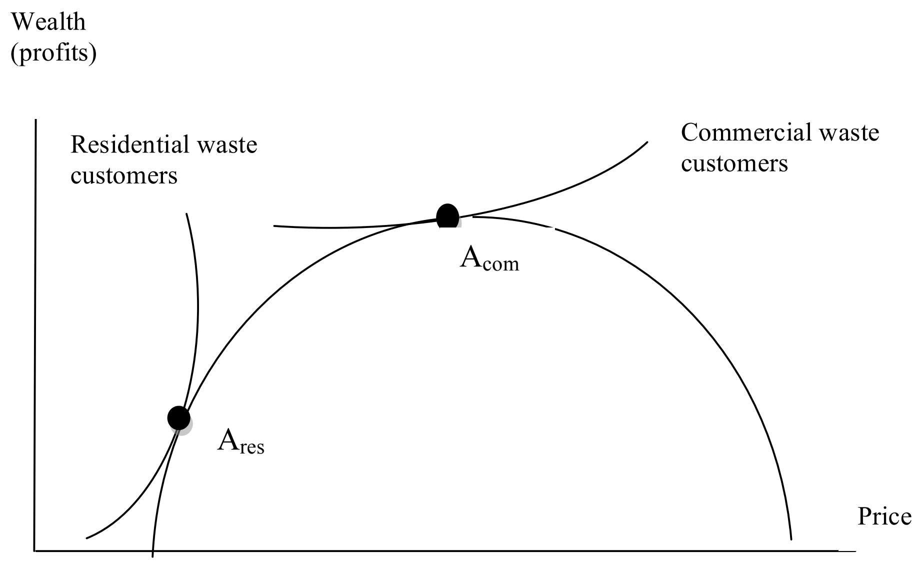


FIGURE 3

Waste Hauling Iso-Support Curves

From the perspective of "captured" city/regulators, this creates a perfect opportunity to maintain support while providing monopoly rents to the franchise hauler. The city merely allows prices to rise dramatically for commercial customers while keeping prices low for residential users. Table 4 presents how this situation should manifest itself in the franchise hauling arena:

TABLE 4

Proposed Characteristics of Price Regulation Systems under Capture

Characteristics	Explanation
1. Differentiation in price adjustment system.	The routine systems for adjusting prices should favor residential users over commercial. Specifically, city/regulators should structure price adjustment systems to allow prices to rise rapidly for commercial customers, while keeping the rate of change low for residential users
2. Use of “profit-capturing” price adjustment methods.	Several established price adjustment methods exist that facilitate integrating profits in price adjustments, including “rate of return,” “cost-plus,” and a fixed profit percentage.
3. Commercial prices would be consistently high, relative to market prices for the same services.	Haulers, wishing to maximize revenues and knowing city/regulators will be favorably deposed to their requests, will continually petition for commercial rate increases. Absent significant risk of losing support (the horizontal iso-support curve) and interested in encouraging hauler profits (to extract support from them), cities will grant these increases. Although prices between franchises will vary, one would expect that in general they would be consistently higher than market prices.

With a clear picture of how a captured franchised waste hauling system should look, it is now possible to compare this theoretical picture against the real picture, as presented in Chapter 3.

TABLE 5

Actual Characteristics of Price Regulation Systems

Characteristics	What is seen in the market:
1. Differentiation in price adjustment systems.	NO. 95% of franchises employ the same price adjustment system for commercial and residential waste hauling.
2. Use of "profit-capturing" price adjustment methods.	NO. There are a few isolated examples of price adjustment systems, including a "fixed profit" number. However, only 2% use any metric or method to specifically adjust prices to include a portion for "profit."
3. Commercial prices would be consistently high, relative to market prices for the same services.	NO. As shown in Chapter 3, commercial prices under waste hauling franchises are highly variable, ranging from competitive-market levels to 400% higher than the competitive rate.

Source: Appendices C and D.

Although sources of regulatory capture can manifest themselves in ways other than pricing (most notably in entry barriers, such as franchise awards), in terms of price-setting itself, when considering the nature and structure of the price-adjustment systems in Chapter 3, regulatory capture is not actively in place.

4.2. Using the NPT to Explain Price-setting Systems for Franchised Waste Services

As was discussed in Chapter 1, the rival view of regulation (extending back to Adam Smith) has been called "normative analysis as a positive theory" or NPT. Focused primarily on the reasons for regulation (to correct market failures or to address problems of negative externalities), there is a price regulation aspect to NPT. A price-setting system reflecting the underlying assumptions of NPT would have at its core a benign regulator setting prices based on costs, with the implicit goal of providing sufficient revenue to the franchisee to maintain quality service, i.e, to cover necessary costs. (This is the heart of Schmalensee's good regulatory system explained in Chapter 1 and utilized in Chapter 3.)

Along with cost concerns must be added a support consideration: even the most benign and effective regulator still must make sure he has support for any price changes he might implement. Therefore, the left term in Peltzman's equation – the marginal political product of the lower price – remains intact, but the right side would be rewritten to align prices with the costs c = c(Q), the quantity Q being the necessary level of service to meet the aggregate waste disposal needs of the community. That would make the solution to Peltzman's equation the tangency between the iso-support curve and the minimal amount to cover necessary costs to provide services:

$$-M_p/f_p = p = c$$

Graphically, this is represented by Figure 4:

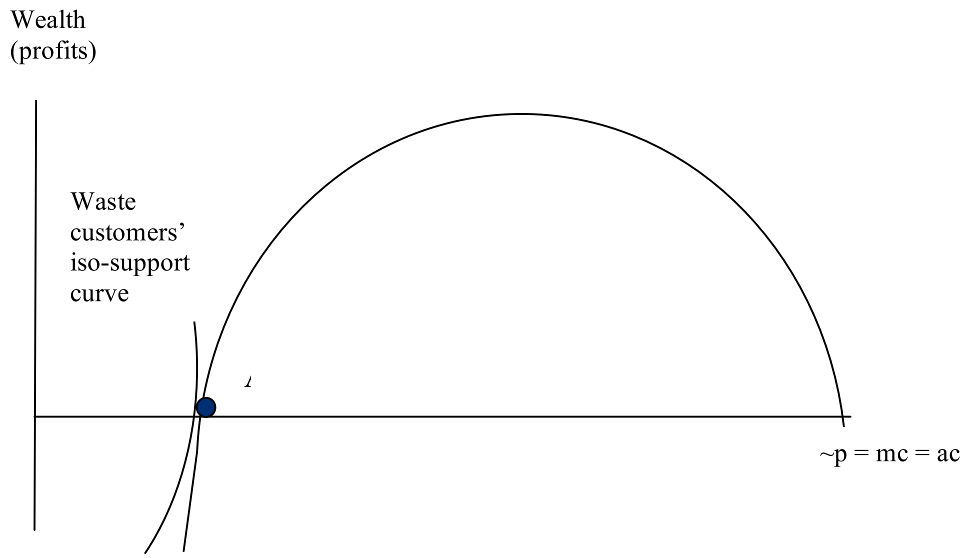


FIGURE 4

Waste Customers' Iso-Support Curve within an "NPT" Price Regulation System

Here it is assumed that the city/regulators' goal is to set prices at marginal cost (for allocative efficiency) and also at average costs, to provide the hauler sufficient revenue to continue providing his services. It is also assumed the price is set at a point of tangency with the iso-support curve (A).

Under the assumptions of NPT – especially the notion of the benign regulator equating price to necessary costs at the point of tangency with an iso-support curve – the following characteristics should be manifested in the franchised waste hauling marketplace (Table 6):

TABLE 6

Proposed Characteristics of an "NPT" Price Regulation System

Characteristics	Explanation
1. Price adjustment systems would be the same for both commercial and residential services.	Since city/regulators have a goal of setting prices based on costs, once they have determined the "precise" method of gauging costs for price adjustment purposes, they would apply them equally to both commercial and residential customers.
2. Use metrics that are solely cost-related, such as CPI, to adjust prices.	The method used to adjust prices relies on putative changes in costs only.
3. Commercial prices could be highly variable between cities.	Knowing the regulator is not captured restrains requests for price increases and forces haulers to anchor them in specific costs requirements. Variations in resistance to petitions plus their specificity would cause a high degree of variation in rates.

Comparing these characteristics to what is seen in the marketplace (Table 7):

TABLE 7

Actual Characteristics of Price Regulation Systems

Characteristics	What is seen in the marketplace
1. Price adjustment systems would be the same for both commercial and residential services.	YES. This is the most critical fact undercutting the notion of capture. 95% of franchises employ the same price adjustment system for commercial and residential waste hauling (see Chart 6 above).
2. Use metrics that are solely cost-related, such as CPI, to adjust prices.	YES. 98% of the 96 price adjustment systems in the sample (94/96) strictly use cost-based adjustment methods.
3. Commercial prices could be highly variable between cities.	YES. As shown in Chapter 2, commercial prices are highly variable.

Source: Appendices C and D.

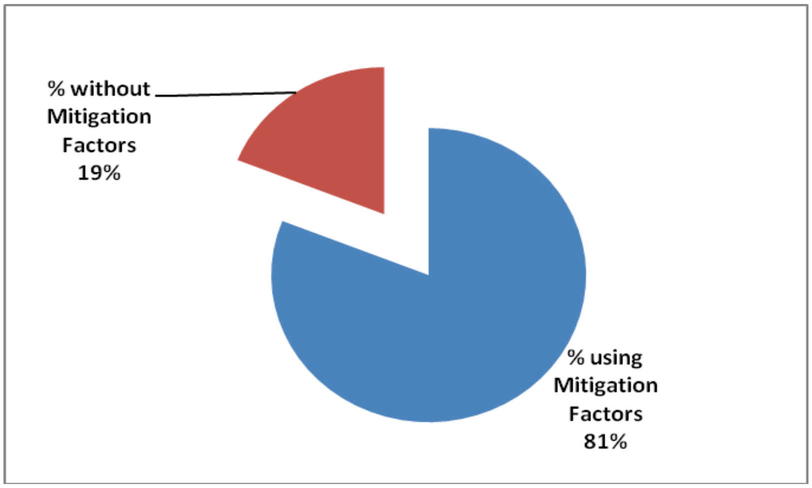
Given the information above, the city/regulators' behavior both in using common price adjustment systems and in the variability of pricing outcomes for commercial customers indicates motivations closer to what one would expect under NPT than a capture scenario.

4.3 Mitigation Factors and Cost Sharing in Price Adjustment Systems

As noted in Chapter 3, mitigation factors play a prominent role in price adjustment systems. In the systems detailed in Appendix C, 81% employ some type of mitigation factor, including limits on the size of PPI/CPI-based adjustments using caps and percentages, disentangling various price adjustment factors (service, tipping fees, fuel) and yardsticks (see Graph 9, below).

GRAPH 9

Percentage of Price Adjustment Systems Using Mitigation Factors



Source: Appendix C.

As mitigation factors are written into franchise agreements, they must be regarded as significant. Within the structure of an NPT-oriented price adjustments systems (as argued above), where do these mitigation factors fit?

To answer that question, it is critical to understand the function that mitigation factors perform. As discussed earlier in Chapter 3, they can be understood as "cost sharing" functions. (Cost sharing is a significant part of Schmalensee's good regulatory regime). *Mitigating cost-based price adjustments force the regulated monopolist to share some of the costs.*

But there is a further, very important, consideration. Under most circumstances, *cost sharing* will necessitate on the part of the regulated monopolist *cost reduction*, in order for the monopolist to avoid operating his business at a loss.

In the SP capture formulation, cost sharing plays, at best, a subsidiary and indirect role in price setting. Recall that Peltzman understands price-setting regulation as an exercise, ultimately, in dividing up costs and benefits between consumers and producers to obtain – for the politician/regulator – the optimal balance between benefits (which accrue to the producer and ultimately flow to the politician/regulator) and costs (which maintain sufficient support to continue in power). Under this formulation, cost sharing could be used to create this balance, but it is far from necessary. For example, one could easily conceive of a politician increasing prices to the benefit of a producer, thereby obtaining sufficient support from the producer to balance the loss of support from consumers. Cost sharing, therefore, is not an imperative – or even a requirement – in the price setting regimen of the captured politician/regulator.

The situation is entirely different under the NPT scenario. Here, prices are set based on cost; the goal of the benign regulator is p = c. The problem for the politician/regulator is that even a perfectly-calculated price change – one based solely on measureable, unavoidable, justifiable changes in franchisee costs – may still elicit a decline in support on the part of consumers.

In the price adjustment systems detailed in Chapter 3, cost cutting is not a specific component. However, implicit cost cutting inducements are included in the form of mitigation factors. The argument is simple: the metric used (such as CPI) represents an exogenous, real upward pressure on costs (i.e., one which the franchisee would experience in an unregulated marketplace). These higher costs would be translated into concomitant price increases. By mitigating these, the waste hauler is forced to either absorb these costs or make cost savings adjustments. Indirectly at least, mitigation factors are a cost cutting strategy.

