A study of the non-franchise electricity supply market in England and Wales from 1990

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Master of Philosophy

University of Loughborough

Subject: A Study in the Non-franchise Electricity Supply Market in England and Wales From April 1990

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ABSTRACT FOR MASTER OF PHILOSOPHY

A Study in the Non Franchise Electricity Supply Market in England and Wales From April 1990

Introduction

The work provides a study into the competitive electricity market or non franchise electricity supply market in England and Wales. Up until April 1990 all electricity customers had no choice in their electricity supplier. Customers were forced to purchase electricity from a company that had been given the franchise for a particular geographical area, known as the Regional Electricity Company or REC. Legislation is gradually opening up the supply market to competition allowing groups or organisations to participate in the competitive market and choose their electricity supplier. There are three main stages of liberalisation of the electricity supply market, namely:

1. From April 1990 all customers over a maximum demand threshold of 1 MW were allowed to choose their supplier. This encompassed some 4,500 in England and Wales.
2. From April 1994 the non franchise market was expanded to include all sites with maximum demand thresholds of between 100kW to MW, some 45,000 sites in total.
3. From April 1998 all the estimated 22 million sites consuming electricity in England and Wales will be free to choose their supplier.

There are four reasons for undertaking this study, which are:

1. To provide one of the first studies into the effect of introducing competition into the electricity supply industry. Some of these issues have been covered by Yarrow (1994). My thesis concentrates on the competitive supply market from a different perspective to Yarrow (1994) which will be to focus on the interaction between supplier and customer. I look at the motivation of the supplier and the customer and the impact on their interaction in the competitive supply market. This thesis covers original areas not mentioned in Yarrow (1994) because it represents a more up to date study from an industry insider's view, giving accounts of the latest market developments.
2. To assist the process of strategy development for a supplier, particularly a REC, by outlining and evaluating all the issues in the electricity supply market.
3. To model the electricity supply market in economic terms.
4. To draw conclusions on the behaviour of market participants in the current non franchise market that may be applicable to the completely liberalised market, and particularly the domestic market, from 1998.
Preface

I believe this will be perhaps the first study of the impact on the customer and the suppliers of competition in the UK electricity supply industry. As an industry insider, I will be able to perform an analysis on the operation of market forces in the electricity supply market as they actually take place. Many of the mechanisms that I will refer to in this work have literally just appeared on the market. They are often innovative, ambitious ideas, only some of which will succeed. I have an insight into a new expanding market where I can see the interaction of competitive market forces within this market as it actually happens.

I would like to acknowledge the assistance of Professor Tom Weyman-Jones and of NORWEB in the production of this thesis. I would like to thank Mike Brindle, Steve Collier, and Geoff Ellis for support in the completion of this work. I also wish to thank Pat Murphy and Cath Tonge for assistance in some of the issues related to the Electricity Pool. Finally, I would like to thank Ann and Benjamin for listening to arguments on the merits of the electricity supply industry.
Chapter One - An outline of the electricity supply market in England and Wales

1.1 The basic structure of the competitive market
1.2 The product
1.3 Breakdown of charges
1.4 The role of the regulator
1.5 The meter operator business

Chapter Two - An explanation of market mechanisms

2.1 The Pool
2.2 Experience of pool price movements
2.3 Contract for differences
2.4 Types of supply contract

Chapter Three - Market participants and their behaviour

3.1 The buyers of electricity for final consumption
3.2 Customers perceptions of the product
3.3 The role of potential competition in the electricity supply industry
3.4 Strategies of RECs
3.5 Strategies of generators
3.6 Strategies of other market players

Chapter Four - The application of auction theory

4.1 The basic types of auction
4.2 The electricity supply negotiation process
4.3 The electricity supply auction
4.4 Conclusion

Chapter Five - The future

5.1 Before 1998
5.2 1998 and beyond.

Chapter Six - Conclusion
The non franchise electricity supply market in England and Wales is an extremely complex animal. To be able to accurately model the decision making process between buyers and suppliers will necessitate this work going into considerable depth into the market mechanisms and the interaction with the actual behaviour of market participants.

The structure of the thesis is as follows:

1. In chapter one I will outline the structure of the competitive electricity supply market in England and Wales. I will propose that electricity has more of the characteristics of a commodity than a service. The factors that differentiate the electricity sold by one supplier from that of another are the terms of the electricity supply contract. I will briefly consider the role of the Regulator which can be seen as to increase competition. I will also consider the role of competition in the meter operator business.

2. In chapter two I will provide an explanation of the main market mechanisms in the Pool, contract for differences, and types of supply contracts. I will explain the workings of the Pool and the experience of high levels of price volatility. I will explain the role of contract for differences. Finally, I will give a brief introduction into the alternative types of supply contract.

3. Chapter three considers market participants and their behaviour in some detail. It segments buyers of electricity into over 1MW single site buyers, 100kW to 1MW single site buyers, and Groups. I will see that the different segments result from different levels of experience and priorities. However, I will show that the buying perceptions of all customers tend to focus on price. I will look at the importance of barriers to entry and the impact on the strategies of RECs, generators, and potential entrants.

4. Chapter four applies auction theory to the negotiating strategies between customer and prospective supplier. It will consider the four basic auction types outlined by Vickery (1961) which are: English; Dutch: First Sealed Bid, and Second Sealed Bid. I will conclude that the negotiating stance adopted by buyers of trading off one supplier against another has characteristics of both English and Dutch auction methods. I will see that one characteristic of negotiating process in electricity supply is the incomplete information of the bidder. Bidders, or suppliers. lack information on the prices of competitors and the expected revenue from the contracts. This lack of information can lead to over bidding and the so called “winners curse” where suppliers could make serious financial losses by winning the contract.
5. Chapter five looks at market trends in the before 1998 over 100kW market and in the 1998 and beyond market. Before 1998 raises the hypothesis that the nature of the market and market structure and the associated low levels of profits could be unsustainable leading to a possible reduction in the number of suppliers. 1998 and beyond focuses on the impact of complete liberalisation for the domestic market and the applicability of trends from the current competitive market.

6. The conclusion will be that the experience of introducing competition into the electricity supply industry can be judged a success because it has resulted in a fall in electricity supply prices for virtually all customers relative to tariff. It can also be judged a success because it has led to an increase in the variety of products in the market that are more tailored to the needs of the consumer.

The reduction in prices has resulted mainly from the structure of the direct supply market where there are twelve RECs in competition with up to five generators and occasionally other players. However, the structure of the generating industry where duopoly power for National Power and PowerGen has created the ability to manipulate Pool prices has serious implications for long term competition in the industry. This problem could become more serious after complete liberalisation of the market in 1998.
CHAPTER ONE. AN OUTLINE OF THE ELECTRICITY SUPPLY MARKET IN ENGLAND AND WALES.

Introduction

The aim of this chapter is to outline the current electricity supply market. The structure of the chapter is as follows:

1.1 The Basic Structure of the Competitive Market
1.2 The Product
1.3 The Role of the Regulator
1.4 The Meter Operator Business

The conclusion will be that the nature of the product and the interaction of buyers and sellers make the competitive electricity supply market a fascinating form of pure market. This chapter will provide the information necessary to apply economic theory to the market in chapters two and three.

1.1 The Basic Structure of the Competitive Market

1.1.1. A Brief View of Structure

The electricity supply industry in England and Wales is split into generators which produce the power and RECs that distribute it to customers. In between these two groups are the central clearing systems that transmit the power from generators to the RECs and set prices for generation and supply. The transmission system is the National Grid that takes power from where it is generated, often at remote isolated spots, to where it is required, often the more densely populated areas. The National Grid Company makes a charge for its services depending upon the physical location of the generating station and the RECs distribution system. The National Grid Company also has responsibility for the price clearing system known as the Pool that matches the preferences of generators and suppliers. The workings of the Pool are discussed in some detail in chapter two of this thesis.

Any organisation that runs a power station will be a member of the Pool if they are over a certain size. National Power and PowerGen own the majority of the power stations in the generation market, particularly the coal fired power stations. The structure of the generation market is an historical "accident". The initial reason for two large generators was for the largest, National Power, to hold the nuclear power stations, whilst the other, PowerGen, would be a slightly smaller competitor. Prior to flotation, the nuclear power stations were split from National Power into Nuclear Electric.
The generation market was left with two dominant market players in National Power and PowerGen, and a smaller Nuclear Electric. Chapter 2.2 will outline the widely discussed viewpoint that the creation of two large generators, National Power and PowerGen, has probably resulted in an abuse of duopoly power. This abuse of market power, could be a major barrier to efficient market competition.

RECs have the sole monopoly over the distribution of electricity in their geographical area. They receive a charge for the use of their infrastructure called Distribution Use of System or DUOS. Before April 1990, RECs also had a monopoly on the supply of power to customers. The monopoly power position in the supply market has been reduced in stages from April 1990, then reduced further in April 1994, and to be removed completely from April 1998. Those customers that are part of the competitive supply market, the non franchise market, can be supplied by virtually any organisation that can satisfy qualifying criteria to become a public electricity supplier.

1.1.2 Background Factors affecting Contract Structure

The competitive market in Electricity Supply in England and Wales commenced from April 1990. The month of April was chosen as it coincided with the start of the financial year and more importantly was the date that RECs set their tariffs each year. The evolution of the competitive market has largely mirrored this timescale structure with the overwhelming majority of electricity supply contracts commencing on 1st April, and terminating one year later on 31st March the following year.

Given that the supplier for the next period takes twenty working days to register the new contract. the market has developed a pattern whereby the enormous bulk of contracts are negotiated and are concluded in January and February prior to this period.

This timetable coincides with the annual publication of Distribution Use of System or DUOS charges for the next April to March period, which normally takes place in the last week of January. As I will see later in the thesis, DUOS charges are a significant proportion of a supply bill. This means that all pricing managers in the competitive market would prefer to set their contract offers for other REC areas when they are certain of the DUOS charges of that REC.

The dates also coincides with the publication of the National Grid Company (NGC) charges for transmission through the Grid. These charges are normally produced in the third week of January.
The largest number of electricity supply contracts are concluded in February each year. This is significant for our analysis because it channels all the intense competitive pressure in this market into a very short time period. Pressure in this month is so intense as sales forces fight to meet and exceed sales targets, that offices resemble stock market dealing rooms. Whilst February is the major month for contract negotiation, “mini-rounds” exist in June/July and September where smaller number of contracts are transacted.

Suppliers are often reluctant to move away from the February negotiating round. By having contracts that run April to March the supplier cannot be financially disadvantaged by movements in DUOS charges and NGC transmission charges. An even more important factor is related to the role of contracts for differences. Contract for differences are used in the derivation of the fixed priced supply contracts and are chiefly sold by generators. Contract for differences are discussed in detail in chapter 2.3 of this thesis. January and February have historically been the best months to obtain the most competitively priced contract for differences contracts.

A final reason for not moving from the April round is that experienced customers demand contracts that terminate at the end of March. They are aware that they can make best use of the competitive market pressure if they negotiate contracts in February.

1.2. The Product

Electricity can be viewed as a product/commodity or a service. If electricity is viewed as a product then the characteristics of the product and the terms of purchasing are of primary importance to the customer. If it is viewed as a service then the customer places an important value on the service of supplying electricity. Chapter 3 of this thesis focuses on the customers perceptions of the electricity supply market. The general conclusion of this chapter is that the fact of primary importance in the purchase of electricity in the competitive market is price. This conclusion supports the overall opinion of this thesis that, in the competitive electricity supply market, customers increasingly perceive electricity as a commodity.

However, this conclusion should be qualified by the nature of the commodity that electricity customers are actually purchasing. I will explain that because of the characteristics of the product outlined in chapter 1.2.1. energy purchasers make a choice of supplier based on the terms of the supply contract. These contract terms are the rates charged for electricity, the payment terms, and any extra value services. Thus, the services from the supplier do play a part in the customers decision making process.
The conclusion that electricity is purchased primarily as a commodity not a service is based on the experience of the current non-franchise market. It may be that when the domestic market is opened up to competition that overall customers perceptions focus more on service. These issues are discussed in chapter 5.

1.2.1 Characteristics

The Coba Group (1994) view electricity as exhibiting the classic features of a commodity, which are:

1.2.1.1 It is an undifferentiated product in that there are no characteristics to differentiate the electricity offered for sale by one seller to that from others. There are no grades of electricity or brands to distinguish the product.

1.2.1.2 There is no significant spatial element to the sale of electricity. A customer can purchase their electricity from RECs on either side of England and Wales and the product will still come out of the same wires.

1.2.1.3 Electricity has no substitutes for many of its uses.

1.2.1.4 There is little opportunity to add value to distinguish the electricity sold by one supplier to that offered by another. Suppliers do offer value added services in the current competitive market. Typical packages are based on providing the customer with their consumption data to assist their billing process or energy management schemes. As I will see in chapter 3.2, market research suggests that value added services only influence the buying decisions of suppliers when the contract prices of competing bids are the same.

1.2.1.5 Commodities with classic characteristics have generated speculators or arbitrageurs on future price movements. Speculation in the electricity industry is limited to the extent to which customers and suppliers take a view on future Pool price movements in deciding on contract options or on what contract prices to offer. This may be as a result of market structure in the generation market. Chapter 2.2 will discuss the evidence to suggest that the two large generators have the ability to manipulate Pool prices. If this is true, the speculation on future Pool price movements by arbitrageurs would be a dangerous game or require inside knowledge.

1.2.2 Is Electricity Unique?

Electricity exhibits the classic characteristics of a commodity but unlike most commodities it cannot be stored. Because it is impossible to store electricity in any significant quantities generation and consumption must be co-ordinated. This may make electricity a virtually unique product. I can think of just a small number of products in the competitive market that have similar characteristics as electricity; these are gas and telecommunications. Though gas can be stored to cover times of peak demand.
Significantly, all three products were once part of nationalised industries that became privatised monopolies and are now subject to increasing competition. All three products have been through the nationalised industry stage. They are now entering the competitive market to varying degrees. The competitive market for each of these three products have similar features. For example, the liberalised gas market has seen the same sort of fierce competition from a large number of different suppliers that the non-franchise electricity market has seen.

It may be that the lessons learnt in each of these three markets are applicable to the other two. For example, with the domestic electricity and gas markets due to open up to competition in 1998, it may be the case that the opening up of the domestic telecommunications market provides lessons to be learnt. However, the market structures of all three products are all different. It may be that electricity is unique to the extent that its unique market structure influences the outcome of the market behaviour.

1.2.3 Product Differentiation

Electricity is a homogeneous product with no differentiating factors. I will find later in this thesis that the main reason why one supplier is chosen instead of another is determined by the price at which suppliers are prepared to supply electricity to that organisation. The price of electricity, and most other determining variables are all related to the electricity supply contract. It is through the different terms of the electricity supply contracts that results in competition in the non-franchise market. I must now examine what constitutes an electricity supply contract.

1.2.4 The Electricity Supply Contract

Customers in the non-franchise market sign a supply contract to purchase electricity at specified rates for an agreed length of time. This contract gives them the right to pay an agreed contractual rate for the energy consumed over the contract period. The key criteria for the supply contract are the energy rates, the contract length, and the payment terms.

1.2.4.1 Contract Length

The contract period can be for any length of time from a month to a decade. The typical supply contract, characteristic of the most recent trends in the market place, runs for one year from the first of April to the 31st March the following year. The reasons for the evolution of this trend has been discussed earlier in this thesis. The conclusion of that chapter was that from the business viewpoint there is less risk in having one year contracts that terminate on that date. For customers, they stand to make the greatest financial savings if they negotiate their contract at this date.
Customers do sometimes prefer longer term contracts than one year for greater financial stability depending upon market trends. For example, current customer pressure from those with market knowledge is for contracts that terminate after 31st March 1996. This is because the Offer “pool cap”, to be discussed later, runs out on that date. However, those customers on longer than one year contracts that did not terminate on 31st March 1994 feel particularly aggrieved because prices for contracts for 1st April 1994 start dates plummeted after the “pool cap” announcement.

1.2.4.2. Payment Periods and Payment Types

In the supply market, suppliers pay the Pool for energy used by their customers thirty days from the date of consumption. Suppliers then have to recover the cost of energy used from their customers. In the tariff market, invoices are typically sent every quarter which means that customers are billed for the energy they consumed up to two months after the REC has paid for it. This means that RECS have a negative cashflow in the tariff supply market. They receive revenue from customers up to several months after they have paid the Pool for the energy consumed by those customers.

In the competitive market where percentage profit margins are much lower, suppliers have attempted to improve cashflow by shortening the payment period for customers to typically fifteen days after the month of consumption. Customers are required to pay for electricity fifteen days after the month of consumption. However, the supplier pays the Pool thirty days after the day of consumption by the customer. This means that for the electricity consumed by non franchise customers towards the end of the month, the customer is paying the supplier before the latter has paid the Pool. The experience has been that the positive cashflow this generates offset the negative cashflow of energy consumed at the start of the month leaving the supplier in a largely neutral cashflow position.
1.3 Breakdown of Charges

The electricity charges can be split into two parts:

Distribution Use of System (DUOS) charges and Supply Charges.

1.3.1 Distribution Use of System (DUOS)

Charges are payable by the supplier for the use of the wires owned by the host REC to transmit the energy to the final consumer. The structure of use of system rates chargeable by each REC vary. They do have certain common charges which are shown below:

1. A standing charge payment covering existing metering charges and other factors
2. An availability charge for each kVA of chargeable supply capacity
3. A charge to cover the peak demand on the system during the months November to February
4. A running charge for each day unit and each night unit
5. A reactive power charge

DUOS charges are payable to the Distribution business of the host REC by the current supplier, whether it is the same REC or a different organisation. Typically use of system charges payable to the host REC and similar charges payable to the National Grid Company account for up to 40% of a customer's final electricity bill. They are payable by the supplier irrespective of whether the customer pays the latter.

1.3.2 Supply Charges

Supply Charges cover the cost of purchasing the energy from the Pool, an insurance cover to mitigate risk, payments to the National Grid for demand charges, and supplier profit. It is in the different rates for the supply of energy that competition in the non franchise market takes place. That means that the cost at which the supplier purchases electricity plus the profit margin is the source of competition. Given that the fierce nature of competition has resulted in a reduction in profit margins, the ability to purchase energy at the lowest possible cost becomes a key determinant to success in the non franchise supply market. The structure of the DUOS charges outlined above tends to be reflected in the supply contract. This will be covered in some detail in chapter 2A of the thesis.
1.3.3 Summary

The structure of distribution and supply charges can be explained in the following equation for a typical contract:

\[ P = \{DUOS\} + \{TUOS\} + \{PC\} + \{SC\} + \text{Profit} + \text{Metering} + \text{Levy} \]

where:

- \( P \) = Price to customer
- DUOS = Distribution Use of System
- TUOS = Transmission Use of System
- PC = Purchase Costs, that is cost of buying from the Pool and any contract for difference cover
- SC = Settlements Charges
- Profit = Includes administration charges as well as profit margin

Of the charges outlined above, DUOS costs account for some 22% of an overall average bill whilst around 60% of total costs are purchase costs. Settlements charges and the Nuclear Levy are set by external sources, with the latter currently at 10% of a bill. Metering costs are small in proportion and are subject to fierce competition in the recently deregulated Meter operator business, see chapter 1.5.

One point to be gained from this analysis is the importance of purchase costs. These are the costs of buying electricity from the Pool. As I will discover in Chapter 2, Pool prices can exhibit extreme volatility which has led to suppliers developing financial instruments called contract for differences to mitigate their exposure to fluctuations in price. Another point to be aware of is the small amount of profit margin available. Finally, RECs have received considerable criticism over the profits made from DUOS charges. Given that REC DUOS charges account for around 22% of bills the potential for making significant savings from energy bills by cutting these charges is not great. Significant savings off energy costs will only be achieved through lower levels of purchase costs.
1.4 The Role of the Regulator

Electricity regulation is performed by Offer, whose director is Professor Stephen Littlechild at the time of writing. Professor Littlechild, hence known as the Regulator, is a strong believer in the importance of competition as a market mechanism to maximise consumer surplus. The main focus of his role in the supply market has been to facilitate competition.

At the time of writing, the Regulator is facing increasing criticism over his regulation of RECs. This primarily relates to the regulation of the Distribution business in which the host REC has a monopoly, not the supply business. It is important for the reader to be aware that the Regulator will probably be increasing restrictions on the level of profit in the Distribution business because it may affect the strategy of RECs to the supply business. However, it is the non franchise supply business that it is the focus of this thesis.

