Stranded Costs: An Overview

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Abstract

The purpose of this article is to review the major results in the literature regarding stranded costs. Despite the starting differences in the areas of research included in the paper, they have one characteristic in common: all recognize that during the last decades, the treatment of stranded costs has been one of the most critical and controversial regulatory issue facing infrastructure industries, specially electric utilities, and regulatory agencies. To this end I attempt to describe the stranded-cost problem, its magnitude and the main arguments for and against recovery. I also seek to provide guidance about welfare implications and efficient recovery of stranded costs.

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1 Introduction

In recent years, regulated utility industries in many countries around the world are facing a massive process of restructuring and liberalisation in order to establish the basis for new competitive systems.[1] The expansion of competitive forces and associated structural and regulatory reforms present substantial, complex challenges and must face a diversity of transition issues. Recovery of *stranded costs*, as well as their assessment and treatment, seem to be a major obstacle to structuring a successful transition to deregulation and perhaps the most difficult and controversial issue confronting regulators in promoting competition in utility industries. Several authors recognize the relevance of this topic in the process of liberalization. Kahn (1998), referring to the process of liberalization in electricity markets, states "stranded cost compensation, i.e. the remuneration of sunk costs incurred in a regulated regime, but not recoverable after the market has been opened to competition, is a fundamental issue in electricity de-regulation." Kühn and Jullien (1998) also recognize that "...stranded assets has become a central problem in the liberalization of industries."

Stranded costs can be defined as those costs that cannot be recovered by regulated firms during the transition from traditional regulation to an open, competitive environment. The firms argue that the establishment of the new competitive framework interrupted the remuneration process under which companies undertook not only their investments on infrastructures but also their contractual obligations. On the basis of the existing regulatory setting, many assets were guaranteed a return which may not be recoverable following the introduction of a competitive market. Those costs, associated with these investments and contractual obligations and incurred by the utility companies under the old regulatory system, which become

[1] It includes the traditional natural monopolies such as electricity, natural gas and telecommunications in the United States, England and Wales, Norway, Sweden, Australia, Chile, Argentina, Venezuela and Spain.

uneconomic due to the introduction of a competitive market are known as *stranded assets*.

To understand the stranded-cost issue it is necessary to understand that its regulatory treatment has potentially enormous economic implications not only on utilities but also on their customers, regulators, and utility shareholders. The public debate on this issue centers around the following questions:

a. What are "*stranded costs*"? Is this a well-defined concept?.

b. Does a "*regulatory compact*" exist that justifies partial or full stranded-cost compensations? Is recovery necessary and appropriate?.

c. What type of utilities are most likely to demand stranded-cost compensation, and why should these utilities be permitted to recover stranded costs?.

d. Who must bear the payment of stranded costs, only ratepayers or should they be borne also by stockholders? Should they be paid also by new customers or/and competitors? How will stranded costs be allocated to the various groups (e.g., utility shareholders, taxpayers, retail customers and wholesale suppliers)?.

e. What is the appropriate magnitude of the stranded cost to be recovered by the utilities? Which methodology should be adopted for estimating stranded costs?.

f. Once the amount of stranded-cost compensation is determined, there remains the question of how to raise the money to pay shareholders.

g. To what extent the implementation of alternative mechanisms to recover stranded costs creates potential distortions in the recently created competitive markets? Are efficient competition and stranded-cost recovery necessarily incompatible?.

The answers to these questions are crucial and have fundamental implications for the efficient development of competitive markets, since any decision about stranded-cost recovery and their reallocation radically affects the eventual structure of the industry, and may become a principal obstacle to the transition to competitive markets. Furthermore, if these are not sufficient reasons to recognize the complexity of the topic I am dealing with, I must also note that, although transitional in nature, the public policy decision with respect to the correct treatment of stranded costs and margins is complicated because of the desire of legislators and regulators to achieve multiple, perhaps conflicting, objectives and the complexity of combining differing perspectives on issues of equity, efficiency and policy implementation. While regulators may accede to compensate stranded costs to existing companies, they often underestimate the difficulty of designing an appropriate mechanism for the recovery of stranded costs in a competitive system.[2] Certainly, not much attention has been paid to the potential distortions that the recovery of stranded costs can create in these recently created competitive markets. Existing economic theory does poorly at explaining these latent distorsions.

The purpose of this chapter is to review the major results in the literature regarding stranded costs. Despite the starting differences in the areas of research included in the paper, they have one characteristic in common: all recognize that during the last decades, the treatment of stranded costs has been one of the most critical and controversial regulatory issue facing infrastructure industries, specially electric utilities, and regulatory agencies. To this end I attempt to describe the stranded-cost problem, its magnitude and the main arguments for and against recovery. I also seek to provide guidance about welfare implications and efficient

[2]Kahn (1994), *Supra* note 5, at 35, asserts:

— it is at least as important from the efficiency standpoint that customers' decisions about whether or not to desert their present requirements suppliers be influenced by the proper signals, reflecting the respective true social (i.e., marginal) costs of the alternatives, as that the utility companies be enabled to recover their regulatory determined revenue requirements.

recovery of stranded costs.

The main body of the survey is divided into five sections. Section 2 focuses on the definition of stranded costs. In section 3, I study regulatory and legislative issues related to the stranded-cost issue. As I am showing later not only economists but also legal authors have dealt with the topic of stranded cost. Consequently, I attempt to provide guidance about the main considerations in this line of research as well as the theory of contracts applied to the stranded-cost issue. Sections 4 and 5 illustrate different theories on the estimation of stranded costs and discuss theoretical and empirical evidence on the competitive implications of mechanisms for the recovery of stranded cost. In addition, these sections are concerned with the potential distortions that the different mechanisms for the recovery of stranded costs, implemented in different countries around the world, can create in these recently created competitive markets. Finally, section 6 offers some concluding remarks.

2 Definition of Stranded Costs

With the introduction of competition many infrastructure industries claim to have suffered the erosion of their asset values. Because competitive pressures are expected in a perfectly competitive market to encourage the prices to fall to *avoidable costs,* there is no longer a guarantee of a remunerative price (covering costs already sunk) for existing firms. The establishment of the new competitive framework could create a decline in income streams, thereby causing a lower valuation of a given asset in the market. Utilities with production costs higher than those likely to prevail in the competitive market will be unable to fully recover the fixed costs of facilities that they own and operate to meet customer demand. On the basis of the existing regulatory setting, many assets were guaranteed a return that may not be recoverable following the introduction of a competitive market unless the

transition is compensated. Infrastructure industries argue that deregulation interfered with reasonable investment-backed expectations and thus constitute a taking. Consequently, utilities claim that deregulation has produced *stranded costs*.

Baumol, Joskow and Kahn (1994) point out that "...the possibility that existing utility costs will not be recovered is the product of the confrontation between our historic and continuing system of regulation and the entry of competition. The costs in jeopardy are the past investments, contractual commitments and deferred recoveries of expenses, previously reviewed and approved (and in some case, mandated) by regulators, that have not yet been fully recovered by utility companies and that could not recovered in a fully competitive market because competitors would bear no such burdens." Joskow (2000) defines *stranded* or *strandable* costs for the utility-owned generating plants "as the difference between the net book value of a generating plant used for setting cost-based regulated prices and the market value of that plant if it were required to sell its output in a competitive market." For contractual obligations, stranded costs are characterized by "the difference between the present value of the contractual payment obligations and the net present value of the competitive market value of the electricity delivered under the contracts."[3]

Some other terms have also been used by analysts generally to describe stranded costs: *strandable investments*, *stranded investments*, *stranded assets*, *stranded commitments*, or *transition costs.* A wider concept of what is called *strandable costs* is also claimed by the utilities. The firms argue that the establishment of the new

[3]Rose-Ackerman and Rossi (2000) indicate that "stranded costs occur when the costs of incumbent exceed the costs to new entrants because of the actions of the state, not because of changes in technology or other exogenous economic shocks." Sidak and Spulber (1997) define stranded costs as the "inability of utility shareholders to secure the return of, and a competitive return on, their investment." Focusing more on capital outlays, Hovenkamp (1999) identifies stranded costs as "investments in specialized, durable assets that may seem necessary, or at least justifiable, when constructed and placed into service under a regime of prices and entry controls but that have become underutilized or useless under deregulation."