The importance of mitigation factors is illustrated by comparing the tools available to the profit/majority maximizing regulator in Peltzman against a benign regulator. In Peltzman's original model (Figure 1), the point of tangency between the iso-majority curve and the profit hill represents a real (albeit almost impossible to calculate) number. In Figure 4, representing the benign regulator's price-setting solution, the iso-support curve intersects at an optimal pricing point. However, unlike with Peltzman's regulator, there is no necessary solution to this problem. To put it another way, Peltzman's regulator can – at least in theory – adjust prices to align the profit hill and iso-majority curve. Conversely, a benign regulator, operating in the best interests of the consumers, sets prices at a level determined by the franchisee's cost structure. If prices are set to cover necessary costs, locating the point of tangency with the iso-support curve with the new price level may require adjusting the iso-support curve. Under this scenario, the function of mitigation factors can be seen as equilibrating the iso-support curve with the p = c point. In other words, mitigation factors change the slope of the iso-support curve to align it with the optimal price.

To illustrate this regulatory conundrum further, consider a situation illustrated in Figure 7, where price = cost and there is support for pricing at this level indicated by tangency with a iso-support curve (point A_1). A change in the cost structure faced by the hauler shifts the Peltzman profit curves left (P_1 moves to P_2) and necessitates, for the regulator, a justifiable price increase. Even if price is reset at the optimal point to cover costs (A_2), it is possible that, from the city/regulators' perspective, a significant loss of support will be forthcoming. This is represented by the loss of tangency with the original iso-support curve (M_1) at A_2 (see Figure 5, below).

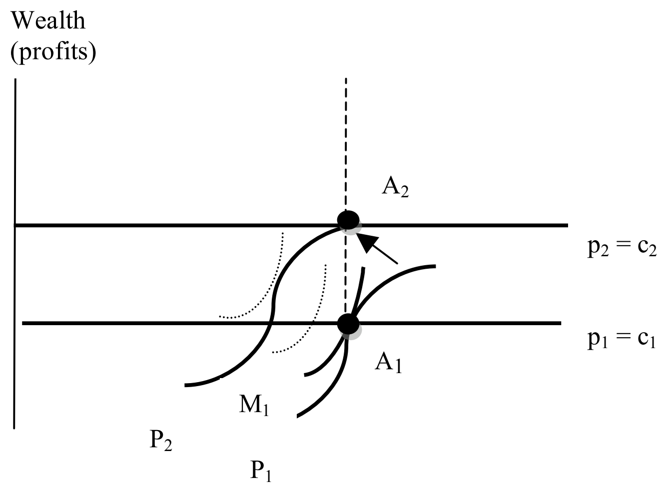


FIGURE 5

Loss of Iso-Support Curve Tangency Entailed by a Justifiable Price Increase

Under these circumstances, the challenge for city/regulators is to change the slope of the iso-support curve, to ensure tangency at point A_2, the new $p_2 = c_2$ point.

As was shown above, the slope of the iso-curve line is contingent on the marginal product of price in terms of support, which is, in turn, a function of the cost of knowledge, cost of opposition and the cost of avoidance.

Cost sharing is a type of avoidance. Higher costs necessitate higher prices. Mitigation factors mean the franchised waste hauler shares some of those costs, rather than forcing consumers to bear them fully. By sharing costs with the producer (franchise hauler), the MC_A is reduced, the slope of the iso-support curve flattens (M_2) and a new point of tangency can be aligned with the price increase. This is illustrated in Figure 6, where a new point of tangency is achieved at A_2:

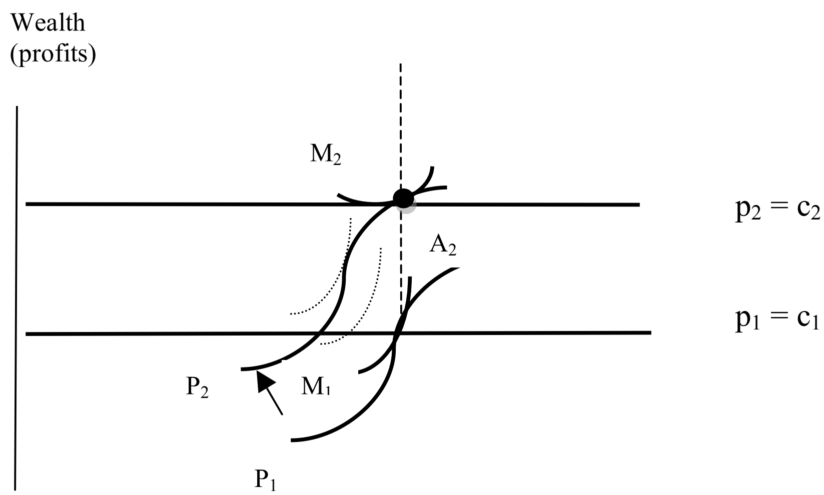


FIGURE 6

The Effect of Mitigation Factors on the Slope of Iso-Support Curves

This formulation is of course theoretical, but it provides an explanation of why cost sharing in the form of mitigation factors is included in price adjustment systems. The benign regulator, attempting to align price with cost *and with constituent support*, would be expected to employ cost sharing techniques as a critical feature of this effort.

4.4 Final Thoughts and Next Steps

The purpose of this chapter has been to attempt to understand city/regulators' motivations when they routinely regulate waste hauling prices using the price adjustment systems presented in Chapter 3.

Using a modified version of the SP analytical structure, two models of city/regulators' behavior were developed. The first represented the behavior of the city/regulators if captured by the franchised hauler, and the second represented their behavior if operating as a benign regulator.

Using these models, it was possible to specify routine price adjustment systems. It was determined that the specifications developed under a capture scenario are not consistent what with is really seen in the franchised waste hauling marketplace, while specifications consistent with the behavior of a benign regulator are present.

Combining the insights of Peltzman regarding the necessity for the regulator to align prices with majority support, it was shown how mitigation factors perform a crucial function in the benign city/regulators' price setting processes. Even if prices are set at what the benign regulator assumes is the optimal point – to cover the hauler's necessary costs – constituent support for this pricing arrangement is not ensured. Mitigation factors, with their cost sharing implications, provide a mechanism to bring price changes and support into alignment.

In Chapter 1, it was seen that most economists writing on price regulation temper their theories with caveats about the complexities of regulating prices in the "real world." This is certainly the case with franchised waste haulers, as nuances and variations abound. However, the overwhelming popularity of routine price adjustment systems, with objective, cost-based metrics and mitigation factors, plus the wide range (from market-level to 400% of market level) of commercial waste hauling prices supports the conclusions here: the city/regulators exhibit behaviors consistent with endeavoring to set prices at optimal levels where price covers the costs necessary to continue providing waste hauling services.

But the best of intentions, as thinkers throughout the ages have noted, do not necessitate the best of outcomes. Having argued that city/regulators' price adjustment systems are attempts to set prices "correctly (p = c)" and secure support from their constituents for these prices (mitigation factors), the question remains as to the effect of their efforts. Specifically – and most obviously – how well do these systems work? This is especially pressing because, as we presented in Chapter 2, the one easily measureable pricing structure – commercial roll-off – was highly diverse statewide, varying from at (or sometimes below) market rates in some locations to 300% to 400% percent higher than market rates. Why this wide variation in outcomes? Chapter 5 will explore why similar benign intentions can manifest themselves in very different pricing outcomes.

And what role do "special" price adjustment requests play in the overall rate setting process? These will be the subject of Chapter 5.

Chapter 5: Competition, Pricing and California Waste Hauling Franchises

Using the information developed in Chapters 2 and 3 – especially the role of price adjustment systems and mitigation factors in setting franchised waste hauling prices – it was argued that city/regulators are not captured in the SP sense. Rather, these routine price-setting methods suggest city/regulators, in a fashion similar to regulators in the theoretical literature, endeavor to set prices at a level sufficient to cover the franchised waste hauler's necessary costs, while maintaining majoritarian support from constituents. Price adjustment systems based on objective metrics (CPI, PPI, etc.) perform the former function. The latter is performed by mitigation factors.

This explanation is adequate up to a point. However, it leaves unaddressed the peculiar variability of commercial roll-off rates demonstrated in Chapter 2. As was shown, prices throughout California for the identical commercial service can vary by 200%, 300%, and even 400% percent. Why, if city/regulators all aspire to set rates using cost factors, are some commercial prices so much higher than others?

A necessary condition for this variability is the ability of haulers to petition for special rate adjustments, based on specific cost needs. Large differences in prices are a function of a franchisee aggressively petitioning for higher prices, and the franchisor approving them. This begs further questions. Why don't all haulers develop cost-based petitions for high rates? Why do some city/regulators allow steep price increases while others do not? The goal of this chapter is to provide answers to all these questions. As in

Chapter 4, the only criterion that will be used in making this determination is *that it is consistent with the facts at hand.*

5.1 Using Stigler/Peltzman to Model Hauler/Regulator Behavior

The Peltzman model proved useful in characterizing a regulatory capture in the waste hauling market. Although the evidence led to the rejection of an SP form of capture in city/regulators' behavior, that does not strip the model of its considerable explanatory power. In fact, if modified slightly, the SP model can provide insights into the behavior not only of city/regulators, but of waste haulers as well.

This is because the franchised hauler, like Peltzman's regulator, balances profit maximization with constituent support, his constituents being the city/regulators. The hauler seeks to maximize profits by petitioning for price increases justified by unique cost requirements. However, the hauler knows his requests are contingent upon the city/regulators' toleration for price increases. In other words, as illustrated by Figure 7, the hauler can push prices only to the point of tangency (A) between his profit hill and the city/regulators' iso-support curve (M):

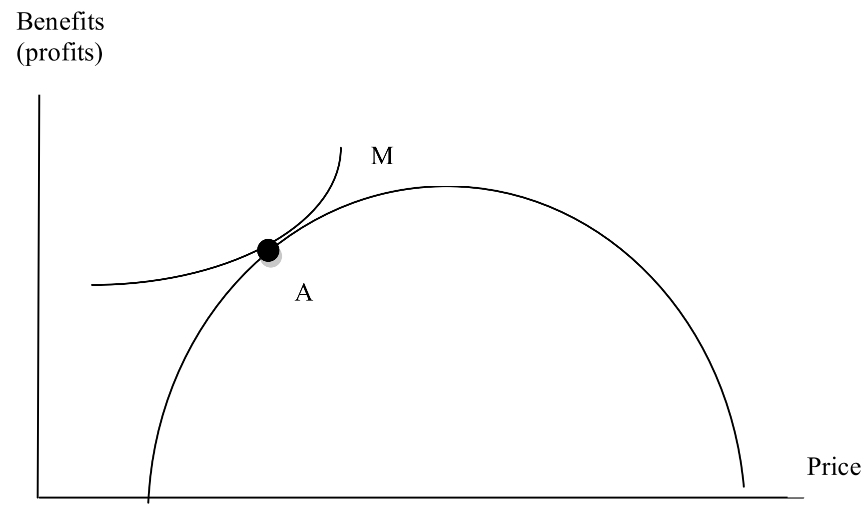


FIGURE 7

The City/Regulators' Iso-Support Curve

To make the model meaningful for both haulers and city/regulators, the dimensions will be price and "benefits." Benefits is even broader than wealth (used in Chapter 4), allowing the model to encompass both monetary benefits (such as wealth) and non-pecuniary benefits, such as political support.

As in Chapter 4, marginal product of price (MP_P) changes in terms of support will be the primary focus of this analysis. As illustrated by Figure 8, below, the smaller the MP_P is, the flatter the curve, and the more likely city/regulators will approve price increases; a higher MP_P means a steeper curve and less support for price increases.