The success or failure of regulation in the non franchise electricity supply market can therefore be judged by the level and intensity of competition. A constant theme throughout this thesis will be that the current non franchise electricity supply contracts market has been characterised by a large number of suppliers engaging in a price cutting war to win business. This suggests that the Regulator has been extremely successful in this market.

However, as I go into more depth later in this thesis I will find that the degree of competition is limited. Suppliers are conducting fierce price wars for small profit margins or in loss making situations. This could be viewed as achieving perfect competition whereby all suppliers make sustainable but not abnormal profits. Alternatively, a situation whereby suppliers make small profits with potentially big losses and carry the associated credit risk of non-payment by final customers may not be a sustainable market structure. I will hypothesise that unless there is more competition in the generation market and the contract for differences market, long term competition in the supply market is unlikely to lead to significant price reductions for domestic customers.

The Regulator does appear to be aware of the situation regarding the absence of competition in the generation and contract for differences markets. He has attempted to take some action which will be referred to in the chapter on the Pool.
Given what I have already said about the promotion of competition, it is slightly ironic that prior to the action taken on movements in the Pool prices, the most significant intervention of the Regulator in this market was to limit competition. Until 1994 RECs were limited on the amount of profit they could make on supply contracts and generators were limited to the size of market share in any REC area.

The effect of the profit restriction, known as “allowable revenue” was to some extent to provide a marker for competition. For example, the administration charges on pool contracts before 1994 tended to be the “allowable revenue”. After 1994, this administration charge has been below the previous “allowable revenue” levels. However, the profit restrictions did not dramatically interfere with competition in the fixed price contract market which is primarily determined by contract for difference levels and pool price forecasts.

1.5 The Meter Operator Business

The electricity meter registers the use of electricity for billing purposes. It is a current requirement that all customers who wish to be supplied by a second tier supplier, that is a company other than the host REC, must have meters that read consumption on a half-hourly basis. The vast majority of these sites have on-line links from the meter to the settlements system that collects the data for distribution to suppliers and host RECs. The current collection system is known as United Kingdom Data Collection Services or UKDCS.

To purchase metering equipment for a 100kW to 1MW site, to a standard called Code 5, plus telecommunications equipment with a maintenance contract and operators fee would cost around £600. This represents about 5% of the annual electricity bill of a small 100kW customer.

All customers in the competitive market are required to have a meter operator. The meter operator business refers to the ownership or leasing of meters and the maintenance of the meter.

From April 1994, a change in the regulations allowed customers to appoint their choice of meter operator. Prior to that date, the choice of meter operator had been up to the discretion of the winning supplier, not the customer. This resulted in the winning supplier nominating the host REC as the meter operator.
Given that the meter operator business was a monopoly business the regulator decided to open it up to competition. The result has been that the twelve REC meter operator businesses have been joined by six new entrants. Competition has taken place in this market as different meter operators have vied for business.

However, the experience of competition in this market has been limited. Non host REC meter operators have successfully won business this year against the host REC only to sub-contract the entire work to the host REC at the latter standard rates. Those customers that did appoint a non-REC as a meter operator tended to experience poor service. The new meter operators were often late in the installation of the metering equipment.

These market trends may be a result of market immaturity. However, the profit margins in the meter operator business are small. The requirements of the meter operator business favour the RECs as they already have the administration and infrastructure in place. Those successful meter operators have subsequently subcontracted the entire work to host RECs because the meter operator business is an addendum to competition in the supply business. That is to say, the main area of competition is in the supply business with the meter operator business an additional factor in the event of two competing suppliers offering the same package.

The “playing field” in the current meter operator business is so heavily in favour of the RECs and the turnover and profit so small that many major competitors in the supply business, such as the generators, are not interested.

The market liberalisation of the meter operator business has attracted criticism from suppliers. Partly as a result of failure by meter operators and telecommunications people to fit appropriate equipment to timescales. This led to some customers not receiving bills until several months after consumption. Since all meter operators perform the same function, and the charges levied are a small proportion of the electricity bill, the meter operator issue will not be discussed further in this thesis.
CHAPTER TWO. AN EXPLANATION OF MARKET MECHANISMS

Introduction

In this chapter I will provide an explanation of the main market mechanisms that affect the competitive electricity supply market. This chapter will provide the background information that will allow us to understand the behaviour of market participants that I will outline in chapter three. The structure of this chapter is as follows:

2.1 The Pool. This will provide an explanation of the technical workings of the Pool.

2.2 Experience of the Pool. Here I will focus on the behaviour of Pool prices since inception of the market in April 1990.

2.3 Contract for differences. This chapter will explain the working of simple contract for differences and the importance to the derivation of fixed priced supply contracts.

2.4 Types of Supply Contracts. This chapter will outline the two most popular types of supply contract in the competitive market, that is fixed priced and pool contracts. I will also discuss two hybrid contract options in “Minimiser” and Energy Block or Contract for difference supply contracts.

2.1 The Pool

2.2.1 An Introduction

The Pool is the term used to refer to the system of trading electricity in England and Wales between the generators and suppliers of electricity. As it is not possible to store electricity in the sort of quantities required to meet demand, an integrated system has been developed to ensure that demand is constantly matched to the generation of electricity. This system is known as the Pool. The Pool has two fundamental requirements, which are:

1. To keep the lights on at all times.

2. To provide a market mechanism to trade electricity.

The detailed explanation of the workings of the Pool is very complex and beyond the scope of this work. A basic explanation is necessary as the operation of the Pool fundamentally affects the selling decisions of suppliers.
The Pool works as a pricing mechanism by which producers of electricity, namely the generators, have their preferences matched with wholesale buyers of electricity, the RECs, such that the demands of final consumers are satisfied. It has to satisfy the following requirements:

2.2.1.1. The amount of power required by customers at any time must be matched by that generated at the power stations; and

2.2.1.2. It is physically impossible to distinguish between electricity generated at one station and that generated at another.

Point 2.2.1.1. requires central co-ordination of the stations, known as scheduling and dispatch of stations. Point 2.2.1.2. means that it should combine the output of all stations to effectively meet demand requirements at one energy price. Geographical factors, such as the fact that stations are concentrated in different areas from the concentration of demand are covered by the National Grid Company (NGC) charging structure.

2.1.2 The Operation of the Pool

The Pool market establishes prices for sales and purchase of electricity, taking into account the variable supply and demand for the product. The settlement period is on a half-hourly basis matching demand and supply for every half-hour. This means that prices are set for every half-hour. Prices can and do vary every half-hour of every single day. The volatility of half hourly pool prices has a fundamental impact on the strategies of electricity suppliers and the buying patterns of final consumers as I will illustrate later in this thesis.
2.1.2.1. Bidding

All generating sets, known as gensets, over a certain size have to bid into the Pool if they wish to generate electricity for other than their own use. Gensets are not obliged to generate, but if they do it must be through the Pool. Whether a genset is called on to generate depends on scheduling systems run by the National Grid Company (NGC).

The process of matching demand and supply for each day works as follows:

No later than 10.00 am each day, all operators of qualifying stations inform NGC of:

2.1.2.1.1. The offer price - this is the price at which each station is willing to operate, at different levels output for each available unit for each half hour of the next day. The offer price consists of a start up price, a fixed price and up to three "incremental prices" per units of electricity produced.

2.1.2.1.2. The declared availability of their plant for each half hour of the next day.

2.1.2.1.3. The prices at which they are willing to keep each unit in a standby mode.

2.1.2.1.4. The state of readiness of the unit.

2.1.2.1.5. The prices at which they are prepared to operate for a limited period at higher levels of output than the declared availability.

NGC rank each unit in order of increasing prices, examine the demand forecast for the next day, ask very large users forecast for their demand, and calculate the operating regime for all stations that meet their demand over the next day at the lowest cost of generation. Calculations also take into account transmission constraints, plant characteristics, and system stability. NGC then produce an indicative notional generation schedule for each set at 3 pm, giving likely levels of output and reserve. The most expensive genset called on to generate in what is now known as the unconstrained schedule, output not subject to limitations, sets the base for the price paid to all gensets called on to generate in that time period. This price is called the System Marginal Price or SMP and is the principle component of the derivation of the pool price paid by the customer.
2.1.2.2 Constitution of the Pool Price

There are two versions of a pool price for every half hour, the Pool Purchase Price (PPP) and the Pool Selling Price (PSP). The PPP is the price paid to the generator and the PSP is the price paid to the supplier. The two important calculations to the derivation of these charges are outline below:

2.1.2.2.1. Pool Purchase Price (PPP)

PPP or PIP  =  SMP  +  LOLP( VOLL - SMP )

where:

PIP  =  Pool Input Price (another term for PPP)
SMP  =  System Marginal Price
LOLP  =  This is the capacity element known as Lost of Load Probability
VOLL  =  Value of Lost Load

The SMP has been explained earlier. The capacity element is based on the day ahead probability in any settlement period of demand exceeding the available generating capacity of the system. This capacity payment is known as LOLP and is defined by NGC based on the VOLL minus SMP. VOLL is a figure set by the National Grid Company which seldom changes. This gives Pool Purchase Price (PPP) also known as Pool Input Price (PIP).

2.1.2.2.2 Pool Supply Price (PSP)

PSP  =  PPP  +  Uplift.

Where:

Uplift  =  a reconciliation factor to ensure that for any day the total amount payable to generators under the pooling and settlement arrangements, together with amounts payable to the Ancillary Services Provider, matches the total amount payable to consumers.

Uplift is used to recover the additional costs that are incurred in running the Pool. These charges include the cost of administration, payments to secure adequate reserve supply, and payments to secure the availability of gensets when required. It includes payments to cover additional costs incurred as a result of the variance between the unconstrained schedule and metered output, and changes in availability since the original offers. To elaborate on the last point, if a genset that stated it was available in the unconstrained schedule now declares itself unavailable for the day of generation, then any extra cost of generation payable to generators is then met from Uplift. Uplift typically averages 1.2% of PPP but is only chargeable in something called Table A periods. The main difference between Table A and B periods is that the latter cover night time periods.
2.1.2.3 Conclusion

The brief explanation of the Pool given above has been to highlight several points, which are:

1. Electricity is charged on a half hour basis.

2. The price can change half hour by half hour depending upon the availability of generating sets (gensets). If large gensets are unavailable, such as happened with Nuclear Electric in the winter 1994/95, the price of SMP and therefore PPP and PSP will rise dramatically.

3. The last genset called on to generate sets the price for all the gensets asked to generate. The last genset is typically owned by either National Power or PowerGen. This is partly because these two own more gensets and specifically more of the expensive coal fired power stations which are called on to generate after all others.

It also reflects the structure of the competing companies. Nuclear Electric stations have to be run as base load due to the difficulty of switching nuclear plant off, though their gensets have the lowest marginal cost. Of the other small generators, the independent companies have tended to offer to generate into the bidding process at no cost. Independent gensets bid in at no cost because their financial viability depends on being called on to generate by the Pool. Independent gensets bid into the Pool knowing that they will receive the value of SMP for generating. This leaves only the big two generators who have the size to be able to turn gensets off. This creates the ability to influence market price by genset availability.

4. Uplift can also be used as a source of revenue to National Power and PowerGen. One reason for this is that because these two companies have a portfolio of gensets, they are called on to provide reserve generating capacity which is paid for through uplift. Another reason is that SMP takes no account of transmission constraints. This means that the SMP is set by the marginal genset irrespective of location. Typically, the cheapest gensets are in the North of England and the more expensive in the South of England. Thus, a Northern genset is likely to set the SMP. However, at times of peak demand, transmission constraints mean that it is not physically possible to meet the demands of the South of England through the cheaper Northern power stations. In this instance, the constrained demand schedule has to be met from more expensive Southern power stations who are paid whatever price they bid in. The payments for these gensets are covered through uplift. Because National Power and PowerGen hold a large portfolio of gensets, the uplift payments will be made to these companies.
Weyman-Jones (1990) has diagramatically illustrated the ability of a single dominant generator acting as a monopoly to influence Pool prices in the short term, illustrated in diagram one (see over). The dominant generator has a true short run marginal cost schedule of SMP*, and is forecasting a peak demand schedule D2. The marginal revenue schedule associated with D2 is MR2. To maximise profits the generator should achieve a position of load kW M at price MP2. To achieve the profit maximising levels of price and output the generator simply announces bids along a hypothetical marginal cost schedule SMP M. This position could be generalised to a collusive joint profit maximising oligopoly.

This increase in price has resulted from the actions of the supplier. It has not resulted from changes in the demand curve. Shifts in the demand curve, either left or right, would also lead to changes in the price.

The experience of pool price movements, see later in the chapter, has been that shifts in both the short run marginal cost curve and demand curve can lead to price changes.
Diagram One. Price Manipulation Under Monopoly

2.2 The Experience of Pool Price Movements

Since its inception in April 1990, the Pool has experienced extreme volatility of prices, half hour by half hour, day by day, month by month, year by year. Furthermore, this volatility appears often to bear little resemblance to demand. At the time of writing this chapter, April 1995, I have a perfect example of this volatility in the attached charts.

The Chart 1 shows the Comparison of the Monthly Average PSP up to June 1995. Given that economic and social conditions have not changed markedly over this period so demand has not changed significantly, and that there have been a number of extra gensets joining the pool from RECs, PSP could be expected to follow a similar pattern over the years on a monthly basis. This is not the case from the diagram. In particular, the behaviour of the pool selling price in 1994/95 graphically illustrates the volatility of Pool prices. The volatility of the Pool with the period November 1994 to January 1995 is characterised by showing dramatic increase in prices relative to previous years. The very high price levels in January 1995 are in sharp contrast to the sharp fall in average prices that occurred in February to historical low levels in March 1995.

Furthermore, the very low pool selling prices seen from the end of March 1995 offset the very high prices seen between November 1994 to January 1995 resulting in the average Pool price cap set by Offer being achieved and the demand weighted cap being narrowly missed. The year 1993/94 was characterised by very high pool selling prices falling off sharply from February 1994. The behaviour of Pool prices over this period eventually resulted in the announcement of caps on Pool prices in February 1994.

Chart 2 illustrates the Average Daily Pool Selling Price for 1994/95. From April to October 1994 the Pool experienced very low pool selling prices with prices correlating around the 25 £MWh, which converted to 2.5 pence/kWh. However from November 1994, pool selling prices increased to peaks between January and the middle of February 1995. Prices then fell dramatically towards the end of February 1995 and in March 1995. To some extent these prices followed general demand conditions with pool selling prices higher in the winter months when demand is higher. However, the noticeable drop in pool selling price in the end of February and March was a period of high demand. The period of peak pool selling prices coincided with the major period of supply contract negotiation and the period of contract for difference negotiation.
Chart 3 illustrates the volatility of Pool prices on a half hourly basis. It gives a profile for the 28 November 1994 which illustrates the levels of increases in pool selling price seen at peak demand times. The daily profile does appear to mirror the daily demand profile with prices rising at periods of high demand. Given the daily demand profile is likely to be very inelastic, if a generator was to restrict supply and shift the supply curve to the left, as illustrated in diagram 1, the outcome would be a rise in prices as seen in chart 3. The very high levels of pool selling prices seen on the chart 3 are not usual of the overall levels of prices in the Pool. However, there appears to have been a growing trend for increased daily volatility of pool selling prices since November 1994 with an all time high of over 84 pence per unit on 11 April 1995 covering the three half hours beginning 5.30pm.

The three charts all highlight the volatility of pool selling prices year on year, month by month, and day by day. In diagram 1 in the previous chapter I illustrated a theoretical example of how pool selling price could be manipulated by a monopoly supplier or a collusive duopoly shifting the short run supply curve. There is insufficient evidence to state categorically that the two big generators have manipulated pool selling prices to achieve an outcome beneficial to themselves. However, the Regulator's statement on pool price movements of February 1994, discussed later in this chapter, does tacitly support this conclusion. The extreme volatility of pool selling prices and perception by a number of customers that manipulation has taken place does make final customers concerned about taking contract options that involve some element of exposure to the Pool. Pool price rises have occurred as a result of increased demand, for example, as a result of unexpected cold weather! The volatility in pool prices can also be the result of unexpected shifts in demand, such as unexpected cold weather.

Returning to the theoretical model of price manipulation outlined in the previous chapter and in diagram 1, the question is whether the shifts in the supply curve could have been the result of genuine supply curve determinants or whether they resulted from manipulation by the Generators.

It is extremely difficult to prove that National Power and PowerGen have deliberately manipulated the Pool. However, there is a belief within the market place that such manipulation has taken place. There are a number of ways that this could take place. One way that Pool prices could be manipulated is for the Generator to make unavailable the power stations with low generating costs that run for longer periods. These cheaper power stations could be replaced by more expensive power stations that would only be available for short time periods. These gensets are more expensive to generate and the generating price has to include start up and run down costs. Since these plants are the most expensive to generate they are the last plants scheduled.
The statement by the Regulator in February 1994 seemed to tacitly admit that manipulation had taken place without being able to prove it. Paragraphs 1 and 2 of the Executive Summary is given below:

1. In February 1992, the Energy Select Committee recommended that I should take steps as soon as possible to reduce the dominance of the two major generators and should decide no later than 1995 whether to refer them to the Monopolies and Mergers Commission (MMC).

2. In my Pool Price Statement of July 1993, I decided that it was necessary to bring forward consideration of this issue. My statement followed renewed concerns about increases in prices in the electricity Pool in April 1993. I found that the increase in System Marginal Price (SMP) were primarily caused by increases in bid prices by National Power and PowerGen. Both companies wanted a price increase and were able to achieve it.

The statement then goes on to consider the merit of arguments from National Power and PowerGen that Pool Purchase Price had been insufficient to cover the avoidable costs of the majority of mid-merit and peaking plant. Whilst not agreeing with this conclusion the Regulator does support the possibility that the differential between peak prices and off-peak prices may have to rise to cover such costs. The Regulator refers to the increased competition in the generation market but states that it is insufficient at present to:

"restrain National Power and PowerGen if they wish to increase prices".
Chart 1. Comparison of Monthly Average Pool Selling Price
1990/91 to June 1995

Price (£/MWh)

Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar

Chart 2 Average Pool Selling Price
for the year 1994/95
Chart 3. Pool Selling Price

Daily Profile

Data: 28 November 1994
Professor Littlechild had two solutions to reduce the dominance of National Power and PowerGen, which were:

- the two companies agree to cap the average annual Pool Purchase Price and the demand weighted Pool Purchase Price at some seven percent below the levels seen in 1993/94.

- the two companies agree to sell or lease, to independent generators, 6000MW of generating load, equivalent to six large power stations. This would increase competition by doubling the extent of the independent power generation sector.

The experience of the first year of the cap in 1994/95 was that annual average Pool Purchase Prices did not get close to the annual average cap. The demand weighted Pool Purchase Price cap was exceeded by a small margin though after consultation with interested parties the Regulator decided not to pursue the matter further. Pool Purchase Prices did fluctuate markedly in 1994/95 with very low Pool Purchase Prices seen in the first part of the year and in the latter part of February 1995 and in March 1995. However, November 1994 to January 1995 consistently witnessed very high Pool Purchase Prices. The Regulator has said that he expects that both caps will not be exceeded for 1995/96.

The Regulator has also stated that he considers the disposal of the 6000MW of plant to be more important than the achievement of the demand weighted cap for 1994/95. This is consistent with the overall thrust of regulation policy of achieving an optimal outcome in the market by increased competition. The sales are near completion in August 1995 though the Regulator is concerned about the current structure of the prospective sales.

Most non-generator market participants believe that the big two Generators have used their ability to manipulate pool prices. This belief seriously affects the way that supply contracts are negotiated. Final customers and RECs believe that they are vulnerable to this manipulation and attempt to take precautions. This has led to the development of market tools such as contract for differences and Pool Price contracts which are discussed in later chapters.

This perceived ability to manipulate Pool prices results from the duopoly market structure. The increase in the size of the independent sector demanded by Professor Littlechild could have a major impact on this market structure possibly leading to the removal of the pricing manipulating capabilities of National Power and PowerGen. If this could be achieved it would
remove the market distorting impact of the market structure in generation leading to Pool prices that reflected actual demand and supply characteristics.
2.3 Contract for differences

Contract for differences are financial instruments analogous to hedging instruments in the foreign exchange markets. They are used to protect against Pool price movements in the derivation of fixed price contracts.