competitive framework interrupted the remuneration process under which companies undertook not only their investments on infrastructures but also their contractual obligations. Those costs, associated with these investments and incurred by the utility companies under the old regulatory system, which become uneconomic due to the introduction of a competitive market are known as *stranded assets*. *Stranded liabilities* are primarily long term contracts most of them mandated by the regulatory entity.[4] Other elements included in the wider concept of stranded costs are *regulatory assets* and *stranded social programs*. The former are deferred expenses undertaken by regulated utility industries whose reimbursement was promised by the regulatory entity to be in the future in order to limit the impact of these investments in current regulated tariffs. The latter comprise a variety of social programs that the utilities have undertaken voluntarily or otherwise by virtue of being a regulated monopoly [Energy Information Administration (EIA) Report (1996)].[5]

The definitions have generally limited stranded-cost recovery to costs that are "legitimate, prudent and verifiable" and directly relate to government's actions in permitting competition for consumers. In 1994, the Federal Energy Regulatory Commission (FERC) issued a notice of proposed rulemaking on stranded costs in the electricity industry in which it defines wholesale stranded costs as "any legitimate, prudent and verifiable costs incurred by a public utility or a transmitting

[4]For instance, the 1978 Public Utility Regulatory Act (PURPA) in the United States required utilities to purchase power produced by certain Qualyfing Facilities (QFs), primarily cogenerators and small power plants using renewable fuels. A similar regulatory measure prevails at present in Spain where Spanish government requires utilities to purchase national coal despite their low quality and high prices [Kahn (1998)].

[5]Brenan and Boyd (1997), at 45, *cited in* Rose-Ackerman and Rosi (2000), *supra* note 77 at 28, also identify four types of stranded costs in the electric power sector: (1) Undepreciated investments in power plants that are more expensive than generators available today. (2) Long-term contracts most if not all mandated by PURPA. (3) Generators built but not used, primarily nuclear. (4) Expenses related to demand-side management (DSM) and other conservation programs that, as substitutes for new plant construction, were charged tot he generation side of the business.

utility to provide service to a wholesale requirements customer that subsequently becomes, in whole or in part, an unbundled transmission services customer of that public utility or transmitting utility."[6] Furthermore, in its Order 888, the FERC reaffirmed its preliminary determination "that the recovery of legitimate, prudent and verifiable stranded costs should be allowed."[7]

Most of the discussions relating to stranded-cost issues have been concentrated on the negative effect that the establishment of competition may have on utility earnings; however, only little attention has been paid to the positive effect that this liberalization process may also yield on utility returns. Therefore, stranded costs are usually defined as the potential monetary losses that utility shareholders or other parties might experience because of structural changes in utility industry. However, the transition to a competitive market could cause some rates to increase if the liberalized market price exceeds regulated rates. This problem may be specially acute for customers of lower cost utilities.[8] When competitive prices (i.e., market-driven) exceed regulated rates (i.e., cost-based), "*stranded margins*" are produced, rather than stranded costs. In a recent report submitted by the Staff of the Virginia State Corporation Commission I find the following statement "...it is quite possible that some of these [electric] utilities will have stranded costs while others will have stranded margins. It should be noted that each utility will have individual assets or contracts that will increase in value and other investments that will decline in value with retail competition. If rates across our state or region are

[6] *See Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Notice of Proposed Rulemaking*, Dkt. No. RM-94-7-000, 59, Fed. Reg. 35, 274 (prop. June 29, 1994).

[7] Federal Energy Regulatory Commission, Order No. 888, *Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities*, Docket No. RM95-8-000, and *Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Docket No. RM-94-7-001 (April 24, 1996), p. 451.

[8] The issue of stranded margins is specially significant in Virginia where several low cost electric utilities serve the state and much of Southwestern Virginia is supplied by one of the lowest utilities in the US. Legislation passed in June 1999 proposes to allow recovery of stranded costs in the electricity market through utility rates that will be capped through mid-2007, and a special wires charge on customers whoo choose to leave their utility for a competitior.

liberalized, some or perhaps many of our consumers may ultimately see increases in the cost of the generation component of their bill while others may see cost reductions."[9] Just as a decision must be made relative to the ability of high cost utilities to recover stranded costs, a decision must be made relative to the ability of customers of low cost utilities to retain the benefits associated with stranded margins. Hirst (1998a) recalls that "stranded costs can have both positive and negative values, although for many utilities the positive costs exceed the negative ones. It is important to calculate *net* stranded costs, rather than gross stranded costs, for a particular utility to avoid overestimating the actual stranded-cost amount. Gross stranded costs would consider only those assets with market values less than book values and ignore those assets and obligations with market values above book values." Advocates supporting utility recovery of stranded costs agree with the fact that consumers have been required to pay for historical investments made on their behalf. So that, as a matter of economic equity, they should also agree that these customers are entitled to the economic benefits arising from historical investments for which they have paid, the stranded margins.[10] Therefore, it seems vital that policymakers and regulators give due consideration to the implications and appropriate treatment of potential stranded margins as well as stranded costs as an symmetrical issue.

Stranded costs are not an isolated concern of the electric industry. Any time a previously regulated industry is introduced to competitive pricing concepts, strand-

[9]The Virginia State Corporate Commission, http://www.state.va.us/scc/, acts as one of Virginia's primary regulatory agencies, with oversight of varied business and economic interests throughout the Commonwealth. The State Corporate Commission's authority encompasses utilities, insurance, state-chartered financial institutions, securities, retail franchising, and railroads. *See* http://www.state.va.us/scc/news/streprt4.htm/ for more details about stranded costs and stranded margins in Virginia, and http://www.state.va.us/scc/news/streprti.htm/ for an overview of the liberalization process of the Virginia's electric utility industry.

[10]The Staff of the Virginia State Corporation Commission propose as a mechanism to resolve the stranded margins issue to require that low cost utilities provide their customers with a credit during a transition period or to provide these customers with some form of extended rate protection such as a rate freeze or rate cap.

ing of costs may occur. In fact, prior to the recent discussion of the possible implementation of competition for the electric industry, some deregulatory actions had taken place in the regulated natural gas and telecommunications industries (Tye and Graves, 1997). However, the stranded-cost issue is more prominent in the current electric industry restructuring debate than in the historical deregulation of other industries (Baumol and Sidak, 1995a; Brennan and Boyd, 1997; Hirst, 1998; Joskow, 1996; Kahn, 1994; *see* also Chapter 3 of this dissertation). In its Order 888, the FERC in the US allows recovery of stranded costs in then electric power industry through an "exit fee" charged to the departing customers. Likewise, the 1997 Electricity Act (Ley 54/97) in Spain includes a series of provisions to compensate the generation companies for these stranded costs and evaluates the procedures for calculating and recovering these costs.[11] With the exception of the natural gas industry, there was little or no attention paid to stranded costs in the discussions on airline deregulation, trucking deregulation, or telecommunications industry (Tye and Graves, 1997). The main reasons trying to explain this fact are the following: the size and capital intensity of the electricity industry, the long economic life of electric generation assets, and the potential impacts of financial disruptions of the interconnected grid are relevant characteristics that may help to explain why stranded costs have appeared and are used so extensively in the context of electric utility deregulation. The restructuring of the natural gas industry also involved a significant stranded-cost issue, but in a minor degree of importance than in the electric case. The FERC has addressed stranded costs and transitional restructuring costs on at least two occasions for the pipeline industry: First, with take-or-pay buyout/buydown recovery allowances and future gas supply inventory charges in 1987 under FERC Order No. 500, *Regulation of Natural Gas Pipelines*

[11] The 54/97 Electricity Act, *Law for the Electric Sector*, was passed by the Spanish Parliament on 27 November of 1997.

after Partial Wellhead Decontrol, on August 14, 1987,[12] and then for all remaining, but obsolete, merchant service costs and for new service restructuring costs in 1992 under FERC Order 636.[13]

Evidence of a stranded-cost problem in the telecommunications industry is revealed in the regulatory strategy of several regional Bell operating companies in the United States in the late 1980s and early 1990s, and in the large write-offs taken by all of the regional Bell operating companies in the period between 1993 and 1996.[14] Nevertheless,as Tye and Graves (1997) recognize, although financial statement evidence reveal that stranded costs has been an issue in the telephone industry, the term *stranded costs* has not been used until recently.[15] According to Sidak and Spulber (1997), who advocate a legal entitlement to recovery of stranded costs in the United States, "...the competitive transformation of local exchange telecommunications and the electric power industry raises significant questions about whether regulators should give a public utility the opportunity to recover its stranded costs."