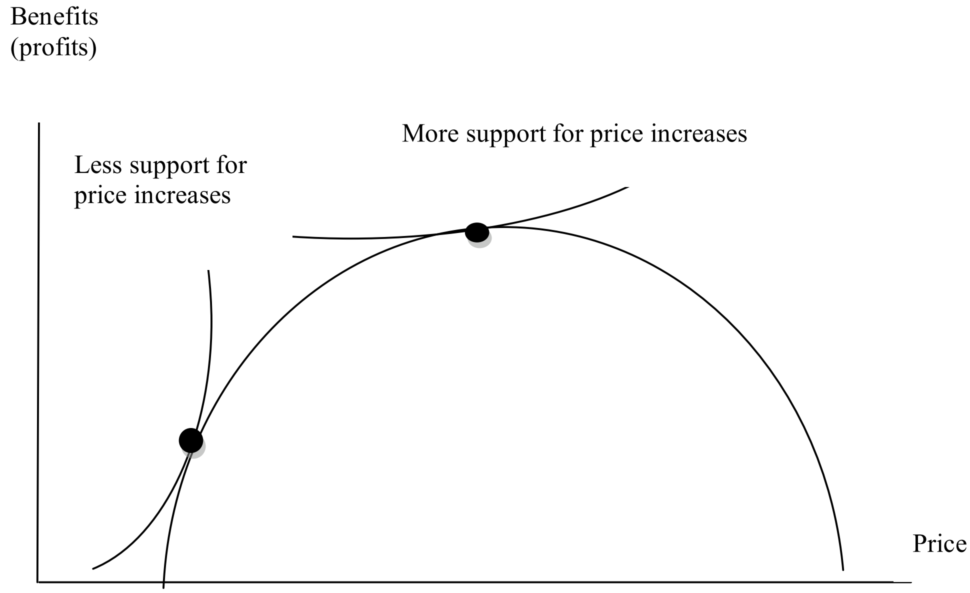


FIGURE 8

Iso-support Curves Reflecting More and Less Support for Price Increases

Building on the earlier analysis, city/regulators' iso-support curve is a function of three factors, similar to those utilized in Chapter 4. $S_{support}$ refers to the quantity of city/regulators' support and is a function of three variables:

$$S_{support} = S(-I, - O, Q) \qquad (6)$$

I is the cost of information, O the cost of opposition and Q, as in Chapter 4, is the cost of quantity of support. As in Chapter 4, I and O are negative; increasing information and opposition costs mean the ability to react to (and resist) price adjustment petitions decreases. Q is obviously positive. The higher the cost to city/regulators – in terms of political support – engendered by price increases, the stronger the resistance to price adjustments. As in Chapter 4, this function is differentiated:

$$dS = -(\delta S/\delta dI)*dI - (\delta S/\delta O)*dO + (\delta S/\delta Q)*dQ \qquad (7)$$

Each term on the right side of Equation 7 includes the marginal costs (MC) to city/regulators of acquiring information (MC_I), mounting opposition (MC_O) and losing consumer support (MC_Q). The latter term, not surprisingly, is simply the slope of the consumers' iso-support curve faced by city/regulators in Chapter 4. One would expect that the responsiveness of constituents to price changes would play a positive role in the city/regulators' own iso-support curve where price increases are considered.

The challenge to the profit-maximizing waste hauler is to estimate the slope of this iso-support curve. Again, a flatter curve represents a higher toleration for aggressive price increases on the part of city/regulators. A steeper curve represents greater resistance to these changes.

In initially estimating the slope, it will be assumed that both MC_I and MC_Q are the same between city/regulators. (Of course, MC_Q varies whether discussing residential or commercial waste customers, but for this analysis that can be disregarded.) Assuming "customers" react similarly to waste price increases is reasonable, as is the notion that the marginal cost to evaluate price petitions is comparable city to city.

However, the marginal cost to city/regulators of opposing price petitions, MC_O, is contingent on the presence of other haulers who could replace the current incumbent franchisee. If there are several possible haulers operating locally, the marginal cost to oppose any price increase is reduced. If, however, there are limited (or no) haulers who could assume the franchise, this raises the cost of opposition. This is summarized in Table 8 below:

TABLE 8

City/Regulators' Marginal Costs for Information, Opposition and Support

	MC_I	MC_O	MC_Q
City with 1 or 0 possible competitors	=	High	=
City with 2 or more competitors	=	Low	=

Source: Analysis found in text.

In terms of the slope of city/regulators' iso-support curve, a higher MC_O flattens the slope. The hauler, aware of these market conditions, would be expected to aggressively petition for higher prices; city/regulators, with limited alternatives available, are more likely to grant them.

If this model is correct, it would provide an explanation for the phenomenon that was presented in Chapter 2: the high degree of variability in commercial roll-off rates between cities in the San Francisco Bay Area and the Los Angeles basin. It will also provide a method for evaluating the effectiveness of the price-setting systems developed in Chapter 3 and discussed in Chapter 4.

5.2 Testing the Role of Competitive Market Structures Using Roll-off Rates

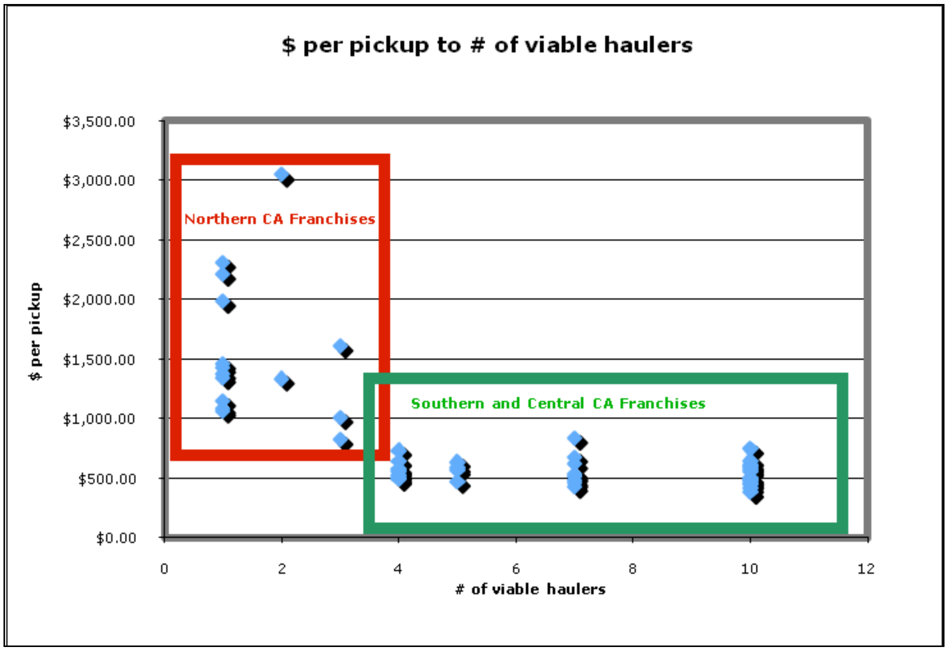
As was demonstrated in Chapter 2, Southern California, from a waste hauling perspective, is far more "competitive" than Northern California. In the former, there are many different haulers who can offer franchised services and no one hauler with a dominant position in any county. In Northern California, there are far less haulers, and one often dominates an entire region.

If the modified Peltzman model is correct, one should see the effects of these competitive differences in levels of prices. Using the modified Peltzmanian model, absence of potential competitors should “flatten” the city/regulators’ iso-support curve, thus enabling the acceptance of large, specific requests for price increases and lifting prices up accordingly. In places where competitors abound, the situation should be opposite: requests will be less frequent and smaller, as haulers – recognizing the role of potential competition in the city/regulators’ calculations – will restrain themselves in requesting price increases.

The effect of “competition” on regulated prices is illustrated in Graph 10, plotting the number of viable haulers against the price for servicing a 40-CY compacted receiver container with 8 tons of materials in it. Each point represents one franchised city. High prices and few haulers (in a given region) are concentrated in Northern California; far lower prices and many more competitors are concentrated in Southern California:

GRAPH 10

Commercial Roll-off Prices Graphed against the Number of Viable Haulers



Source: Appendices D and E.

The obvious question is whether strong correlations exist between, on one hand, the large commercial price disparities found in Northern and Southern California and, on the other, the variations in the number of national and regional haulers in a given area. To test this, a regression will be run using as the dependent variable the ratio of the regulated price to empty a 40-cubic yard compacted container to the market price. The independent variables will consist of (1) the log of the number of national and regional ("viable") haulers in the county (local haulers are not included because they do not provide franchised services outside of their particular narrow locale); (2) the elements of our price adjustment systems (PAS); (3) a franchise fee statistic (if charged); and (4) a variety of miscellaneous factors, including variables for billing (whether done by the city as part of a utility bill or by the hauler); automatic price adjustment mode; and several characteristics of the city in terms of population, per capita income, commercial activity (measured in per capita sales tax collections) and political affiliation (percentage of registered voters who are Democrats). These variables are summarized in Table 9. It should be noted that the form of this analysis is similar to the evaluation of electric utility rates used by Stigler and Friedland in their classic paper from 1962:

TABLE 9

Independent and Dependent Variables

Variable	Description
LNRATIO	Log of the ratio between the franchised price and market price
POP	Population, divided by 10,000
FFRATIO	The ratio of the franchise fee % to the average franchise fee %
LNHAUL	Log of the number of viable haulers
YARD	= 1 if PAS includes a yardstick (other cities' rates) in setting prices
ADJ	= 1 if PAS adjusts rates annually
RES	= 1 if city bills residents for waste disposal services
COM	= 1 if city bills commercial firms for waste disposal services
CAP	price cap on adjustment (fraction)
%IND	percentage of adjustment index (e.g. CPI) PAS allows to apply to prices
TIP	= 1 if PAS makes special adjustments for tipping fee changes
FUEL	= 1 if PAS makes special adjustments for fuel price changes
PCINC	Per capita income, divided by 10,000
PCSTAX	Per capita sales tax collected, divided by 100
%DEM	Percentage of all voters registered as Democrats

$$\begin{aligned} \mathrm{LNRATIO} = \; & \beta_0 + \beta_1 1\mathrm{POP} + \beta_2\mathrm{FFRATIO} + \beta_3\mathrm{LNHAUL} + \beta_4\mathrm{YARD} + \beta_5\mathrm{ADJ} + \beta_6\mathrm{RES} + \\ & \beta_7\mathrm{COM} + \beta_8\mathrm{CAP} + \beta_9\%\mathrm{IND} + \beta_{10}\mathrm{TIP} + \beta_{11}\mathrm{FUEL} + \beta_{12}\mathrm{PCINC} + \\ & \beta_{13}\mathrm{PCSTAX} + \beta_{14}\%\mathrm{DEM} + u \end{aligned}$$

TABLE 10

Regression Results

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.8787
R Square	0.7721
Adjusted R Square	0.6942
Standard Error	0.2763
Observations	56

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	14	10.6021	0.7573	9.9199	4.12E-09
Residual	41	3.1300	0.0763		
Total	55	13.7321			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.7550	0.3260	2.3160	0.0256	0.0967	1.4133
POP	-0.0105	0.0061	-1.7071	0.0954	-0.0229	0.0019
FFRATIO	-0.0788	0.0536	-1.4700	0.1492	-0.1871	0.0295
LNHAUL	**-0.5041**	**0.0572**	**-8.8121**	**5.2381E-11**	**-0.6197**	**-0.3886**
YARD	0.2434	0.1196	2.0343	0.0484	0.0018	0.4849
ADJ	0.1057	0.0862	1.2259	0.2272	-0.0684	0.2797
RES	0.0108	0.1060	0.1022	0.9191	-0.2033	0.2250
COM	-0.0842	0.1374	-0.6129	0.5434	-0.3617	0.1933
CAP	1.5406	1.3930	1.1060	0.2752	-1.2726	4.3538
%IND	0.1834	0.1123	1.6328	0.1102	-0.0434	0.4103
TIP	-0.0291	0.0914	-0.3187	0.7516	-0.2137	0.1554
FUEL	0.0328	0.0977	0.3357	0.7388	-0.1645	0.2300
PCINC	-0.0242	0.0555	-0.4356	0.6654	-0.1363	0.0879
PCSTAX	0.0257	0.0219	1.1695	0.2490	-0.0186	0.0699
%DEMO	0.4832	0.3620	1.3349	0.1893	-0.2478	1.2143

Source: Data Analysis.

TABLE 11

Summary Statistics

	LNRATIO	POP	FFRATIO	LNHAULERS	YARD
Mean	0.32	8.29	-0.22	1.51	0.14
STD Deviation	0.07	0.95	0.10	0.11	0.05
	ADJ	RES	COM	CAP	%IND
Mean	0.66	0.39	0.18	0.02	0.43
STD Deviation	0.06	0.07	0.05	0.00	0.05
	TIP	FUEL	PCINC	PCSTAX	%DEM
Mean	0.66	0.29	2.47	2.00	0.44
STD Deviation	0.06	0.06	0.12	0.26	0.02

Source: Data Analysis.

The results of this regression (Table 10, above) are enlightening. First, almost none of the elements of the price adjustment systems correlate with the price differentials, nor are they significant in any way. The same holds true for the population, political affiliation, per capita income, levels of business activity (as represented by per capita sales tax collections) and billing methods variables[25]. A small, marginally interesting, correlation exists between the use of yardsticks in price setting and higher commercial rates. Yardsticks are utilized solely for mitigating residential prices; the small positive number could hint at a slight degree of regulatory capture (as described in Chapter 4), where tamping down residential prices provides a small incentive to increase commercial rates.

Most interesting is the overwhelmingly strong correlation between the log of number of national and regional haulers operating in a given area and the log of the ratio between commercial roll-off pricing.

