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TRANSACTION COST ECONOMICS AND CONTRACTUAL RELATIONS

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Abstract

One of the key factors in the study of transaction costs economics is the concept of opportunism. Williamson (1986) develops a heuristic model of transaction costs and governance structures, in which the critical dimensions with respect to which transaction costs differ are identified. These dimensions are the frequency of exchange, the degree of relationship-specific investment, and uncertainty. This work examines if empirically, through the use of case studies, there is support for Williamson's model. Firms in four different industries were interviewed about their contractual relationships with their customers or suppliers. The degree of asset specificity and transaction costs differs across these industries and across firms within an industry. We find that there is strong support for the Williamson model, however, a critical dimension that is omitted from the model is market structure. By affecting the number of alternative sellers and buyers, and hence the risk of opportunism, we find that market structure also has important consequences for the nature of contractual relations to be found governing firms' transactions.

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1. INTRODUCTION

This study undertakes a number of case studies across different industries in order to examine the governance of contractual relations within the context of transaction cost economics. Coase (1937 and 1960) was one of the first to recognize the importance of transaction costs in understanding the organization of economic activity. For example, transaction cost economics may help to illuminate why it is that some transactions are governed by vertical integration whereas others are mediated through the market place. If transactions costs were insignificant then the organization of economic activity would be irrelevant. In this case, the benefits of one mode of organization (e.g. vertical integration) could also be obtained by the market through costless contracting.

One of the key factors in the study of transactions costs economics is the concept of opportunism. In the absence of asset-specificity, Williamson (1985) argues that a market based governance structure is preferable because the incentives necessary to minimize costs cannot be maintained within a unified (e.g. vertically integrated) structure. On the other hand, where relationship specific investment is undertaken by firms the possibility of *ex post* opportunistic behaviour arises. This problem, also known as the hold-up problem, has been widely discussed in the literature, see Klein *et al.* (1978), Schelling (1960) and Williamson (1971, 1975 and 1985), among others. The problem arises since parties must make idiosyncratic investments before trading. Although *ex ante* there may be many suppliers and buyers, *ex post* firms find themselves in a bilateral monopoly. It is this absence of *ex post* competition that raises the possibility of hold-up since one party to the relationship may have an incentive to appropriate the gains associated with the other party's investment.

Vertical integration is one way of resolving the hold-up problem.¹ In many cases, however, this may mitigate against the desirability of encouraging competition, see Grossman and Hart (1986) and Hart and Tirole (1990). Furthermore, if economies of scale are important, outside procurement may be preferable in this case. Another way of ensuring against opportunistic behaviour is through the design of complete contracts. Contracts in this case must *ex post* guarantee that parties earn a fair rate of return on their investment in order to promote *ex ante* specific investment and, they must also guarantee *ex post* that the efficient volume of trade is undertaken by preventing monopoly pricing. However, the writing of complete contracts is usually infeasible because of high specification costs, particularly in cases where the product is relatively complex. Where contracts are incomplete, Hart and Moore (1988) have shown in cases where renegotiation is permitted, the problem of underinvestment remains since *ex post* each party will want to appropriate the common surplus. This jeopardizes the *ex post* efficient realization of trade and the efficient levels of specific investment *ex ante*.

However, once parties have made specific investments then trading with each other can yield a surplus relative to trading with someone else. Parties have an incentive to contract *ex ante* to avoid or limit the degree of opportunism and *ex post* trade inefficiency that may result due to renegotiation and bargaining.² Firms, therefore, may look for some intermediate or alternative governance structures to unified or market governance, since these may not be the most economical organizational forms in this case. There is a tradeoff, however, between transaction costs and the degree of asset specificity. As assets become more idiosyncratic then

¹Klein *et al.* (1978) and Williamson (1971) show that the existence of opportunism and idiosyncratic investment is a leading factor in explaining why firms decide to vertically integrate.

²Some recent results have provided renegotiation conditions that yield efficient outcomes, see Aghion *et al.* (1991), Chung (1991), Dewatripont and Maskin (1990), and Rogerson (1992). Other recent studies have addressed the issue of what role the courts can play in enhancing efficiency when contracts are incomplete and parties are asymmetrically informed, see Aghion and Hermalin (1990), Ayres and Gertner (1992), Hermalin and Katz (1993) and Johnson (1990).

the costs of using simple governance structures (e.g. market governance) increases because of opportunism and, in this case, firms may favour more complex governance structures with consequentially higher transaction costs.³ One would therefore expect that as the degree of asset specificity and transactions costs increase that firms will move towards a more unified governance structure.

One of the problems with transaction cost economics is that almost anything can be rationalized through the application of suitably specified transaction costs. Williamson states that "further progress in the study of transaction costs awaits identification of the critical dimensions with respect to which transaction costs differ and an examination of the economizing properties of alternative institutional modes for organizing transactions"⁴. Williamson then goes on to develop a heuristic model in which he identifies the critical dimensions by which transaction costs differ and examines the economizing properties of alternative governance structures. This paper sets out to examine if empirically, through the use of case studies, there is support for Williamson's model.

Section 2 presents Williamson's model of transaction costs and governance structures. Case studies were undertaken by interviewing firms about their contractual relationships with their customers or suppliers. Four different industries were selected where the degree of asset-specificity and transaction costs differs across these industries and, in some cases, across firms within an industry. Sections 3 thru 6 present a summary of our findings in the automobile, mechanical engineering, electronics, and gas industries, along with an analysis of how well they fit into Williamson's model. A summary is presented in section 7.

³For example, this may include the writing of more complex contracts which require more time and effort by the parties involved to ensure the integrity and continuity of the transaction.

⁴Williamson (1986), p. 101-102.

2. Williamson's Model of Transactions Costs and Governance Structures

Williamson's (1986) model attempts to explain which transactions are located where and to give the reasons why. A three-way classification of contracts is used: classical, neoclassical, and relational categories of contract law⁵; and in each case an appropriate governance structure is delineated. In the case of classical contract law the emphasis is on legal rules, formal documents, and self-liquidating transactions. Under classical contract law, therefore, (i) the identity of the parties to the transaction is irrelevant; (ii) the nature of the agreement is carefully delimited; (iii) remedies are narrowly prescribed; and (iv) third party participation is discouraged. Contracts where all future contingencies pertaining to the transaction are described and accounted for would fall under classical contract law.