The reason for the creation of this instrument is as a direct result of the volatility and apparent manipulation of pool prices. The volatility of pool prices has resulted in a large number of contract customers in the electricity supply market who prefer fixed price contracts. The fundamentals of a fixed price contract are that the basic unit of energy supplied to the customer is supplied at a fixed unit price. This requires suppliers to either take a risk on pool price movements by buying at variable prices and selling fixed. The more likely alternative is to purchase a financial instrument to hedge against pool price movements by purchasing a contract for difference.

Given the potential for large financial losses from buying from the Pool and selling fixed without contract for difference cover, most suppliers will choose the alternative option. Suppliers have the option to hedge 100% of their exposure to pool prices or a smaller percentage figure. Should suppliers take the latter option they are taking a financial gamble that the savings in purchase costs will outweigh the exposure to pool prices. Given the experience of pool price movements outlined in chapter 2.2 the costs of such decisions are potentially very high.

To provide what the final customer market wants requires that suppliers have to buy at uncertain variable prices from the Pool to sell at certain fixed price contracts to final customers. The financial implications of buying at variable and volatile pool prices and selling at fixed prices are potentially so enormous as to cause serious financial losses to a supplier in a year.

This has led to RECs hedging against pool price volatility in two ways. The first has been to construct their own power stations which sign long term contract for differences with the owning REC. These power stations have been built from scratch using Combined Cycle Gas Turbine Technology instead of coal fired stations. This has led to a reduction in the market share of coal fired stations and a reduction in the demand for coal. Offer has put limits on the size of load that gensets owned by RECs can generate which are set in terms of level of demand they can generate. The purpose of these limits are to prevent so called “sweeheart” deals where by RECs buy contract for difference cover from their own generating sets rather than other possibly lower cost alternatives.
One problem with these restrictions is that they could act as a barrier to expansion of RECs in the generation market which could have broken the marked dominance of National Power and PowerGen in the generation market. Another problem to mention is that if the RECs are making inefficient purchasing decisions by entering into contracts with their own power stations the competitive market from 1998 will mean that these RECs will lose business. This trend may take several years to reach its full impact but the impact of full competition should force RECs to purchase at the lowest cost option.

The second method of hedging against pool prices has been to attempt to sign contract for differences with contracting parties, mainly generators. RECs do not own the quantities of power stations to meet their supply needs. This leaves them with no alternative but to purchase contract for difference cover from third parties.

2.3.1 The Mechanics of a Typical Contract for Difference

Contract for differences have no direct connection with the Pool. The price at which a contract for differences is sold has no direct impact on the pool prices. Contract for differences are financial instruments between two contract parties. The contract for differences buyer will be a supplier, who could be a REC, another supplier or even the direct sales force of the generator. The contract for differences supplier does not have to be a generator of electricity as this is a financial instrument dependent on pool price movements. There are however, advantages for the contract for differences seller to be a generator. There are disadvantages to the contract for differences seller not being a generator. These points are discussed in part three on generator supplier strategies.

The contract for differences buyer is seeking to mitigate his risks to movements in pool prices through the contract for differences. The seller of the contract for differences is attempting to make financial gains out of pool price movements and charges an administration fee for the supply of the contract.

The contract for differences is literally a contract for the difference in pool price movements. The two parties agree a "strike price" for a specified quantity of load. This means that for that quantity of load, if pool prices rise above the "strike price" the contract for differences seller agrees to pay the difference between the pool price and the "strike price". If pool prices fall below the "strike price", then for the agreed quantity of load, the contract for differences buyer pays the contract for differences seller the difference between the "strike price" and the pool price. The mechanism just described is a known as a "two way contract for differences" which is the most common form of contract type.
The supplier takes the “strike price” for that energy block, adds on distribution charges, administration and profit charges to give a price to sell to the customer. The other factor that the supplier must be aware of in fixing a price to the customer is that the contract for differences is for a fixed block of energy irrespective of the consumption of the final customer. This means that if the customer uses no energy in a period the supplier, who is the contract for differences buyer, must still pay the contract for differences seller for those units. These are referred to as “unsold units” because the supplier has to pay for them but has not necessarily sold them. These “unsold units” have to be charged for in some way, sometimes by building their cost into the overall charging structure.

Contract for differences typically use a strike price based on the Pool Purchase Price (PPP) not the Pool Supply Price (PSP). As we stated in a previous chapter the difference between the two prices is termed uplift. However, it is the PSP that the supplier purchases from the Pool to supply to customers. Even with contract for difference cover to provide insurance cover for fixed price contracts, the supplier is subject to risk due to volatility in the level of Uplift. Uplift is typically under 2% of the PSP.

The contract for differences are used to set the price offered to the customer. This means that in the majority of cases, the supplier has bought the contract for differences but has not yet sold it to the customer. The key determinant for the successful purchase of a contract for differences by a supplier is to obtain “strike price” at which the entire block of energy can be sold to final customers. Purchasing at too high a “strike price” could mean that the supplier still has to pay for the contract for differences they have bought but are unable to sell.

2.4 Types of Supply Contracts

Introduction

Economists have categorised the efficiency gains arising from competition in to four types, which are:

1. Productive efficiency - relating to lower costs of production, in this case supply costs.

2. Allocative efficiency - where buyers pay prices more closely related to costs.

3. Scale efficiencies - where markets are characterised by increased number of entrants if there are constant or decreasing returns to scale and decreased number of entrants if there are increasing returns to scale.

4. Dynamism and product choice - where competitive markets are characterised by more innovation and a wider range of products on offer.
The attention of most commentators on the non-franchise electricity supply market has been focused on the benefits of improved productive and allocative efficiency. Writers such as Yarrow (1994) have shown that the reduction in prices in this market are evidence of greater productive efficiency and allocative efficiency. This chapter will show that the market has also seen considerable increase in dynamism and product choice. It will outline the starting point for the competitive supply market by briefly explaining the roles of tariffs. It will then outline the structure of supply contracts, then go on to consider the types of contract seen in the supply market. The chapter will show that the increasing trend to move away from a contract structure to products such as Pool contracts, "Minimiser", and Energy blocks is evidence of the greater dynamism and product choice in the competitive supply market.

2.4.1 The Difference Between Tariffs and Supply Contracts

In the franchise market customers are supplied with electricity through the terms of tariffs. Tariffs are a set of standard rates available to all organisations in a particular group. This group is determined by geographical area, such as REC boundaries, and by the types of consumption, such as customer grouping and voltage type. Tariffs involve groups of consumers which leads to one set of consumers with the tariff group tending to subsidise another set within the group. Tariff customers have no choice of supplier though may have a choice of different tariffs from the host REC.

Customers in the competitive non-franchise market have the choice of contract from a variety of suppliers, including their host REC, or to stay on their current tariff. Greater choice of supplier has resulted in lower prices. The impact has been that customers on contract pay on average 10% less for their electricity than those on tariff. The electricity contract is the terms of the arrangement by which electricity is supplied to companies in the competitive market.

For the supplier, the sale of energy through the electricity contract involves decisions on the likely movement in Pool prices, contract for difference prices, and a view on the prices that will sell in the market. The combination of all three gives an estimate of the potential profit available from winning the contract.
It is important that the reader keeps in mind this point that the electricity contract is a financial instrument with considerable risks attached. Once a contract is in place the supplier is liable to pay the costs of meeting that customers electricity needs, irrespective of the financial costs. It may be that the price received is less than the price paid for a considerable period of the contract leading to considerable financial losses.

2.4.2 Structure of the Typical Supply Contract

The design of the typical supply contract has in the past been designed to cover DUOS charges as well as supply charges. A standard supply contract would follow the structure as outlined below:

1. A standing charge payment covering use of system charges and suppliers fixed costs
2. An availability charge for each kVA of chargeable supply capacity
3. A charge to cover the period of peak demand on the system during the months November to February
4. A running charge for each day unit and each night unit to cover the use of system charges and the supply of energy charge.
5. A reactive power charge

2.4.3 Types of Supply Contracts

There are two main categories of contracts on offer to customers in the non franchise market, fixed price and pool based contracts. As the market has become more mature two other types of supply contract have developed which I will discuss here, called Minimiser and Contract for Differences or Energy Blocks. The latter two types incorporate features of both fixed and pool priced contracts.

I will discuss the following four types of supply contract in this chapter.
2.4.3.1 Fixed Priced Contracts

Here the unit price of electricity is fixed for the contract length. With a fixed priced contract the customer has certainty on the energy charge payable per unit of consumption. Fixed priced contracts allow customers to budget more successfully for financial purposes. This tends to make the contract type more attractive to purchasing managers who are from a financial background who may need to produce accurate internal budgets. This is especially true of some of the major energy buyers in the new non franchise market.

Fixed price contracts hold greater risks for suppliers unless they have contract for differences cover; these include:

1. Contract for differences are not always available at a price which translates into a competitive final price for the customer.
2. One risk is termed “unsold units” when a final customer does not consume the quantity of energy covered by a contract for difference bought by their supplier. Contract for differences are typically sold in blocks of energy where the quantity of cover is the same irrespective of the time of day and the time of year. Customers that have a load shape that means they are consuming less energy than is covered for in the contract for difference, create the cost of “unsold units”. In effect, the supplier has “bought” the energy through the contract for difference but has not sold it to their customer. Suppliers build in an extra charge to cover the cost of these “unsold units”.

Customers that have a consumption pattern that matches the shape of the contract for difference will have less “unsold units” and therefore a lower energy price. Customers that have a load shape that does not match the contract for difference shape will have more “unsold units” and therefore a higher price.

One way around this problem of “unsold units” would be to find several customers with profiles that compliment each other. These profiles could be matched to give lower overall levels of “unsold units”. An illustration of matching profiles would be to match the load profile of a quarry which consumes large quantities of energy at night with a department store that is open in the day. In effect, this would be creating a “mini-tariff” for these customers. As we will see later in the chapter, this is an increasing trend for some groups.
Fixed priced contracts have greater profit potential than the pool counterparts. Whilst selling at fixed prices and buying at variable prices generates greater risk, it also creates greater profit potential. This profit potential is reduced by the premium required for the contract for differences cover. Greater profits could be achieved by not using contract for differences cover, though there is a corresponding increased exposure to pool prices. Given that pool prices are arguably subject to manipulation by the same organisation that the supplier has refused to buy a contract for differences from, the supplier is taking a considerable gamble out of proportion to the potential profit available.

The credit worthiness of final customers is important for suppliers. Suppliers have signed agreements to pay for the units supplied to a customer, but do not receive final payment for those units for up to two months after the date of supply. A number of bad debt customers could wipe out all supply profits for the year.

2.4.3.2 Pool Priced Contracts

"Pool” contracts, as mentioned earlier in this work, are electricity supply contracts where the energy price paid by the final consumer is the Pool Selling Price paid by the REC scaled up for distribution use of system charges and a small administration charge by the supplier. “Pool” contracts allow the final customer to buy electricity at the “wholesale” price paid by the supplier plus a small charge to cover administration and profit. The customer is charged for energy based on their consumption half hour by half hour at the Pool Selling Price for the relevant half hour. The customer’s bill is composed of: the pool selling price of energy consumed, transmission and distribution charges, and fossil fuel levy.

The advantages of Pool priced contracts to the customer are:

1. In theory they are getting the lowest price electricity.
2. Customers are not paying for the cost of Contract for differences cover or the risk factors that are inevitably built in by the supplier when setting the price.
3. “Pool” customers can take full advantage of lower Pool Selling Prices when demand is weak.
4. Customers who have load patterns that are different from the overall demand profile of the Pool will consume more energy when Pool prices are cheap and less when Pool prices are expensive.
The disadvantage to final consumers are the uncertainty and vulnerability to pool price movements. As I have shown earlier in this thesis, pool prices can fluctuate violently to quite astronomical prices. Customers have the uncertainty of not being able to budget accurately for their energy consumption. They have an open ended exposure to the movement in pool prices. For these reasons only certain types of customers like pool contracts.

The advantage to the supplier is that their exposure to pool price movements is removed. The customer takes all the risk. This is particularly appealing to RECs who are concerned about their own exposure to pool price movements and/or the cost of and exposure to contract for differences cover. The disadvantage to the supplier, is that there is very little profit in these contracts. There is no potential to make profits from the margin on the price sold to the customer. Furthermore, competitive market pressure has driven down the administration charge that suppliers make on such contracts.

An example of the greater level of innovation and product choice has been in the additional services sold with the supply contract. These added value services can be sold with fixed priced contracts but the types of options generally sold are more relevant to Pool contracts and energy blocks. Standard options in the additional service packs of most suppliers include the following:

1. A “Triad” warning service. The “Triads” are the three highest demands in any half hour between November to February each year. Customers on Pool contracts and hybrid “Triad Demand” contracts have their transmission use of system charges calculated on their consumption at the time of the “Triads”. If customers are able to reduce their demands at the correct time and date of the “Triads” they will reduce their energy costs. For a small fee, typically around £500 per annum, suppliers attempt to forecast the time and date of the “Triads” for their customers.

2. Provision of half hourly data on computer disc or by transmission through some electronic medium. This service allows customers to undertake their own analysis of their consumption profiles. Costs vary from nil to £2,000 per annum depending upon the customer.

3. Pool price warning service performing a similar function to Triad warnings, cost around £300 per annum.
2.4.3.3 Minimiser

In 1993 Northern Electric developed a supply contract called Minimiser which aims to combine the potential savings available by not paying the risk premium of Contract for differences cover yet allowing the customers the certainty of fixed priced contracts. Minimiser works from the premise that customers prefer fixed priced contracts but are aware that Pool prices should overall be cheaper, albeit more risky.

The customer goes on a long term contract, over say five years, where the charges for each year are fixed based on an independent arbiter's view of the best alternative fixed priced contracts on the market. At the end of the contract year, the cost of the fixed priced contract is reconciled to pool prices over that year. If pool prices have been cheaper, the customer shares the benefit of those savings with the host REC. If pool prices have been more expensive, the cost that the customer would have paid on pool price contracts are added onto the charges of the next year of the contract.

This would allow Northern Electric to avoid the dependence on purchasing contract for differences cover from generators in the setting of fixed priced contracts and retain customers loyalty year on year. Customers will receive some benefit year by year any low levels of pool prices but are exposed to high prices through the cost of next year's contract.

Northern Electric appear to be the only REC that actively pursued this type of contract. They apparently had some success with major national organisations placing some of their business on such contracts. However, the product has not expanded to other suppliers and is not widely accepted by the purchasing managers of most major energy users. The latter fact is probably because customers can always find alternative suppliers willing to come close to the Northern Electric one year offer for fixed priced contracts. In subsequent years, they find another supplier prepared to make a similarly low offer fixed priced contract. Furthermore, the extreme volatility of pool prices exhibited over the past few years would make Minimiser less attractive.
2.4.3.4 Contract for differences or Energy Blocks

As the market has become more sophisticated suppliers have sought to differentiate their product from competitors, to remain competitive, whilst minimising risks to pool price movements. Minimiser has been one development though only proposed by Northern Electric. A wider hybrid supply contract has been supply contracts that are a contract for differences or an Energy Block.

With this contract, the supplier acts as an intermediary buying a contract for difference for a final consumer. The supplier charges a fee for administrating the contract for difference. An Energy Block can be classified as similar in structure to a contract for difference as the customer purchases a block of energy at a strike price.

The main difference between this type of contract and the ordinary fixed priced contract is that the customer receives an energy rate for their organisation as a whole not on a site by site basis. With a standard fixed priced contract the customer is given an energy rate for each site. With a contract for differences or Energy Block contract all the consumption of the sites of the customer are aggregated and compared to the level of energy agreed in the contract. For all the levels of consumption within the agreed contract levels the customer is charged the energy rates in the contract. For consumption levels in excess of the agreed amount, the customer is charged another rate or pool prices.

The customer who receives this contract type is receiving a mini-tariff for their organisation only. Once the customer has received the overall energy charge for their organisation they allocate the charges to the sites within the contract. It is the customer’s responsibility to allocate the charges for each individual site. This type of contract represents a highly innovative solution to meeting customer requirements providing an important example of product efficiency outlined earlier in this chapter.

The contract type is aimed at the organisations with large levels of consumption. These customers are groups with a large number of sites or over 1MW single sites with considerable consumption levels. To make full use of this contract type the customer requires some experience of the electricity supply market and the ability to derive the total costs and allocate them to sites on the contract. A risk of the Contract for Difference contract, to the customer, is that they must bear all the costs of uplift. With a standard fixed price contract the supplier bears the cost of uplift.
2.4.3.5 Market Trends

Market research undertaken on customer attitudes to the market, (Power Contracts Research Andrew Irving - 1994), suggests that customers prefer simple contracts. This is supported by anecdotal evidence and market experience of NORWEB in the electricity supply market. The research suggests that the large majority of customers find the electricity contract very difficult to understand and to evaluate the lowest cost offer.

This research suggests that organisations that are new to the market, that is the 100kW to 1MW market, and are not part of major groups would prefer supply contracts that have a smaller number of chargeable rates. Recommendations have been to exclude standing charges and demand charges from the standard contracts outlined in 2.4.1. Indeed a number of suppliers have acted on these recommendations and more recent supply contracts have incorporated the demand charges into the current offer package.

However, simplicity brings with it the associated danger that customers pay considerably more for their electricity than they need to. Supply contracts that reflect the use of system charges in the pricing structure are in effect passing through these charges to the customer. With this type of contract, customers can clearly see how much they are paying for the supply of energy relative to the use of system charges. With the simpler contracts, suppliers can build in extra supply profit because the customer is unsure of the mixture of use of system and supply charges that constitute the bill.

The dislike of what appear to be complex contracts has outweighed the fear of overcharging by suppliers. Market pressure is being reflected in different offer structures which meet customer’s needs. A general trend has been the removal of the November to February demand charges. Some companies have also removed standing charges leaving just a day unit, night unit, and availability charge. Of course, it is worth repeating that removal of these charges from the supply contract still means that these charges have to be paid for DUOS purposes. The cost of these charges will have been built into the unit rates.

Companies where electricity constitutes a large proportion of the energy costs are increasingly focusing upon more transparency in their contracts. Energy only contracts allow the customer to focus on the fundamental difference between competing offers, which is the rate at which the companies are offering to supply energy.

The advantage for the supplier is that they are not forced to guess the likely outcome of rival host RECs DUOS charges. This reduces the vulnerability of making fixed priced offers before DUOS charges are published. The advantage for customers is
that they do not have any risk premiums for uncertain DUOS charges. Suppliers’ offers do not build in risk premiums allowing a more straightforward comparison of rival offers.

The disadvantage for the customer is that they are required to know the total energy costs for internal budgetary purposes, inclusive of DUOS charges. If they accept an energy only offer, the customer or the winning supplier will have to add the supply rates to the DUOS charges for all sites to give the total energy cost for each site. This requirement and an overall lack of understanding of the electricity contract has meant that energy only contracts have limited appeal to a small number of select buyers.
CHAPTER THREE MARKET PARTICIPANTS AND THEIR BEHAVIOUR

Introduction

Chapter three considers market participants and their behaviour in some detail. It segments buyers of electricity into over 1MW single site buyers, 100kW to 1MW single site buyers, and Groups. This results from different levels of experience and priorities. However, I will suggest that all customers buying perceptions are focused on price. I will look at the importance of barriers to entry and the impact on the strategies of RECs, generators, and potential entrants.

3.1 The Buyers of Electricity for Final Consumption

3.2 Customers Perceptions of the Product

3.3 The Role of Potential Competition in the Electricity Supply Industry

3.4 Strategies of RECs

3.5 Strategies of Generators

3.6 Strategies of Other Market Players

3.1 The Buyers of Electricity for Final Consumption

Background information to Electricity Buyers

The non franchise market was opened up to competition in April 1990 for any site that had average maximum demands over 1MW over a twelve month consecutive period. Known as OM customers this national market comprised approximately 4,500 sites accounting for 60 TWh per annum. Typically these sites are very large industrial plants, such as shipyards, car plants, chemical works, and other large manufacturing plants. A much smaller proportion of sites are in the commercial sector, which are typically head offices or very large department stores both of which have large air conditioning loads. The OM sites have a broad split across RECs with about 400 sites in each area.