[12]The take-or-pay issue was addressed in a number of ways. Pipelines and producers renegotiated contracts, and FERC in the United States required pipelines in certain circumstances to absorb a portion of the liability. Former pipeline sales customers, who had turned to transportation, were also required to pay a transition charge. Pipelines ultimately were required to unbundle services and separate their merchant function into a separate business from the pipeline business. Stranded costs were composed of long-term contracts between pipeline companies and producers that were priced higher than the new, competitive market price. Liability was addressed through negotiations with producers, recovery from customers, litigation, losses to shareholders, and, in one case, bankruptcy.

[13]FERC Order No. 636-A, *Order Denying Rehearing in Part, Granting Rehearing in Part, and Clarifying Order No. 636*, August 3, 1992, spells out the details.

[14]In 1982, AT&T agreed to divest its Bell operating companies (the companies providing intrastate service) as part of a settlement of a federal antitrust suit. as a result, seven regional Bell operating companies were formally spun-off from AT&T in 1984.

[15]*See* Tye and Graves (1997), at 225-249, for a more extensive discussion of the issue of deregulation and stranded costs in the natural gas pipeline and telecommunications industry.

3 Regulatory and Legislative Issues: The "Regulatory Compact"

Any firm in the market faces not just ordinary commercial risk, but also regulatory risks that proceed from the actions of the state itself. These state actions can undermine the profitability of firms in the market. It seems clear that infrastructure projects embody considerable risk for private investors since they involve high levels of fixed capital and long payback periods.

"Takings clause" requires the state to pay compensation when it "takes" property for public use and thus it reduces the risks faced by infrastructure investors by providing a guarantee against certain types of state actions. However, I must also recognize that this fact in no way implies that everyone harmed by government actions will or ought to be compensated. Thus, a key issue is to determine the line which divides the protection of property rights for the firms and the maintenance of government flexibility.[16]

A central issue in the stranded-cost debate is the justification for the existence of stranded costs. Is there any kind of justification that could made legitimate the claims for stranded-cost compensation by the utility industries? In deciding whether it is sustainable to compensate utilities for stranded costs, authors have tried to identify what obligations and guarantees were created among regulators and utilities on the basis of the former regulatory setting which could give utility industry the right to claim for compensations since new competitive frameworks have been established.

Some see the relationship between the state and regulated firms as essentially contractual (Baumol, Joskow and Kahn, 1994; Baumol and Sidak, 1995a; Sidak and Spulber, 1997). These authors describe it as a regulatory compact that imposed a burden on utilities and an obligation on the state, in a manner identical to

[16] *See* Rose-Ackerman and Rossi (1999) for a more extensive discussion.

a contract between private parties. Brennan and Boyd (1997) sustain that there are no explicit assertions of these obligations in regulatory agreements and consequently remark that "the stranded-cost issue turns not on explicit terms but on whether an "implicit contract" between public utility commissions and utilities mandates costs recovery in the event of competition." The argument developed by Sidak and Spulber (1997) to justify the recovery of stranded costs is as follows. They argue that government can be sued for breach of contract or sued under the takings clause of the Constitution if it does not act to protect expectations as it attempts to deregulate natural monopoly industries. Breach of the regulatory compact generates a decline in firms' investment-backed expected revenues, "takes" investors' property without compensation, and hence, authors consider the state responsible for providing a regulatory mechanism which compensates for the full value of lost expected revenues at the time the state makes a decision to deregulate. Against this argument, Rose-Ackerman and Rossi (2000) indicate the difficulty to infer ex post what the firms' legitimate expectation might have been because "there is no explicit contract guaranteeing the firm a rate of return on each specific investment." Baumol and Sidak (1995a) and Baumol, Joskow and Kahn (1994) justify the recovery of stranded costs on the grounds that regulators "previously reviewed, approved and in some cases mandated" these now stranded investments. Furthermore, the authors argue that in some cases regulators failed to allow utilities to respond to competitive risk and forced them to make inefficient power purchases.

Rose-Ackerman and Rossi (2000) identify several obstacles facing by the advocates of deregulatory takings arguments. First, they cite the fact that United States takings jurisprudence has never found that regulatory actions in infrastructure industries demand compensation. Second, the authors maintain that, except in a small number of cases, there are no explicit contracts guaranteeing a certain

rate of return on utilities' assets or promising to indemnify them against future changes in policy. Finally, they argue that utilities were not induced to invest by eager regulators, but instead they pushed the regulators to permit high levels of investment. The authors' point of view is that courts should treat the deregulation of public utilities as an exercise of government policymaking authority that does not require compensation of stranded costs. Rossi (1998), in a review of Sidak and Spulber's article, doubts the ability of a firm to prove that the state's breach of the regulatory compact is casually related to the damage it claims it suffered. Moreover, assuming a taking can be established, the author remarks the difficulty or impossibility to prove the damages ex ante. VanDoren (1998) sustains that such compensation is not justified, critiques the predominant view that consumers should pay and argues that shareholders of utilities have already been compensated for the risk of a loss of wealth created by changes in regulation and, thus, should suffer any losses that occur.

3.1 Arguments For and Against Stranded-Cost Compensations

A vast literature has discussed the advantages and disadvantages of stranded-cost compensations. There are convincing arguments both for and against compensating utility shareholders for stranded costs. A review of some of the arguments for and against stranded-cost recovery is the following.

Arguments in favor of compensation mainly fall in with equity and efficiency considerations. Each of these points is addressed in turn.

An equity justification for allowing stranded-cost recovery is based on the existence of the regulatory compact between utilities and the state legislators. Regulatory compact theory is articulated most thoroughly in Baumol, Joskow and Kahn, (1994), Baumol and Sidak (1995a) and Sidak and Spulber (1997). The argument

suggests that utilities incurred costs to fulfill its legal obligation to provide adequate and reliable service within their exclusive territory. With the regulatory compact the symmetrical allocation of risk between investors and customer is preserved as it is the case in unregulated markets. Investors in unregulated industries bear the full cost of investments that turn out badly but retain all profits of successful ventures. In the utility industries, shareholders have been limited to regulated earnings in exchange for more stable profits and the opportunity to recover their approved costs. Advocates of stranded-cost recovery allege that to allow the consumer to abandon the financial support of investments legally required on behalf of that consumer and transferring this burden to utility investors is thus unfair. Although almost all work on stranded costs is theoretical, a paper by Kolbe and Tye (1995) shows empirically that the return earned by utility investors is much too low to compensate them for the risks to their investment created by uncompensated deregulation.[17] Baumol, Joskow and Kahn (1994) and Baumol and Sidak (1995a) support this argument and sustain that utility shareholders were never adequately compensated, through their utility allowed rates of return, for the risk that the regulatory compact would be rewritten. Furthermore, the authors claim that a breach of this regulatory contract will preclude investors from obtaining a reasonable return which constitute a "taking" of the utility's property in violation of the Takings Clause of the Fifth Amendment.[18]

Efficiency grounds for recovery of stranded costs are the following. Several authors claim that properly structured, recovery of stranded costs can be compatible with efficiency (Baumol, Joskow and Kahn, 1994; Joskow, 1996; Tye and Graves, 1997; Gordon and Olson, 1999; *see* also Chapter 4 of this dissertation). Baumol and Sidak (1995a) argue that recovery of stranded costs will serve to protect the

[17] For more extensive analyses, see Kolbe and Tye (1996).