Not all transactions, however, will fit into this scheme. For example, long term contracts involving some degree of asset specificity, where all future contingencies cannot be identified and where appropriate adaptations may not be evident until the contingency arises, would break down under classical contracting. Firms in this case could move towards more standardized products or vertical integration; or, alternatively, implement a different contracting scheme which preserves trading but provides for additional governance structure. It is this last one that Williamson and MacNeil refer to as neoclassical contracting. Contracts under neoclassical contract law will, therefore, be characterized by (i) gaps in their planning, (ii) the presence of a range of processes designed to create flexibility, and (iii) third party participation is encouraged thru arbitration procedures in the event of a dispute.⁶

As the degree of asset specificity, and contract length and complexity increases, neoclassical adjustment procedures will also be displaced in favor of more transaction-specific,

⁵Williamson himself borrows this classification from Macneil (1978).

⁶The purpose of these procedures and arbitration is to ensure the continuity or completion of the contract.

ongoing, and administrative procedures. This is what is referred to as relational contracting. The reference point for effecting adaptations under relational contracting becomes the entire relationship as it has developed thru time, whereas, under neoclassical contracting the reference point remains the original agreement.⁷

As stated above, Williamson defines an appropriate governance structure for each classification of contracts and type of transaction. He considers three broad types of governance structures: non-transaction specific, semi-specific, and highly specific. Governance structures, as with the type of contracting, will vary with the nature of the transaction. Williamson identifies three critical dimensions for characterizing transactions: (i) uncertainty, (ii) the frequency with which transactions recur, and (iii) the degree to which idiosyncratic investments are incurred. Frequency of transactions can be either occasional or recurrent, and investments are classed as non-specific, mixed, and idiosyncratic. Examples of the types of commercial transactions that fall in each category are given in figure 1. All of these dimensions will affect the type of contractual relationship and governance structure that firms will choose to regulate their transactions; for example, Williamson remarks:

That simple governance structures should be used in conjunction with simple contractual relations and complex governance structures reserved for complex relations seems generally plausible. Use of a complex structure to govern a simple relation is apt to incur unneeded costs, and use of a simple structure for a complex transaction invites strain. [however] the prospect of recovering the set-up costs associated with specialized governance structures varies with the frequency with which transactions recur. Specialized governance structures are much easier to justify for recurrent transactions than for identical transactions that occur only occasionally.⁸

Standardized transactions, whether occasional or frequent, involving non-specific investment will not require specialized governance structures and, classical contracting is appropriate in this case. Williamson defines market governance as the main governance

⁷See Williamson (1986), p. 105.

⁸Ibid, p. 105 and 111.

structure for transactions of this kind. When products are standardized, since alternative buyers and suppliers are easily obtainable, the market protect parties against opportunism. In this case the specific identity of the parties is unimportant and content is determined by reference to formal terms of the contract.⁹

Two type of transactions for which a semi-specific governance structure will be needed are occasional transactions where investment is mixed and idiosyncratic. Although investment may be idiosyncratic, since transactions are only occasional, a highly specific governance structure cannot be supported because of the high set up costs involved. Once investments have been made, parties have a strong incentive to see the transaction through to completion since the opportunity cost of the investment in alternative uses will be lower. However, given that there is some degree of asset specificity (either mixed or idiosyncratic), classical contract law and market governance will not be very effective in ensuring the continuity of the transaction. Neoclassical contract law will be better able to ensure this continuity and completion of the contract. Under neoclassical contracting, parties will not resort immediately to strict reliance on litigation but will employ third-party assistance thru arbitration in resolving disputes. Williamson refers to this as trilateral governance, presumably because of the involvement of a third party in governing the relationship.

Only recurrent transactions will support a highly specific governance structure as this allows the costs of the specialized governance structure to be recovered.¹⁰ Investment must also be either mixed or idiosyncratic, since market governance works well in the case of standardized products. Williamson defines two types of highly specific governance structures

⁹Ibid, p. 113.

¹⁰Williamson notes that defence contracting may be an exception since elaborate governance structures often exist even though transactions are occasional. He states that this reflects the special disabilities of the government as a production entity. He also notes that contracts that are very large and of long duration, as many defence contracts are, do have a recurring nature. See Williamson (1986) p. 128.

that apply in this case; a bilateral and a unified (vertical integration) structure. Where investment is mixed, since the degree of asset specificity is less complete, outside procurement may be preferred to vertical integration because of economies of scale. In this case relational contracting and a bilateral governance structure will be adopted. Adaptations here will be effected within the relationship, where the reference point will be the relationship itself, rather than referenced to an outsider arbitrator. Proposals for adaptations, however, give rise to the hazards of opportunism. However, since both parties also have an incentive to maintain the relationship, what is needed in this case is: "some way for declaring admissible dimensions for adjustment such that flexibility is provided under terms in which both parties have confidence"¹¹.

Not all adaptations will have the same risks of opportunism. Parties, therefore, have an incentive to contract such that the degree of opportunism is limited. Although price adjustments have a zero sum quality about them, quantity adjustments can usually be taken at face value. Williamson states that:

*Quantity adjustments have much better incentive compatibility properties than do price adjustments...a presumption that exogenous events rather than strategic purposes are responsible for quantity adjustments is ordinarily warranted.*¹²

In recurrent transactions where investment is mixed one should, therefore, expect to see quantity adjustments occur routinely. Furthermore, not all price adjustments will have the same degree of risk. Where price adjustments can be related to exogenous and verifiable events, and the cost consequences of such adjustments are apparent, then few risks exist. Examples of price adjustments that pose few hazards are price escalator clauses that relate to the price of a raw

¹¹Williamson (1986), p. 115.