First, the sign on the log of haulers coefficient is negative. This means that as the number of haulers declines in a given area, the prices rise. This follows the empirical analysis of haulers in the six areas in Southern and Northern California.

Second, the coefficient is -.504. As this is a double-log model, this means each percentage change in X (in this case, the percentage increase in the number of viable competitors) will induce a -.504 percentage change in the ratio of the actual price to the market price.

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[25] Stevens (1978) and Dubin & Navarro (1988) argue that the low cost providers of waste services are franchises where the city bills and collects. The rationale is that relieving the franchisee of this responsibility reduces the cost of providing the service. If this were so, one would expect prices (assuming they are related to costs) to be lower where cities handle the invoicing function. Clearly this is not the case.

This result is consistent with the theoretical analysis above, which projected that in areas with limited or no hauling alternatives, higher prices would be present. However, that does not make the following finding any less surprising: *competition may exist in ostensibly regulated monopoly markets*. The presence of *potential* competitors – even in markets where bidding is rare and change almost unknown – appears to have a salutatory affect on pricing.

It is necessary to comment on the robustness of the results. In the "small universe" of California franchised cities (in Chapter 2 we noted that 154 of the major cities in California have both residential and commercial waste hauling franchises), 56 cities represent a significant portion (36%). However, it is useful to add additional cities to provide further assurance of the robustness of these findings. In Table 12 are the results of a single variable regression that looks solely at the log of ratio of prices (dependent variable) against the log of the number of haulers (independent variable) for 77 cities (50% of the total):

$$\text{LNRATIO} = \alpha + \beta_1 \text{LNHAUL} + u$$

TABLE 12

Price Differentials and the Number of Viable Haulers

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.8672
R Square	0.7520
Adjusted R Square	0.7487
Standard Error	0.2921
Observations	77

TABLE 12

Price Differentials and the Number of Viable Haulers, Continued

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	19.4031	19.4031	227.4275	2.06306E-24	
Residual	75	6.3987	0.0853			
Total	76	25.8017				
	Coefficients	*STD Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.1882	0.0565	21.0400	3.41551E-33	1.0757	1.3007
LNHAUL	**-0.5484**	**0.0364**	**-15.0807**	**2.06306E-24**	**-0.6209**	**-0.4760**

Source: Data Analysis.

This regression supports the robustness of the results of our first regression. The coefficient is slightly lower (-.54) and the correlation remains very strong.

5.3 Speculating on a "Competition Threshold"

If the presence of multiple haulers in a market dampens price increases, is it possible to estimate a "competition threshold": how many potential competitors are required to exert "competitive" pressure on prices?

One way to approach this question is to begin with the original findings above, specifically the log-log model and the -.504 coefficient, and use this model to project how increasing the number of haulers one by one would impact the dependent (Y) variable, the ratio of the franchised price against the market price. The results are in Table 13:

TABLE 13

Projected Impact of an Increased Number of Haulers on Price Ratios

# of haulers (X)	% Δ in # of haulers	Coefficient	% Δ haul rate/market rate ratio	Projected Ratio (Y)
2				*3.12*
3	50%	-0.504	-25%	2.32
4	33%	-0.504	-17%	1.93
5	25%	-0.504	-13%	1.68
6	20%	-0.504	-10%	1.51
7	17%	-0.504	-9%	1.38
8	14%	-0.504	-7%	1.28
9	13%	-0.504	-6%	1.20
10	11%	-0.504	-6%	1.13

Source: Data Analysis.

The 3.12 starting ratio is the actual average ratio for franchisees in areas with two viable haulers taken from the original sample of 56 cites (there are 11 cities that fit this category). In these cities, on average, the price to haul a compacted receiver container with 8 tons of materials in it = 3.12x the market rate.

The decline in the projected ratio moves downward in a predictably "exponential" fashion, dropping fairly precipitously and then flattening out. The chart below compares the predictions of this model to the actual average ratios for cities with 2, 4, 7 and 10 viable haulers taken from the 21 cities not in the original sample of 56 but incorporated into the second regression above. The results are enlightening and are found in Table 14, below:

TABLE 14

Projected Price Ratios Compared to Actual Price Ratios

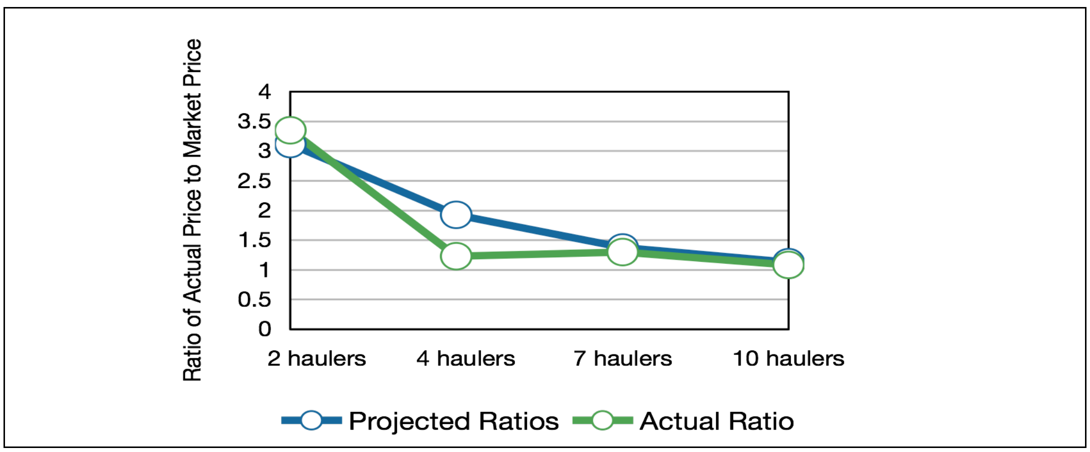
# of haulers (X)	% Δ # of haulers	Coefficient	% Δ haul rate/market rate ratio	Projected Ratio (Y)	Average Actual Ratio
2				3.12	3.35
3	50%	-0.504	-25%	2.32	
4	33%	-0.504	-17%	1.93	1.23
5	25%	-0.504	-13%	1.68	
6	20%	-0.504	-10%	1.51	
7	17%	-0.504	-9%	1.38	1.30
8	14%	-0.504	-7%	1.28	
9	13%	-0.504	-6%	1.20	
10	11%	-0.504	-6%	1.13	1.08

Source: Data Analysis and Appendix D.

The 3.35 average ratios for cities with only two haulers are consistent with earlier findings. And the projected ratios for cities with 7 or 10 viable haulers are remarkably similar to the actual results for these cities.

GRAPH 11

Price Ratios and the Number of Viable Haulers: Projected versus Actual



Source: Data Analysis.

The only major difference between the projected and the actual average price ratio is for cities with 4 haulers. Not only is the *actua*l ratio (1.23) well below the projected ratio (1.93), it is very close to the actual values at 7 haulers (1.30) and 10 haulers (1.08). Since the value of the actual ratios have plateaued at 4+ haulers and this number is 42% lower than the 3.35 ratio for 2-hauler cities, one can reasonably surmise that the "competitive threshold" is or has been crossed with 4 viable haulers. (There is almost no data for 3-hauler areas available to test.)

Two interesting questions follow from this. First, are the positive effects of competition felt when there are more than 4 viable haulers present in a given area? The chart above suggests no, but this is certainly worthy of testing. And, second, are there some positive effects from competition even with a small number of viable haulers? Specifically, will prices be relatively lower in a "duopoly" rather than a monopoly situation?

To test both these questions, two single variable regressions will be run. The first examines the 40 Southern and Central California cities that were part of our 77 city sample. The second does the same thing for the 37 Northern California cities.

TABLE 15

Analysis of Prices and Number of Haulers in Southern and Central California Cities

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.1306
R Square	0.0171
Adjusted R Square	-0.0088
Standard Error	0.1780
Observations	40

TABLE 15

Analysis of Prices and Number of Haulers in Southern and Central California Cities, Continued

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	0.02091	0.02091	0.65975	0.4217	
Residual	38	1.20457	0.03170			
Total	39	1.22548				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	0.1875	0.1500	1.2503	0.2188	-0.1161	0.4911
LNHAUL	**-0.0615**	**0.0757**	**-0.8123**	**0.4217**	**-0.2149**	**0.0918**

Source: Data Analysis.

TABLE 16

Analysis of Prices and Number of Haulers in Northern California Cities

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.7726
R Square	0.5968
Adjusted R Square	0.5853
Standard Error	0.3222
Observations	37

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.3807	5.3807	51.8156	2.12317E-08
Residual	35	3.6345	0.1038		
Total	36	9.0153			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1.2358	0.0648	19.0808	4.44929E-20	1.1044	1.367
LNHAUL	**-0.5276**	**0.0733**	**-7.1983**	**2.12317E-08**	**-0.6764**	**-0.378**

Source: Data Analysis.

In Southern and Central California – where the number of haulers in different markets varies between 4 and 10 – there is functionally no relationship between price and number of competitors. Reviewing the price ratios in the above chart (1.23 for 4-hauler cities, 1.3 for 7-hauler cities and 1.08 for 10-hauler cities) and "eyeballing" the price data (which shows all prices hovering in the vicinity of $518 per pickup), the conclusion is that as long as a city enjoys the benefits of 4+ viable haulers within its vicinity, rates will remain low; i.e., near the market rate.

In the Bay Area, however, both a coefficient (-.52) and strong correlation were found, similar to the first regression. This is due to the fact that prices are *relatively* lower in counties such as Solano or Santa Clara, where two viable haulers exist, as compared to those in Alameda, West Contra Costa and San Mateo, which have a single dominant provider. (The word "relative" is important, as all Bay Area prices are far higher than those in other parts of the state with a greater number of haulers.)

These results suggest that the presence of even a single competitor may contribute to keeping prices lower, although not so much as to drive them toward open market pricing. If there are 4 or more viable haulers, the full effects of competition set in. The suggestion therefore is that there is a "competition threshold" and that the number of haulers necessary to reach this threshold is either 3 or 4. At that point the full benefits of competition take effect.

5.4 Special Price Changes and Hauler Concentration

It is predictable, given the market structure, that haulers in Northern California have exploited the ability to petition for special rate increases to meet unforeseen circumstances. Petitioning for a special price increase is a logical component of any price adjustment system because it is entirely fair to compensate firms when (ostensibly) exogenous events impact costs ("Z" costs in the literature). But since the 1980s, the aggressive pursuit by franchised haulers of special rate increases combined with most cities' willingness to acquiesce to these increases (as predicted by the modified Peltzman model for waste haulers) is unique to the Northern California franchise marketplace. Many of these petitions follow the acquisition of a local hauler by one of the three main players in the Northern California waste marketplace and the consolidation of their dominant position in a particular county.

A simple illustration is the price changes in Foster City (San Mateo County) before and after Browning Ferris Industries (BFI) acquired San Mateo Disposal in 1982. For the four years prior to the acquisition – during a period of high national inflation (56%) – commercial rates rose 36%. In the four years after the acquisition – in a period of far lower inflation (14.8%) – BFI petitioned and received rate increases of 64%[26].

A similar example is the large rate increase in the late '80s and early '90s enjoyed by Waste Management of Alameda County. In 1986, WMAC purchased Oakland Scavenger, a regional hauler in Alameda County. The purchase (plus others) put WMAC

[26] Amendments to the 1964 Franchise Agreement, dated 1976, 1978, 1980, 1981, 1982 and 1984 and new Franchise Agreement, 1987.

into a dominant position in Alameda County. Rapid rate increases followed, equal to 30% in the period from 1989 – 1991 (CPI = 9.8%)[27].

Recology (then Norcal Waste) moved into a dominant position in Solano County in the early 1990s. In a 3-year period, from 1991 to 1994, rates in Vallejo were driven up by 102%, again when CPI changes were modest (7.8%)[28].

In all these cases, potential competition has been muted by aggressive acquisitions in a given county by Waste Management, BFI or Norcal. Some consolidation took place in Southern California; Waste and BFI/Allied/Republic made (and still make) acquisitions in the LA basin. But so too did small haulers like EDCO, CR&R and Athens, which created numerous regional powerhouses. From a price-setting perspective, whether any actual bidding ever took place was less important than the *possibility* that viable competitors existed that could take over a franchise at any time.

The salutatory affect of this crypto-competition is further illustrated by comparing, for Northern and Southern California, the ratio of commercial price increases to changes in CPI for franchised haulers from 1990 to 2002. Given that most of our price adjustment systems are based in some manner on CPI changes, we would expect a reasonably close correlation between the two variables (a value of 1.0 in this ratio). As Graph 12 demonstrates, this is the case in Southern California, where prices have generally risen in conjunction with CPI (1.13x CPI ratio). But in Northern California, commercial rates have risen, on average, 2.6x CPI.