[18] U.S. CONST. amend. V ("nor shall private property be taken for public use without just compensation").

long-term interests of consumers, because failure to do so could undermine economic efficiency by raising the cost of capital to utilities above the competitive level, or by creating an enduring shortage in investment for them. There is also a strong efficiency reason for allowing recovery of stranded costs, which is to honor regulators' promises. Credible government is key to a successful market economy, because it is also important for encouraging long-term investments. Baumol and Sidak (1995b) study the problem of transmission pricing and stranded costs in the electric power industry, and recognize that failure to ensure recovery of stranded costs may deter future investments in regulated industries. Baumol, Joskow and Kahn (1994) argue that allowing customers to avoid paying historic costs will promote productive inefficiency and it will only shift the costs to other customers or to investors. The authors argue that in the absence of stranded-cost recovery mechanism stranded costs may represent an artificial competitive asymmetry in favor of entrants that would not arise in a purely competitive market. In Chapter 3 of this dissertation, I develop a theoretical model that explicitly takes into account the mechanism designed in the recent Spanish Electricity Law for settling stranded-cost payments, the competitive transition charges (CTCs), and proves that, under ideal conditions, stranded-cost recovery payments can be used as a versatile regulatory tool to encourage competition and achieve allocative efficiency. Other arguments in favor of stranded-cost recovery payments are those that claim that denying utilities recovery of stranded costs will only delay competition by encouraging litigation and adversarial regulatory proceedings.

Critics of stranded-cost recovery frequently argue that there is no clause in the regulatory compact, explicit or implicit, that requires the government to compensate utilities for stranded costs (VanDoren, 1998; Hovenkamp, 1999; Rossi, 1998). Thus these authors sustain that firms should have internalized these risks in making their investment choices. Rose-Ackerman and Rossi (2000), in an extensive

analysis of takings law and political and regulatory risks in private infrastructure investment, sustain that no government should indemnify investors against all of the hazards of business life. The authors consider deregulation of public utilities as an exercise of government of policy making authority that, in general, does not require compensation of stranded costs. However, the authors also reflect that a remarkable exception should be made for clearly uneconomic investments required by government policy objectives such as the encouragement of alternative resources. Stelzer (1994) and VanDoren (1998) claim that investors in utility industries need not be reimbursed stranded-cost recovery payments because they have been previously compensated for the risks of stranded assets. Furthermore, VanDoren's paper revises the work by Kolbe and Tye (1995) and identify the possible errors that allow the authors to conclude that it is mathematically impossible for investors to have been previously compensated for regulatory risks. VanDoren sustain that market compensates investors ex ante for the risk of policy change, particularly in regulated markets, because everyone knows that the privileges granted by government can also be withdrawn. Thus the author consider that compensation is neither efficient nor equitable. In Chapter 4 of this dissertation, I analyze strategic incentives and welfare implications created by the settlement of competition transition charges in the markets to allow utilities to recover stranded costs. In particular, his model suggests that defining the transition charges ex post on an on-going basis, which is contingent on market outcomes, may interfere with rational behavior in the market, modifying the strategic incentives of the firms. In this case stranded costs affect not only the distribution of wealth but also the total amount of social welfare in the economy. The author demonstrates that an unappropriated design of the stranded-cost recovery mechanism may deliver productive inefficiency in the market and delay or prevent desired new competition.[19] A paper by Lasheras

[19]For a more extensive discussion against stranded cost compensation, see also Penn (1994), Michaels (1996) and Thierer (1997).

(1998) evidences that "[T]here is no reason to pay for stranded costs when market power exists in energy markets. Only full and effective competition could justify the legal acknowledgment of stranded costs."

3.2 A Risk Analysis of the Regulatory Contract

As I have already discussed not only economists but also legal authors have dealt with the stranded-cost problem as one related to the theory of contracts. Furthermore, it is heavily extended that stranded-cost justification turns not on explicit terms but on whether an "implicit contract" between public utility commissions and utilities mandates costs recovery in the event of competition.

An interesting line of research in this direction is due to Brennan and Boyd (1997). They turn to the economic theory of contracts to understand how an implicit regulatory compact between utilities and regulators would follow principles in the economic analysis of law, particularly theories of efficient breach and implicit contracts. As applied to stranded-cost recovery the authors consider adaptation, opportunism, insurance and moral hazard issues to clarify whether there should be a legal duty to compensate utility shareholders for stranded costs. A risk analysis of the implicit regulatory contract should consider two factors: first, "which party could be best adapt to or insure against the risk that a costly contingency would ensue"; and second "moral hazard, i.e. which party could mitigate damages at least cost by changing the likelihood of that contingency arising or the magnitude of costs due to breach of the contract." In the same spirit Brennan and Boyd (1995) and Boyd and Brennan (1996) consider a general theory of compensation that takes the government as an agent with numerous principals and show that properly designed takings policy could prevent disproportionate utility influence over policy decisions regarding the transition to competition in utility markets. Boyd and Brennan (1996) evaluate the desirability of compensation for regulatory

takings. To do so, the authors describe a public choice model in which regulators' decisions are influenced by competing political interests and consider how the political incentives of landowners, environmentalists, and taxpayers are affected by alternative compensation rules.

Turning on the public choice theory in law, Rossi (1998) considers that because contracts governing all risks are costly to write ex ante, some mechanism for interpreting risk bearing ex post, such as superior risk bearer analysis, is necessary. The author claims that regulators should consider not only reliance interests and expectations, as Sidak and Spulber (1997) urge, but also the relationship between the risk and incentives. They then reflect that "[c]ompensation may create additional incentives favoring government regulation regardless of whether this is welfare enhancing. For this reason, the optimal compensation scheme from and economic efficiency perspective may provide for only partial indemnification of expectation or reliance losses from changes in regulation". If firms anticipate that their costs will be reimbursed no matter what the competitive environment, they have an incentive to overinvest. Rose-Ackerman and Rossi (1999) analyze private-investment issues concentrating upon the use the government intends to make of the property. They distinguish between improvements to property that the government will use and improvements that it will destroy and sustain that on this first efficiency ground only the former should be compensated. Full compensations in other cases will be inefficient because it will produce overinvestment by private individuals-the Averch-Johnson effect.[20] Their paper also analyzes insurance issues and the problem of risk spreading motivated by the uncertainty inherent to public policies. They conclude that whether the ex ante probability of being harmed is broadly distributed and if no compensation is paid, then we can see that the uncertainty created by the threat of harm may lead risk neutral and risk averse

[20] See Averch and Johnson (1962) for more details.

investors to underinvest.[21]

Apart from the previous argument voting for partial recovery of stranded costs, there are other convincing arguments both for and against full stranded-cost recovery. For instance, while stranded-cost recovery may appear appropriate from the standpoint of fairness, if full stranded-cost recovery is guaranteed, incentives to mitigate stranded costs, through prudent cost reduction, renegotiation of long-term obligations, aggressive marketing of available energy and capacity, and avoidance of additional strandable investment, may disappear. However, if only partial recovery of prudent stranded costs is allowed, then symmetry may require that utilities be allowed to retain a portion of the gain from mitigation efforts or a portion of stranded benefits if the utility's cost is below market prices. The literature available on the subject suggests that incumbent utilities in both the natural gas and telecommunications industries received partial, not total, recovery of any stranded costs they incurred as a result of the move to competition (Tye and Graves, 1997).

4 Stranded-Cost Magnitudes and Estimation Methods

It must be understood that a stranded-cost program must delineate a method of measuring stranded costs as well as a method of paying them. As difficult as the debate over the payment of stranded costs might be the discussion about the appropriate method of estimating stranded costs. The definition and determination of stranded-cost amounts is a critical policy issue on which legislators and regulators will play a key role.

Although transitional in nature, the public policy decision with respect to the appropriate magnitude of stranded-cost compensation is extremely controversial,

[21] The authors sustain that "underinvestment would not occur if insurance were available, but the risks discussed here are not always insurable in the private market both because of the arbitrary incidence of harm and the problems of moral hazard and adverse selection".

largely because the value that enter into the calculation (in particular, the future market prices) are uncertain at any point in time. Estimates of stranded costs and margins are dynamic in nature since they are a function of long-term market price objections, on forecasts relating to unpredictable future events, and embedded costs. Significant, but unknown, future events could dramatically impact market prices and, therefore, actual stranded costs or margins. And thus, estimates of projected stranded costs may vary widely depending on small changes in the critical assumptions and methodology over which there can be disagreement. Initial estimates of stranded costs in electrical utility deregulation in the United States ranged from $10 billion to $500 billion. National Economics Research Associates (NERA), for example, estimates the stranded costs for the US electricity industry to be the difference between the short-run marginal costs of generation (in the range of 2 to 3 cents per kilowatt-hour) and the average costs (in the range of 5 cents per kilowatt-hour) for an unknown time period, so that its estimate of $500 billion is at the upper bound of the spectrum.[22] Moody's Investor Service's estimate of total stranded costs for the investor-owned electric utilities is in the range of $50 billion to $300 billion, depending on market price assumptions.[23] The large divergence in estimates of stranded costs again reflects the difficulty of defining and quantifying stranded costs.