¹²ibid, p. 115.

material. We should not, therefore, expect to see crude escalator clauses that relate to general economic conditions being implemented in contracts where investment is transaction specific.¹³

As investment becomes more idiosyncratic then economies of scale can be fully realized by the buyer as by an outside supplier. Under recurrent, idiosyncratic transactions one would, therefore, expect a unified governance structure to dominate other governance structures. Relational contracting in this case will be dominated by the advantages of vertical integration since adaptations can be made quite easily under a unified structure. Williamson's schema for characterizing transactions and their contractual relations and governance structures is given in figure 2.

Uncertainty, although not included in the matrix will also affect contractual relations and governance structures. Classical contract law and market governance will hold for standardized transactions regardless of the degree of uncertainty.¹⁴ This is because alternative trading partners can still be easily arranged. However, where investments are mixed or idiosyncratic, then increasing the degree of uncertainty will imply that contractual gaps will be larger and hence, the need for adaptations will increase. Firms can either move towards more standardized products or more elaborate governance structures. In particular, Williamson claims that as uncertainty increases: (i) more elaborate arbitration apparatus are apt to be devised for occasional non-standard transactions and (ii) bilateral governance structures will give way to unified ones for recurrent transactions.¹⁵ As the case studies will show there is strong support for Williamson's model.

¹³Since such crude escalators are not transaction specific, if implemented, imperfect adjustments would result. Changes in overhead or other types of expense will also be foregone, since such changes, even if verifiable bear an uncertain relation to the cost of the product. See Williamson (1986), p. 116.

¹⁴Ibid, p. 117.

¹⁵Ibid.

3. The Automobile Industry

Case studies, involving detailed interviews, were carried out with five firms in the industry. Only buyers (i.e, automobile manufacturers) were interviewed. Industry demand has varied a great deal in the last 10 years. One major change that has occurred has been the increased tendency by firms to increase the amount of out-sourcing (i.e, reduce the amount of vertical integration). Firms, especially in the last few years, were also looking to reduce their supplier base. In all cases, transactions were governed by bilateral, long-term relationships between buyers and suppliers. Not all of these relationships, however, were governed by written contracts. Contracts can take the form of formal long-term contracts or purchase orders and, in both cases, are legally binding. Only in one case did the buyer claim that their relationships with suppliers were always governed by written contracts. Contracts are usually 3-5 years in length, and in some cases 7-8 years. In all cases except one (see below), contracts did not guarantee that buyers would not switch supplier during the contract period. Buyers have a "best-in-class" list of suppliers and will often review and possibly change suppliers when new models are brought in. If suppliers remain "best-in-class" then buyers will often stick with them when going over to a new model.

Transactions in this industry can be characterized as recurrent and investment is mixed. Therefore, according to Williamson's schema we should expect to find relational contracting and a bilateral governance structure regulating transactions in this industry. In all cases this is indeed what we found. Since transactions are recurrent, a more elaborate governance structure can be supported. On the other hand, since the degree of asset specificity is not complete, if economies of scale are important firms will prefer outside procurement to a unified governance structure. In all cases, we found economies of scale to be very important.

Products are customized for specific buyers and, in this case, suppliers can not sell the same product to other firms. However, since the degree of asset specificity is not complete, they can sell similar products. Economies of scale in this industry are significant for two reasons. One of the reasons is due to the fixed costs involved in developing the input and/or the investment costs that are relationship specific. These development and investment costs are often in the suppliers' overheads and are amortized.¹⁶ In this case, the price that buyers pay will therefore be related to volumes. However, development costs are not always amortized. In some cases, buyers pay for development costs separately through a fixed fee.¹⁷ However, since products are similar, suppliers gain from having other customers. Economies of scale are also important to the buyer because of the fixed costs of tooling. Buyers in this industry will pay for, and own, the tooling. Volumes again will be significant since these fixed costs can be spread over greater volumes. Because of this, buyers will single-source their inputs.¹⁸ If firms used multiple-sourcing, then not only would they have to duplicate their tooling costs, but each supplier would have smaller volumes. Economies of scale, therefore, are important and there is very little vertical integration to be found in this case.

Since investment is mixed the possibility of *ex post* opportunism arises. Not all adaptations, however, have the same risks of opportunism. We should, therefore, expect that adaptations where this risk is limited will be implemented. The case studies revealed that quantities adjustments do occur routinely, as Williamson predicted, since these can be taken at face value. Quantities are set by buyers with annual targets typically being specified annually. Firm quantities may be specified for anything from one to three months, but quantity adjustments

¹⁶In some cases investment costs might be covered by deferring price decreases until the cost of the investment is covered.

¹⁷This could be a particular buyers policy for development in general. On the other hand, some buyers who usually amortize development costs may, however, pay separately in the case of risky developments.

¹⁸There are exceptions to this. For example, where an input has a lot of brand recognition, which is the case with tires, firms may use Michelin tires in France and Continental tires in Germany.

are still allowed for by the buyer even within this period.¹⁹ Also, we should not expect to find crude escalators clauses relating to general economic conditions. And indeed, in all cases, buyers said they had no contracts that used such crude escalator clauses.

Price adjustments that incur few risks, however, are adopted in contracts. Price escalator clauses related to the price of raw materials, in particular, volatile metals such as aluminum, lead, copper, etc., are routinely found in contracts governing transactions in this industry.²⁰ In this case, the price of the material is easily verifiable and the London Metal Exchange is often the medium used to verify prices. As there is very little asymmetric information (see below) the cost consequences of such increases are also known.²¹ In some cases escalator clauses that allow for changes in international exchange rates may also be implemented, in particular, where inputs are bought from abroad. In most cases, prices were negotiated annually and buyers were often looking for target reductions each year.²² Contracts, therefore, often include efficiency clauses specifying reductions (or target reductions) each year.

Under relational contracting and a bilateral governance structure we should expect that adaptations will be effected within the relationship (where the reference point is the relationship itself) rather than using outside arbitrators. The case studies do indeed show this to be the case.