In April 1994, the market was expanded to include customers with maximum demands over 100kW. The 100kW to 1MW market or OH market added a further 45,000 sites to the competitive market accounting for 30TWh per annum. These smaller sites are more in the commercial than industrial sectors and are often part of large group organisations.

One point worth noting is that, whilst smaller in number of sites, the OM market is significantly larger in units cover.

The attitudes and behaviour of buyers of electricity can be split into three main groups depending upon their experience of the market and the importance of electricity to the organisation. These groups are as follows:
3.1.1 Over 1MW (OM) single sites

3.1.2 100kW to 1MW (OH) single sites

3.1.3 Groups

3.1.1 Over 1MW Market (OM) Single Sites

This group relates to industrial plants of firms that are not part of organisations with a large number of similar sites. Typical examples of this type include paper mills, chemical factories, or manufacturing plants. Buyers have been in the competitive market for a number of years and have considerable experience of market mechanisms such as the Pool and supplier behaviour. Buyers tend to be employed on a full time basis as energy managers which means that they are much closer to the impact of energy costs. This makes them more receptive to supply contracts that require greater knowledge of the market, involve greater risk but have potentially larger energy savings.

This is an attractive group for all competing suppliers though one that demands keenly priced energy contracts. In the past this group have had some loyalty to the incumbent REC. Typical buyer behaviour would be to obtain quotes for supply from a number of non host RECS, known as Second Tier Suppliers, with a perceived aggressive market strategy. The buyer would then approach the host REC and threaten to take their business elsewhere. Thus the host REC is "encouraged" to provide his best price and if it is not adequate, the buyer goes to a Second Tier Supplier.

3.1.2 100kW to 1MW (OH) Market Single Sites

This group has a more even split between industrial and commercial sectors. Electricity is not as important to these organisations as the OM market. The electricity buyer is therefore someone who has been given the task of negotiating electricity along with their existing tasks. As they are less close to the problem of electricity costs and have less experience of the non franchise market, this group of buyers are less receptive to more unusual contract options.

This group consumes less electricity but may be less keen to trade off suppliers to drive down electricity costs. The latter hypothesis has yet to be fully tested. The smaller sites do not have the luxury of energy managers charged with the major role of energy efficiency. They have often turned to so called energy consultants to perform the contract negotiation who have no loyalty to a supplier. The increased role of energy consultants is discussed later in this work.
3.1.3 Groups

The expansion of the market in 1994 dramatically increased the buying power of groups. Groups can be defined as central organisations that negotiate on behalf of a number of sites. Group purchasers in the OM market tended to negotiate on behalf of no more than 20 sites with very high consumption levels. With the advent of the OH sites, large group purchasers negotiate on behalf of hundreds of sites, whilst small group purchasers negotiate for 5 to 20 sites.

The expansion of the non-franchise market changed the buying behaviour of group purchasers as a whole. In the OM market few organisations had more than a small number of qualifying sites. The combined load of these sites was significant to an REC. These organisations would include water companies, health authorities, supermarket chains, and industrial conglomerates. Most of these group organisations and some of the large single sites had, and still maintain, a large profile within the host REC and often a significant political presence. Thus, a strong market tendency existed for the host REC to "win" the supply contract of the buyer irrespective of profit levels.

With the inclusion of the OH market, groups tend to have a national presence, not just significant in a REC area. This means that they have no loyalty to a particular REC or supplier but will switch to the supplier with the lowest cost option every contract renewal.

Many of these groups have some knowledge of the market from their tentative experience in the OM market. Energy buyers tend to be non-specialist employees who do not wish to take risks with the energy budget. Furthermore, group energy buyers tend to have a financial or purchasing background, not engineering. This makes them prefer less risky, fixed price contracts where the costs of energy costs are more predictable. Because these customers have considerable purchasing power and are a good credit risk they tend to get good price deals.
3.2 Customers' Perceptions of the Product

Having stated in the previous chapter who the buyers are and provided background information to their buying motives, I will now look at the perceived customer perceptions of the product related to buying decisions. In chapter 1.2 of this thesis I outlined the product characteristics of electricity. To summarise the points raised in that chapter, electricity has no inherent product differentiating factors. This means that the electricity purchased from one supplier is exactly the same as that available from another supplier.

Given the homogeneity of the product, there are only two areas to differentiate the product of a supplier from its competitors; through price and service. All market research undertaken on the buying motives of organisations in the non franchise buyers sector suggest that the overwhelming predominant reason in customers choice of supplier is the price of the contract.

This conclusion is further supported by anecdotal evidence in numerous conversations from my experience with a variety of different purchasing managers from major national chains to small single sites. Non price factors, such as the billing period or the quality of service are said to influence a buyers decision making process only if competing prices are the same.

The customers perceptions of the market can be accurately summed up by the following often quoted comment made by Mr John Whateley, electricity purchaser for Marks and Spencers, at a seminar on the electricity competitive market:

"There are three things I want from my supplier. Price, Price, and Price."

This attitude exemplified by John Whateley is characteristic of purchasers with experience of the market. Those customers who are new to the market tend to be more fearful of the consequences of changing supplier for the first time. Typically, they are worried about security of supply. However, this is a transient business decision since once they have made the move, or know another organisation that has made the move, then they are no longer fearful about the security of supply.

The fear of reduced security of supply factor is of course a completely spurious decision making factor, as the same standard of security of supply is maintained irrespective of the supplier.

The other point to mention regarding the issue of price is that electricity contracts do not always make the full costs of the contract transparent to the customer. It is not always easy to evaluate which is the lowest cost option.
Whether the overwhelming importance of price in the buying motives of energy purchasers will be maintained as the electricity supply market opens up to domestic customers remains to be seen. The current thinking within the industry itself is that given the likely small profit margins in domestic supply, differences between the competing suppliers will be small. This will reduce the incentive to switch suppliers, leading to greater customer inertia in the domestic market.

The issues of competition in the domestic market will be discussed later in the thesis. However, the hypothesis that domestic customers will become inert is based on a prior assumption on the selling patterns of suppliers. This would appear reasonable given the current structure of the supply market where suppliers are split directly or indirectly from generators. However, if a REC was vertically integrated with a generator this would marry the competitive advantages of both market participants leading to a potential market dominator. These issues are discussed later in the document.

3.3 The Role of Potential Competition in the Electricity Supply Industry

3.3.1 Introduction

From inception in April 1990 the non franchise electricity supply market has been characterised by fierce competition between a large number of suppliers such as RECS, generators such as National Power, PowerGen, Nuclear Electric, Scottish Power, Scottish Hydro, and EdF, and a number of other suppliers including British Gas (to its own sites) and a financial arbitrageur Marc Rich and Associates.

In this chapter I will examine the application of traditional economic analysis of competition to the electricity supply industry. I will use the analysis of potential competition based on Gilbert (1989) which outlined four major schools of thought on this subject, which are the traditional model of limit pricing, dynamic limit pricing, the theory of contestable markets, and the market efficiency model. I will first outline the key characteristics and hypothesis of each of these four schools of thought. I will then apply these theories to the electricity supply industry. The conclusion will be that there are features of each of the schools that are applicable to the electricity supply industry though no one theory provides a complete model of the industry.
3.3.2 Economic Theory and the Role of Potential Competition.

Potential competition has been recognised as a mechanism to control the exploitation of market power. In his role at Ofer, Professor Littlechild has made the promotion of competition in the electricity supply industry a key component of his regulatory policy. One important feature of this policy and of electricity privatisation in general will be the complete liberalisation of the electricity supply industry from April 1998. It is therefore important that I consider the applicability of economic theory on potential competition. Gilbert (1989) outlines four schools of thought on potential competition which are discussed in this chapter.

3.3.2.1 The Traditional or Classic Limit Pricing Model

This relates to the structural theory of market performance developed by Bain. "Conditions of entry" are technological features which affect the exercise of market power such as economies of scale, absolute cost advantages, and production differentiation features. These features act as barriers to entry of rival firms allowing incumbent firms to maintain price above average cost which results in above normal profits. A critical assumption of this school is the Sylos postulate that potential entrants expect established firms "will not accommodate the entry of a rival by reducing their output. This means that if a rival did enter the market the additional output would lead to competition which forces price below its average costs making entry unprofitable. This creates a limit output which is the smallest pre-entry output at which entry is not profitable. The corresponding limit price of the output is the highest price at which entry is deterred. Entry is an all or nothing affair. At above the limit price, entry occurs instantaneously. At below the limit price the threat of entry is eliminated.

The key conclusions of the school are that established firms can exploit structural features of the market to earn persistent above-normal profits. An important feature is that the incumbent firms require a mechanism of signalling to potential entrants that they will not act passively in response to their entry into the market. Dixit (1980) shows that sunk costs, such as investment expenditure or excess capacity, may offer this mechanism. Entry may be deterred by incumbent firms reducing pre-entry prices to a level that signals to potential entrants that post-entry profitability will be unattractive.
3.3.2.2. The Dynamic Limit Pricing Model

In this model, scale or technical requirements do not restrict entry and a reservoir of potential competitors exist ready to spill into the market at a rate depending upon the level of expected profits. Incumbent firms are aware of this and can trade off current profitability against the prospect that current high profits which will lead to increased competition and reduced profits in the future. Incumbent firms can earn abnormal profits but only for a transient period. Pricing behaviour of these firms depends on existing as well as potential competition. Incumbent firms making abnormal profits will aim to alter behaviour to slow the rate at which they lose market share to new entrants.

3.3.2.3. The Contestable Markets School

This theory as developed by Baumol, Panzar, and Willig (1982) describes a perfectly contestable market as one in which prices and output are “sustainable” if no new firms (using the same technology as the incumbent firms) can choose lower prices (of the products in the market) and operate profitably by serving all or part of demand. It is a theory of market equilibria not a description of firms behaviour. In this sense it would appear to be a descriptive rather than a predictive model in the same sense as the classic critique of the kinked demand curve model of oligopoly. This is because the model explains why an incumbent producer may not wish to depart from sustainable, break-even Ramsey prices. Ramsey prices are defined as stable prices at which normal profits only are made and there is no incentive for entrants to come in to the market, or incumbents to leave. It does not necessarily explain how the incumbent firm chooses the Ramsey prices initially.

The theory suggests that even in natural monopoly markets, incumbent firms will have to maintain prices at average cost because any higher level of price leads to abnormal profits which would attract competitors into the market. The theory depends upon the ability of “hit and run” entrants who are able and willing to enter a market whenever profitable opportunities arise. This makes sense as long as entry and exit costs are zero. Where barriers to entry exist Willig (1989) has produced a model that still leads to a contestable market but where prices move more slowly in response to entry. Gilbert (1989) and Stiglitz (1987) have presented models that show if prices move quickly in response to entry, then hit and run entry becomes risky with some sunk costs.

The key conclusions of perfectly contestable markets are that if market prices are sustainable then established firms will earn just normal profits. If barriers to entry are insignificant, the threat of entry alone will hold the level of profits to negligible levels. All incumbent firms will have to be cost minimisers and investments have to be efficient at a level of output that is intended to deter entrants.
3.3.2.4. The Market Efficiency Model

This school which Gilbert (1989) refers to as the “Chicago school” of industrial organisation postulates that firms owe their position to superior performance not strategic behaviour, and profits are the rent accruing from this superior technology. Gilbert (1989) states that barriers to entry play a minor role and uses a definition by Stigler which is:

“The cost of producing (at some or every rate of output) which must be borne by firms seeking to enter an industry but is not borne by firms already in the industry.”

By this definition, if the entrant and incumbents had access to the same technology, then the extent of scale economies would not be a barrier to entry as it affects the costs of both firms equally. If entrants believe they can compete on equal terms then scales economies are not a barrier to entry.

Gilbert (1989) sees the Chicago school as a weak form of contestable markets because in perfectly contestable markets barriers to entry are non-existent, whereas in the Chicago school barriers to entry play a minor and temporary role.

3.3.3 Possible Barriers to Entry in the Electricity Supply Market

This chapter will outline four areas of potential barriers to entry, which are: geography, invoicing, energy purchasing, and low cost selling.

3.3.3.1. The definition of the size of the market will lead to quite different outcomes on the effectiveness of barriers to entry. The issue is whether to consider the market as the REC area or the actual the Pool in England and Wales. Whilst there are no restrictions to supplying customers in the Pool geographical area, there is a perception amongst some REC competitors and some customers that the primary market is within the historical REC boundaries. These RECs view their primary goal as to retain market share within their own geographical area. I have described these RECs as “Fortress Host REC” in chapter 3.4.1 of this thesis. Other competitors, such as generators, and some customers, such as national organisations such as supermarkets, see REC boundaries as an irrelevance.
The experience is that competition tended to focus on REC areas in its pre 100kW to 1MW market in the early years. When the 100kW to 1MW market was opened up to competition, this included a significant number of national organisations who focused on the national market. The conclusion is that increased competition has led to a reduction in the importance of REC boundaries.

3.3.3.2. A potential barrier to entry is the requirement to send an invoice to the customer. The importance of this barrier to entry depends upon the size of market share desired by the entrants. For a small number of customers invoicing can be achieved at a small cost and therefore is not a barrier to entry. However, if a supplier wishes to supply a large number of customers the need to acquire a low unit cost, high volume billing engine creates an absolute cost barrier to entry.

Incumbent RECs have an advantage in invoicing terms in both absolute cost advantages and economies of scale against non-REC suppliers. RECs are required to have a billing engine for invoicing for DUOS charges. The same billing engine can be used for invoicing supply purposes. Incumbent RECs should always have an absolute cost advantage because they do not have to fund the full cost of the system from supply revenue. Furthermore, because RECs can fund part of the billing machine from distribution revenue this should give them the lowest unit billing cost per customer. This point is discussed in more detail in chapter 3.4. These advantages could be of extreme importance when the domestic market opens up to competition in 1998. The domestic market will be characterised by high volume and very low margin business.

3.3.3.3. The ability to purchase effective contract for difference cover is in theory not a barrier to entry of a potential entrant. Any potential supplier can purchase contract for difference cover in the same way that an existing supplier to the desired quantities. However, the current market structure of the generation market means that contract for difference sellers are virtually all generators. This means that suppliers who are vertically integrated as the direct sales arm of generators could be in a better position to purchase the quantities of contract for difference cover in the desired amounts for the optimal price. Suppliers who are not vertically integrated do not have this advantage. This category of potential entrants with no experience of the contract for difference market may view it as a barrier to entry. This point is elaborated in chapters 3.4 and 3.5 on REC and generator strategies.
3.3.3. The ability to sell to customers at the lowest possible cost can be a barrier to entry. Given that the profit margins in the supply market are small, it is important for suppliers to control costs, such as targeting, marketing, and selling to customers. Such costs will be lower for the incumbent supplier than most potential entrants making marketing and selling costs a barrier to entry. However, not all potential entrants will face such a cost barrier to entry in the electricity supply market. If the potential entrant already has an association with the customer, such as an electricity customer may also be a British Gas customer, then the new entrant, in this case British Gas, will have virtually the same selling and marketing costs as the incumbent supplier.

I have highlighted three areas of potential barriers to entry in invoicing, purchasing contract for difference cover, and minimising selling costs. The effectiveness is dependent upon the scale of entry of the entrant and the type of potential supplier.

3.3.4. Application of Potential Competition Theory to the Electricity Supply Industry

In chapter 3.3.2, I outlined the key features of each of the four schools in the area of potential competition theory. In 3.3.3, I considered the potential for barriers to entry in the electricity supply industry. In this chapter, I will consider the application of the economic theory to the competitive electricity supply industry by considering the relevance of each of the four schools.

3.3.4.1 The Traditional or Classic Limit Pricing Model

The school states that established firms can exploit structural features of the market, namely barriers to entry, to earn persistent above-normal profits. A limit price is derived at which incumbent firms can earn above-normal profits. Potential entrants are sent signals that incumbent firms will fight entry by maintaining output levels which will make entry unprofitable.

The direct sales to final customers competitive electricity supply industry experience has been that the existing barriers to entry have not deterred new suppliers from entering the market. The new entrants have been generators who have exploited their competitive advantage in efficient energy costs to make profitable entry. The barriers to entry of incumbent firms have proved ineffective against this type of organisation. The experience of the market has been that incumbent suppliers have attempted to lower price to make entry unprofitable but have lacked a significant cost advantage over entrants to prevent entry.
Significantly, the market has not seen entry by an organisation with no historical links to the electricity industry, except on a very small scale. This may support the Central Limit Price Theory in that barriers to entry and the threat that incumbent suppliers will maintain output leading to unprofitable prices have deterred entry. To test this hypothesis will require a more developed competitive supply market. In particular it will be interesting to see whether the complete liberalisation of the market in 1998 makes entry more profitable to this type of organisation.

As entry has not been deterred and incumbent suppliers have been unable to prevent entry it casts doubt on the relevance of the Limit Price Theory to the electricity supply industry. The barriers to entry have been ineffective against the potential new entrants who are generators. However, it may be that when the domestic market opens up in 1998 the very small level of profit margins will increase the effectiveness of the absolute cost advantage and economies of scale that RECs have in invoicing costs. This will mean that if a REC can match the efficient purchasing of generators, the competitive advantage in billing will mean that it could reduce prices to a level that only others REC with similar circumstances could match. In effect, the REC could set a limit price with signals to potential entrants that entry would be met by maintaining output that would lead to unprofitable prices. This issue is considered in more depth in chapter 5 of the paper.

3.3.4.2. The Dynamic Limit Pricing Model

In this model, scale or technical requirements do not restrict entry and a reservoir of potential competitors exist ready to spill into the market at a rate depending upon the level of expected profits. Incumbent firms can earn abnormal profits but only for a transient period and will price with the aim of slowing the rate at which they lose market share to new entrants.

Gilbert (1989) states that early dynamic limit pricing models assume that dominant firms set prices without explaining why the dominant firms should be price leaders. In the national electricity supply market no one firm is able to dominate by setting prices which are followed by competitors. This tends to limit the applicability of the dynamic pricing model. However, the first year of the competition involving the OH (100kW to 1MW) market did exhibit features of the model. Prior to April 1994, several RECs were concerned about losing market share after 1 April 1994. They took the strategic aim to use the dominant position as the incumbent supplier to offer their OH customers discounts off their existing tariffs in return for signing supply contracts that tied the customers to the REC for a period of time. This behaviour tends to support a conclusion of the dynamic pricing model as RECs use the dominant position to set a pricing policy to slow down the rate of decline in their market share.
3.3.4.3. The Contestable Markets School

A perfectly contestable markets is one in which prices and output are “sustainable” as incumbent firms have to maintain price at average cost because any higher level of price leads to abnormal profits which would attract “hit and run” competitors into the market. “Hit and run” entrants are able and willing to enter a market whenever profitable opportunities arise. “Hit and run” entry only makes sense however if entry and exit costs are zero, that is there are no barriers to entry or exit. In the analysis of the electricity supply market I have shown that barriers to entry do exist though their effectiveness depends on the type of the potential entrant. Willig (1986) has developed a contestable model that allows for barriers to entry though prices move more slowly in response to entry. Gilbert (1989) and Stiglitz (1987) have argued that if prices move quickly in response to entry, then hit and run entry becomes risky with some sunk costs.

The theory of contestable markets does appear to have relevance for the competitive supply market. In chapter 3.3.3. I stated that there are virtually no barriers to small scale entry of organisations entering at the margin. If the national market is seen as a collection of regional markets, suppliers can make “hit and run” entry into the area of particular REC if the host REC is making abnormal profits. The “hit and run” supplier can quickly withdraw from the contract round in that area if prices move down and without any costs of exit. This means that the host REC is forced to maintain prices close to marginal costs or run the risk of “hit and run” entry by other suppliers.

The experience of the current non franchise market does support this analysis. The main April negotiating round has seen incumbent suppliers making initial contract offers that build in a good profit margin. Incumbent suppliers are testing the market seeing what profit margin they can get away with. Customers then approach other suppliers for competing offers and potential entrants come in to the market with lower competitor offers. Incumbent suppliers return with counter offers and prices move downwards. The negotiation process between customers and suppliers takes on the features of an auction. The role of auctions is discussed in Chapter 4 of the thesis.