However, the objective of all stranded-cost approaches is to compare the regulated value of assets with their market value. Summing up, the estimation approaches fall essentially into two categories: *top-down approaches* and *bottom-up*

[22] *See* National Economic Research Associates, '*Rewriting the Rules of the Road: Retail Wheeling and Competition in Electric Generation*' (New York, NY, March 1994), *cited in* EIA Report (1996) at 79.

[23] Defining break-even price as the minimum price that a utility must charge to fully recover its fixed production costs, Moody's estimates the difference between a utility's break-even price and the market price for that capacity. Multiplying the difference by the total of a utility's capacity enables the derivation of stranded costs for any given year. These projections are extended for a 10-year period and then appropriately discounted to yield a net present value.

approaches (Hirst, Hadley and Baxter, 1996; Hickey 1998; Hirst, 1998). Top-down approaches look at the loss in revenue (for a given number of years in the future) as a market price changes and compute the present value of stranded costs. It calculates the difference in revenues under a regulatory regime and those likely to accrue with the commencement of competition. Bottom-up approaches compute the present value of its individual utility assets and compare the resulting valuation with its sunk or historical costs. While bottom-up approaches are especially data intensive and time consuming, they allow the estimation of stranded costs using the individual asset or liability as the unit of observation. So that, they can identify specific assets that are uneconomic. A top-down approach cannot, since it treats the utility as the unit of observation. This type of approach is much simpler than a bottom-up approach; however, it is also much less detailed and, therefore, provides few insights into the specific assets and liabilities (Hickey, 1998; Hirst, 1998). Baxter and Hirst (1995) categorize the alternative approaches along three dimensions. The first dimension is the use of *administrative* vs *market procedures* to value the assets in question. The second dimension concerns when the valuation is done, before or after the commencement of transition to competition, what is called *ex ante* versus *ex post* methods. The third dimension concerns the level of detail involved in the valuation: top-down vs bottom-up valuation. An interesting analysis about market valuation and administrative estimation methods can be found in Hirst (1998) and a Report of the Missouri Public Service Commission Task Force on Retail Electric Competition in Missouri, Missouri PSC Case No. EW-97-245.

Summing up, the alternative ways to compute stranded commitments can be compiled in the following table, which provides possible combinations of the approaches discussed above:

Table 1: Alternative Methodologies for Estimating Stranded-Cost Obligations

	Administrative Valuation		Market Valuation	
	Ex ante	**Ex post**	**Ex ante**	**Ex post**
Bottom-up	Asset-by-asset value projections	Assets valued after restructuring	Assets sold at auction	After-the-fact purchase-price adjustment
Top-down	Projection of regulated rate by customer class	After-the-fact adjustment of regulated prices	Bundles of assets spun off	Deferred valuation of spun-off assets

Source: Oak Ridge National Laboratory, *Estimating Potential Stranded Commitments for U.S. Investor-Owned Electric Utilities*, ORNL/CO-406 (Oak Ridge, TN, January 1995), pp. 7.

Several "mixtures" of many of these methods (reflecting both an administrative approach and an element of market information) for quantifying stranded costs have been proposed in the electric industry restructuring debates that are taking place across the world. In its recent filing with the Public Service Commission of New York, the Niagara Mohawk Power Corporation opted in favor of a hybrid approach for estimating strandable costs, using several of the above methods. Its preferred method was ex-ante, top-down, and administrative. Nevertheless it will also use a bottom-up approach to identify the source of deficit, and the utility proposes to make ex post adjustments to market electricity prices in an attempt to fine tune the estimates. In addition, the Illinois Commerce Commission used a top-down approach in estimating stranded costs for Commonwealth Edison Company and Illinois Power Company (Hickey, 1998). In other cases, I can find that several states (e.g., California and Massachusetts conditioned stranded-cost recovery on the utilities' willingness to sell substantial portions of their generating assets. In fact, several articles in the December 1997 issue of *The Electricity Journal* discuss the use of auctions to establish a market value for generating units in order to obtain

an accurate measure for stranded-cost compensations (Cameron, Cramton and Wilson, 1997; Rothkopf, 1997). Cameron, Cramton and Wilson (1997) describe the options for measuring stranded costs and argue that a simultaneous ascending auction is the best approach. The auction method is being implemented by Pacific Gas and Electric Company (PG&E) and Southern California Edison Company (SCE) in California, the New England Electric System (NEES), COM/Electric, Eastern Utilities Associates, and Boston Edison Company in Massachusetts, and by Central Maine Power Company and Maine Public Service Company in Maine, among others.

Regardless of the method used to estimate the amount of stranded costs, one must make certain assumptions. As I have already recognized, variances in available estimates of stranded costs and margins stem from the assumptions made with respect to critical variables in the process. A further discussion of the main factors affecting stranded-cost magnitudes is developed by Hirst (1998) who recognizes that most important determinants affecting stranded-cost magnitudes in the electric-utility industry include the future market price of electricity, the extent of retail access, when retail access begins, the amount of utility regulatory assets, and utility fixed production costs. Other factors that affect stranded-cost estimates are the relevant time periods (i.e., the book lives of the relevant assets and liabilities or the number of years used in computing stranded investments) or discount rates. Because so many assumptions are required to develop estimates of the dollar amounts at stake and because of the difficulty of the estimation several authors support that flexible and adaptive mechanisms for their recovery ought to be allowed (Hirst, 1998; Tye and Graves, 1997).

Stranded-cost case studies are developed by Hirst (1999) and Hickey (1998). The former paper focuses on the treatment of stranded costs in three states in the United States, California, Massachusetts and Pennsylvania, and also reviewed the

status of stranded-cost resolution in Arizona, Connecticut, and Montana. These states are among the most advanced in their implementation of retail competition and treatment of stranded costs. Hickey's report describes the Illinois Commerce Commission's top-down method for estimating stranded costs, explains the assumptions underlying the analyses, and produces a range for Commonwealth Edison Company's and Illinois Power Company's exposure to stranded cost. In a similar work for Spain, the *Comision Nacional del Sistema Electrico,* in Docket. No. I 044/98, *Sobre la Modificación de la Ley 54/1997 por la que se conceden derechos a cinco empresas eléctricas por valor de 1,3 billones de pesetas no determinados en la Legislación vigente*, (December 10, 1998), focuses on the global method to calculate the amount of stranded costs for the Spanish electricity industry.[24] This document evaluates the sensitivity of the stranded-cost estimations to the assumptions made during the calculation process and concludes that the results showed a high sensitivity to small modifications of the critical assumptions, specially of the residual economic life of present generation capacity. The CNSE disapproves the method reflected in the Law 54/1997 to estimate the stranded costs and recommends a bottom-up approach in which is compared, unit-by-unit, the net book value of the individual utility assets to the market value of those assets.

5 Stranded-Cost Recovery and Efficient Competition

Separate from the debate over "How much should utilities be allowed to recover?" is the question, "How do you recover it?." The answer to this question has fundamental implications for the efficient development of a competitive market. While regulators may accede to the recovery of stranded costs for the existing compa-

[24]The 1997 Electricity Act (Law 54/1997), approved by the Spanish Parliament on November 1997, defined the procedures for calculating and recovering the stranded costs in Spain.

nies, they not infrequently underestimate the difficulty of designing an appropriate cost-recovery mechanism in a competitive system. Kahn (1994), *supra* note 5, at 35, asserts: "...[I]n its recent notice of proposed rulemaking on the problem of stranded costs, the FERC devotes much of its attention to alternative possible methods of recovering these costs. It is important that the Commission keep in mind the perhaps greater importance of the goal of keeping competition efficient."