¹⁹Quantity adjustments are not symmetric. Late delivery or failure to deliver on the part of suppliers would be seen as non-performance of contract. In this case, unless the problem can be resolved, buyers could switch to alternative suppliers.

²⁰In one case the buyer offered two types of contracts, one which contained no escalator clauses and one which included escalator clauses relating to the price of raw materials. In the first case, as long as the performance terms and conditions were being met, the buyer guaranteed not to switch suppliers. No such guarantee is given in the latter case.

²¹Buyers will require cost breakdowns from their suppliers, therefore, the fractional cost of the input in terms of the raw material will be known.

²²With one exception, price was negotiated annually. The exception was the case where the buyer offered two types of contracts. Contracts that included no escalator clauses and where suppliers agreed to a minimum x% annual reduction, the buyer guarantee not to switch suppliers. In this case contracts were for a longer duration than those that included escalator clauses and the supplier offered less than a x% annual reduction. However, in both cases price was determined throughout the length of the contract by the initial price and annual efficiency and escalator clauses.

Arbitration procedures are not specified in contracts and rarely (if ever) used and, we found that adaptations were effected bilaterally (within the relationship) through negotiations. Renegotiations may arise for a variety of reasons. In some cases, prices may be related to quantities or based on annual volume targets. The risk for the supplier, especially when development costs are being amortized, is that volumes turn out to be very different from the targets. In this case price may be renegotiated. Another instance where adaptation would be allowed is where costs are affected by environmental legislation. Bilateral governance in this case allows the parties to negotiate how these additional costs will be shared. In both of these cases the request for adaptation would be considered reasonable.

Not all costs would qualify as reasonable requests for price relief. Adaptations for overheads and other expenses where verifiability is difficult and which bear an uncertain relation to the cost of the input, will normally be foregone. Williamson, however, claims that faced with a viability crisis that jeopardizes the relationship, *ad hoc* price relief may be permitted.²³ The case studies indeed revealed this to be the case. In all cases, buyers claimed to work closely with their suppliers and although price relief *per se* may not be granted, the bilateral governance structure allows the parties to work together to find a solution. In most cases buyers claimed that they will first work with the supplier to reduce costs. If the supplier was making a loss prior to this and the loss is eliminated then, effectively, the gain goes 100% to the supplier. The sharing parameters in this case are $\alpha_s=1$ and $\alpha_b=0$ where α_s and α_b are the percentage gains that go to the supplier and the buyer respectively. Price relief, however, may be granted if the price remains competitive. Most significantly though we found that firms were open for negotiation and that both parties will work together to find solutions to problems. Parties work within a bilateral governance structure to find those solutions and, arbitration is not really used. In all cases, firms

²³Williamson (1986), p. 116.

said that it was very unlikely or unlikely that either they or their suppliers would take legal action.

The degree of lock-in in this industry is a priori fairly high given the mixed nature of the investment. Although tooling investment by buyers is often specific to the supplier, tools will be paid for and owned by the buyer. This reduces the degree of lock-in to buyers since they can take their tooling out and go to an alternative supplier. In almost all cases, however, it would take a significant amount of time to replace the supplier and may involve new investment in tooling and/or development. The value of this investment could be anywhere from moderate to substantial.²⁴ Where the value of this investment is not very much, the degree of lock-in for buyers is very low. Furthermore, since products are similar, firms could manage in the short run if they had to find an alternative supplier. The value of the contract to buyers tended to be fairly small and, buyers did not expect that the price they would have to pay for the input to increase if they had to find an alternative supplier.

Suppliers, for the most part, tended to be less locked-in since it would not require any new investment of their part if they had to find an alternative buyer. However, it would take time to replace the buyer and the supplier would lose volumes. In cases where the buyer is responsible for a substantial share of the suppliers turnover (in some cases over 50%), this loss of volumes could be crucial. In one case the degree of lock-in was very high for both parties and would require substantial new investment by both parties if they were to switch. There were no formal contracts governing this transaction but it was a long-term relationship of over 20 years regulated by bilateral governance. In this case the buyer worked very closely with the supplier and was keeping him afloat because the degree of lock-in was so high (i.e., the supplier would

²⁴In one case the buyer said that they would, therefore, prefer to put the effort into improving the existing supplier rather than switch suppliers. On the other hand, another buyer said that they tended to go with products that were similar to other manufacturers and no real development was involved. The switching costs are reduced substantially in this case. Tooling costs, however, could still be substantial, offsetting this effect.

go bankrupt if he lost this buyer). Although in general, both suppliers and buyers could switch with relative ease there are many cases where the degree of lock-in is much higher. Transactions in this industry are, therefore, governed by bilateral governance structures with suppliers and buyers working closely together and adaptations are affected within the relationship, with reference to the relationship itself as it develops thru time.

What can we say about the degree of uncertainty or asymmetric information in this industry? Uncertainty exists mainly on the demand side and adaptations are allowed for by quantity adjustment. If this has consequences for price because of amortization of development costs, then price would normally be renegotiated. In this case, therefore, the risks of this uncertainty can be said to be shared between buyers and suppliers. The degree of asymmetric information is very low or non-existent. Buyers require highly detailed cost breakdowns from suppliers and, in addition, often require detailed information as to the properties, specifications, and terms of production of the input. Costs, therefore, are highly predictable. Buyers did say, however, that suppliers have "expert" knowledge about producing the input. Buyers visit suppliers on a frequent basis and formal audits are often carried out.²⁵ Suppliers are required to complete SQA (Supplier Quality Assurance) forms and the frequent visits, besides ensuring the smooth running of the relationship, ensure quality standards. Furthermore, buyers tend to share information with other buyers; especially in the case where a supplier may be in trouble. Therefore, not only are economies of scale important but because the degree of uncertainty and/or asymmetric information is so low, firms will prefer to use a bilateral governance structure rather than a unified one to govern transactions in this industry.

4. Mechanical Engineering

²⁵In one case, the buyer claimed that all suppliers had a formal audit every 18 months. Audits may be carried out on everything, including the suppliers management methods. And in another case, the buyer had its own cost estimating department.