What is unclear is whether the incumbent supplier takes account of the threat of potential entry in setting initial prices. The experience has been that if the incumbent supplier sets high prices, entry does occur. If he sets lower prices then entry will probably not occur as the potential entrant will see no profit in entry. Under contestable markets this leads to the conclusion that the threat of entry will lead to the incumbent electricity supplier setting price equal to marginal cost.
A problem for the incumbent electricity supplier is that the unpredictability of pool prices means that average and marginal costs are not always certain. This may result in building a risk premium to cover the uncertainty. In setting prices the incumbent electricity supplier may not wish to offer prices that are close to estimated lowest cost because of the risk that their prediction of pool prices is wildly out of step with the rest of the market. They may deliberately set prices that are above estimated marginal and average costs because of the uncertain nature of those costs. This gives the supplier the option to reduce the level of risk premium if it is necessary to win business.

A qualification to this argument is that if a potential entrant has a strategic plan to enter a region and has bought contract for difference cover in the expectation of making a certain level of sales, then sunk costs are not zero and there is a barrier to exit. This last point supports the propositions of Gilbert (1989) and Stiglitz (1987) that hit and run entry can become risky if sunk costs exist. For example, if a potential entrant attacks the area of an incumbent supplier having bought contract for difference cover to support fixed priced offers, if the incumbent reduces prices sharply and retains market share the entrant will be left with unsold contract for difference cover.

3.3.4.4. The Market Efficiency Model.

Gilbert (1989) terms this the Chicago school where firms owe their position to superior performance not strategic behaviour, and profits are the rent accruing from this superior technology. Barriers to entry are stated to play a minor and temporary role. If entrants believe they can compete on equal terms then scales economies are not a barrier to entry. Gilbert (1989) sees the similarity between the Chicago School and contestable markets. With the Chicago school, barriers to entry play a minor and temporary role whereas in the contestable markets barriers to entry do not exist. The end result of both schools will be perfect competition.

In terms of the electricity supply industry, I have found that barriers to entry do exist but have not prevented a competitive market from developing.
3.3.5 Conclusion

In this chapter I have attempted to apply economic theory on potential competition to the competitive electricity supply industry. In chapter 3.3.2 I outlined the four main schools of thought in this area as described by Gilbert (1989). I then discussed the potential barriers to entry that may occur in the market in chapter 3.3.3. In chapter 3.3.4 I applied each of the theories to the practice of the competitive electricity supply market.

The conclusion from this analysis is that there is relevance in applying economic theory to the practice of the supply markets. No one school fits the experience of the competitive electricity supply market but there are relevant issues from each set of theories. With the Limit Theory I found that the current structure of the market did not support the conclusions of the theory. However, I stated that the 1998 market could generate a situation where a REC supplier could set a limit price through the use of barriers to entry and by making price signals to potential competitors. With the Dynamic Limit Theory I gave an example of how the experience of 1994 appeared to support some of the conclusions of the school. Given the large number of incumbent suppliers, the theory of contestable markets did seem to provide a good model of the actual behaviour. In particular, when I treated the market place as the REC area and the host REC is also the current supplier, the experience of hit and run entry does lead to a reduction in prices and abnormal profits of the incumbent supplier.

One problem I have had is to define the area of the market. If the market is defined as the host REC area, then the other current suppliers can be seen as potential entrants. This fits well with the contestable market theory because the potential entrants can undertake “hit and run” entry with zero entry and exit costs. I showed that the experience of the non franchise market did support these contestable markets theory. I qualified this conclusion by stating that in certain circumstances, entry could involve sunk costs and that only actual not potential entry may lead to the lowest cost prices.

The specification of the area covered by the market is relevant to the issue of barriers to entry and the definition of a potential competitor. If the market is defined as the host REC region then other current suppliers, RECs or not, are viewed as potential entrants. This means that there are no significant barriers to entry for this group of potential entrants. If the market is defined as the national arena, then potential entrants would refer to organisations that currently do not supply electricity. Under this definition, barriers to the entry could exist in the form of invoicing costs, lowest cost purchasing, and low cost selling. The impact of these barriers to entry will depend on the type of organisation making the entry and scale of entry. However, if firms want to expand significantly then the expense of funding a large billing engine will be an absolute cost barrier to entry.
My analysis has consistently focused on the possibilities of potential competition when complete market liberalisation occurs in 1998. The enormous increase in the size of the market could significantly change the nature of competition and the importance of barriers to entry. The current competitive market provides important lessons for the 1998 market. These are discussed in some detail in chapter 5 of the paper.

Chapter 3.4 Strategies of RECs
The RECs have a strong starting point in that they have the infrastructure already in place to compete in the competitive market. RECs have an established presence in the market place. Host RECs have an established sales force in the power marketing representatives that regulation allows to sell products that use more electricity, such as electric motors, refrigeration equipment, and storage heating. Finally, through their sales contacts and their billing systems, host RECs have a marketing database of all their customers.

The most important competitive advantage that a REC has is a large billing engine whose costs can be covered entirely or partly by the Distribution Use of System (DUOS) revenue that a REC receives for being the host distributor. DUOS revenue has historically provided the bulk of profits earned by a REC. The host REC will receive this revenue whether it supplies customers or not. Host RECs must have a billing engine for DUOS purposes to know how much DUOS charges to make and which supplier to invoice. This means that RECs do not have to cover the full cost of building and running the billing engine from supply profits. In the non franchise market where profits are small this is an important factor to successful competition.

The competitive advantage is not that RECs have an established billing system, it is that they are not required to cover the full costs of the billing system from supply profits alone. All other non-REC competitors have to cover the full costs of this billing system from just supply profits.

Significantly, these competitive advantages apply to RECs competing in each other region. For example, Yorkshire Electricity can compete in a rival REC region, without significant extra cost because it already has a billing engine and sales force. What it does not have is the contact details or the established sales links of the host REC. Whilst RECs cannot use DUOS running costs to cover sales out of area, the marginal cost of supply in terms of billing to out of area customers will be very small for RECs because they already have a billing engine paid for out of DUOS revenue.
The main disadvantage to successful competition for RECs is that they do not actually "own power" of its own, except in very small amounts through new power stations. The term "own power" is a misnomer as none of the suppliers in the competitive market "own power" not even the generators. All suppliers have to purchase their energy through the Pool. The term "own power" refers to the fact that to mitigate the vulnerability to movements in the Pool all RECs to a greater or lesser degree take out contract for differences cover. As stated previously, contract for differences are financial instruments that can be sold by anybody irrespective of whether they own a power station or not. They are in effect a financial gamble on the future movements in pool prices between the seller of the contract for differences and the buyer.

By not "owning power" RECs are forced to turn to the generators to purchase their contract for differences. This would not be a problem if there were a large number of competing generating companies all selling contract for differences in the same way that there are large number of competing final suppliers. With a large number of competing generators there would be market competition in the sales of contract for differences. Suppliers would be able to "shop" around to obtain the best contract for differences deal for their customers and enter in to long term arrangements to secure their market share of contract for differences cover.

In practice there is negligible competition in the contract for differences market. For the size of load necessary to compete in the competitive market there are just three main sellers of contract for differences, that is National Power, PowerGen. and Nuclear Electric. These three companies have their own direct sales force in direct competition with the RECs. This creates a number of problems for the REC. The host REC cannot be certain that the contract for differences offered for sale by the generator is as good as the one sold to the generator's own direct sales force. The REC cannot be sure that if it agrees to purchase a contract for differences from a generator that the prices generated by the contract for differences will not be undercut by the generators own direct sales force leaving the REC with large quantities of unsold contract for differences cover.

I can see from this argument that despite the advantages of the REC in the competitive market, the fact that they do not "own power" means that they have to negotiate with the generators for contract for difference cover. This creates vulnerability to the business strategies of the generators.

There are proposals from Professor Littlechild that generators must be forced to sell more of their existing generating plant. Several RECs have expressed an interest in purchasing these generating sets. RECs would become more vertically integrated
with their own UK generating arm, in the same way that Generators have become more vertically integrated by moving in to direct sales to final consumers. My understanding of the selling off of generating sets is that some RECs are unhappy with a perceived stalling tactics by the two main generators. They believe that the two main generators are deliberately delaying the sale of the generating sets because it would weaken their effective monopoly position. RECs keen to buy must also be sure that they purchase efficient cost effective generating sets not just the sets that the former are happy to lose.

3.4.1 Different REC Strategies

In this chapter I will outline what I believe are the main strategy groups for the RECs. I will endeavour to put names to these groups, such as Eastern Electric is a national supplier. In placing names to strategic groups I will be using my own impressions of REC strategic aims together with public statements by senior management from these RECs. The RECs can be grouped in to four strategic types, which are:

3.4.1.1. Major National Suppliers

3.4.1.2. Minor National Suppliers/Niche Players

3.4.1.3. Fortress Host REC

3.4.1.4. Passive

A brief explanation of the behaviour of RECs within these groups is as follows:

3.4.1.1 Major National Suppliers

There are four RECs widely regarded as major national suppliers, these are Eastern Electric, Midlands Electric, Northern Electric, and Yorkshire Electricity. In this group the REC has either stated that they intend to adopt this stance or have won a large number of major national contracts which involve major industrial and commercial business typically with a large number of sites. Examples of this type of organisation include national supermarket chains, such as Tesco Supermarkets, fast food restaurants, and major industrial users such as aerospace or telecommunications companies.

To be successful in this market sector the REC must have be able to offer very competitive fixed priced types of contract that cover a large quantity of load. This means that unless that company wishes to make a gamble on Pool prices and risk serious financial losses, the contracts must be supported by Contract for differences cover.
The advantage of this type of strategy is that the customers are high profile, good credit risk, with good consumption levels and profiles. The disadvantage of this strategy is that because of the nature of the contracts that you are bidding for, the customer will have no loyalty to any one supplier and will move to wherever the price is cheapest for the next contract. Furthermore, generators are active in this market so the prices required to secure the business will be forced to be extremely competitive.

The experience of RECs as national suppliers has been that the RECs who have this strategic aim has varied over the years. For example, the first few years of competition saw East Midlands Electricity and Southern Electricity as national suppliers. It appears that the cost of staying as national suppliers proved too much for these organisations who moved to other strategic groups. Eastern Electricity and Northern Electricity have had a perceived role as major national players for several years. They have recently been joined by Yorkshire Electricity and to a lesser extent Midlands Electricity.

### 3.4.1.2 Minor National Suppliers/Niche Players

This group includes SWALEC, East Midlands Electricity, and recently London Electricity and Seeboard. In this group the REC has targeted the smaller single sites of host RECs around the country through direct mail and telesales, national advertising in the press and by radio. Here the RECs are deliberately aiming their marketing at the smaller end of the electricity market in consumption terms. RECs have concentrated on those sites that do not undertake a tender process at contract renewal but rely on just one or two offers from the host REC and one other.

This group generates little revenue at the moment for the supplying REC. Furthermore, in the short term the set up costs and advertising and administration expense is unlikely to be covered by the revenue that such sales will generate. The plan is not to just win the customer in year one but to retain that business in subsequent years. Whether the winning supplier has the ability to generate “loyalty” in a customer who has experienced the benefits of “shopping around” remains to be seen. However, in defence of this strategy, as the market becomes more mature, the price differences between competing suppliers will probably narrow so that there are negligible savings to be made by switching suppliers. This will make customers more reluctant to switch supplier.

### 3.4.1.3 Fortress Host REC

The REC has a policy of concentrating sales resources on customers based in its own geographical boundaries. The REC has a strategy based around defending their own geographical area. The strategy can be summed up that the host REC will fiercely compete to retain its own customers but will not actively seek new business outside of its geographical boundaries.
The advantage of such a strategy is that it maintains customer loyalty to the host REC. This allows the host REC some leverage in providing the best offer to customers that have been supplied for several years. Typically, the host REC is assisted by the customer by providing details of competitor's offers. The customer will allow the host REC to match the best competitor's offer, rather than being forced to beat the best rival's offers. Furthermore, if this strategy is communicated to rival suppliers they may be deterred from fierce competition in the host REC and tempted to try an area where the host REC is not such a fierce competitor.

The disadvantage of the strategy is that it increasingly revolves around a shrinking market. As the non franchise market has expanded an increasing number of organisations, that in the past negotiated on a local level, now operate as part of a group tender process. Furthermore, the preoccupation with its own geographical boundaries may prevent the REC from exploiting profitable opportunities for out of area business.

3.4.1.4 Passive

Some RECs appear to have a passive attitude that given the small profit margins they are prepared to lose some or all of their supply business. MANWEB has been one of the main proponents of this approach in that they do not appear to be prepared to compete for customers.

Given that the profit margins in the supply business are so small and the potential risks from the provision of fixed priced contracts are not insignificant, it is surprising that the passive strategy has not been adopted by more than one or two RECs. Indeed, the complete opposite has occurred. RECs that appeared to adopt a passive strategy in the past to non franchise competition, such as SWALEC and London Electricity, have now become aggressive minor national players.
3.4.2 Is Profit Important?

As I stated in chapter 2.4 on types of supply contract, fixed priced contracts have the greatest profit potential. However, the fierce nature of competition in the non franchise market together with a large number of competing suppliers has resulted in low profit margins on fixed priced contracts. Despite the very small profit margins, more and more suppliers are entering the non franchise market as aggressive market participants.

The large number of suppliers competing for supply contracts has driven down profit per unit levels in the electricity supply market. The potential to make profits comes from the volume of sales not the profit margins. Supply contracts that are likely to lead to large sales volumes are therefore very attractive because of the potential level of overall profits.

In setting potential profit margins suppliers must be aware of the exposure to pool price movements. This exposure can be covered through the use of contract for difference cover as explained in chapter two. They must also be aware of the potential credit risk of customers. A customer that defaults on its supply contract leaves the supplier with the obligation to pay for distribution charges and to pay for contract for difference cover.

This aim of profit maximisation through volume not profit margins provides an explanation for the fierce competition for the supply contracts of national organisations that represent a large quantity of units and are a perceived good credit risk.

Volume can also be achieved by increasing market share. This has the effect of driving down fixed unit costs. Furthermore, the marginal cost of servicing an extra customer is very small as a high proportion of the supply service costs are fixed costs. This provides a further justification for the drive by some companies to become national suppliers because it reduces their average fixed costs and marginal costs for service are negligible.

Given the size of turnover the overall levels of profits are small for the size of financial risk from adverse pool price movements. The vulnerability of profits to movements to pool prices suggests that supply profit levels vary year on year. If pool prices are high then profits will tend to be lower, whereas if pool prices are lower profits will be higher. This suggests that suppliers need to have a strategy over a number of years, and be prepared to make losses in the short term. Customer retention is absolutely crucial as suppliers may not make profits on a one year contract.
The experience of RECs who have moved from a passive to an aggressive policy may suggest that in spite of the small profit margins and high associated risks, virtually all RECs do want a future in the competitive supply market.

Even more interesting is the changing nature of strategies from different RECs over the years of the competitive market. Strategies do not always remain constant. Most RECs have become more aggressive in their stance, whilst a smaller number of have adopted a more defensive approach. This may reflect the fact that the rules of the market have changed allowing suppliers to now make unregulated profits in this market. I do not actually see the latter point as a significant factor at the moment since competition is so fierce in the non franchise market that no supplier can be making large profits.

What I believe it does reflect is the transitional nature of a nationalised industry moving to a competitive market. Having been in a monopoly position but with regulated profits, RECs are now testing the arena of competition. I use the term testing deliberately because this is in effect what the past five years have been.

It has not mattered whether the RECs have made money in the non franchise supply business because the distribution and franchise supply business were the profit centres. Costs of participating in the market have been small because RECs have had the infrastructure in place to allow competition, such as the billing engine. RECs did not have to make money from the non franchise market. Instead RECs, have had to avoid making big losses in the market. In effect, the non franchise supply market has seen almost perfect competition but distorted because the market participants are not really driven by the desire to maximise profits.

The climate will have to change if it is not already doing so. More severe restrictions on the ability to make profits from distribution and the opening up to full competition of the remaining tariff market in 1998, may make RECs focus more on the profitability of their non franchise supply business.
Chapter 3.5 Strategies of Generators

In this chapter I will examine the potential supply strategies of the major Generators, primarily that is National Power, and PowerGen. Nuclear Electric have until 1995 not participated in the direct market in a major fashion. As well as participating as a direct sales force, major Generators make sales to other direct suppliers in the non franchise market of contract for differences cover. These two tasks could occur concurrently, with the Generators direct sales force in competition with another supplier, such as a REC, who has bought contract for difference cover from the Generator.

I will show that Generators supply strategies to the direct market are interlinked with the contract for differences market. Generators appear to use the direct sales force as a “supplementary sales tool” to compete with other suppliers only when contract for differences sales have not met target levels.

3.5.1. The Importance of Contract for differences

The previous chapter of REC strategies should have made the reader aware of the main competitive advantage of the Generators in the non franchise electricity supply market, that is they “own power”. This does not mean that the Generators sell the power they created to the final customer. Instead the Generator sells electricity contracts that are supported by a contract for differences that the Generator has sold to its direct sales arm. As there are only three major sellers of contract for differences cover in large quantities, the Generators direct sales force should have access to the most competitive contract for differences on the market. The Generators direct sales force has a virtual certainty that the contract for differences used to produced their price is some of the cheapest power available and will not be undercut by all but rival Generators is a major competitive advantage.

The experience of Generators competing to supply direct customers tends to justify the point that I made in the previous paragraph. If a Generator really wants a customer they will generally succeed. Generators have tended to successfully win the custom of the largest single site energy users in the NORWEB REC area. The experience has been that it has been very difficult to compete with Generators in supplying electricity to very large users such as paper mills, chemical factories, and shipyards.
3.5.2. Sales of Contract for Differences or Direct sales?

The Generator faces a dilemma in the direct sales market. If they continue to be successful in the direct sales market, sales of contract for differences cover will decline as other suppliers, namely the RECs will withdraw from the supply market. Direct sales by a major generator could tend to conflict with sales of contract for differences.

Selling contract for differences has two major advantages over direct sales to customers:

1. With sales of contract for differences the quantity of electricity sold and its price is certain. Other suppliers, largely RECs, agree to buy a quantity of electricity at an agreed price. With direct sales, the Generator is in direct competition with RECs and other Generators. This has the impact of driving down prices and leads to greater uncertainty as the choice of supplier is often made at the last minute after customers have driven down prices by trading off competitors.

2. A Generator that sells contract for differences should be in a favourable financial situation irrespective of the movement in pool prices. If pool prices are high then the contract for difference seller will have to pay the difference between pool prices and the “strike price” agreed in the contract to the buyer of the contract. However, if the contract for difference seller also generates electricity into the Pool, they will receive a compensating increase in revenue due to the rise in pool prices. The qualification to this last point is that if the rise in pool prices results from an increase in uplift not pool purchase price, then the main beneficiaries of high prices will be National Power and PowerGen, see earlier for an explanation of this point.

3. The costs of administering sales of contract for differences are very small in connection with the size of revenue received. The service costs for the direct sales market are the requirement to bill customers and fund all the costs of the billing suite from supply profits. As I will see in the next chapter, billing costs could be a potential barrier to competition for Generators.

3.5.3. The Importance of the Billing Engine?

Supply revenue must cover all the costs of billing the customer, including set up costs. This has not been a practical problem for the OM market since the number of customers that could be supplied by Generators was regulated. This meant that for the number of customers that could be supplied, billing could be achieved in some fashion.

With the expansion of competition to include the OM market, and the removal of restrictions on the numbers that Generators could supply, billing will be a problem for generators that seek to supply large number of customers.
Some Generators have moved to expand their market share and have signed large multi-site national contracts. For example, National Power supplied all the ASDA sites in the UK amongst many others. The dilemma for the generators is that the cost of creating a new engine capable of invoicing all the customers they wish to supply will require an expensive billing suite. Given that the profits to be made on the supply business are very small, the cost of this new billing suite will not be covered by the revenue received from supply for several years.

Some Generators have tried to resolve their billing problem by attempting to link with RECs. The Generator will supply the customer and the REC will bill the customer.

Regarding the 1998 market, to build a billing engine necessary to service all the customers will be very expensive. The potential revenue to be made from supply to the domestic market is unlikely to cover the cost of this building engine, except over an extremely long payback period. One option for the Generators would be to link with a non-electricity company with an existing large billing engine. For example, credit card companies could probably perform the electricity billing function. This would not remove the competitive disadvantage that the Generators have relative to RECs in that the former must cover all the costs of billing from supply profits.