Certainly, not much attention has been paid to the potential distortions that the recovery of stranded costs can create in these recently created competitive markets. Existing economic theory does poorly at explaining these latent distortions. In considering the competitive implications of stranded-cost recovery, it is also important to recognize that participants may behave in an anticompetitive manner. Stranded-cost recovery is held by some to be anticompetitive because these provisions necessarily lead to inefficient competition and they are an impediment to a successful transition to deregulation. Specifically, the concern is with market power, and the possibility that providing stranded-cost recovery to incumbent utilities will provide increased opportunities for anti-competitive behavior. Furthermore, stranded-cost recovery may have negative impacts on the dynamic efficiency of utilities and lead to predatory pricing, cost shifting, and inefficient despatching that will distort competition among generators, shielding high-cost utilities from lower-cost competitors, distort price signals, and promote barriers to entry, etc. (Penn, 1994; Navarro, 1996; Thierer, 1997, Kühn and Regibeau, 1998; Lasheras, 1998). According to this theory, stranded-cost recovery will act as a subsidy to those providers that are less efficient or economical. A policy of recovery could also discourage entrance into the market of new competitors, who must attempt to recover both fixed and variable costs in the prices charged, while the incumbent needs to compete only on variable incremental costs because the presence of non-bypassable stranded-cost charges covers its fixed costs. Similarly,

stranded-cost recovery policies based on rate freezes which deny consumers access to competitive markets until the incumbent has paid down its fixed costs could create potential "super competitors," again placing potential competitors at a disadvantage.

Several parties opposed the settlement of stranded-cost recovery payments, because high stranded-cost recovery makes the amount of money the customer can save by switching suppliers so small that even low cost competitors cannot afford to sell at a price below that level; and thus a competitive market will not develop. Hirst (1999) recognizes this problem in its stranded -cost case study for Pennsylvania. In this state the legislation established a cap on rates to ensure that the total charges for retail electric service do not increase above the levels during the transition period. Some participants opposed this settlement because "the generation rate cap created a *shopping credit* that, in the view of the power marketers, was too low to permit the entry of competitive suppliers.[25] In Chapter 4 of this dissertation, I develop a dynamic model of Cournot competition which takes into account competitive transition charges (CTC), a particular regulatory mechanism regularly employed in United States and also in Spain for settling stranded-cost payments. I demonstrate that an inappropriately designed mechanism may deliver productive inefficiency in the market, distort price signals and delay or prevent desired new competition.

However, several authors demonstrate that there is not necessarily a conflict between stranded-cost recovery and efficient competition, and propose reasonably straightforward methods to implement fair stranded-cost recovery policies (Joskow, 1996; Tye and Graves, 1997). In a context of liberalization of entry Kühn and Jullien (1998) show how optimal regulation involving a menu of price caps and price

[25]Hirst (1999), at 369, defines *the shopping credit* as "the amount that the incumbent utility is allowed to charge retail customers for generation services. It is therefore the maximum amount that a competitive supplier could reasonably charge and still hope that customers would select it as their supplier."

floors could optimally finance stranded assets when government transfers to firms are not permitted and sunk investments cannot be financed through public funds. Kahn (1994) and Joskow (1996) also deal with the stranded-cost issue. While Kahn (1994) discusses the need for the coexistence of competition and regulation in the electric power industry, Joskow (1996) provides simple mechanisms to implement stranded-cost recovery policies that are "fair to investors and promote efficient competition." In Chapter 3 of this dissertation, I develop an auction model to analyze spot market competition with stranded costs in the deregulated Spanish electricity market in an static duopolistic game, and I also confirm that "the implementation of stranded-cost recovery in the market does not necessarily create additional market distortions, at least no more than those that already appear in a typical spot market without stranded costs." Baumol and Sidak (1995a) go further and maintain that recovery of stranded costs is not against the interests of consumers. In fact, the authors claim that recovery of then serves to protect the long-term interests of consumers, because failure to do so can undermine economic efficiency by raising the cost of capital to utilities above the competitive level, or by creating an enduring shortage in investment for them. They then argue that failure to ensure recovery will discourage future investments in regulated industries. The basis of their argumentation is what they consider the disparity in obligations between the utility and its competitors which, from their point of view, undermines the competitive market's ability to enforce efficiency in the industry. Rather than a competitor facing barriers to entry, the authors consider that the utilities currently serving the market faces "incumbent burdens."

5.1 Candidates Mechanisms for Recovery of Stranded Costs

If stranded-cost compensation must be made, the regulator would like to know which kind of stranded-cost recovery mechanisms are appropriate for providing

the correct economic incentives to facilitate efficient competition. There seems to be a consensus among the analysts dealing with the stranded-cost issue that competitively neutral and non-bypassable mechanisms should be designed to allow competition to proceed efficiently (Baumol, Joskow and Kahn, 1994; Gordon and Olson, 1999). On one hand, this implies that suppliers must compete and succeed or fail on the basis of their relative incremental costs, the *parity pricing principle*.[26] On the other hand, *non-bypassable property* means that the recovery mechanism must be designed so that no customers can escape or bypass their responsibility to pay for their share of the costs associated with the transition.[27] Furthermore, stranded-cost recovery methods must be also combined with the allowance for the incumbent to recover the correct amount of stranded-cost compensations.

The desired objectives that stranded-cost recovery mechanisms should hold also include short-term rate reductions; promotion of competition and retail choice; a short transition period; and utility recovery of its legitimate, verifiable, and prudently incurred stranded costs (Hirst, 1999). An extension of the goals for the recovery mechanism for stranded costs are enumerated in Tye and Graves (1997). The authors present as other objectives of stranded-cost recovery mechanisms allowing both incumbent and entrants the opportunity to compete on equal terms, limiting the duration and magnitude of the recovery mechanism in the transition only to true stranded costs, allowing all competitors to realize the competitive advantages of any true efficiency gains they have going forward, minimizing costs of administering the transition; and ensure that the transition costs are borne by customers in an equitable way. In addition, they identify relevant characteristics that satisfactory stranded-cost recovery mechanisms should try to adequately meet: "[A]cceptable stranded-cost recovery mechanisms should try to satisfy as

[26] *See* Baumol, Joskow and Kahn (1994), at pp. 44-49.

[27] The FERC recognized in Order 888 that competitively neutral and nonbypassable mechanisms for recocering wholesale stranded costs can be designed and implemented.

many as possible of the following criteria: reliable cost recovery, competitive neutrality, allocational efficiency, fairness of incidence on customers, transparency and predictability, administrative simplicity, objectivity (few concerns about biases or distortions in the estimates), automatic termination ("sunsetting"), and incentives to mitigate."

The method of recovery of stranded costs can be controversial. There are numerous examples of raising revenue through competitively neutral methods (Joskow, 1996; Smith, 1996; Tye and Graves, 1997; Van Doren, 1998). Sale taxes are one example. They create no artificial competitive advantages and disadvantages as long as the costs of historical commitments are assessed in a non-discriminatory manner against all competing suppliers, including the incumbent utility. That should be accomplished by separating the surcharges completely from electricity use. An efficient system may use access or lump-sum fees to transfer funds between consumer and producers and allow the recovery of stranded-cost compensations without affecting the market equilibrium. Several authors have proposed a simple two-part tariff over unit-cost recovery as an efficient mechanism to be implemented to recover stranded costs. Suppose there are n homogeneous consumers who demand for power and S is the amount of stranded costs that regulators have mandated that utilities be allowed to recover. The efficiency access fee is S/n per period per customer. This has no impact on the unit price of electricity and assuming no income effects in demand generated by this access fee, the demand is unaltered. An alternative to two-part tariff is to use a general income tax levy and pay these proceeds to the electric utilities to cover their lost income from lower electric prices. Given that almost all income-tax payers are also electricity consumers, the distinction nearly vanishes. A different approach is to recover stranded costs from customers as they leave in the form of an exit fee (Fox-Penner, 1997). Tye and Graves (1997) present an interesting analysis of diverse stranded costs charges (exit

fees, entrance fees...) and show the robustness of the various collection methods with regard to competitive neutrality. Alternatively, utilities could recover the stranded costs in the form of a non-bypassable usage fee, or access price for rights to access the incumbent utility's transmission and distribution facilities. In this direction, Baumol, Joskow and Kahn (1994) propose a charge that competitive suppliers pay as part of the price for access to the utility and distribution system as the means to recover stranded costs. It remains imperative that the resulting transmission prices satisfy the parity principle. Stranded costs, in the context of access charges, are also discussed in Sidak and Spulber (1997). In an interesting paper, Berry (2000) explores how the principles of Ramsey pricing can be applied to the particular problem of network access pricing and stranded costs when there are multiple consumer groups with differential propensities to exit. In particular, this paper focus on differentiation between the individual customers elasticity of demand for electricity and the elasticity of exit and proposes that with the inclusion of a one-time exit fee, the optimal access charge for every class should be equal to the marginal cost of transmission and distribution.