Four firms were interviewed in this industry. Three of the firms were interviewed as sellers and one firm as a buyer. Industry demand seems to vary a great deal in this industry and firms found that the recession had hit particularly hard. Unlike the automobile industry, the degree of asset-specificity and frequency of transactions varied amongst the firms interviewed. In all of these cases, therefore, the type of governance structure and contractual relations used by firms differed with the type of transaction. In the interview with the buyer their transactions could be characterized as recurrent and investment was mixed. As with firms in the automobile industry, these transactions were governed by a bilateral governance structure and relational contracting. In two of the case studies, transactions, on the other hand, were occasional and investment was both mixed and idiosyncratic. In one interview, transactions were recurrent and, although products were customized, investment was fairly non-specific.

In the cases where transactions can be characterized as occasional and mixed or idiosyncratic we should, according to Williamson's model, find a trilateral governance structure and neoclassical contracting. This is what we found in both cases. Both firms always had written, legally binding contracts with their customers and their relationship were long-term, in most cases, over 20 years. Contracts tended to be for one-off idiosyncratic jobs.²⁶ Contracts will specify what is to be designed and built, progress schedules and delivery dates. Although the relationships with their customers were long term, contract durations were relatively short since contracts were for a specific job. With one firm the average duration of a project was nine months, whereas the other firm had contracts ranging in length from one to six months. Price is negotiated for each contract and is a lump sum for the job. Suppliers will often be paid in installments, for example, a certain amount as a downpayment and progress payments at different stages. Contracts end on delivery and successful installation.

²⁶Example could be the constructing a plant, bridge, or specialist equipment.

Since transactions are only occasional, highly specific governance structures of the bilateral kind cannot be supported. Once investments have been made, however, parties have a strong incentive to see the transaction through to completion, since in this case the opportunity cost of the investment in alternative uses would effectively be zero. Because of the idiosyncratic nature of the investment, market governance will be ineffectual in ensuring the continuity and completion of the transaction. Neoclassical contracts on the other hand will exhibit gaps in their planning and will, therefore, have a range of processes designed to create flexibility. In both cases, delivery time could be varied, subject to negotiation.²⁷ However, firms do try to incorporate all possible eventualities into the contract.

Since investment is relationship specific, either mixed or idiosyncratic, specifications are often changed during the contract. For example, the customer may decide he wants something slightly different. Firms, therefore, have established a procedure by which all these variations to contract are put in writing and logged, and buyers are requested to acknowledge that the changes took place. Firms will provide the customer with a price for each variation to contract along with an estimate of how this may affect the time scale of the project. It is important to log all variations and changes in specifications because this may have consequences for delivery or affect the time scale of the project. If the time scale is affected, the seller will want to document this, otherwise he could be liable for damages for late delivery. Firms will also negotiate over the price consequences of the changes to contract. Therefore, where specifications change, firms are continuously renegotiating the contract via a variations to contract procedure.

The amount of asymmetric information is reduced by the fact that buyers will often visit suppliers in order to control for quality, audit the time scale or for technical discussion. Although buyers may not require a cost breakdown, they will often ask for a price breakdown

²⁷One firm claimed that either side could vary delivery if the reasons were acceptable, in which case, they would enter into negotiations. For example, the customer may not be ready to take delivery of the product into his factory. With the other firm variations to delivery were brought about due to changes in the specifications of the contract.

into the different stages i.e, design, manufacture and supply, delivery, installation, and completion. In the case where investment could be characterized as mixed, buyers multiple-sourced the product. This effectively reduces the degree to which buyers are locked-in to the relationship. This is not possible in the case where investment is idiosyncratic. Buyers couldn't really cancel contracts once the job had started and security of supply was extremely important. Once investments have been made, firms are fairly locked-in since the opportunity cost of the investment in alternative uses is so low. In the case where investment was idiosyncratic these outside options are zero. However, given the nature of the investment, once the job has started it's not really possible for the buyer to replace the supplier either. This is because the seller could legally recover some of its sunk costs from the buyer. A trilateral governance structure regulates transactions in this case and, neoclassical contracting encourages third party participation through arbitration procedures in the event of a dispute. Contracts, therefore, will specify arbitration procedures and, one firm stated that the Institute of Mechanical Engineers was usually specified as the arbitrator.

In the case study where investment was found to be recurrent and non-specific, market governance and classical contracting was found to govern these transactions. The firm was interviewed from the seller's side of its transactions. Although the products the firm produced were customized machine tools, investment was fairly non-specific. The firm sold similar products to other customers and contracts did not specify that they could not sell the product to other firms. Although no formal written contracts seem to exist, distribution agreements governed these transactions and are legally binding. All their contracts were the same, therefore, the identity of the parties is irrelevant. In accordance with classical contract law the nature of the agreements are carefully delimited. Contracts specified exact delivery dates, three months firm (committed) quantities and, target quantities for 12 months. Buyers could vary quantities

with one month written notice. The initial price was established through negotiation and price renegotiations were very rare.²⁸ Contracts were effectively fixed price.

The degree of lock-in was practically zero and the market provides for effective alternatives in this case. In the event that the buyer had to find a new supplier it would not take him very long and would not really require any new investment. The supplier had over 2,000 customers and no single customer accounted for more than 2% of their turnover. Some buyers tended to single-source, possibly because it was too complicated to deal with more than one supplier, whereas other tended to dual-source. The firm claimed that there was no particular pattern as to why buyers single or dual sourced. The degree of asymmetric information was also very low. Buyers visited the supplier and carried out formal quality audits (ISO 9000 and BS 750). Although suppliers did not provide cost breakdowns they did provide detailed information regarding specifications, properties and terms of production. No arbitration procedures are specified and third party participation is discouraged. It was very unlikely that either party would ever take legal action and the market provided for effective governance.

In the one interview with a buyer, transactions could be characterized as recurrent and investment was mixed. Written, legally binding contracts governed these transactions and, bilateral governance structure and relational contracting governed these transactions. Relationships with suppliers were long term, often over 20 years, and contracts were also long-term.²⁹ Contracts were complicated where the basic contract was over 15 pages long (not including specification of the product or appendix). One interesting aspect of these contracts was that information exchange between parties was required and explicitly written into contracts.