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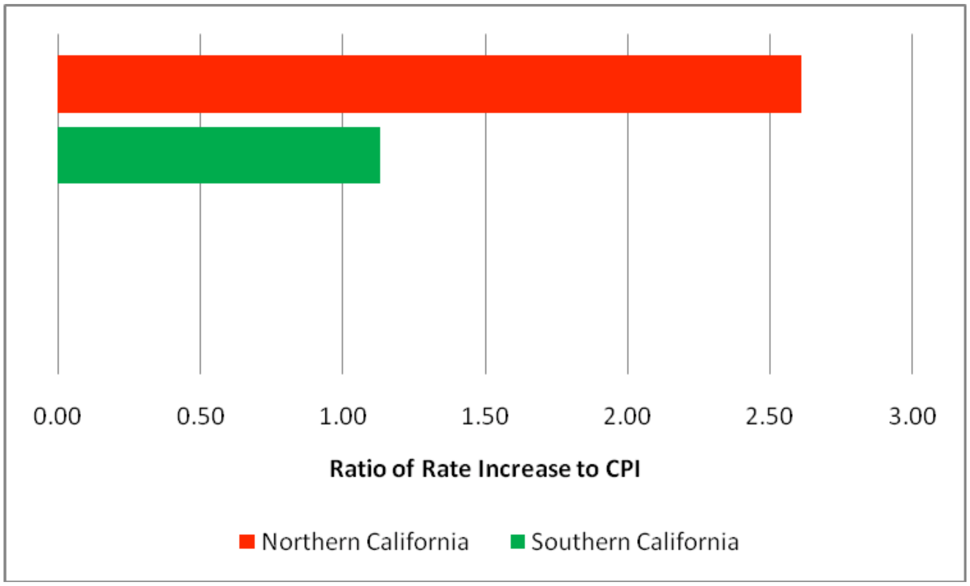
[27] "Joint Refuse Rate Report," City of Fremont, 1992.
[28] "Garbage Rate Report," City of Vallejo, August 9th, 1994.

GRAPH 12

Ratio of Commercial Rate Increases to CPI 1990 - 2002



Source: Appendix D.

There are two other developments unique to Northern California that indirectly confirm the power of county-by-county consolidation by major waste haulers. First is the emergence of regional hauling associations to counteract the dominant hauler. One such example is South Bayside Waste Management Authority in San Mateo County, which emerged in the 1980s as BFI was consolidating its position in the county. Another is the Central Contra Costa Solid Waste Authority created in the mid-90s, allowing cities to deal collectively with the dominant hauler (again BFI)[29].

The second development unique to Northern California is the proliferation of outside consultants used to either "rationally" determine prices or evaluate a waste hauler's rate petition and determine the legitimacy of his claims. Beginning in the 1990s,

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[29] For information about the South Bayside Waste Management Authority, see www.rethinkwaste.org. For information about the Central Contra Costa Solid Waste Authority, see www.wastediversion.org.

the cities of Concord and Vallejo, as well as all of San Mateo County, began using consultants as an obvious check to hauler rate requests[30]. This is not found in Southern California. Cities would only absorb the costs of consulting firms if they felt it necessary to check the high rate increases coming from their local franchises.

5.5 Other Potential Sources of High Prices: Tipping Fees and Recycling Services

In comparing waste disposal prices in Southern and Northern California, it is necessary to ask if there are other explanations for these price differences. Since the costs of providing waste services – trucks, drivers, support staff, fuel, land prices and insurance – are similar statewide, these are clearly not the source of the wide gap. It is possible, however, that landfill costs are radically different throughout California. Especially in the wake of the "landfill crisis," could rapidly rising tipping fees in the Bay Area be the explanation for higher rates?

In general, landfill tipping fees have stayed remarkably steady throughout California in the period from the early 1990s to the present, actually declining from $36.62 per ton in 1997 to $30 per ton today.[31] Graph 13 from 1997 illustrates both this consistency and the fact that there is little difference in tipping fees between Northern and Southern California[32]. By this time, as noted above, commercial rates in the Bay Area

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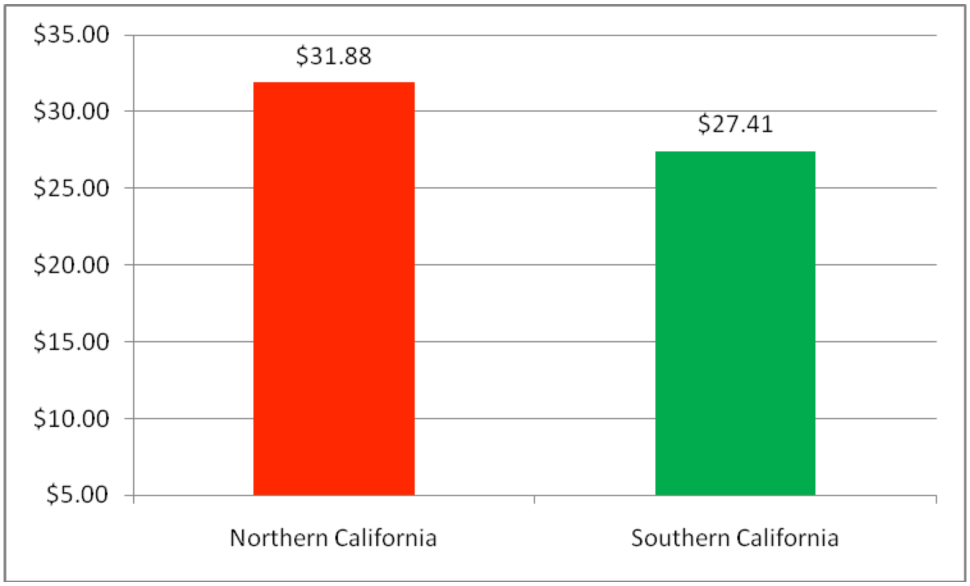
[30] Consultants working for the City of Concord have published a step-by-step booklet about price-setting.
[31] See "1997 Tipping Fees at California Solid Waste Facilities" and "Incentive Programs for Government Recycling and Waste Reduction," both found at www.calrecycle.ca.gov.
[32] From the "1997 Tipping Fees at California Solid Waste Facilities," using rates from the five largest landfills in the Bay Area vs. the five largest in Los Angeles and Orange counties.

were in the midst of their far more rapid increases when compared to the Los Angeles area:

GRAPH 13

Average $ Per Ton Tipping Fees in Northern and Southern California



Source: From the “1997 Tipping Fees at California Solid Waste Facilities,” using rates from the five largest landfills in the Bay Area vs. the five largest in Los Angeles and Orange counties.

To understand the low impact a $4.47 per ton difference has, consider the effect of this price difference on the standard service utilized above in the price analysis. The difference between an 8-ton load is $35.96, which equals a trivial 6.9% of the average market service cost of $518.

It is now universally recognized that the so-called “landfill crisis” was in fact a chimera, at least in most of the United States[33]. In fact, low landfill costs in both

[33] See Fullerton and Kinneman, (2000) pg. 4. More recently, see “Europe Finds Clean Energy in Trash,” *New York Times*, April 4th, 2010.

Southern and Northern California have actually been identified as a problem because they *discourage* recycling.[34]

A second possible explanation as to why rates are so different could lie in the recycling programs offered by different franchisees. Since the passage of AB 939 – which mandated 50% diversion rates by 2000 – cities have scrambled to implement all manner of recycling programs, whose costs are often covered by waste hauling revenues. Is it possible that recycling programs are more highly developed in Northern California than Southern California, and that explains these higher rates?

Again, the evidence is not there. CalRecycle (formerly the California Integrated Waste Management Board) compiles data of every city's recycling programs. A simple test can be conducted using the 56 cities in our regression and checking if they offer the following major programs: residential curbside collection; residential curbside green waste collection; and commercial on-site collection. The result of this review is that *every city* offers these three critical programs[35].

5.6 Can Markets Be Both Regulated and Contestable?

In his 1982 speech before the American Economic Association, William Baumol, in describing his then-radical theory of "contestable markets," identified the critical aspect of such markets as "one into which entry is absolutely free . . . not to mean it is costless or easy, but that the entrant suffers no disadvantage in terms of production

[34] "Bargain Basement Tipping Fees Create Chaos in California," *Waste Age*, February 1st, 1997.
[35] See www.calrecycle.ca.gov/Profiles/. See Waste Diversion Programs under Jurisdictions/Waste Flows.

technique or perceived product quality relative to the incumbent . . ." (Baumol, 1982, pp. 3 - 4). Baumol continued to describe how the fact of being "contestable" serves to constrain rates of profits, production inefficiencies and prices.

Baumol leaves unarticulated two implicit assumptions of contestable markets but ones which are very real nonetheless and essential to the processes he uncovers. First, non-incumbent firms that can enter a market must *exist;* without these, contestability is a nonentity. And second, the positive constraints Baumol recognizes in contestable markets are *self-imposed* by incumbents; these firms, realizing the possibility of competition, *themselves* restrain prices, eliminate inefficiencies and accept only normal profits.

The franchised waste hauling marketplace is far removed from what Baumol was describing in his address. Baumol's markets are open and competitive; he specifically sets regulated markets aside. However, in light of the results here, one cannot help but speculate that the franchised waste hauilng market in California is, in a peculiar sense, contestible.

The modified Peltzmanian model of city/regulators' iso-support curve points toward the role that multiple waste hauling competitors play in the city/regulator's toleration of price increases. The strong correlations between commercial roll-off pricing and number of haulers provides support to this conclusion. Viable waste haulers have, to use Baumol's words, "no disadvantage in terms of production technique or perceived product quality relative to the incumbent" (1982, p. 4). Of course these firms cannot simply enter a franchised area, especially in the Baumolian "hit and run" fashion. But the *possibility* that the city can bid out the franchise contract must provide incumbent franchisees with a strong incentive to – in the spirit of contestability – restrain their requests for special price increases. Conversely, where little or no potential competition exists, waste haulers may, with reasonable impunity, petition aggressively for higher prices, which city/regulators are less inclined to disapprove.

Such appears to be the case among Southern California haulers, with the result that at least for commercial prices, close-to-free-market rates predominate. It is not the case in Northern California. Often lacking even a single viable competitor, these markets are in no way contestable. The result, as would be expected, are far higher commercial rates than one would obtain in a open market.

5.7 A Final Word: Efficiency, Price Adjustment Systems, Franchises and Competition

As was discussed in the Introduction, perhaps the most important question regarding price regulation is that of efficiency: how close can regulators come to setting prices at (or near) marginal costs? For commerical roll-off waste services, a benchmark for making such an evaluation are the prices found in the almost-perfectly competitive market for roll-off waste services. Armed with a statewide average price, it was shown that – in terms of commercial roll-off services – franchises in Southern California were priced at a near-efficient level (the market rate), while those in Northern California were often priced 2, 3 or 4x higher.

It was then argued that the source of these differences was not in the price adjustment systems used by almost every city in California, but the competitive situation in the particular area. Southern California has far more national and regional waste haulers than in the Bay Area. Although franchises are seldom bid out (and almost never change), the very presence of potential competitors keeps prices down, in a manner similar to what Baumol described in his contestable markets theory.

The theoretical explanation of how Baumolian contestibility can exist in regulated markets was found in the modified Peltzmanian analysis of the city/regulators' iso-support curves. There it was argued that the iso-support curve becomes flatter – representing greater tolertation for price increases – when the marginal cost of opposition rises. This is the situation in the San Francisco Bay Area, and one that has has been exploited by Bay Area haulers through specific price petitions, especially as they consolidated their dominant positions in a single county or other geographic area.

The broad implications of this finding for economists and regulators will be examined in the Conclusion that follows. At this point, it suffices to say that the price adjustment systems only succeed – in terms of keeping prices at (or near) efficient levels – if buttressed by the hidden, but ubiquitous, presence of possible competition. In other words – as economists have long known and taught – competition works in generating efficient pricing, even in the most unlikely of places.

Conclusion: Price Regulation under Waste Hauling Franchises

This dissertation began with the goal of understanding price regulation for California waste hauling franchises: how regulators set prices; why do they choose the processes that they do; whether price-setting is successful (prices $\approx$ marginal costs); and – if not – why not? It concluded with the surprising revelation that competition – even in a regulated monopoly market – has a profound impact on price, in much the same way that in standard markets, the presence of potential competition keeps prices low. In this Conclusion, I will sum up what has been presented about California waste hauling franchises and price-setting, and also briefly comment about the discovery that competition has a positive impact on regulated prices.