Summing up, if the regulatory authority decides that stranded-cost recovery compensations must be paid, analysts agree that these costs should be recovered efficiently via a two-part, access charge tariff or a general tax levy and subsidy that does not distort the relation between the price of the good and the marginal cost of production. But if this is the case several case studies confirm that this has not always been the methodology chosen by the regulators in order to implement stranded-cost recovery mechanisms. For instance, Gordon and Olson (1999) studies wholesale stranded-cost policies of the FERC in the United States. In Order 888, the FERC allows the utilities the recovery of the stranded costs through an exit fee charged to departing customers that is equal to the estimated total dif-

ferential in utility revenues incurred because of the customer's departure.[28] The authors claim that the inefficient stranded-cost recovery policies that have been implemented through the Order 888 threaten to introduce inefficiencies during the transition to competition in the form of uneconomic bypass and uneconomic new entry. In recent jobs, several authors analyze a particular regulatory mechanism regularly employed in the United States and also in Spain for settling stranded costs payments, the competitive transition charges (CTC) and demonstrate that an unappropriated design of this particular stranded-cost recovery mechanism may deliver productive inefficiency in the market, distort price signals and delay or prevent desired new competition (Lasheras, 1998; Borenstein, Bushnell and Wolak, 2000; *see* also Chapter 4 below).[29]

In California, the recovery of stranded costs has been split into two components: an amount defined ex-ante, which is to be securitized, and an amount to be defined ex-post on an annual basis as the difference between the spot market revenues and generation related revenue entitlements. The utilities are not guaranteed recovery of all their uneconomic costs, and all customers must pay a stranded cost or CTC to the utility distribution company.[30] The extent of stranded costs per se are not defined in advance, but are calculated as a residual on an on-going basis, once the market price is known as the difference between the revenue entitlements and the market price. In the June 11, 1996 Decision the Commission set the 1998 forecast for the market price of power at 2.4 cents/kWh. Thus, in 1999, there will be a true up to account for the difference between the estimate of 2.4 cents/kWh and the actual market price. This reconciliation process will be carried out annually. A

[28] As an example, we can see that stranded costs are recovered through exit fees charges in Michigan, Alabama or Virginia in the United States.

[29] California, Arizona, Arkansas, Illinois, Montana, Ohio, Oklahoma, Rhode Island, Pennsylvania are states that have authorized CTCs as the mechanism employed to recover stranded costs in the United States.

[30] The Californian approach to CTC recovery in the electricity industry is established in the California State Assembly Bill AB1890 of September 23, 1996.

similar approach has been implemented in Spain for the recovery of stranded costs whose annual amount varies depending on the price level in the wholesale market. The stranded component is calculated in a way that moves inversely to the energy price, the higher the energy price, the lower the CTC component. Several authors sustain that this agreed mechanism to compensate incumbents for their stranded costs is highly distortionary since it gives the incumbent utilities the possibility to act strategically with respect to the pool price and, for instance, delay or prevent desired new competition. Obviously only incumbent firms are allowed to receive stranded-cost compensation. The basis of their argumentation is that as long as the stranded-cost component paid by all consumers is contingent on the energy price, it could interfere with the rational behavior of the agents acting in the market giving them incentives to manipulate them. Note that incumbent players in the market make their performance conditional on the joint maximization of profits based on combined revenues from the market place and stranded-cost remuneration. These compensations thus may allow incumbents to set lower prices and thus deter entry at lower cost (Kühn and Regibeau, 1998; *see* also Chapter 4). In addition, since the final price is now altered by the introduction of a new element, the CTC component, in the profit function of the firms then now we have that stranded costs/benefits are no more a simple transfer of wealth among incumbents and end-use consumers, a wealth-sum-zero game. In this case stranded costs affect not only the distribution of wealth but also the total amount of social welfare in the economy. Precisely, this fact is analyzed in Chapter 4 below in which I focus my analysis on the welfare implications and price incentives created by the settlement of stranded-cost recovery mechanisms through CTC in a dynamic market.

5.2 The Role of Securitization

Securitization is a financing technique that can be applied to stranded-cost collection. Under a securitization procedure, the state legislature or state regulatory commission irrevocably orders that consumers pay a separate charge as part of their overall bills to allow a utility to recover an identified portion of its stranded costs. Utility customers would be charged a special tariff that would be irrevocable, limited to a set period of time and collected by the utility through a non-bypassable charge to all customers. All or portions of this tariff can then be securitized through the sale of the right to this cash flow to a special-purpose vehicle that will issue securities backed by these irrevocable cash flows. And thus, securitization of the tariff allows utilities to recover allowable stranded investments upfront, rather than overtime.

Legislation in the United States allows utilities to finance the recovery of large portions of their stranded costs by issuing bonds backed by special tariffs designed to recover theses cost in most of their states. Between 1996 and 1997, California, Illinois, Massachusetts, Montana, Pennsylvania and Rhode Island enacted electric restructuring legislation providing for deregulation, stranded-cost recovery and securitization of the tariff (Jones, Pedendergast and Sebastian Fichera, 1998).[31] An agreement was also taken in Spain at the end of 1998 between the Ministry of Industry and electric companies in order to securitize a major part of stranded costs. The relevant change on stranded-cost recovery procedure in Spain was put into force at the end of 1998 by an amendment of the 1997 Electricity Act.[32] According to this agreement, the maximum amount to be perceived as CTC's by the Spanish utilities, Ptas 1,693,285 millions, was transformed in a fix quantity

[31] *See* also Richer (1996) for a more extensive description of the securitization process in California.

[32] For more details see *Artículo 107 de la Ley 50/1998, de 30 de Diciembre, de Medidas fiscales, administrativas y del orden social.*

to be recovered by a 4,5% levy on the electric bill, during a foreseen period of 15 years.[33] In a similar manner to that one implemented in California the recovery of stranded costs was then split into two components: an amount defined ex-ante, which is to be securitized, and an amount to be defined ex-post on an annual basis as the difference between the spot market revenues and generation related revenue entitlements.[34]

The major perceived benefits of securitization claimed by advocates of this procedure are as follows. Firstly, the certain and rapid recovery of a set amount of stranded costs, may reduce the utility's financial and business risk. Secondly, securitization removes uncertainty about the future remuneration of the utilities, so that mitigates the problem of regulatory uncertainty which utilities claimed to have been suffering because of the excessive degree of freedom in tariff setting enjoyed by the regulatory authorities. Thirdly, it is also argued that securitization enables utilities to reduce its cost of capital. This is because the utility is able to lower the weighted-average cost of capital by replacing the various types of higher-cost capital with low-cost financing backed by rated assets. Finally, advocates of securitization sustain that this procedure may generate benefits to customers via lower customer rates since savings in the cost of capital and financing costs may be translated to customers through lower rates and/or reduction in stranded

[33] According to the amendment in 1999, the Spanish government allowed electric utilities to securitize the major part of this maximum amount to be perceived as CTC's, Ptas. 1,693,285 millions, defined under the 1997 Electricity Act. In fact, up to Ptas. 1,050,000 millions were allowed to be securitized. In exchange to this right, the electric utilities accepted a deduction of Ptas. 250,000 millions in total stranded cost. And thus, around Ptas. 300,000 millions in concept of CTC's were still subject to the evolution of pool prices.