²⁸Only if the price of raw materials or exchange rates changed would price be renegotiated and, even in this case it was very rare.

²⁹Contracts were for 3 years in the case of one supplier and 10 years in the case of another supplier.

Contracts guaranteed that they would not switch suppliers as long as the terms of the contract were met. Products are customized and the supplier cannot sell the product to other firms.

In general, the degree of lock-in was moderate. Economies of scale are important because of tooling costs and products are single-sourced. However, the buyer claimed that they often search for new suppliers and had a 3-4% turnover each year. It would take several months to replace a supplier and it would require some new investment in tooling on their part. The buyer also had a policy of restricting the dependence of suppliers on them to 30-40%.³⁰ This was to reduce the risks to suppliers and diversification on the part of their suppliers was strongly encouraged. The degree of asymmetric information was fairly low since parties worked closely together in a bilateral relationship. The buyer frequently visited their suppliers and formal quality audits are undertaken. The buyer also required cost breakdowns and detailed information from suppliers. Contracts also stipulated information exchange between parties.

As expected with a bilateral governance structure, adaptations were affected within the relationship. Under these contracts, quantity adjustments are permitted and 3 months firm quantities and long-run forecasts are also specified. Initial prices are negotiated and the contract will either be fixed price or falling price.³¹ However, escalator clauses were permitted in the case of metals. Adaptations were effected within the relationship and contracts were sometimes renegotiated. Factors that would trigger renegotiation are price, quality, and/or the overall competitiveness in the supplier's industry. If for example, the contract moved out of line with general prices in the supplier's industry, the buyer would use the threat of withdrawal of future business in renegotiating the contract. Renegotiations often take several months and, during this period, supply continues under the original terms. The buyer claimed that they were less reliant

³⁰Suppliers in this case could not have more than 30-40% of their turnover coming from this one buyer.

³¹Some contracts, especially those with long-term suppliers, included efficiency clauses where the buyer was looking for a 30% reduction over 3 years.

on common law and that transactions were more of a two-way process. The purpose of contracts was to allow for the resolution of disputes without have to go to court or arbitration.

5. Electronics

Case studies were carried out with seven firms in this industry. Two of the firms were interviewed on the seller's side of the contractual relationship and, the remainder were interviewed from the buyer's side. The electronics industry is extremely diverse in that there are different sectors within the industry itself. Since firms were interviewed in different sectors of the industry, the type of transactions in terms of asset-specificity and frequency of transactions varied amongst the firms interviewed. Two of the firms' transactions could be characterized as recurrent and non-specific and, these firms operated in a very competitive sector of the electronics industry. On the other hand, two of the firms interviewed were heavily dependent on the defense sector of the industry. Transactions in this instance can be characterized as recurrent and, both mixed and idiosyncratic. The remaining three firms were more in commercial sectors (as opposed to defense) and their transactions could be characterized as recurrent and investment was mixed.

In the case where transactions could be characterized as non-specific and recurrent, both firms were interviewed from the buyer's side of the relationship. Market governance and classical contracting was found to govern these transactions. Their purchases consisted of standardized products such as electronic components, including memory and communications products. One would not expect the duration of contracts to be very long in this case since assets can be employed in other uses or sold to other buyers. Therefore, we should expect changing market conditions to be reflected relatively quickly in both price and quantity. Under classical contracting the nature of the agreement is carefully delimited and remedies are narrowly

prescribed. We should therefore expect relatively stringent contracting attitudes to prevail. Contracts were written and legally binding in both cases.³² Both firms felt that contracts were uncomplicated and were straightforward, centered around delivery, quantity and price.

In both cases, contracts were fairly short-term and never more than one year in duration. Although the duration of the contract may be one year, reviews were undertaken quarterly. Prices and quantities were set either annually or quarterly depending on the component and market conditions. Changing market circumstances are, therefore, reflected very quickly in both prices and quantities. Both firms did, however, provide estimates of annual quantities. In one case, the firm had an agreed batch size and would take delivery even if they didn't need it since, once a batch was ordered cancellation fees would apply. Fairly stringent rules can, therefore, be said to apply. However, the buyer can vary quantities thru batch size and frequency of delivery since these are determined quarterly. But price and quantities are fixed for that quarter. In the other case, quantities could be varied by either side with 30-45 days notice. Prices are set by the manufactures and may be based on an estimate of the buyer's annual usage.

Since products are standardized, sellers do supply the product to other firms. The buyers both single and dual-sourced products depending on the component. In the case where they single-sourced, the contract may specify that they cannot switch suppliers during the contract period. Given that contracts are short term this is not really an issue. The degree of lock-in is effectively zero and renegotiation does not arise. Strict interpretation of the contract applies and cancellation fees would be implemented. No arbitration procedures are specified, and would be unnecessary in this case, since the market acts as the ultimate arbitrator. There is very little asymmetric information. In one case the buyer reviewed their suppliers every six months in terms of delivery, performance and technical support. Site visits and quality audits were also

³²One firm did, however, say that in some instances they did not have written contracts with all of their suppliers. A lot of their contracts with suppliers was mainly to show good intent. However, contracts were unnecessary since if they didn't buy from the supplier it wouldn't matter to either party and the market provided outside options.

carried out. In the other case, although the buyer carried out no formal quality audits, they did visit their suppliers. Since the market is competitive, buyers have a relatively good idea of the cost of the product and, there is a clear market price.

Interviews were carried out with three firms where their transactions could be characterized as recurrent with mixed investment. Two of the firms were interviewed on the buyer's side of contractual relationships and, one from the seller's side. In all three cases, relational contracting and a bilateral governance structure could be said to regulate these transactions. One of the buying firms, however, had a dominant market position in its sector of this industry. Therefore, where suppliers are not very diversified, few outside options exist. The implication of this was that even in the case where products were standardized, bilateral governance structures were found to govern these transactions. This case study is discussed separately below. In all cases, however, contracts were written and legally binding.