Although this was not a definitive history – there are too many franchises whose pedigrees are irretrievably lost – enough historical data was presented to provide a consistent picture of franchise development. For many older cities, waste hauling franchises evolved as cities asserted control over waste disposal (and related sanitation concerns). Contrary to the "privatization story" popular among economists and political scientists, this evolution did *not* include a municipal hauling phase. Instead, cities granted licenses to local private haulers; inevitably, these licensees would be consolidated and a single franchisee would emerge. For almost all newer cities (incorporated after World War II), there was no evolution. A franchise was granted at the time of incorporation, which in almost all cases remains in place today.

The most important historical lesson is in regard to bidding, which looms large in theoretical literature about franchises and privatization of government services. As has been shown, bidding did not – and still does not – play a critical role either in granting franchises or in price-setting. Concomittantly, it also was shown that few waste hauling entities, once established as a franchise, ever lose it.

Without bidding as the centerpiece of price regulation, it was shown that, over time, two processes came to dominate price-setting for waste hauling franchises. *Routine* price changes were accomplished by using a “price adjustment system,” which employed objective metrics, city-specific algorithms and well-defined modalities to adjust prices periodically. *Special* changes in pricing were the result of petitions by the waste hauler, made on an as-needed basis. These systems, rather than competitive bidding, constitute the “how” of franchised waste hauling price-setting.

Determining “why” city/regulators set prices as they do required identifying the characteristics of price adjustment systems under regulatory capture and then comparing these hypothetical characterisitcs to actual systems. Utilizing the works of Stigler and, especially, Peltzman (SP), a model was developed that facilitated this characterization. The result of the comparison that followed was that no evidence of regulatory capture was detected. Instead it appears these systems reflect the goals of a “benign” regulator, interested in setting prices at a level sufficient to cover the hauler’s necessary costs. This conclusion was buttressed by its success in explaining the role of “mitigation factors,” the complex mixture of caps, percentages, yardsticks and other methods designed to limit price increases. The SP-based model postulated that even a benign regulator who sets prices at the optimal ~p = mc = ac level still must contend with the problem of maintaining constituent support. Mitigation factors perform this function by lessening the effects of price increases on consumers. This in turn enhances support for price changes (within the SP-model, mitigation factors "flatten" the iso-support curve to maintain its alignment with the price/wealth curve).

The inevitable question is: how well do these price-setting systems work? The benchmark used to evaluate their relative success is "efficiency" as measured by "p = mc" (or close to it). Near marginal cost pricing was found to exist in the pricing of commercial roll-off waste services because – due to the commodity nature of the service, large number of competitors and an absence of scale economies – commerical roll-off services are provided under conditions of (near) perfect competiton.

The specific metric chosen to evaluate these systems was the average rate to service a roll-off 40-cubic yard compacted container with eight tons of materials in it, set in the major *open, competitive* commercial markets that exist in Los Angeles, San Jose, San Diego, Sacramento County and Fresno. This rate – found to average $518 – turns out to be very close to the rates set by regulators for franchisees in Southern California. In Northern California, however, the average rate for the same service was 2 – 4 times higher.

To explain these regional differences, the SP model developed to evaluate price adjustment systems was utilized, but with a variation: the model was set up from *the waste hauler's perspective*, with the city/regulators taking the role of *constituents*. Using this model it was argued that the likelihood of approving higher prices *increases* where there is *less potential competition* from other waste haulers. This prediction was tested using an OLS regression where the dependent variable was the log of the ratio of franchised prices (for this particular commercial roll-off service) to the $518-average market price for the same service. The independent variables included the log of the number of viable haulers in a county plus factors drawn from price adjustment systems, as well as city characteristics (population, per capita income, business activity, political affiliation), and billing methods. *The sole variable that proven highly signficant was the log of the number of haulers*. Other regressions were run, with great numbers of cities; all came to a similar result.

The conclusion, therefore, is that the ability of waste hauling franchises – which are, after all, *regulated monopolies* – to price at or near market rates was contingent on the *competitive* hauling environment. Pairing the words "competitive" with "regulated monopoly" may seem oxymoronic. But as predicted by the SP model and supported by this analysis, it is the competitive structure of the waste hauling market that is a primary determinant of price variability, even for locally-regulated monopolies. As surprising as this seems, it appears that even within a world of government-granted franchises, contestable markets in the Baumolian sense do exist, and that lack of competition – even if it is only potential competition – leads inevitably to higher prices.

Appendix A: 184 California Cities and their Waste Hauling Arrangements

#	City	Population	Residential	Commercial	#	City	Population	Residential	Commercial
1	Alameda	70,580	Franchise	Franchise	47	Elk Grove	133,003	County	Open
2	Alhambra	85,953	Franchise	Franchise	48	Encinitas	60,372	Franchise	Franchise
3	Anaheim	335,288	Franchise	Franchise	49	Escondido	137,103	Franchise	Franchise
4	Antioch	100,219	Franchise	Franchise	50	Fairfield	103,683	Franchise	Franchise
5	Artesia	17,000	Franchise	Franchise	51	Folsom	67,788	County	Open
6	Atascadero	28,452	Franchise	Franchise	52	Fontana	184,984	Franchise	Franchise
7	Auburn	13,106	Franchise	Franchise	53	Foster City	29,089	Franchise	Franchise
8	Azusa	46,847	Franchise	Franchise	54	Fountain Valley	55,516	Franchise	Franchise
9	Bakersfield	321,078	City	City	55	Fremont	202,867	Franchise	Franchise
10	Baldwin Park	77,380	Franchise	Franchise	56	Fresno	476,050	City	Open
11	Bellflower	73,033	Franchise	Franchise	57	Fullerton	131,868	Franchise	Franchise
12	Belmont	24,776	Franchise	Franchise	58	Garden Grove	165,796	Franchise	Franchise
13	Benicia	26,174	Franchise	Franchise	59	Gilroy	49,934	Franchise	Franchise
14	Berkeley	101,371	City	City	60	Glendale	197,176	City	City
15	Beverly Hills	34,445	City	City	61	Glendora	50,073	Franchise	Franchise
16	Brentwood	49,480	City	City	62	Hawthorne	84,305	Franchise	Franchise
17	Buena Park	79,379	Franchise	Franchise	63	Hayward	142,061	Franchise	Franchise
18	Burbank	102,968	City	Open	64	Hemet	70,991	Franchise	Franchise
19	Burlingame	27,706	Franchise	Franchise	65	Hercules	24,484	Franchise	Franchise
20	Camarillo	63,324	Franchise	Open	66	Hollister	34,877	Franchise	Franchise
21	Campbell	38,617	Franchise	Franchise	67	Huntington Beach	192,620	Franchise	Franchise
22	Capitola	9,533	Franchise	Franchise	68	Huntington Park	60,898	Franchise	Franchise
23	Carlsbad	96,374	Franchise	Franchise	69	Inglewood	112,714	Franchise	Franchise
24	Cathedral City	52,095	Franchise	Franchise	70	Irvine	207,500	Franchise	Franchise
25	Cerritos	51,326	Franchise	Franchise	71	La Habra	59,155	Franchise	Franchise
26	Chico	83,791	Franchise	Franchise	72	La Mesa	54,673	Franchise	Franchise
27	Chino	83,031	Franchise	Franchise	73	La Verne	33,623	Franchise	Franchise
28	Chino Hills	73,879	Franchise	Franchise	74	Lafayette	25,011	Franchise	Franchise
29	Chula Vista	219,318	Franchise	Franchise	75	Laguna Beach	23,995	Franchise	Franchise
30	Citrus Heights	84,432	County	Open	76	Laguna Hills	31,838	Franchise	Franchise
31	Concord	121,160	Franchise	Franchise	77	Laguna Niguel	64,469	Franchise	Franchise
32	Corcoran	25,139	Franchise	Franchise	78	Lake Forest	75,566	Franchise	Franchise
33	Corona	149,923	Franchise	Franchise	79	Lakewood	78,444	Franchise	Franchise
34	Costa Mesa	110,080	City	Open	80	Lancaster	145,469	Franchise	Franchise
35	Covina	46,944	Franchise	Franchise	81	Lemon Grove	24,089	Franchise	Franchise
36	Cupertino	53,637	Franchise	Franchise	82	Livermore	80,188	Franchise	Franchise
37	Daly City	101,514	Franchise	Franchise	83	Lodi	61,301	Franchise	Franchise
38	Danville	41,182	Franchise	Franchise	84	Long Beach	463,789	City	Open
39	Davis	62,593	City	City	85	Los Altos	28,349	Franchise	Franchise
40	Diamond Bar	57,235	Franchise	Franchise	86	Los Angeles	3833995	City	Open
41	Dinuba	20,335	Franchise	Franchise	87	Los Banos	34,968	Franchise	Franchise
42	Downey	107,587	Franchise	Franchise	88	Los Gatos	29,320	Franchise	Franchise
43	Dublin	44,297	Franchise	Franchise	89	Madera	56,700	Franchise	Franchise
44	El Cajon	92,718	Franchise	Franchise	90	Manteca	65,028	Franchise	Franchise
45	El Cerrito	22,222	Franchise	Franchise	91	Martinez	35,145	Franchise	Franchise
46	El Monte	121,791	Franchise	Franchise	92	Menlo Park	30,087	Franchise	Franchise

#	City	Population	Residential	Commercial	#	City	Population	Residential	Commercial
93	Merced	77,160	City	City	139	San Fernando	23,833	Franchise	Franchise
94	Millbrae	20,800	Franchise	Franchise	140	San Francisco	808,976	Franchise	Franchise
95	Milpitas	67,503	Franchise	Franchise	141	San Jose	948,279	Franchise	Open
96	Modesto	202,967	Franchise	Franchise	142	San Juan Capistrano	34,793	Franchise	Franchise
97	Monrovia	37,651	Franchise	Franchise	143	San Leandro	77,880	Franchise	Franchise
98	Monterey	27,763	Franchise	Franchise	144	San Mateo	92,256	Franchise	Franchise
99	Moorpark	36,372	Franchise	Franchise	145	San Pablo	30,729	Franchise	Franchise
100	Mountain. View	71,348	Franchise	Franchise	146	San Rafael	55,602	Franchise	Franchise
101	Murrieta	97,918	Franchise	Franchise	147	San Ramon	49,161	Franchise	Franchise
102	Napa	74,547	Franchise	Franchise	148	Santa Ana	339,130	Franchise	Franchise
103	Newark	41,781	Franchise	Franchise	149	Santa Barbara	86,093	Franchise	Franchise
104	Norwalk	102,982	Franchise	Franchise	150	Santa Clara	110,200	Franchise	Franchise
105	Oakdale	20,299	Franchise	Franchise	151	Santa Clarita	169,500	Franchise	Franchise
106	Oakland	404,155	Franchise	Franchise	152	Santa Cruz	56,124	City	City
107	Oakley	32,035	Franchise	Franchise	153	Santa Fe Springs	16,223	Franchise	Franchise
108	Oceanside	169,684	Franchise	Franchise	154	Santa Maria	86,356	City	Franchise
109	Ontario	171,691	City	City	155	Saratoga	30,445	Franchise	Franchise
110	Orange	136,392	Franchise	Franchise	156	South Lake Tahoe	23,333	Franchise	Franchise
111	Pacifica	37,739	Franchise	Franchise	157	South San Francisco	62,502	Franchise	Franchise
112	Palm Springs	47,952	Franchise	Franchise	158	Stockton	287,037	Franchise	Franchise
113	Palmdale	143,197	Franchise	Franchise	159	Sunnyvale	132,109	City	City
114	Palo Alto	59,395	Franchise	Franchise	160	Temecula	97,100	Franchise	Franchise
115	Pasadena	143,080	City	Open	161	Thousand Oaks	123,091	Franchise	Franchise
116	Pico Rivera	63,138	Franchise	Franchise	162	Torrance	140,820	City	Open
117	Pittsburg	64,148	Franchise	Franchise	163	Tracy	79,196	Franchise	Franchise
118	Pleasant Hill	32,862	Franchise	Franchise	164	Tulare	56,654	City	City
119	Pleasanton	66,828	Franchise	Franchise	165	Turlock	68,549	Franchise	Franchise
120	Pomona	152,699	City	Open	166	Tustin	71,814	Franchise	Franchise
121	RNC Cucamonga	171,176	Franchise	Franchise	167	Union City	72,123	Franchise	Franchise
122	Redding	90,201	City	City	168	Upland	72,091	Franchise	Franchise
123	Redlands	69,689	City	City	169	Vacaville	92,219	Franchise	Franchise
124	Redondo Bch	66,882	City of LA	Open	170	Vallejo	114,729	Franchise	Franchise
125	Redwood City	74,060	Franchise	Franchise	171	Victorville	110,318	City	City
126	Reedley	23,439	City	City	172	Visalia	121,040	City	City
127	Rialto	98,700	Franchise	Franchise	173	Walnut Creek	63,486	Franchise	Franchise
128	Richmond	102,285	Franchise	Franchise	174	Watsonville	50,442	City	City
129	Riverside	295,357	Franchise	Franchise	175	West Covina	105,790	Franchise	Franchise
130	Rocklin	52,811	Franchise	Franchise	176	West Sacramento	47,511	Franchise	Franchise
131	Roseville	112,660	County	Open	177	Westminster	88,975	Franchise	Franchise
132	Sacramento	463,794	County	Open	178	Whittier	82,267	Franchise	Franchise
133	Salinas	143,640	Franchise	Franchise	179	Williams	5,123	Franchise	Franchise
134	San Bernardino	198,580	City	City	180	Winters	6,624	Franchise	Franchise
135	San Bruno	40,315	Franchise	Franchise	181	Woodland	54,567	Franchise	Franchise
136	Ventura	103,706	Franchise	Franchise	182	Yorba Linda	65,717	Franchise	Franchise
137	San Diego	1,279,329	City	Open	183	Yreka	7,765	Franchise	Frachise
138	San Dimas	35,043	Franchise	Franchise	184	Yuba City	61,226	Franchise	Franchise