The generator has three potential sources of revenue from the electricity market. There is the price per unit they are paid from generation. There is the revenue they receive from sales of contract for differences. Finally, they have the profits from electricity supply to final consumers. Of the three sources, the latter, direct sales to customers, is possibly the least profitable because of the low profit margin in the supply business.

3.5.4 Problems for Generators

The larger Generators, namely National Power and PowerGen, appear to be in a favourable financial position as a result of the structure of the electricity supply market. They will make money from generation, from sales of contract for differences, and almost certainly are in a minimal risk position in the direct supply market. The big two Generators do face a number of problems to achieve an optimal position, which are:

1. Erosion of market share in the generation market.
2. Proliferation of “Pool” contracts.
3.5.4.1 Erosion of Market Share

Since the start of the Pool there has been a proliferation of small Generators entering the market to take advantage of the profits to be made in generation. This has reduced the market share of the generation market of National Power and PowerGen. Most of these generation sets are partly or entirely owned by RECs in a bid to reduce their exposure to the volatility of pool prices. The big two have also seen their market share eroded by Nuclear Electric.

The two Scottish Generators, Scottish Power and Scottish Hydro have expanded in the market but are limited by the size of the "interconnector" link between the Pool in England and Wales and the Scottish generating system. This has been upgraded once in 1993 and there are plans to upgrade further. The latter are subject to environmental pressures. EdF, the French generator, has also entered the market though its market share is limited by the size of the interconnector between the Pool and the continent.

3.5.4.1.1 Market Share and Sales of Contract for Differences

It appears that the loss of market share in the generation market has not had a major impact on sales of contract for differences. Major sales of contract for differences are the prerogative of National Power, PowerGen, and Nuclear Electric. This is partly because only these three companies have the size of generating power to support the size of sales required in the contract for difference market. It may also result from the alleged ability of these three companies to manipulate pool prices to support their financial position. As stated previously in this thesis, these generators have the alleged ability to manipulate pool prices. If the three companies do have the ability to influence pool prices they are obviously not going to be worried about their exposure to movements in pool prices.

The converse argument applies to the smaller generators. They will be contract for differences sellers only to the extent that they have the generating ability to support such exposure to pool prices. If they sell contract for differences greater than the generating cover they have to support sales, their exposure to pool price movements is as great as any direct supplier.

Furthermore, by virtue of their lack of size, the smaller generators have no alleged ability to influence pool prices.
3.5.4.2. Proliferation of "Pool" contracts

A major problem to the achievement of the optimum financial position of the generators has been the proliferation of customers in the non-franchise market who are supplied on what are referred to as "pool" contracts:

If suppliers have customers on "pool" contracts, then generators have no opportunity to sell contract for differences cover. This leads to a reduction in the revenue they obtain from contract for differences cover, and a reduction in their direct sales revenue as customers turn away from their fixed priced contracts to low margin "pool". Generators cannot match the low margin administration charges of RECs on "pool" contracts as the former have to cover the full costs of billing, whereas the latter have to cover just the supply business costs of billing.

A proliferation of pool contracts is a major concern for National Power or PowerGen as it attacks a major profit area. One strategy to defend this profit area is to use the direct sales arm to supply the large load customers that may be tempted to consider pool contracts on fixed price contracts. The other strategy that the big two generators have been accused of is manipulation of pool prices to intimidate customers from choosing pool contracts. Such an accusation is of course difficult to prove, though anecdotal evidence from the April 1995 negotiation round suggests some evidence to support this claim. For example, December 1994, January 1995, and February 1995 witnessed the highest peaks in Pool Supply Prices since the inception of the competitive market. These three months are also the peak months for negotiation of electricity contracts. March 1995, the month after the vast majority of electricity contracts are signed, saw pool prices tumble to records lows.

In conclusion I see that the optimum strategy for the large generators is a combination of generation, sales of contract for differences, and a direct sales force. The direct sales force is an integrated part of the strategy as it provides an option to enter the non-franchise supply market should RECs and other non-generator suppliers refuse to buy contract for differences in the quantities desired by the generators.

I have seen that the ability to "own power" is a considerable competitive advantage to generators in the direct supply market. Billing is a competitive disadvantage to generators in the direct supply market relative to RECs because of the requirement to build an expensive billing engine to service the market and to cover all its costs from supply profit.
This leads to the conclusion that markets where profit margins are likely to be very small, namely the domestic market from 1998 may be best served by a combination of a generator to provide the “power” and a REC to do the billing. Such an alliance would combine the competitive advantages of both generators and RECs and remove the disadvantages of each group.

3.6. Strategies of other Market Players

This chapter refers to new comers to the market and intermediaries between buyers and sellers.

3.6.1 New Comers

A small number of players have entered the non franchise electricity supply market though they have not had a major impact on the behaviour of incumbent participants. One such company is the commodity broker Marc Rich and Associates. This organisation has been in the competitive market for a number of years but does not appear to have any strategic expansion plans. Another is Accord Energy, a British Gas company, created to supply British Gas sites in the competitive market. Interestingly, Accord Energy does not have a monopoly on the right to supply British Gas sites but has to tender for them each year.

It would appear that the barriers to entry referred to previously in this thesis are in fact an effective deterrent to potential entrants. An unknown factor is the extent to which new comers will consider entry into the domestic market in 1998. These companies may lack the competitive advantages of RECs and Generators but could have the prerequisites of entry such as a large customer database and a billing engine.

The types of companies that are viewed as potential entrants include utilities, such as British Gas, and organisations with a large billing engine like credit card companies. The rational is that if electricity companies can move into British Gas, then what is to stop British Gas taking the opposite route. British Gas already has a license to supply in the competitive market through Accord Energy, which it may be using to gain experience of the market. British Gas could use its existing billing engine and database of customers to reduce the cost of servicing the market. What British Gas does not have is any power. If they do wish to enter the electricity supply market they will be forced to buy Contract for differences off the generators, at least one of which it is in direct competition in the gas market. Furthermore, British Gas will obviously consider the potential profit from the market. Given the large number of suppliers and the small profit margins, British Gas may decide that it is not financially advantageous to enter the market at the current time.
There are many companies that have an established billing engine that could probably be extended to cover the electricity market at small extra cost. The type of companies in this group include credit card companies and mail order companies. These companies have established databases and could use the opportunity to cross sell. As with the previous groups in this chapter, the lack of ownership of power, the fierce level of incumbent competition, and the low profit margins will probably deter these organisations from full scale entry into the electricity market. However, I would not be surprised to see some form of partnership between these types of organisations and existing small scale incumbents in the market.

3.6.2. Intermediaries

I have stated previously in the thesis that the nature of the energy market is that a large number of customers find the derivation of the likely lowest cost energy package extremely difficult. Spotting a market opportunity, Energy Brokers/Consultants, hence to be referred to as Consultants, have approached customers to negotiate their electricity contract in return for a fixed fee, or a percentage of the savings of the new contract compared to the previous contract or tariff.

With the removal of market barriers in 1994 the market has witnessed an explosion in the importance of consultants. The size of these organisations vary from businesses such as The Energy Information Centre and MacKinnon and Clark who have thousands of customers on the books including many high street names, to one man companies based from home.

A more recent development has been the proliferation of Representatives. Independent organisations or individuals who are employed on a commission only basis by an Energy company. For example, the independent company will receive a payment for all new contracts to a host REC for business in other REC areas.

The interesting point about this development is that these representatives largely work in the small single site competitive market. This is a market segment where customers are more likely to be “inert”. That is they are too busy running their own businesses to spend the time to negotiate electricity which is a small proportion of their purchase costs. These “inert” customers have the potential to make reasonable savings in the move from tariff to contract, generating some commission. However, the savings in future years between existing and future contracts will not typically be significant for this market sector. This means that the commission available to the representatives will be small or non-existent in subsequent years. This would suggest that the phenomenon of tied representatives is a transitional phase, only present in the early years of market expansion.
For many of these organisations the key market place to be part of, was the switch from tariff to contract in 1994. This move offered the greatest savings to the customer, and therefore the consultants fees. Given the quantity of work involved, moving from one contract to another is unlikely to generate large rewards for consultants in the majority of cases.

This generates a problem for consultants. They depend upon large numbers of customers, but given that each of those customers could have up to fifteen different original offers then subsequent offers, the workload they generate is enormous. This means that the profits generated from the business are eroded by the quantity of work required to service it. Anecdotal evidence suggests that just one sixth of the customers of these consultants thought they received a satisfactory level of service.

3.6.3 Clearing Houses

In keeping with the spirit of this new market, yet another recent development for the 1995 contract round has been the launch of computerised clearing systems designed to link between the consultant and the supplier. Two rival systems currently exist both offering systems based around the type of product seen in the insurance company/brokerage market. The principle of both systems is to provide a computerised link between the supplier and the consultant. Consultants would place their clients requiring electricity contracts on to the system. Suppliers who are signed on to the system have the option to produce prices for all, some, or none of the customers requiring prices.

Suppliers have the option to bid or not depending upon their own business requirements. If a supplier decides to bid it must do so on a standard basis. Prices are entered on to the system and transmitted through the computerised network to the consultants. If a supplier decides to bid it must do so by a specified date. Until the specified date, suppliers have the ability to withdraw their price. After the specified date, there is stated to be an agreement between the supplier and the customer, not the consultant.

The system sorts the bid prices into order with the best first. One system allows all competing suppliers to view the position of all their bids in relation to all competing bids. In the other system, suppliers can take this market information and act upon it to withdraw their original offer or rebid. In one system, fourteen days prior to the date on which the decision will be made, suppliers cannot withdraw their current offer but can produce better offers. The customer then accepts an offer and a contractual arrangement is made with the successful supplier.
The advantage of the system for the consultant is that it reduces their administration costs and allows them to provide alternative quotations for a greater proportion of their customers. The benefits for the Supplier are that they can reach a larger number of customers at lower administration costs and will get market feedback on the current status of their offers. These features are important towards the small size of customer which constitutes the large sector, in terms of numbers in the market. The disadvantages of the system for the Supplier include the greater transparency of prices together with a greater number of competitors will inevitably drive down prices. Furthermore, the impersonal nature of the system means that it is much harder to use sales negotiation techniques.

My experience of the operation of one of these systems has been that it ran into a number of problems. One problem was that the clearing system was not the only source of offer prices. Another problem was that there was no legally binding agreement built into the system between the supplier and the customer. The experience of the operation of the system was that negotiations were not always performed within the system.

These clearing house systems are another example of economic theory being put into business practice. It gives the impression of a market clearing system rather like the Walrus/Arrow Debrus Auctioneer Principle. In the Auctioneer model an auctioneer uses open outcry or “tattonnement” to match all the preferences of buyers and sellers as market clearing prices. The auction is closed and all deals are made leading to an optimal position where it is not possible to make one person better off without making someone else worse off.
CHAPTER 4 THE APPLICATION OF AUCTION THEORY

Introduction

The purpose of this chapter is to attempt to model the negotiation process in the competitive electricity supply market using auction theory. The chapter will show that auction theory has applications to the supply contract negotiation process between the customer as the auctioneer and the bidders as suppliers. The aim of the auctioneer is cost minimisation of the costs of the supply contract. In this chapter I will attempt to model this auction process.

In section 4.1 I will outline auction theory and the four basic types of auction as outlined by Vickery (1961). In chapter 4.2 I will outline the working of the electricity supply contract negotiation process which I will term the electricity supply auction. Chapter 4.3 will seek to apply the auction theory to the practice of the electricity supply market by outlining a benchmark model. I will then relax the assumptions underlying the benchmark model to provide a more relevant analysis for the electricity supply model. The conclusion of the chapter will be that the electricity supply auction is a hybrid auction type that accommodates features of the market that are different from the theoretical basic auction types.

4.1 The Basic Types of Auction

4.2 The Electricity Supply Negotiation Process

4.3 The Electricity Supply Auction

4.4 Conclusion

4.1 Basic Types of Auction

The economic analysis of auctions is largely based on the work of Vickery (1961) who outlined four basic auction methods: which are as follows;

1. The English system where all bids are made in public and the auctioneer sells to the highest bidder.
2. The Dutch system, where the auctioneer starts with a highest bid and comes down until the first bidder accepts the price on offer.
3. The First Price Sealed Bid (FPSB) auction
4. The Second Price Sealed Bid (SPSD) auction devised by Vickery combining features of the English and FPSB auction methods.
The important features of each of the four different auction types are as follows:

4.1.1. The English Auction

The English auction is the most popular form of auction for selling goods. It is a progressive auction involving open outcry where the auctioneer starts with a low price and bidders increase their offers until only one bidder is left who wins the auction. There is a continuous flow of information allowing bidders to change their valuation of the product and the value they have to bid at to "win" the auction and purchase the item. Bidders are price takes in the sense that the price they pay is determined by the action of competitors. Vickery termed it as a Second Price Auction because the price paid by the winner is effectively determined by the second best price, because the price paid is slightly better than the second best bidder.

4.1.2. The Dutch Auction

It is a common phrase in the supply market that buyers are operating Dutch auctions because of the descending nature of prices. If I use McAfee (1987) definition of this mechanism, outlined below, the supply market is the converse of the Dutch auction. McAfee defines the Dutch auction as follows:

"The auctioneer calls an initial price and then lowers the price until one bidder accepts the current price."

Using the above definition the auctioneer begins at his optimal price and lowers the price until a bidder accepts his best suboptimal price. In the supply market, prices start at a suboptimal high level from the auctioneer's preference viewpoint and then descend towards an optimal lower point. The electricity market is a progressive auction as prices commence at suboptimal prices and move towards the optimal price. In the Dutch auction bidders are price makers. Each bidder must have a bidding strategy to predict the behaviour of his rivals. Vickery terms this auction a First Price Auction as it is the first bid that wins the auction. Like the English auction, bidders have the option to rebid.
4.1.3. **First Price Sealed Bid**

This auction type is commonly used in tendering processes for "one off" lots or contracts such as for construction. It works on the principle that all bidders submit independent bids to be opened at the same time with the best offer winning the entire auction. All offers are sent separately with no knowledge of competing suppliers bidders. There is no option to rebid. This method is a First Price Auction. Vickery (1961) views this auction type as having similar characteristics to the Dutch auction in that bidders are price makers. Each bidder must predict the probable behaviour of rivals as bidders are not forced to pay the maximum price they would have been willing to pay.

4.1.4. **Second Bid Sealed Bid**

Vickery (1961) developed this method as a sealed bid auction form that may encourage bidders to bid up to their optimal value. He outlines a procedure whereby the auctioneer asks for bids on the understanding that the award will be made to the highest bidder, but on the basis of the price set by the second highest bidder. Vickery (1961) states that, under certain assumptions, this will encourage each bidder to bid the true value of the contract to them in order to maximise their chances of winning. There is no option to rebid. This method is an Second Price Auction. Bidders are price takers.

The conclusion of Vickery’s analysis was that, under some strong assumptions which are discussed later, that the four types of auction methods lead to the same optimal outcome. Later work by writers such as McAfee (1987) and Milgrom (1989) relaxed these assumptions and searched for the optimal auction method for the auctioneer.

4.2 **The Electricity Supply Negotiation Process**

The competitive electricity supply contracts negotiation process contains many features that lend itself to analysis through auction theory. The electricity purchaser for an organisation can be termed the auctioneer, with the suppliers bidding for the contract. Information technology means that suppliers can make virtually instantaneous offers to the auctioneer as if they were in an auction room.
There are two broad types of auction method practised by buyers in the electricity market. The first approach is to invite offers from a number of suppliers including their current supplier. The best suppliers are then asked to rebid by trading one offer against another. The second method is to invite sealed bids from suppliers then select the best three or five and ask them to rebid. These approaches are essentially the same as the buyer or auctioneer inviting suppliers to put in their bids then asking the best of these offers to rebid.

Where the bidding process is by offer submission or sealed tender all bidders submit their bids in strictest confidence. This means that the bid is for the attention of the auctioneer only. The prices of competing bidders are not freely available to rival bidders. The confidential nature of the bidding process means that the electricity supply auction does not have the price signalling mechanisms of the English auctions. Instead, the issue of confidentiality is a feature of the first price sealed bid.

With the exception of local authorities and other government bodies which are forced by law to operate FSPB tenders the experience of the market has been that the auctioneers in this market mechanism, operate this auction process of elimination rounds in which the “survivors” in each round are asked to rebid by lowering their offer. Whether the initial round was a tender procedure, suppliers that are asked to rebid do not re-tender but simply resubmit their prices to the auctioneer. Purchasers operate an initial elimination round then ask chosen supplier to rebid. The rebidding process is similar to an auction mechanism as the auctioneer trades off suppliers until only one bidder is left in the auction. For major supply contracts, purchasers may receive up to four or five rebids before choosing their supplier.

A variation of this method that has become increasing popular amongst auctioneers is to provide the bidders selected for the next elimination round with limited information on the substance of rival offers. This historically started out by suppliers attempting to gain information on the position of their offer in relation to competitor offers. Some auctioneers now notify the bidders of their position at the end of the previous round with an estimate of the overall difference between the value of their offer in relation to rival offers. Bidders are not informed of the detail of rival offers which would be in contravention of the confidential nature of the suppliers' offers.

Sometimes the auctioneer deliberately provides the bidders with deliberately misleading signals about the substance of rival bids. For example, auctioneers have exaggerated the length of contract that rival bidders are prepared to offer in an attempt to persuade bidders to improve their offers even more.
Auctioneers in the competitive electricity supply have increasingly adopted this mechanism as they believe it will lead them to their optimal outcome, the lowest price. The auction mechanism has characteristics of all the four main methods outlined by Vickery (1961) but does not appear to fit into any of his four categories.

It appears to be both a First Price auction through the tender process for the elimination round, and a Second Price Auction for the progressive negotiation stage. It is not an English auction because those bidders that are eliminated after the initial tendering round are not given the option to rebid. However, the rebidding process is characteristic of an English auction as prices move towards the optimal outcome of the auctioneer.

Many market insiders class the mechanism as a Dutch auction because of the descending nature of prices. This is not correct according to the definition of a Dutch auction by Vickery (1961). In his definition, the auctioneer starts with a high price then announces prices in descending sequence until one bidder stops the auction. The supply market auction is a progressive auction because by the end of the auction only one bidder is left. However, like the Dutch auction, bidders have to be aware of the probable bids of others. Bidders are in a gaming “situation” where they may wish to bid a value that will get them through to the next round of bidding but allow them to move prices in the rebidding round. The supply auction method incorporates a tendering process as an elimination round. However, the rebidding process means that the method is not the same as the FPSB or the SPSB.

4.3 The Electricity Supply Auction

Chapter 4.1 outlined the features of the four basic auction types outlined by Vickery (1961) and compared them to the auction method in the electricity supply industry. I concluded that the supply auction has features of both First Price Auctions and Second Price Auctions. The characteristic of the supply market is split into two parts: the tender procedure followed by a hybrid of the English/Dutch auction systems with information limitations to the bidders. The function of this chapter is to analyse the theoretical basis for this system. The electricity purchasers obviously believe that this system will bring the optimal outcome, that is to buy at the cheapest price. This chapter aims to see whether they are right in theory.
4.3.1 The Benchmark Model

The McAfee thesis (1987) provides a general summary of the auction and bidding process. For a benchmark model with the four assumptions outlined below he establishes the Revenue-Equivalence Theorem:

Revenue-Equivalence Theorem -
"For the benchmark model, each of the English auction, the Dutch auction, the first-price sealed-bid auction, and the second-prices sealed-bid auction yields the same price on average".

It can be expressed in the following equation:

\[ \text{Expected payment} + \text{Expected bidder's rent} = \text{bidder's valuation} \]

OR

\[ P(v) + S(v) = v \]

McAfee states that the analysis by Vickery (1961), supports this theorem. McAfee (1987) expresses this theorem mathematically but it can be stated intuitively as follows:

In second price auctions each bidder bids their valuation without any shading. In first price auctions, players bid slightly less than their valuations. On average, second price auctions are less cautious than first price auctions which offsets the difference between the highest bid in the first price auction and the second highest bid in the second price auction.

This conclusion rests on the assumptions of the benchmark model which are as follows:

A1. The bidders are risk neutral

A2. The independent-private-value assumption applies.