The contracts governing the transactions in the other two cases (one buyer and one seller) were very similar. The seller used to be quite dependent on the defense sector but had now successfully diversified. The typical duration of contracts was five years against which annual purchase orders are written. Prices and quantities will be determined by the annual purchase order. In this case, the contracts contained no escalator clauses.³³ Products are customized and there are two stages; the development stage and the supply (production) stage. Prices, therefore, have an element of two-part tariffs. There is a fixed charge to cover the non-recurring engineering (NRE) costs and then a price per unit for production. In this case, development costs are not amortized and are covered by the fixed fee. Price, however, may still be related to volumes since the price that is negotiated may depend on target volumes. In the case of the particular contracts discussed, the firms said that there were minimum order requirements on

³³The particular contracts we discussed had no escalator clauses. One firm did say that, in general, their contracts would have escalator clauses which allowed for changes in the cost of labour and materials in their sector of the industry. For example, the labour cost escalator was based on the index for the Electrical Engineering Industry.

quantities. Unlike the automobile industry, quantity adjustments did not occur routinely. In one case, quantity variations by either party to the contract would have to be renegotiated. In the other case, both parties to the contract could reschedule terms for delivery. However, in this latter case, price was related to volumes and the contract contained a renegotiation clause in the eventuality target volumes were not met.³⁴

Products were single-sourced because of economies of scale emanating from the fixed costs of development. Suppliers cannot supply the product to other firms but could sell products in a modified form. There is no stipulation in the contract that buyers cannot switch suppliers. Again, there seems to be very little asymmetric information. The seller claimed, in this particular case, that there were no formal quality audits carried out by their customers, however, they supply detailed information regarding product specifications, etc.. There is a general awareness of what the market has to offer, but there is a tendency to not go out and re-source a customized product because there is some degree of lock-in. In the case of one of their contracts the degree of lock-in was quite high on both sides. The supplier had a cost advantage over the competition and substantial new investment would be required by both parties if the relationship ended. Adaptations were effected within the relationship and there were no arbitration procedures. Parties to the relationship must be flexible and contracts were renegotiated.³⁵

In the case where the buyer had a dominant market position, the typical duration of contracts was two years and the buyer claimed that they were moving towards longer-term contracts. Although they have long-term relationships with their suppliers, products are put out to competitive tender every 2-5 years depending on the product. Information on contractual

³⁴Price had indeed been renegotiated twice in this particular contract. Once because target volumes by the buyer were not met and once where the £/Yen exchange rate changed significantly.

³⁵Only in one case was litigation being entered into. The supplier had decided to terminate the relationship, pull out of the market and, no longer make the product. The buyer, therefore, was taking the supplier to court. This is what one would expect in this circumstance since, once the relationship was terminated, all that's left is a conflict over money damages to be settled by a lawsuit.

relations with two different suppliers was provided. In one case the product was standardized and in the other it was customized. Where the product was customized, investment could be characterized as mixed. In both cases, there is no contractual commitment on the part of the buyer not to switch suppliers. However, the buyer claimed that they tended to work with the industry and to have close relationships with their suppliers. A bilateral governance structure existed with a lot of managing of both the relationships and the contracts.

There is very little asymmetric information. Suppliers and contracts were reviewed every six months and the buyer frequently visited suppliers. They also have a good idea of what their outside options are since products are frequently put out to competitive tender. Where products are not tendered, the buyer required a cost breakdown of the product. No expert knowledge could be said to exist since the buyer had a good idea of the specifications, quality, reliability, and costing of the product. Suppliers were encouraged to diversify and often the buyer would not contribute directly to the cost of development because he would want the seller to develop the product and sell it to other markets. The buyer is effectively trying to reduce the degree of supplier dependence and lock-in.

Prices were based on volumes and some contracts had escalator clauses based on the price of raw materials, especially metals, and general costs in the suppliers industry. Customized products were multiple-sourced *ex ante* and the buyer would work with several different suppliers during requests for information and development stages. However, once the product was developed they would put the contract out to tender and single source the product. Where products are standardized or not very asset specific, quantities are allocated to suppliers on the basis of market share and performance.³⁶ Contracts contained renegotiation clauses dealing with performance and market share. A supplier could lose (gain) market share if his

³⁶Although quantities were allocated primarily on suppliers market share, it would depend on the whole package that was being offered by a supplier. Performance, therefore, includes such things as price, service, quality, etc.

performance decreased (increased). Contracts specify target quantities and could be varied by the buyer. The buyer usually operated under a "short-term window" of 3 months where quantities were firm, but the buyer always has an option to cancel.

As expected with relational contracting and a bilateral governance structure, adaptations were effected within the relationship with reference to the relationship itself. Renegotiations did occur and the sharing parameter was positive in circumstances which were reasonable. The buyer would, however, look at outside options in determining whether or not the increase was justified. Renegotiations also occurred for other reasons. For example, if a supplier bought a lot of stock based on expected volumes and the buyer no longer wanted the product, he claimed that they would still help the supplier to pay for this and manage through the difficulty. The reason for this, even though there was no contractual obligation on their part, was the buyer may want to do future business with this supplier.

A bilateral governance structure undoubtedly regulates these transactions even in the case where products are non-specific. The repeat nature of the relationships and the buyer's dominant position may be the explanatory factors. Williamson's heuristic model says nothing about how market structure may affect contractual relations and governance structures. It is clear, however, that market structure is bound to have an effect. Where markets are monopsonistic (or monopolistic) in nature then sellers (buyers) will have no outside options. In this case, the monopsonist may choose to not behave opportunistically in order to ensure supply. If the buyer did behave opportunistically, then sellers may be less willing to supply or enter this industry. Product supply could also be affected via quality. Opportunism on the part of the monopsonist may therefore be limited by his need to ensure a good supplier base with high quality products.