Appendix B: Postwar Waste Hauling Franchises at 40 California Cities

City	INC Date	Prior Municipal Hauler?	First Franchise	First (or earliest) Franchisee	Current Franchisee	Initial Bid?	Ongoing Bids?	First = current
Anaheim	1876	No	1948	Jaycox & Taomina	Taomina	No	No	Yes
Atascadero	1979	County Franchise	1982	Wilmar	WMX	No	No	Yes
Baldwin Park	1956	No	1960	Webster	WMX	No	Yes, 1989	Yes
Benicia	1850	Unknown	1971	Pleasant Hill Bayshore	Plesaant Hill Bayshore	No	No	Yes
Buena Park	1953	No	1953	Patrick Moore	EDCO	No	No	Yes
Capitola	1949	Unknown	1968	Carmel Marina	WMX	No	No	Yes
Carlsbad	1952	Unknown	1979	Coast	WMX	No	No	Yes
Cathedral City	1981	Unknown	1996	WMX	WMX	No	No	Yes
Cerritos	1956	Unknown	1978	Calsan	Calmet	No	Yes, 1989	Yes
Chino Hills	1991	No	1993	USA Wastes	Taormina	Yes	Yes, 1997	No
Concord	1905	Unknown	1967	Concord Disposal	Concord Disposal	No	No	Yes
Corona	1896	Unknown	1983	Western Waste	WMX	No	No	Yes
Cupertino	1955	No	1955	Cupertino Garbage	Los Altos Garbage	No	No	Yes
Encinitas	1986	County Franchise	1996	Mashburn	EDCO	No	No	Yes
Foster City	1971	Estero Muni IMP District	1963	San Mateo Disposal	Republic	No	No	Yes
Fountain Valley	1957	No	1963	Rainbow	Rainbow	No	No	Yes
Fremont	1956	No	1976	East Bay Disposal	Republic	No	Yes, 2002	No
Gilroy	1970	No	1984	South Valley	South Valley	No	No	Yes
Glendora	1911	Unknown	1956	City Refuse	Athens	No	No	Yes
Huntington Beach	1909	Unknown	1978	Rainbow	Rainbow	No	No	Yes
Huntington Park	1906	Unknown	1978	System Disposal	WMX	No	No	Yes
Inglewood	1908	Unknown	1978	System Disposal	WMX	No	No	Yes
La Habra	1925	Unknown	1985	Western Waste	WMX	Yes	No	Yes

City	INC Date	Prior Municipal Hauler?	Original Franchise	First Franchisee	Current Franchisee	Initial Bid?	Ongoing Bids?	First = current
La Mesa	1912	County Franchise	1979	EDCO	EDCO	No	No	Yes
Laguna Beach	1927	Unknown	1972	LB Disposal	WMX	Yes	No	Yes
Lakewood	1954	No	1954	BZ	EDCO	No	No	Yes
Lancaster	1977	No	1991	Antelope Valley	WMX	No	No	Yes
Lemon Grove	1977	No	1978	Edco	Edco	No	No	Yes
Loma Linda	1970	No	1973	Loma Linda Disposal	WMX	No	No	Yes
Madera	1907	Unknown	1977	BFI	Republic	No	No	Yes
Martinez	1976	Unknown	1993	Pleasant Hill Bayshore	Pleasant Hill Bayshore	No	No	Yes
Millbrae	1948	Unknown	1972	South City	South City	No	No	Yes
Palmdale	1962	No	1962	Palmdale Disposal	WMX	No	No	Yes
Pico Rivera	1958	Unknown	1979	Pico Disposal	Calmet	No	No	Yes
Rocklin	1893	No	1979	Aub Plc	Aub Plc	Yes	No	Yes
San Dimas	1960	No	1967	San Dimas Disposal	WMX	No	No	Yes
San Ramon	1983	County Franchise	1986	Valley	Waste	Yes	No	Yes
Vacaville	1892	Unknown	1965	Vacaville Sanitary	Vacaville Sanitary	No	No	Yes
West Sacramento	1987	County Franchise	1987	WMX	WMX	No	No	Yes
Yorba Linda	1967	Unknown	1989	Yorba Linda Disposal	Yorba Linda DIS	No	No	Yes

Summary Statistics

% of franchises awarded through bidding:	12.5%	(5/40)
% of franchises that are examples of “privatization”:	0.0%	(0/20)
% of franchises where bidding occurs during the agreement’s lifetime:	10.0%	(4/40)
% of franchises where the hauler changed:	5.0%	(2/40)

Appendix C: Price Adjustment Systems at 96 California Cities with Waste Hauling Franchises

CITY	Primary Adjustment Index	Specific Mitigation Factors	Index Weight	Tip Fees (weights)	Fuel (weights)	Selected Critical Formula	Yardstick
Alhambra	CPI, LA	none	none	<15%	none		
Anaheim	CPI, LA						
Antioch	CPI, SF	60%, <5%	none	none	none		
Artesia	CPI, LA	none	75%	25%	none		
Atascadero	CPI, LA	<5%	exclude tip $	% of tip fees	none		
Auburn	CPI, CA	<4%	none	none	none		Auburn Placer Clients
Azusa	CPI	none	Service com-ponent	MRF portion	none		
Bakersfield	CPI, LA	none	none	none	none	"equitable adjustment"	
Baldwin Park	CPI, LA	>2% CPI Δ	none	Extra Costs	none		
Benicia	CPI, SF	<5%	none	none	none		De Facto: Solano Cities
Buena Park	CPI	none	none	none	none		
Carlsbad	Accept-able index	none	none	pass-through	none		
Cathedral City	CPI, LA	100%	none	none	none		
Cerritos	CPI, LA	<5%	70%	30%	none	Cart = 70% Serivce + 30%Disposal; Bin = 59% Serivce + 41% Disposal	
Chico	CPI	none	Allow-able ex-penses	Landfill % pass through	NFI		
Chino	CPI, LA	none	none	billed to City only	none		
Chino Hills	PPI, finished goods	80%	per service	per service	none		
Concord	Consultant System						
Corona	CPI	none	Service portion	Landfill portion	none		
Covina	CPI, LA	none	Col-lection costs	Disposal portion	none		Low-AVG LA/OC franchises
Cupertino	CPI	CPI, L, E, Δ in revenue	formula	none	none	Rate Adjustment = .CPI*{[Base Revenue*(.25Labor +.25Dur.Equip+CPI) - (.6 Res Rev+.7Com Rev+.3Deb Box)]/[BR*(.25L+.25E+.5CPI)]}	

CITY	Primary Adjustment Index	Specific Mitigation Factors	Index Weight	Tip Fees (weights)	Fuel (weights)	Selected Critical Formula	Yardstick
Diamond Bar	CPI, LA	none	none	Tip Fees > $23/ton	none		Neighbor Cites
Dixon	CPI, US	formula	none	none	none	CPI-1%+50& of CPI>8%	
Downey	CPI, LA	none	none	Tip Fees (OR Cty Landfill)	none	NR=DC*Δ%TF+OC*ΔCPI%	
El Cajon	CPI, SD	<5%	none	Include in Extra Costs	Include in Extra Costs		
El Cerrito	CPI, SF	90% CPI	(-Union & Fuel Adj)	Landfill fees	Diesel FPI	1+Union$*%Costs+Dsl*%Costs+90%CPI*(-Un+Ds)	
El Monte	CPI, LA	none	67%	33%	none		
Elk Grove	CPI, SF	none	Service component	none	FPI		Yes, other Sacramento cities
Encinitas	CPI, LA	none	none	Disposal portion	none	TR= ((LD*[1+LD%Δ]) +(OE*[1+CPI%Δ])) *1.053	
Escondido	CPI, San Diego	none	none	none	none	none	Lowest 25% in San Diego County
Foster City	Costs/ Rev method						
Fountain Valley	CPI, LA	none	76%	16%	8%		
Fremont	CPI, SF	none	CPI variable	none	Fuel variable		
Fullerton	CPI, LA	none	Service component	pro rata portion*Δ% change	none	Service Component*CPI + tons/mo./customer*Δ%	
Garden Grove	CPI, LA	<5%	none	Δ% + carrying charge	none	none	
Gilroy	CPI, SF	70% CPI, 10% max	none	none	10% FPI	70% CPI, SF + 10% CPI, Fuel	
Glendora	CPI, LA	none	Service com-ponent	Tip $ component	none	Weighted average of all tip fees divided by households	
Hawthorne	CPI	65% prior year's Net Rate	75%	25%	5%	65% of prior year's net rate*(75%CPI+5%Fuel+30%Tip)	
Hayward	CPI, SF	80%	none	(see formula)	(see formula)	80% CPI adjustement*General Costs (includes tipping) + actual Δ% in fuel and taxes	
Hollister	NONE						
Huntington Beach	CPI, LA	none	76.00%	landfill charges, 16%	8% FPI		
Huntington Park	CPI	<5%	100%	see formula, 30%	none	RES: AVG $/ton LA County + B&K; COM: AVG $/ton LA, South Gate & Commerce WEP	
Inglewood	CPI, LA	<5%	none	none	none		

CITY	Primary Adjustment Index	Specific Mitigation Factors	Index Weight	Tip Fees (weights)	Fuel (weights)	Selected Critical Formula	Yardstick
Kingsburg	CPI	85%	portion of the rate	Yes, %> $28.80			
La Habra	CPI	<5%	none	Amount of increase	none	none	
La Mesa	NONE						
Laguna Beach	CPI, LA	90% <5%		Disposal portion	none		
Laguna Hills	PPI, natural gas	Col-lection portion	94.50%	Δ% tip fees	none	94.5% Collection x PPI%Δ + PPI%Δ*Processing + %Δ Tip Fees * Disposal Portion	
Laguna Niguel	CPI & PPI	none	see formula	(Fee ÷ GAL) * tip fee	none	Δ = .3325labor+(.08Fuel+.07Dep + .1431Eq+.0244Parts + FabParts.02)*SpecifcPPI+.35CPI	
Lake Forest	PPI, LA	75%; <7%	none	none	none		
Lakewood	CPI, LA	none	none	none	none		
Lancaster	CPI, LA	50%	none	none	50% FPI	Δ = .5 CPI + .5 FPI	
La Verne	CPI, LA	78%	none	Δ$ home-owners	none		Neighboring Cities
Lemon Grove	NONE						
Livermore	CPI, SF	allow- able labor $	none	Δ allow-able tip $	FPI	Subtract from Costs - unallowable then adjust up with CPI, etc. Then divide by .92 for profits	
Lodi	CPI, SF	80%	none	none	non		
Loma Linda	CPI, LA	>1%	none	none	none		
Madera	ENR Cost Index	<4%	none	none	none		
Martinez	Consultant						
Millbrae	PPI, SF	2%<#<5%		PPI	PPI	PPTTDE=PTPD*PPTTDR; PPTTDR=PTTR+DRF; PTTR=PTTR(n-1)*1+PPI	San Mateo County Rates
Modesto	Consultant						
Monrovia	CPI	none	70%	30%	none	OR*.7*(1+CPI)+OR*.3*(1+TF%Δ)	
Moorpark	CPI, LA	86%	none	Δ tip fees/ house-holds/12	none		
Murrieta	CPI, LA	none	none	none	none		
Norwalk	CPI, LA	3% CAP	none	Tip $, 30%	none		
Oakland	CPI	80%; <5%	none	none	none		
Oceanside	CPI	<5%	none	none	none		Other San Diego Cities
Orange	PPI, OC	none	% = (TC-DIS$)/TC	% TF = TF/TC	none		Lowest 1/3 of Orange County
Palmdale	CPI, LA	<10%	none	Yes (Extra)	Yes (Extra)	none	