[34] On February 2001, a new decree was approved which eliminated the securitization procedure as a mechanism to recover stranded costs by the Spanish electric utilities. The prior method for the recovery of stranded costs, contained in the 1997 Electricity Act, has again been implemented and thus the total amount of CTC's to be perceived by the electric utilities is subject again to the evolution of the pool price in the market. (See Real Decreto Ley 2/2001, de 2 de Febrero, *por el que se modifica la disposicion transitoria sexta de la Ley 54/1997, de 27 de Noviembre, del Sector Electrico, y determinados artículos de la Ley 16/1989, de 17 de Julio, de Defensa de la Competencia).*

costs. This reduction in customer rates may improve also the utility's competitive position in the market.

As with pro-securitization arguments, there are many opposing viewpoints. The two main criticisms of securitization procedures are the following. First, securitization may result in an inappropriate shifting of risk because of its irreversible and inflexible character. The main concern about this fact is that as long as securitization is premised upon an irrevocable right of the utility to recover a certain amount of stranded costs in rates, then any forecast error in the original stranded costs estimates by definition cannot be corrected. The risks that stranded-cost estimates may be incorrect will be shifted from the utility to its customers by use of securitization.

This aspect of the securitization procedure was the main concern for *La Comisión Nacional del Sistema Eléctrico* (CNSE) in Spain.[35] In its opinion what the utilities were really seeking under the guise of securitization in Spain was to exchange the prospect of receiving subsidies worked out in line with future circumstances (demand, interest rates, market prices, etc.) for an entitlement to collect no matter what happens during the period of transition to competition. Specially important is this concern in Spain because of the duopolistic structure of the electricity market and the continuous claims by consumers and different analysts about the absence of effective competition in the market. And thus, since inaccurate forecasts of stranded costs will not be corrected under securitization, use of this methodology does not guarantee that customers will not overpay stranded costs relative to the amount actually incurred by the utilities.[36] As a consequence it is argued that tariffs will never come down in the future as much as is deemed necessary and the consumers will have to pay additional charges to cover the undertakings accepted

[35] The CNSE is the regulatory body for the electric system in Spain which supervises the proper functioning of the whole sector.

[36] *See* the CNSE's Report (1998) for further details about the process of securitization in the restructuring Spanish electricity industry.

with securitization.

The second argument against the securitization of stranded costs is that securitization may encourages the potential for anticompetitive conduct. Fears have been expressed in terms that this guarantees on financial aids to recover stranded costs may generate important cash flows which can be used by the incumbent firms as a financial weapon against new entrants and delay or prevent new desired competition. It is argued that incumbent firms may use this massive cash flows to price aggressively to drive potential competitors out of the business, and/or use their securitization cash to acquire potential competitors and forestall competition. The main response to this criticism is that securitization does not leave utilities with paid-off assets and a "war chest" of cash but it is use to put utilities on the same footing as unregulated competitors. Other arguments sustain that competition will not suffer because the companies have greater financial resources but rather because market rivalry will be missing and ex-monopolistic firms will still wield market power (Thierer, 1997; Report of the Stranded Cost Working Group, 1997; Report of the CNSE, 1998).

5.3 Potential Mitigation Strategies of Stranded Costs

Given the massive amount of money often associated with stranded costs, regulators, utilities, customers, suppliers and others have strong interest in finding ways to reduce or eliminate them, to"mitigate" those costs. Many such costs clearly cannot be reduced because they reflect sunk costs and future obligations, that is the case, for instance, of the contractual obligations undertaken in the past with regulatory encouragement. Thus, nearly all the "mitigation" strategies aim to shift stranded costs among differing segments of the economy (shareholders, ratepayers, taxpayers, wheeling customers...). However, in other cases there may be a possibility for mitigation whenever alternative and remunerative uses can be found for

the stranded investments (Baumol and Sidak, 1995a).

Several rules and notices from the FERC in the United States allowed utilities to recover stranded costs but required them to mitigate the wholesale customer's stranded investment obligation when the customer leaves the transmitting utility's system. Furthermore, in 1997, the FERC issued a notice in which conditioned utility recovery of stranded costs on pursuit of "all reasonable means to reduce its potential stranded costs...The Commission shall consider a utility's efforts to satisfy this requirement when determining the amount of utility's stranded costs."[37] The main problem is thus to define the proper and effective way to adopt mitigation measures for stranded costs and how to deal with those stranded costs that are difficult to mitigate. Mitigation options available are carefully examined in FERC's stranded costs Notice of Proposed Rulemaking in 1994. It provides a discussion of the options suggested by utilities, regulators and other interested parties that could be used in mitigating the level of stranded costs likely to confront a utility. A review of the main potential mitigation strategies are listed in the following table which appears in a paper written by Hirst (1998), at page 20:

[37] *See* Energy Servs., Inc, 59 FERC's Report. (CCH) 61, 369 (1992) and *Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Notice of Proposed Rulemaking*, Dkt. No. RM-94-7-000, 59 Fed. Reg., *supra* note 1, at 35, 277 *cited* in Baumol and Sidak (1995a), at page 848.

Table 2: Potential Stranded-Cost Mitigation Strategies

Action	Effect
Market Actions	
Accelerate or delay the start of retail competition	Shift costs to (away from) utility depending on Public Utility Commission-approved-cost-recovery plan; hasten (defer) benefits of competition
Increase electricity sales, either at wholesale or at retail	Lower stranded costs
Finance Options	
Accelerate depreciation schedules for high-cost generating units	Shift costs through time
Slow depreciation rates for transmission and distribution assets to offset faster depreciation of generating assets	Shift costs from generation to transmission and distribution
Write off or write down the amount of assets above market value	Shift costs from customers to utility shareholders
Rate-Making Options	
Price energy at close to marginal cost, increasing monthly customer charge	Increase sales, lower stranded costs, and improve economic efficiency
Adopt performance-based rates	Shift risks to utility, encourage utility to cut costs, and reduce stranded costs
Utility-Cost Reductions	
Improve generating-unit performance by: ▪ Increasing efficiencies ▪ Increasing availability ▪ Lowering O&M costs	Lower stranded costs
Retire uneconomic generating units	Lower stranded costs
Renegotiate or buy out expensive power-purchase contracts	Lower stranded costs, may shift costs to owners of these contracts
Reduce nongeneration costs, assign savings to stranded costs	Shift savings from transmission and distribution rates to generation

Source: Hirst, E., (1998), 'Policy Choices for Electric-Utility Stranded Costs', Report prepared for Electricity Consumers Resource Council, (Washington DC, July 1998), pp. 20.

A more extensive analysis of potential mitigation strategies and its consequences is provided in Baxter, Hadley and Hirst (1996) and also in the Energy Information Administration Report, (1996), Appendix E. Furthermore, in Appendix D of the last report we can find a study of these strategies and their impact

applied to a hypothetical utility. A different approach to mitigation strategies based on whether mitigation strategies are transaction or non-transaction related is considered in a study prepared by the National Regulatory Research Institute (1994).

6 Concluding Remarks

Recovery of stranded costs is perhaps the most litigious issue that regulators encounter in promoting competition in United States and European utility industries. It is a general consensus that regulatory treatment of stranded costs has potentially enormous economic implications on utilities, their customers and the development of effective competition. It is therefore quite natural that much theoretical and empirical attention has been devoted to study their properties. Not only among economists but also between professors of law and political science, a hot and passionate public debate has been focused on the discussion about the legitimacy of the incumbent infrastructures compensation claims and also on the appropriate methodology used to compute the accurate magnitude for the compensations to be recovered by the regulated utility industries. Furthermore, the large amounts of money at stake have ensured that stranded costs would be a critical concern for the massive process of restructuring and liberalisation of regulated utility industries in many countries around the world.

It is only in recent studies that more attention has been paid to the analysis and design of appropriate mechanisms to implement stranded-cost recovery compensations that are fair to investors and promote efficient competition. While regulators may accede to the recovery of stranded costs to the existing companies, they not infrequently have underestimated the difficulty of design an appropriate cost recovery mechanisms in a competitive system.

This survey has tried to explore possible ways in which not only economists but

also analysts from different areas, academic professors of law and political science can usefully contribute to the resolution of the stranded-cost controversy. I have tried to provide some answers to the main questions surrounding the stranded-cost controversy and contribute some suggestions for further research.

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