A3. The bidders are symmetric

A4. Payment is a function of bidding alone.
Explaining the Assumptions-

A1 states that there are no post auction conditions. Assumption A2 states that buyers are unaware of rival's valuations, but would not change their valuation if they were. Every bidder's valuation can be drawn from a set of probability distributions known to all bidders. A2 states that all probability distributions are identical and that bidders are fully aware of the cost of the completion of the contract. Assumption A3, treats all bidders as the same to the purchaser, that is they have the same valuation of the product.

The McAfee (1987) thesis concentrates on the choice of one of the four auction types depending upon the circumstances of different markets. In the Supply market the auctioneers have chosen the auction type, the Supply mechanism. This mechanism is a real world combination of the basic auction types. In the Supply market some of the above assumptions do not apply, which affects the outcome of the particular mechanism.

4.3.2. Relaxing the Assumptions of the Benchmark model for the Supply Market

Of the four assumptions outlined for the benchmark model in the previous chapter, the first three assumptions of risk neutral bidders, the independent-private-value assumption, and symmetry amongst bidders require further analysis for our purposes. The fourth assumption of payment is a function of bidding alone which means in electricity supply terms that the auctioneer and bidders abide by the rules of the auction mechanism. They do not attempt to break the contract arranged through the auction. With the minor exception of the clearing house system mentioned in chapter 3.6.3 all participants generally follow the payment rules of the auction.

4.3.2.1. The Bidders are Risk Neutral

The analysis of the electricity supply market that I have outlined in this thesis has placed considerable stress on the financial risks associated with supply contracts. I have explained the importance of contract for differences in the derivation of fixed priced contracts to mitigate these financial risks. This analysis suggests that the electricity supply market is risk averse not risk neutral.
However, this conclusion could be an over simplification. The main risk in the electricity supply market is from Pool price
movements. Suppliers that have bought contract for differences are mainly protected against Pool price movements.
They still have some exposure due to the fact the contract for differences do not cover for uplift. This point is discussed in more
detail in the subsequent chapters. Suppliers are exposed to bad debts but use credit checking facilities to mitigate these risks.

In the discussion on the setting of fixed priced contracts I considered that suppliers could take a positive attitude to risk by
supplying fixed priced contracts without hedging them against contract for differences. I concluded that, given the considerable
risks associated with this option, the majority of suppliers would not take this option.

Assuming that all bidders have contract for difference cover, the conclusion is therefore that bidders in the electricity supply
market are more risk neutral than risk averse. This is supported by the experience of the competitive market which has seen
the number of suppliers bidding for contracts increase year on year in spite of the high level of Pool prices.

McAfee’s (1987) conclusion on the optimal auction method amongst risk averse bidders is a theoretical complex one
involving incentives for high bidders and penalties for low bidders. Of sub-optimal outcomes he concludes that First Price
Sealed Bid auctions lead to a better outcome than English auctions. He also highlights a practice used in government auctions
with risk averse bidder where auctioneers attempt to hide the number of bidders to prevent bidders forming a view on the
bidding strategies of rivals.

These conclusions do not seem to be relevant to the electricity supply auction which is characterised by a tender followed by a
bidding process similar to an English auction but with incomplete information.

4.3.2.2. Asymmetric Bidders

Assumption A3 treats all bidders as the same to the purchaser. This will be true of some bidders in the Supply market who
have bought the same contract for difference and have similar profit margins. However, for the type of customer that I am
concerned with, there will always be some bidders who have different valuations. These different valuations may be as a result
of more efficient purchasing of contract for differences leading to different profit margins. Different valuations may result
from the different purchasing decisions of rival suppliers. For example there will be bidders who have priced based on contract
for differences and those who have priced based on a view of future pool price movements.
Different valuations may also result from a different perception of the worth of the customer to the supplier. For example, a customer may be perceived as more important to the host REC than an outside competitor for political reasons. Host RECs may see that retaining the business of customers increases the likelihood of long term loyalty to their organisation. The experience of the market has been that once an historical "loyal" relationship between a REC and a customer has been broken the latter becomes ready to switch suppliers for price alone. These organisations may have a significant number of sites that will be part of the competitive market in the future. This means that the REC sees the potential for long term profits by maintaining the historical relationship with the customer.

This means that there are economic reasons why suppliers may have different valuations of a supply contract they are bidding for. It may be that a particular supplier, such as the host REC would be much more price competitive, and may even bid for the contract at no profit at all.

In these circumstances each bidder does not know just how important the contract under auction is to its competitors and therefore exactly how low the rivals will go. It is important to have an idea of the competitors' valuations because if you are competing against a rival who has different valuations and is prepared to go to lower prices than other bidders then good business suggests that you are wasting your time continuing with the auction. Bidders are unable to use the price signalling mechanism to reveal the true valuation of rival bidders due to the confidential nature of all bids.

Gaming may become more important if a supplier, say a host REC lets it be known to potential competitors that a contract is so important to the bidder that they will beat whatever price is offered by competitors, so called "suicide bids". However, if all rivals do withdraw, then the "suicidal" bidder wins the contract at a profitable surplus rent. He has in effect bullied the rivals into submission. However, rivals may decide that they will force the "suicide bidder" to prices that are so low they are unlikely to be profitable. The danger with this approach is that the "suicide bidder" may have a longer term view than the rivals which means that the latter are unlikely to match the former's valuation.

This may explain why purchasers practice the Supply auction and why they deliberately prevent information on competing bids from becoming available. This is one way of forcing the "suicidal" bidder, also known as the bully, close to his true valuation of the contract.
When the auction has progressed from the initial elimination round, some auctioneers provide limited and occasionally misleading information on the status of rival bids to each supplier. This has the advantage in that it attempts to make the price signalling mechanism work by giving bidders an idea of the valuation of rival offers whilst still maintaining the confidentiality rules over the details of the offers. Those auctioneers that provide misleading information are attempting to manipulate the price mechanism to “encourage” bidders to get closer or beyond their true valuation of the product.

Another reason why this system would be adopted would be if the bidders were not fully aware of their own valuations. This sounds strange but it is in fact correct. Because of the variable nature of the Pool, that is the wholesale market, companies do not precisely know exactly how much it will cost to supply a customer over the contract length. They can take out contract for difference cover to reduce this uncertainty but this will not make the valuation of the potential profit completely certain. The actual profit from the supply contract will only be available at the end of the contract when the full cost/revenue from the relation of contract for difference cover and pool price movements are available.

I have hit upon a unique feature of the Supply market. None of the bidders precisely know the valuation of the contract to be auctioned. They must base their pricing strategy on estimated valuations. It is inevitable that this leads to asymmetric bidding.

The conclusion that bidders do not know their full value of the contract contradicts the Independent-Private Assumptions of our benchmark model. This issue is discussed in more detail in chapter 4.3.2.3.

I have shown in this chapter that asymmetric bidding does exist in the Supply market auctioning process. I will now attempt to model it using the benchmark model.
4.3.2.2.1. Asymmetry Under The Benchmark Model

Vickery states that by relaxing the symmetry assumption the English or progressive auction will produce an optimal allocation, whilst in general the Dutch auction will not yield this outcome. He concludes that where bidders are homogeneous and sophisticated, the Dutch auction produces results close to the optimal outcome. However, where the information available varies, or the desire for the object varies, the sophistication of bidders varies and the Dutch auction will prove relatively inefficient in securing the optimal outcome. In terms of applicability to the electricity market, the First Sealed Bid Price tender elimination round removes those bidders who value the product least.

Vickery's analysis suggests that the progressive auction should continue. In the case of electricity, the uncertain nature of the valuation of bidders, as well as bidder asymmetry, may mean that the outcome of a progressive auction may be suboptimal. Bidder one may be prepared to win that contract at any cost, that is zero profit, whilst bidder two may have bids that build in extra profit margins to cover the uncertainty over pool price movements. In a normal progressive Dutch auction it would be obvious to bidder two that bidder one was determined to win the contract. There is no incentive for bidder two to be less cautious over future pool prices as even if he does rebid at lower prices he is not going to win. Bidder two withdraws from the auction at a level which is probably above what he would have been prepared to go to. Bidder one wins at a price just below that level, which is considerably above what he would have been prepared to win the contract at. Uncertainty in valuation of bidder two means that the outcome is not optimal.

Under the Supply auction, the elimination round has removed the bidders with little valuation of the contract. The bidders that remain are those who value the contract highly, in particular there is at least one bidder who is determined to win the contract because he lodged the lowest offer, termed bidder one. By preventing the full nature of bidder 1's intentions to other bidders, the latter is encouraged to rebid as they are made to believe that their next offer could win. They are encouraged to remove the risk premium built in to profit margins. They are encouraged to be optimistic rather than pessimistic in future pool price movements and profit levels.
If the rebids of rivals are below bidder one's original offer then bidder one is given the details of these rival offers and rebids. If the offers are above bidder's original offer then the auctioneer may mislead bidder by hiding the true intentions of rival bidders to encourage another offer from him. If the revised bids are still less than bidder's original offer the purchaser accepts it and has lost nothing by doing so. By deliberately hiding the true intentions of bidders from each other the auctioneer has succeeded in driving down prices towards his optimal price.

4.3.2.3.2 Imposing Uncertainty on the Model

There are two aspects of uncertainty in the electricity supply model, which are:

1. Bidders are uncertain about their valuation of the supply contract. This issue was first raised in chapter 4.3.2.2 on asymmetric bidders. I stated that because of the uncertain nature of the pool price movements, even if a supplier has purchased contract for difference cover, the supplier is not fully aware of the cost of completing the contract. This is because contract for differences mean that if pool prices, in this case pool purchase price, are above the agreed “strike price” on the contract then the contract for difference supplier pays the contract for difference customer. If pool purchase prices are less than the “strike price” then the customer pays the contract for difference supplier. The full cost of these difference payments will be unknown until the end of the contract term. The contract for difference is used to make up the supply contract which means that the full cost of the latter contract will not be known until the end of the former contract.

A further area of uncertainty in the setting of supply contract prices results from the impact of uplift. In chapter 2.3.1, I pointed out that uplift is typically not included in contract for differences.

This uncertainty factor is common to all suppliers. It results in suppliers building a risk premium into the bidding prices. It is probable that this risk premium is reduced as bidders get further into the auction process. The uncertainty factors do not affect the bulk of the supply contract which is covered by contract for difference payments. The uncertainty factors may be the difference between winning the auction and losing it.

However in practice what I see is that the outcome is more likely to be affected by purchase costs, non purchase costs, and the different valuations put on the contract by the bidder. To illustrate this point, experience of the competitive supply market has shown that the supply contracts of very large users, whether single sites or groups, typically go to a generator who can
purchase contract for differences at lower cost or to the host REC who values the contract more highly. The low profit margins in the domestic market from 1998 will mean suppliers will require very low billing costs and purchase costs to be profitable.

The conclusion is that, assuming all suppliers have bought contract for difference cover, is that purchase costs, servicing costs, and the valuation put on a contract, are the main determinants of bidding strategy. Relaxing the private values assumption would not materially affect the outcome of the auction in the majority of cases.

2. The other area of uncertainty results from the confidential nature of the auction. Unlike the English progressive auction where all offers are known to all rival bidders, the electricity supply progressive auction does not have this open-ness. This means that bidders are unaware of the bidding strategies of rivals and are unable to use this information to form an view of the rival bidders valuation with any confidence.

Buyers or the auctioneer provide some information on the nature of the rivals offers. This does provide bidders with an approximate valuation of rival bids. In some ways the behaviour of the auctioneer is following a theory postulated by Milgrom and Webber (1982) that a seller can increase expected revenue by having a policy of publicising any information about the item’s true value. In the case of electricity which has no intrinsic value, the value comes from the revenue that bidders expect from their supply contract. Thus by informing bidders of the substance of rival offers the auctioneer may be attempting to affect the valuation that a supplier places on his own offer. Alternatively, the auctioneer may be attempting to influence the supplier's bidding strategy not their actual valuation of the contract. This issue is more related to the Independent Private Value Assumption than the Uncertainty assumption and is discussed in more detail in the next chapter.

4.3.2.3. Independent-Private-Value-Assumption

The assumption here is that the bids made by competitors are statistically independent and that all bidders are aware of the cost of completion of the contract to them.

The independent values part of the assumption is that bidders are statistically independent and there is no unobserved common factor affecting all of the bids. The private values part of the assumption states that bidders are aware of the true value of the contract and that valuation is unaffected by knowing the valuation that competitors place on a contract.
The issue here is whether knowing the valuation that a rival bidder places on the contract affects your valuation. If the assumption holds, then knowing the valuation of a rival bidder would not affect the first bidder's valuation but would affect the bidding strategy.

Milgrom (1989) criticises this assumption as failing to portray the auction environment accurately. He refers to the problem of uncertainties that affect the bidder's cost estimates, such as different views on changing factor prices and the weather in construction projects. He states that in practice, for many auctions each contractor's cost estimate is subject to error as no contractor knows exactly what their costs will be. Each contractor is aware that other bidders may have superior or just different assumptions that would find it useful for its own cost estimate. For this reason he states that the private values assumption fails.

Milgrom’s (1989) analysis as outlined above provides a good explanation of the problems I have outlined previously for bidders in the electricity supply market. In previous chapters I pointed out that, in spite of contract for difference cover, the variability of pool prices and the lack of cover for uplift means that the bidder does not know the full cost of the supply contract. Having contract for difference cover means that they are able to reduce their exposure to pool prices but they are not able to eliminate risk entirely.

Milgrom’s (1989) then goes on to replace the private values assumption with a weaker assumption called common values that he states is more relevant to the practice of auctions. By use of the common values assumption he modelled the outcome of an auction that allows for the sort of estimation error outlined above. It is useful to consider Milgrom's model analysis because the type of estimation error could be used to apply the estimation error found in the forecasting of pool prices required to set fixed priced contracts.
The common values assumption states that all suppliers are equally capable of doing the job for the same cost denoted $C$. He admits that this is a special assumption but states that it is relevant to illustrate some general phenomena.

The equation is as follows:

$$X_i = C + E_i$$

where:

- $X_i$ is the $i$th bidder's estimate of costs
- $C$ is the common cost figure
- $E_i$ is the $i$th bidder's independent estimation error.

Milgrom (1989) states that whilst estimation errors are independent the bidder's estimates are not independent because the estimates are the sums of the common random term $C$ and the independent errors.

His conclusion is that although each bidder's estimate is unbiased, that is equal on average to the expected cost, the lowest estimate is biased downwards. Because the expected values of the individual estimation errors is zero, the expected value of the minimum estimation error must be less than zero which implies estimation bias.

Milgrom (1989) states that if all bidders added on the same mark-up to their estimation of costs, it follows that the one that wins will have, on average, too low an estimate of costs. He terms this the "Winners Curse". His conclusion is that bidders tend to lose when they overestimate costs and win when they underestimate costs. His advice to bidders is to mark up twice, one for profit then another to compensate for any underestimate of costs. He states that the key to success is in the correct estimate of costs. In a fiercely competitive market, like the electricity supply market, the bidder should reduce their profit margin not the margin for underestimation.

### 4.4 Conclusion on Auctions

Auction theory as outlined by Vickery (1961) states that, under certain assumptions, the outcome of all four auction methods will be efficient in that the bidder that has the highest valuation will win. In the case of electricity supply I have outlined an auction model that has certain characteristics of the four basic types but is different from each one.
The electricity supply auction model has increasingly been adopted by all buyers or auctioneers as the method that achieves an optimal outcome. In this chapter I have explained why electricity auctioneers have chosen this method not one of the methods outlined by Vickery. I have highlighted several features that distinguish the electricity supply auction method, which are:

4.4.1. The confidential nature of the bidding mechanism has meant that the pricing mechanism of an English auction method will not work. Auctioneers have attempted to circumvent the confidential nature of offers by giving indications to bidders or rivals offers.

4.4.2. I found that unlike the benchmark model suppliers could have different valuations of the supply contract. I explained that some suppliers take a long term or political view on some supply contracts, such as host RECs, that make the contract more valuable to them than other suppliers. This makes them willing to win the contract at virtually any cost. However, their bidding strategy is to hide this fact from the auctioneer to try to achieve their highest price. The auctioneer must then attempt to persuade the so called “suicide bidder” to move to his lowest price. I postulated that this could be achieved by hiding the true value of rival offers from the “suicide bidder”. The attempt to deceive the bidders as the substance of rival offers to encourage bidders to lower their offers.

4.4.3. I considered the role of uncertainty specifically related to the estimation of supply cost through the forecast of Pool prices. I concluded that this issue was more relevant to the Independent-Private-Values assumption than the Uncertainty assumption.

4.4.4. I used Milgrom (1989) to model the issue of estimating the costs of supply. His analysis does seem to address an issue for the electricity supply model which is how to deal with the issue of not fully knowing the costs of the supply contract on the bidding process. Indeed, in the early operation of the electricity supply market certain companies, such as East Midlands Electricity, won a large market share then made heavy losses in the market. It may be that companies like East Midlands Electricity who won contracts that led to large financial losses were examples of the “Winners Curse” as outlined by Milgrom (1989).
The problem with general applicability of the Milgrom (1989) model to the supply industry is that bidders do appear to make very low offers in the face of fierce competition and not suffer from the "Winners Curse". This outcome could be as a result of different purchase costs or it could be as a result of different valuations on the costs of a contract. To explain the latter point, Northern Electric are currently one of the most profitable suppliers in the market whilst still having the largest market share in the non franchise market. This could result from the use of the Minimiser product discussed earlier in the thesis. With Minimiser Northern Electric spread the full costs of the contract not over one year like competitors, but over more than one year.

The electricity supply model is a combination of a tendering process for an elimination round followed by a progressive English style auction until one bidder is left. Milgrom (1989) produces a comparison of different auction methods and concludes that the English auction system generates a better outcome for the auctioneer on average than the Dutch/sealed-bid auction. He states that it leads to efficient outcomes in a wider range of environments. Milgrom (1989) sees a disadvantage of the method in that they require the presence of bidders. However, the use of telephones, faxes, and modems mean that communication with bidders is quick enough for the requirements of the electricity supply auction.

The overall conclusion has been that auction theory has provided some useful lessons for modelling the electricity supply purchasing process. I have had to relax some of the assumptions of the Vickery (1961) model which has led to some different conclusions than Vickery. However, the overall outcome is that auction theory provides a useful tool to model the economic activity between potential electricity suppliers and buyers.
CHAPTER FIVE  THE FUTURE

From April 1998, all electricity customers will have complete freedom in their choice of supplier. 1998 will see the complete liberalisation of the electricity supply market in England and Wales. The purpose of this chapter is to forecast likely trends in the market to assist the REC in its decision making process.

I will split the future into two distinct groups, before and after 1998. This will allow us to focus attention on two distinct customer groups. The before 1998 chapter will consider the developing trends in the over 100kW market comprising some 50,000 industrial and commercial sites.

The after 1998 chapter, will focus on some of the issues relating to the liberalisation of the domestic market which is estimated to account for 22 million households in total. The after 1998 chapter will not consider as a separate issue those non domestic sites that are currently part of the tariff market. This is because I believe that this market sector will tend to have the same buying characteristics as outlined for the non domestic market sector above 100kW market. It is likely that a considerable proportion of the sites within this market sector are part of large organisations that already have experience of the competitive electricity market. The chapter is split as follows:

5.1 Before 1998

5.2 1998 and beyond. There are three key areas of concern for the RECs, which are:

5.2.1 Customer Behaviour

5.2.2 Pricing Strategies and Competitor Behaviour

5.2.3 Systems for 1998

5.1 Before 1998

The current supply market is still in its infancy as the majority of customers have been in the non franchise arena since April 1994. The over 1MW market that has been in operation since April 1990 is characterised by relatively mature customer behaviour. Customers generally do not always fully understand the market but are aware of market mechanisms such as the Pool, pool priced contracts, and the behaviour of suppliers. These customers tend to be more receptive to sophisticated contract offers and are experienced in trading off suppliers to obtain the best prices. The OH market has been in the competitive situation for over a year. Many of the customers that are new to the market remained with the host REC for the first year of competition. They have yet to take full advantage of the opportunities available to them.
The before 1998 market is likely to see the development of trends already outlined in the thesis, these are summarised below:

5.1.1 An increase in the number of customers that are prepared to leave the host REC for better prices.

5.1.2 An increase in the importance of price as the major decision making factor affecting the choice of supplier. The current 100kW to 1MW market has seen some customers nervous at the prospect of leaving the host REC due to uncertainty of the quality of service of new suppliers. Once these participants realise that the difference in service between the host REC and other suppliers is negligible, this will cease to be a factor affecting the decision making process.