CITY	Primary Adjustment Index	Specific Mitigation Factors	Index Weight	Tip Fees (weights)	Fuel (weights)	Selected Critical Formula	Yardstick
Palm Springs	CPI, LA	none	Service component	Disposal portion	none		
Palo Alto	CPI, SF	82%	Applies to FAC	none	none	Profit = FAC/OR - FAC; Compensation = FAC+Profit	
Pico Rivera	CPI, LA	none	none	Yes, LA County rates	none		
Rancho Cucamonga	NONE						
Rialto	CPI, LA	none	none	none			
Riverside	CPI, LA	none	71.2%	Local landfill, 29%			
Rocklin	NONE						
San Dimas	CPI, LA	none	none	Acutal tonnage	none	none	
Santa Fe Springs	CPI, LA	none	none	As needed	As needed		
San Fernando	CPI, LA	none	none	none	none	(1+CPI%)*rate	
San Juan Capistrano	PPI, LA	none	none	see formula, 14.5% rate	NA	Portion adjusted by % change	
San Ramon	CPI	<8%	none	none	Motor Fuel Index	(1%+CPI)*category of costs	
Santa Barbara	CPI, LA	5% cap	none	none	none		
Santa Clarita	PPI, local & CPI, US	<5%	see formula	25%	5% FPI	Adjustment = 30%L (PPI)+ 5% Fuel (PPI)+15% Equipment (PPI)+25%Disposal+25Other (50% CPI)	
Saratoga	CPI, SF	80%	none	Guadalupe Landfill	none		
Tracy	CPI	none	none	none	none	none	
Tustin	PPI, natural gas	Col-lection portion of rate	85% of collection	Δ% in tips fees applied to Disposal Portion	none	85% Collection x PPI%Δ + PPI%Δ*Processing + %Δ Tip Fees * Disposal Portion	
Upland	CPI, LA	<5%	80%	20%	none		
Vacaville	CPI for standard adjustments						
Vallejo	Consultant						
W. Sacarmento	CPI, SF	75%, <5%	none	%Δ landfill costs >$36			
West-minster	CPI, LA	none	76%	16%	8%		
Winters	RRI (Refuse rate ndex)	none	Collection costs	Landfill portion	none		
Woodland	CPI, CA	<3% (see note)	none	>CPI	none		
Yorba Linda	CPI, LA	90% <5%	none	none	none		

Appendix D: Commercial Roll-off Waste Hauling Rates

Price for Disposal of a 40-CY Compacted Container with 8 Tons of Materials (provided by franchised cities)					
CITY	COUNTY	Total $ per pickup	CITY	COUNTY	Total $ per pickup
Alhambra	Los Angeles	$492.80	La Verne	Los Angeles	$562.83
Antioch	Contra Costa	$1,068.64	Laguna Beach	Orange	$435.33
Artesia	Los Angeles	$578.03	Laguna Hills	Orange	$542.30
Azusa	Los Angeles	$599.19	Laguna Niguel	Orange	$624.18
Cerritos	Los Angeles	$616.35	Lake Forest	Orange	$466.55
Chino	San Bernardino	$561.60	Lakewood	Los Angeles	$482.13
Corona	Riverside	$508.50	Lancaster	Los Angeles	$505.25
Covina	Los Angeles	$503.63	Livermore	Alameda	$2,218.00
Diamond Bar	Los Angeles	$650.83	Loma Linda	San Bernardino	$585.00
Dixon	Sacramento	$1,013.99	Millbrae	San Mateo	$1,990.56
Downey	Los Angeles	$385.00	Moorpark	Ventura	$499.38
El Cajon	San Diego	$639.95	Mountain View	Santa Clara	$1,338.00
El Cerrito	Contra Costa	$2,315.00	Murrieta	Riverside	$495.00
El Monte	Los Angeles	$465.48	Napa	Napa	$3,051.60
Encinitas	San Diego	$595.92	Oakland	Alameda	$1,382.00
Escondido	San Diego	$572.66	Oceanside	San Diego	$476.70
Fountain Valley	Orange	$531.00	Orange	Orange	$840.16
Fremont	Alameda	$1,463.02	Riverside	Riverside	$529.75
Fullerton	Orange	$681.64	San Fernando	Los Angeles	$424.80
Gilroy	Santa Clara	$1,614.00	San Juan Capistrano	Orange	$481.25
Glendora	Los Angeles	$649.00	San Lorenzo	Alameda	$1,349.71
Goleta	Santa Barbara	$826.86	San Ramon	Contra Costa	$1,150.59
Granada Hills	Los Angeles	$485.15	Santa Clarita	Los Angeles	$385.00
Hayward	Alameda	$1,089.32	Santa Fe Springs	Los Angeles	$750.00
Huntington Beach	Orange	$515.95	Tracy	San Joaquin	$647.00
Huntington Park	Los Angeles	$454.56	Upland	San Bernardino	$577.62
La Cresenta	Los Angeles	$458.45	Vacaville	Solano	$1,432.80
La Verne	Los Angeles	$562.83	Woodland	Yolo	$736.00
Laguna Beach	Orange	$435.33	Yorba Linda	Orange	$518.70

Price for Disposal of a 40-CY Compacted Container with 8 Tons of Materials (provided by waste haulers)					
CITY	COUNTY	Total $ per pickup	CITY	COUNTY	Total $ per pickup
Alameda	Alameda	$1,265.00	Richmond	Contra Costa	$2,315.00
Concord	Contra Costa	$1,100.00	San Leandro	Alameda	$1,536.00
Danville	Contra Costa	$2,050.00	San Mateo	San Mateo	$2,165.00
Fairfield	Solano	$1,064.00	San Rafael	Marin	$2,376.00
Inglewood	Los Angeles	$586.00	Santa Ana	Orange	$655.00
Milpitas	Santa Clara	$1,311.00	SO San Francisco	San Mateo	$1,919.00
Modesto	Stanislaus	$674.00	Stockton	San Joaquin	$605.00
Moraga	Contra Costa	$2,331.00	Sunnyvale	Santa Clara	$1,971.00
Palmdale	Los Angeles	$455.00	Vallejo	Solano	$1,884.00
Pleasanton	Alameda	$1,691.00	Walnut Creek	Contra Costa	$1,611.00
Redwood City	San Mateo	$2,196.00			

1990 – 2002 Price Changes as Ratio to CPI

Northern California Cities	% Price Increase	Ratio to local CPI	Southern California Cities	% Price Increases	Ratio to local CPI
Fremont	124%	3.92	Anaheim	10%	0.56
Hayward	48%	1.51	Baldwin Park	16%	1.08
Livermore	131%	4.13	Laguna Beach	30%	0.87
Oakland	91%	2.87	Lancaster	28%	1.62
Redwood City	186%	5.86	Loma Linda	21%	1.93
Richmond	2%	0.06	San Dimas	20%	0.73
Vacaville	36%	1.14			
Vallejo	45%	1.41			
Average Ratio:	**83%**	**2.61**		**21%**	**1.13**

Appendix E: National and Regional California Waste Haulers

	Southern California				Northern California			
Hauler (National)	**LA**	**OC**	**RC**	**SB**	**AL**	**CC**	**SM**	**SC**
Republic Services	√	√	√	√		√	√	√
Waste Management	√	√	√	√	√	√		
Hauler (Regional)	**LA**	**OC**	**RC**	**SB**	**AL**	**CC**	**SM**	**SC**
Athens	√	√						
Burrtec	√		√	√				
Calmet	√	√						
Consolidated	√	√						
Crown	√							
CR&R	√	√	√	√				
EDCO	√	√						
Recology							√	√
Taormina	√	√						

Checkmarks indicate counties where the hauler has franchises. Counties: LA = Los Angeles, OC = Orange County, RC = Riverside County, SB = San Bernardino, AL = Alameda, CC = Contra Costa, SM = San Mateo and SC = Santa Clara.

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Note: All cities which provided information used in this dissertation are listed below. As noted in the body of the work, this information varies widely both in terms of quantity and quality. The information is divided into four categories:

Complete	***Current***	***Selected***	***Mixed***
Agreements, addenda, ordinances and resolutions from the date indicated.	Agreements, addenda, resolutions and ordinances currently in force.	Selected information.	Complete or current information from the date listed + selected information from an earlier date

City	**County**	**Information Provided:**	**Date:**
Alhambra	Los Angeles	Complete	1995
Anaheim	Orange	Complete	1950
Antioch	Contra Costa	Current	2007
Artesia	Los Angeles	Current	2007
Atascadero	San Luis Obispo	Complete	1980
Auburn	Placer	Complete	1999
Azusa (LA)	Los Angeles	Complete	2000
Bakersfield	Kern	Current	2006
Baldwin Park	Los Angeles	Complete	1990
Benicia	Solano	Complete	1980
Buena Park	Orange	Complete	1953
Capitola	San Benito	Complete, Selected	1998, 1967
Carlsbad	San Diego	Complete, Selected	1997, 1980
Cathedral City	Riverside	Complete, Selected	1996, 1977
Cerritos	Los Angeles	Current	2007
Chico	Butte	Selected	2007
Chino	Riverside	Complete	1998
Chino Hills	San Bernardino	Complete	1991
Concord	Contra Costa	Current, Selected	2007, 1959
Corona	Riverside	Complete	1983
Covina	Los Angeles	Complete	2001
Cupertino	Santa Clara	Complete	1970
Diamond Bar	Los Angeles	Current	2000
Dixon	Solano	Current	1996
Downey	Los Angeles	Current	1995
El Cajon	San Diego	Current	1994
El Cerrito	Contra Costa	Complete	1993
El Monte	Los Angeles	Complete	2001
Elk Grove	Sacramento	Complete	2004
Encinitas	San Diego	Complete	1996

City	County	Information Provided:	Date:
Escondido	San Diego	Complete	1999
Foster City	San Mateo	Complete	1964
Fountain Valley	Orange	Complete	1965
Fremont	Alameda	Complete, Selected	2006, 1991
Fullerton	Orange	Complete	1994
Garden Grove	Orange	Complete	1989
Gilroy	Santa Clara	Complete	1984
Glendora	Los Angeles	Complete	1956
Hawthorne	Los Angeles	Current	2007
Hayward	Alameda	Current	2007
Hollister	San Benito	Complete	1986
Huntington Beach	Orange	Complete	1980
Huntington Park	Los Angeles	Complete	1986
Inglewood	Los Angeles	Complete	1978
Irwindale	Los Angeles	Current	2003
Kingsburg	Fresno	Current	2003
La Habra	Los Angeles	Complete	1986
La Mesa	San Diego	Complete	1979
Laguna Beach	Orange	Complete	1972
Laguna Hills	Orange	Complete	1991
Laguna Niguel	Orange	Complete	1990
Lake Forest	Orange	Current	2003
Lakewood	Los Angeles	Complete	1954
Lancaster	Los Angeles	Selected	1977
La Verne	Los Angeles	Current	2006
Lemon Grove	San Diego	Complete	1978
Livermore	Alameda	Compete	1885
Lodi	San Joaquin	Complete	1987
Loma Linda	San Bernardino	Complete	1970
Madera	Madera	Complete	1978
Martinez	Contra Costa	Complete, Selected	1993, 1976
Millbrae	San Mateo	Complete	1972
Modesto	Stanislaus	Complete	1911
Monrovia	Los Angeles	Complete	1997
Moorpark	Ventura	Complete	1995
Murrieta	San Bernardino	Current	2004
Norwalk	Los Angeles	Complete	1996
Oakland	Alameda	Complete, Selected	1993, 1978
Oceanside	San Diego	Complete	1994
Orange	Orange	Current	1999

City	County	Information Provided:	Date:
Palmdale	Los Angeles	Complete	1962
Palm Springs	Riverside	Current	2006
Palo Alto	Santa Clara	Selected	1999
Pico Rivera	Los Angeles	Complete	1979
Rancho Cucamonga	San Bernardino	Selected	1985
Rialto	San Bernardino	Selected	1996
Riverside	Riverside	Current	2001
Rocklin	Placer	Complete	1979
San Dimas	Los Angeles	Complete	1967
Santa Fe Springs	Los Angeles	Complete	1988
San Fernando	Los Angeles	Current	2002
San Juan Capistrano	Orange	Complete	1993
San Ramon	Contra Costa	Complete	1986
Santa Barbara	Santa Barbara	Current	2001
Santa Clarita	Los Angeles	Current	2004
Saratoga	Santa Clara	Current	2004
Tracy	San Joaquin	Complete, Selected	1993, 1976
Tustin	Orange	Current	2007
Upland	San Bernardino	Current	2000
Vacaville	Solano	Current, Selected	2006, 1965
Vallejo	Solano	Complete	1994
W. Sacramento	Yolo	Complete, Selected	2002, 1987
Westminster	Orange	Complete	1939
Winters	Yolo	Selected	2002
Woodland	Yolo	Complete	1967
Yorba Linda	Orange	Complete	1991

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