5.1.3 The increasing use of more sophisticated contracts tailored to the needs of major energy purchasers, such as customers purchasing their own contract for differences. This represents an important development of productive efficiency of the new supply market.

5.1.4 The smaller energy users end of the market is likely to see more simple contracts. Customer pressure will move supply contracts from the original structure which was based on tariffs to options that incorporate the various charging requirements, such as maximum demand bands or standing charges, into just one or two unit rates.

5.1.5 The trend of REC suppliers to actively participate in other REC areas is expected to continue. Chapter 3.5 on REC strategy highlighted that a number of REC suppliers who had at one time taken a "Fortress Host REC" policy or a "Passive" strategy have moved into the more aggressive strategies of "Minor National Suppliers/Niche players".

Suppliers have become more aggressive in spite of the low profit margins in the non franchise market. This may be due to the low marginal cost of servicing an extra customer. The trend may also reflect the desire of RECs to maintain or increase market share. As competition becomes more fierce and customers are increasingly willing to move suppliers for lower energy bills, RECs that traditionally supplied only within their own boundaries are being forced to move outside their area to retain market share.

5.1.6 Chapter 3.5 introduced the role of "Clearing Houses" - the computerised systems that attempt to provide a market clearing function. These systems are in their infancy and as such have a high likelihood of failure. However, there is a strong economic and business requirement to provide market mechanisms that allow consultants to service customers at the lowest
possible cost. This should necessitate the eventual development of some form of clearing system between Consultants and suppliers.

5.1.7 Suppliers, particularly RECs, face an unknown future for Pool prices. In March 1994, the Director General of Electricity Supply, Professor Littlechild, agreed with the two major generators, National Power and PowerGen, a series of price caps on the level of Pool prices. These caps run out in April 1996. The uncertainty in Pool price movements after April 1996 has left REC pricing managers very reluctant to give supply contracts that run over this date.

5.18 The high number of suppliers, the low level of profit, and fierce nature of competition, all suggest that the current market structure may be unsustainable. The rational for this conclusion is that the there is not enough profit to sustain the high number of current suppliers in the market. However, this hypothesis is based on the premise that suppliers will have to be profitable over a number of years. As I have seen in the current structure of the electricity market, non franchise suppliers do not have to make significant profits to remain in business. RECs do not have to make profits from supply as the bulk of profits come from DUOS revenue. Generator suppliers do not have to make significant profits from supply as their revenue is largely obtained from Contract for differences sales and power generation.

5.1.9 The need to make profits from the Over 100kW market may increase from 1998 when the RECs no longer have the certainty of revenue from the captive tariff market.

5.2 1998 and Beyond

The complete liberalisation of the tariff market from 1998 will be a major challenge for REC supply companies. This chapter will discuss the three key areas for future development in customer behaviour, pricing strategies, and systems for 1998.

5.2.1 Customer Behaviour

Up until April 1998, the 22 million customers that comprise the electricity supply tariff market have had no choice in their electricity supplier. Geographical boundaries have dictated the electricity supplier for a customer. From April 1998, those geographical boundaries are irrelevant. From that date, electricity users will be able to choose between their host REC or a range of other companies as their electricity supplier.
Will Customers Move?

This is the fundamental question for all potential suppliers for 1998. It refers to the possibility that customers will leave the tariff of the host REC for another supplier or for a contract of the host REC. It is a totally unknown quantity.

The evidence to date is contradictory. The current non franchise electricity supply market has shown that customers do move from tariff if there are savings to be made in their energy bills. These customers do not always move suppliers, but they have moved from tariff to contract from the host REC in large quantities. This conclusion is supported by customer behaviour in the competitive gas market where, those customers eligible to leave British Gas have exercised their option.

The contradictory viewpoint to this is the experience of the Telecommunications market. Here, customers have had the choice of either British Telecom, Mercury, or cable operators. The evidence from this market has been that the majority of customers have remained with British Telecom. However, British Telecom do appear to be losing increasing quantities of business to aggressive cable operators. It may be that competition in the domestic market has taken longer to become established or alternatively that the degree of competition depends upon the ease of switching and the actions of rival companies.

Factors affecting the decision to Move?

It is my belief that the importance of price in the decision making process of households will play an increasingly important part from 1998. All the evidence in the current non franchise market is that price is the overwhelming reason for choosing a supplier.

Other factors are important such as security of supply fears, service levels, and ease of moving. However, the latter reasons decline in importance for buyers, once they realise that moving suppliers creates no security of supply problems, service is largely unchanged, and that it is easy to move.

Customer education will be an important variable in removing these fears from customers. If customers are made aware that their fears over reduced security and service if they move suppliers are groundless, they may be tempted to take savings that are available by moving off tariff.
It is a widely held view within the industry that domestic customers will not leave the tariff of the host REC. It is based on a view that customers will be apathetic and inert to the market changes. It states that the potential savings to be made by switching off tariff are likely to not be significant that customers have little incentive to leave the incumbent REC.

This is not my personal view. I believe that customers will move if there are significant savings to be made from energy bills and if the customer education process is sufficiently strong to make buyers aware of their options. The customer education process is fundamental to the validation of this hypothesis. Education may take the form of Offer publications focusing media attention on the options for moving. It may also take the form of an advertising campaign from aggressive suppliers, possibly like the Direct Line marketing campaign for motor and household insurance.

Not for several years will it be possible to test whether my hypothesis is correct. However, from a strategic viewpoint for RECs, if RECs assume serious competition will take place and take preventive measures they will not be taken by surprise. If RECs assume that customers will not leave tariff and competitor action is very aggressive, in the Direct Line approach, they will suffer serious loss of market share.

**How Many Times Will Customers Move?**

The previous paragraph outlined the hypothesis that customers will move supplier if the price is right. The next hypothesis that requires testing is will customers change supplier every contract renewal? If the customer has moved supplier for a reduction of their existing tariff will they continue to move suppliers for reductions from contract?

The current viewpoint in the market is that given the likely small nature of profits in the domestic supply market, there is unlikely to be significant savings by switching between suppliers. This will reduce the incentive to switch supply on contract renewal. This will be influenced by the ease of switching suppliers. If there are considerable administrative tasks to complete to move suppliers, low level of savings may deter customers from making the switch.
Customer Behaviour Conclusion

The forecast of domestic customer behaviour has led to two hypotheses:

1. That customers will move from the tariff of the host REC if a new supplier is prepared to offer "significant" savings off the existing tariff. The difficulty for suppliers is to quantify the "significant" savings. This is discussed in the next chapter on future pricing strategies.

2. That customers are unlikely to make more than one or two moves of supplier because there will not be significant savings to be made by switching from one contract to another. This is based on the assumption that suppliers will offer similar products with similar contract prices. It states that because of the small profit margins, there will be limited opportunity for new suppliers to undercut an existing contract to persuade the customer to switch supplier.

5.2.2 Pricing Strategies and Competitor Behaviour

Success in the non-franchise supply market will require a clearly defined strategy. Chapter three outlined alternative strategies for RECs, Generators, and also potential entrants. Whatever approach is adopted by a supplier will require consistent pricing and sales strategies.

Pricing strategy must be influenced by expectation of customer behaviour. For example if the host REC assumes that customers will not move supplier then they may conclude that a policy of maintaining a tariff position and not offering contracts is correct. If a supplier follows the hypotheses outlined in the previous chapter then it will tailor strategy to targeting customers for a one-off move from tariff to a contract that will in subsequent years seek to match not better competitors.

I have outlined in the previous two points that correct assumptions about customer behaviour in the competitive domestic market is crucial to success from April 1998. All suppliers that are planning to enter the market from 1998 must be currently undertaking market research in this area. the conclusions of this research will have a major impact on competitive behaviour toward the 1998 market.
5.2.3 Systems for 1998

The addition of a potential 22 million customers to the competitive electricity market is a major challenge to the operation of electricity systems. At the time of writing, these systems are not fully specified leading to considerable concern that the administration systems will not be in place to allow the competitive market to function properly.

One of the key issues that still requires resolution at the time of writing relates to the settlements and data collection systems. Because electricity is priced and supplied from the National Grid in half hourly units, suppliers and RECs are keen that customer meter readings are in half hourly time periods. This would allow suppliers to know exactly how much energy they will be charged for. Equally, if meter readings are in half hourly units distributors know exactly how much to charge suppliers. Thus, all customers in the current competitive market must have half hourly meters.

However, given the cost of this metering equipment is about £600 for the current non franchise market, these costs would make entry into the competitive market for customers with smaller energy bills prohibitive. With the average energy bill for the domestic market around £300 this means that half hourly metering is not a viable option for this market.

With half hourly metering equipment uneconomical, the solution suggested for small customers is to use standard profiles. The current thoughts are that for the smaller customer four general profiles will be used covering: domestic unrestricted tariff, domestic “Economy 7” tariff, non domestic unrestricted tariff, and non domestic Economy 7. These four profile types may be subject to regional variations.

Current thinking suggests that profiling will be acceptable for the domestic market and the smaller non domestic market. However, the larger non domestic customers that are below 100kW will be difficult to profile accurately. This has led to a recommendation that there is a mandatory metering level where all sites above the limit will be forced to have half hourly metering equipment. The mandatory metering level has been agreed at 60kW maximum demand. It has been suggested that sites from the mandatory metering level to 100kW will have a cheaper, version of half hourly metering incorporating fewer validation procedures called code 6. Sites above 100kW will have the existing code 5 metering.
Sites below the mandatory metering level will have the option to install half hourly metering level. Concern has been expressed that this will lead to "profile drift" where sites that have an actual profile that is not advantaged by the standard profile will switch to half hourly metering. This may leave sites on profile simply because it is cheaper than going on actual half hourly metering. It remains to be seen whether this phenomenon of "profile drift" will be experienced in reality.

Sites with half hourly metering equipment will be part of the current competitive market settlements system. One variation to this could be that major retail chains have suggested that they be allowed to do their own data collection. The argument runs that they currently have electronic data transmission systems for payment and stock control that could be utilised to transmit the half hourly data. It is likely that the major chains will be allowed to collect their own settlements system. If this goes ahead it will represents another way in which greater productive efficiency has been achieved as a result of the competitive market through the use of some existing technology to reduce transmission costs.

For the section of the market not covered by the half hourly metering, profiles will be adopted instead of metering. The likely structure for the profiled settlements system is known as the "Preferred Trading Arrangement" advocated by the Pool Executive Committee. Under this system, customers without half-hourly metering will be allocated a profile to model their consumption over a day and a year. A two tier settlement system will operate. The Primary settlement system will summate the assumed readings of all profiled customers and actual half-hourly meter readings to be reconciled against actual half-hourly metering at the settlement point. The reconciled values will then be split by the market share of suppliers. The Secondary settlement system will reconcile the assumed customer consumption from the profile with actual consumption at the meter.

The Preferred Trading Arrangement does appear to be a viable solution to the problem of settling the electricity accounts between rival suppliers. Furthermore, it makes the competitive market viable to most customers in that they will not be required to fit half-hourly metering and telecommunications equipment.
One aspect which is worrying a considerable number of people in the industry is the interfaces with the customer, particularly the issue of transfer of debt between customers. Suppliers are concerned that customers will build up debts on their electricity contract then simply switch suppliers to avoid paying their bills. One possible solution to this problem lies in the draft proposal for the Gas Bill for the partial opening up of the gas market in Devon, Cornwall, and Somerset in 1996.

The proposal in the gas bill is that, contractually conditions allowing, customers will not be allowed to leave their current supplier if they have more than £100 outstanding with their current supplier. For amounts below £100, the customer can have up to a third of their debt assigned to the new supplier. In theory, this does appear to be a simple solution to the problem of outstanding debt.

In theory, the Preferred Trading Arrangements the mandatory metering levels, and the assignment of small debt does appear to solve many of the problems to encourage competition after 1998. However, grave doubts exist over the computer systems required to turn these proposals into reality.
CHAPTER SIX CONCLUSION

The thesis has been to provide a study in the competitive electricity market in England and Wales since its inception in April 1990. There were four reasons for undertaking this study, which were:

1. To provide one of the first studies in to the effect of converting a monopoly into a competitive market in the electricity supply industry. Yarrow (1994) has covered several of the issues within this thesis though I have concentrated on the competitive supply market and have focused on the customer perspective. Through working in the supply industry I have endeavoured to provide an “inside” view, giving accounts of the latest market developments as they happen.

2. To assist the process of strategy development for a supplier, particularly a REC, by outlining and evaluating all the issues in electricity supply.

3. To model the electricity supply market in economic terms.

4. To relate the lessons from the current market to the problems of the future.

In chapter one of the thesis I outlined the structure of the competitive electricity supply market in England and Wales from April 1990. I concluded that because of the homogeneous nature of the electricity and that it exhibits the characteristics of a commodity, means that there is no difference between the product sold by one supplier to that sold by another supplier. The factors that differentiated the electricity sold by one supplier from that of another was in the terms of the electricity supply contract. I briefly considered the role of the Regulator and concluded that this could be defined as increasing competition. I concluded that the current experience has been that there has been fierce competition between final suppliers. I highlighted the importance of market structure in that in the direct market there are a large number of final suppliers which encourages competition. However, I noted that in the generation market and the Contract for Differences market there is a duopoly market structure of market structure with the potential for abuse of market power.
In chapter two I provided an explanation of the main market mechanisms in the Pool, contract for differences, and types of supply contracts. I explained the workings the Pool because of its impact of pool price movements. I made reference to the volatility of pool prices and the apparent ability of the two large Generators to manipulate Pool prices. I concluded that this level of volatility could have serious financial consequences for suppliers in the setting of prices for fixed priced contracts unless they take out insurance cover, called contract for difference cover. I noted that contract for differences were only sold in very large quantities by the very large generators. I explained the link between fixed priced contracts and contract for differences cover. A brief introduction into the alternative types of contract to the standard fixed priced option looked at three products that have developed as a result of the competitive market, which were Pool contracts, Minimiser and contract for differences or Energy Blocks.

Chapter three considered market participants and their behaviour in some detail. Chapter 3.1 looked the buyers of electricity which were segmented into OM single site buyers, OH single site buyers, and Groups. It concluded that the different segments were as a result of different levels of experience and priorities resulting in different priorities in purchasing electricity. In chapter 3.2 I considered the customer's perceptions of the product which I concluded was primarily focused on price. Chapter 3.3 introduced the three major barriers to entry which were: the ability to “own power”; a low cost billing engine; and a marketing database. In chapters 3.4 to 3.6 I concluded that RECs had the advantage of a low cost billing engine, Generators had the advantage of “owning power”, some potential entrants had the database and a possible low cost billing engine.

Chapter four applied auction theory to the negotiating process. It considered the four basic auction types outlined by Vickery (1961) which were: English; Dutch; First Sealed Bid, and Second Sealed Bid. I concluded that the negotiating stance adopted by buyers of trading off one supplier against another to cut prices was similar to the Dutch auction. However, I noted that unlike the Dutch auction, suppliers were deliberately not given full information of the negotiating stance of rival bidders in an attempt to persuade them to bid at a lower price than required to win the contract. The problem of over bidding is affected by the peculiarities of the wholesale electricity market. Fixed priced contracts are based on Contract for differences whose outcome will not be known until the end of the Contract for differences contract term because of movements in Pool prices. These factors could combine into the so called “winners curse” where suppliers could make serious financial losses by winning the contract.

Chapter five looked at market trends in the Before 1998 over 100kW market and in the 1998 and beyond market. Before 1998 raised the hypothesis that the nature of the market and market structure and the associated low levels of profits could be
unsustainable leading to a possible reduction in the number of suppliers. 1998 and beyond focused on the impact of complete liberalisation for the domestic market and the applicability of trends from the current competitive market.

**Themes From the Analysis**

A number of themes have been developed as the thesis has progressed which are summarised below:

1. The homogeneous nature of the characteristics of electricity make it impossible to differentiate the electricity sold by one supplier from another. The only differentiating factors between the suppliers are the terms of the supply contract.

2. The key areas of difference between the supply contracts of different suppliers are the price, the length of contract, and the payment terms. I saw in chapter one that due to a combination of structural factors the majority of contracts last twelve months running from April to the end of March the following year. Payment terms between suppliers tend to be similar as cashflow becomes important due to the low profit margins. This leads to the conclusion that the main area of differentiating the supply contract of one supplier to another is the price of the contract.

3. The primary role of the Regulator is to increase competition.

4. The operation of the price mechanism of the Pool where prices vary half-hour by half-hour day by day has led to price volatility.

5. The industrial structure of the generation market whereby National Power and PowerGen hold the vast majority of generating capacity has created a duopoly in the generating market. These two generators have allegedly used the workings of the Pool to manipulate pool prices. This duopoly in the generation market has led to market power in the contract for differences market.

6. The duopoly market structure in the generation market and the contract for differences market is in complete contrast to the direct supply market whereby up to thirteen suppliers are regularly competing for a customer's business. This has led to fierce competition in the direct market and low profit margins.
7. If suppliers are to offer fixed priced contracts they tend to purchase contract for difference cover to mitigate the potential financial losses due to the volatility in pool prices.

8. Most customers prefer fixed priced contracts. This trend increased with the expansion to include the 100kW to 1MW market and is likely to increase when complete liberalisation occurs.

9. Customers' perceptions of the competitive market reflected in their buying preferences can be summed up in the John Whateley quote:

"There are three things I want from my supplier. Price. Price. and Price."

10. As awareness of the market increases, buyers have become more sophisticated in their techniques. They become ready to trade off suppliers to achieve reductions, they move suppliers solely for price reductions, and actually manipulate suppliers bidding strategies by limiting the information available to bidders.

11. RECs have a competitive advantage in that they have a large billing engine whose cost can be largely covered by Distribution Use of System (DUOS) revenue. Their competitive disadvantage is the vulnerability to generators in terms of pool price movements and contract for differences sales.

12. Generators have the contract for differences cover to dominate the market but lack a billing engine to achieve low cost sales.
Overall Conclusion

The overall conclusion of the thesis is that the direct supply non franchise market has been fiercely competitive with a large number of suppliers and low profit margins. From this viewpoint, the deregulation of the industry has been a success. However, more competition is required in the generation market and the contract for differences market to break the effective monopoly power of National Power and PowerGen.

The perceived ability of these two companies to influence pool prices has not inhibited the level of competition in the direct supply market. This may be because of the large number of competing companies in the direct supply market. With a large number of competing companies, if one supplier experiences a financial loss as a result of an increase in pool prices, there are always rival companies who believe they can do the job better.

The large number of competing companies in this market may be affected by the current financial structure of these organisations. All the major suppliers are part of organisations who can rely on other sources of revenue to generate the majority of their profits. REC suppliers make the majority of their revenue from the distribution business whilst Generators receive income from generation and from contract for difference sales. The Scottish generators also have revenue from their distribution business. These suppliers do not have to generate large profits from the non franchise market to maintain the viability of their organisation.

There are major changes underway that may make suppliers focus more closely on the profitability of their non franchise supply business. The two major Generators are being forced to sell off generating plant which will weaken their monopoly power in the generation and contract for difference market. As a result of the distribution revenues of 1994 and 1995 RECs will earn less income from DUOS charges. The removal of franchise areas from 1998 will mean that RECs will face competition for their entire supply market, not just a proportion of it as occurs at the moment.

The requirement to generate sustainable profits from the supply market without the protection of guaranteed revenue from the protected tariffs markets and the vulnerability to pool price movements could lead to major structural changes in the supply market. Trends could include alliances between Generators and RECs forming utilising the competitive advantages referred to earlier.
Indeed, at the time of writing, Scottish Hydro Electric, a Scottish generator, has launched a takeover bid for MANWEB, the REC that covers Merseyside and North Wales. At the time of writing, it appears likely that this takeover bid will be referred to the Monopolies and Mergers Commission because of fears that the combined organisation will adversely affect competition in the market. Should the bid be successful it may precipitate a increase in the links between generators and RECs.

Alliances of current suppliers with new market entrants to maximise cross selling opportunities could be a possibility. Eventually some current suppliers may withdraw from the supply market to concentrate on either generation or DUOS depending upon whether they are Generators or RECs. Whatever happens the complete liberalisation of the domestic electricity supply market from April 1998 will bring major changes to the current structure of the market.
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page 107


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