Two of the firms interviewed, one seller and one buyer, were heavily dependent on the defense sector of the industry. Transactions in this case could be characterized as both occasional and recurrent and, both idiosyncratic and mixed. Even where transactions are

occasional, Williamson (1986) claims that defense contracts have a recurring nature since they are very large and of long duration. Therefore, where we might expect to see neoclassical contracting and a semi-specific governance structure, more elaborate governance structures can be supported. In the case where investment is idiosyncratic we should expect a unified governance structure (vertical integration). However, due to the special disabilities of the government as a production entity, these transactions are left in the market to be governed by relational contracting and a highly-specific governance structure. We found that contracts tended to have a mix of both neoclassical contracting and trilateral governance structures along with relational contracting and bilateral governance.

Contracts had changed significantly in this industry, primarily due to Ministry of Defense requirements. There has been a switch from long-term, cost-plus contracts, to shorter-term, fixed price contracts. There was an increased reliance on the market as competitive tendering had become compulsive. The typical duration of the actual contract, or purchase order, that specifies how much is to be supplied and at what price is one year. Some longer term contracts did exist, or in the case of options for future deliveries, an escalator clause based on a nationally published index of material and labour costs may be used. Although contracts are short term, suppliers are under an obligation to supply the product for 15-20 years.

There are two different stages of production, the development stage and the supply stage. Although development could take anywhere from several months to several years, this stage will be covered by a lump-sum fixed price that will cover tooling and the non-recurring engineering charge (NRE). After the development stage, there will be a separate contract, often a purchase order, that will specify a per unit price, quantities, and delivery dates. Products will be multiple-sourced in the development stage. However, the production stage will be put out to competitive tender and single-sourced. Economies of scale are important and, tooling and test equipment

will often be owned by the buyer. The seller claimed that in their case the products were highly idiosyncratic and the switching costs were not trivial.

There is very little asymmetric information since parties develop the product together through its stages and will have a very good idea of the costs involved. There is very little expert knowledge by the supplier since the buyer is often the designing authority. Formal quality audits are carried out, including site visits to monitor the smooth running of the contract and, breakdown of the costs are provided along with detailed information. The buyer claimed that they had a policy of trying to reduce the dependence of suppliers by trying to account for no more than 30% of the suppliers' turnover in the longer-term.

As to be expected under a bilateral governance structure these products are often developed with buyer and supplier working closely together in order to optimise the design and minimize costs. However, unlike relational contracting and a bilateral governance structure where the sharing parameter is positive, the sharing parameter in this case was zero.³⁷ Cost savings, on the other, hand are usually shared 50/50. Flexibility in the contract is usually on quantity and this is not really an issue. However, time to market is crucial and there were penalties for late delivery. Renegotiations did occur and these were typically about changes to specifications, timescales, quantities, or cancellation by the ultimate customer. Simple renegotiations may only take a few days whereas a cancellation of contract by the customer may take six months to agree terms with the supplier. However, contracts were fixed price and if there were cost overruns or other problems it was just tough.

The seller claimed that their contracts did not specify an arbitration procedure and that it was very unlikely that legal action would be entered into. The repeat nature of the relationship

³⁷Both firms were emphatic on this point and that price renegotiations did not happen. The supplier even gave an example where a design provided by the buyer didn't work i.e, the customer provided the design, the seller put it together and it didn't work. They had to go through several designs prior to getting the product to work. Since there had been a fixed lump-sum contract, there was no renegotiation of price and they lost quite a bit of money on this contract.

is very important. Unlike a trilateral governance structure which exists when transactions are occasional, the need for parties to trade in the future meant that you had to be flexible. The firm interviewed from the buyers side of their contractual relations claimed that although their contracts did specify an arbitration process in the event of a dispute, it was unlikely they would go to arbitration or take legal action. The normal method is to agree a settlement with the buyer or the supplier by negotiation between the two parties. These transactions, therefore, can be said to be governed by a bilateral governance structure, but some elements of neoclassical contracting do exist in that arbitration procedures may be specified and the sharing parameter is zero. The fact that the sharing parameter is zero is probably due to the incentive problems that would arise and, are particular to defense contracts since governments have "deep pockets".

6. The Gas Industry

Six firms were interviewed in this industry; four from the seller's side of their contractual relations and two from the buyer's side. Until recently, the industry was dominated by British Gas having both a monopsonist and monopoly position. Upstream oil and gas firms had few outside options, British Gas being their sole customer. With the privatization and restructuring of both the electricity industry and British Gas, this is now changing. Upstream producers are now selling more to industrial and commercial users, whereas 10 years ago the only outlet for their sales was British Gas. Also the emergence of new combined cycle gas turbines (CCGT) in the power generation market has opened up a whole new market for the upstream exploration firms. The main areas, therefore, in which competition is now emerging is: (i) at the beach for the sale and purchase of gas to commercial and industrial users and (ii) natural gas for power generation. Another major change that is occurring due to the restructuring of the industry, is that a lot of the major upstream players are setting up their own downstream marketing arms.

Previously, British Gas' monopoly would have prevented them from integrating into the downstream market.

Contracts in this industry are written and legally binding. Although upstream exploration firms will often have private information about the geology of a field, the product is fairly homogeneous and the buyer is just purchasing gas. Investment in a field is very large and risky, however, that investment is not by nature idiosyncratic.³⁸ The risk of developing a field is underwritten on the sale of the gas. Short-term contracts, therefore, will not provide the exploration firms with the underwriting of this risk. Although almost all fields are developed by joint ventures, the sellers will need longer term contracts to underwrite the risk of the investment. So even though transactions in this industry could be characterized as non-specific and recurrent, given the long-term nature of the investment and contracts, market governance will not be very effective in regulating these transactions. Since contracts are of a very long duration, not all possible future contingencies can be accounted for. Classical contracting would break down in this case. Contracts in the industry, however, are changing as a result of the changes in market structure and the emergence of competition. Different types of contracts and governance structures were, therefore, found to regulate transactions in the industry.

When British Gas had a monopsony, almost all contracts were long-term depletion contracts.³⁹ These long-term depletion contracts are becoming a thing of the past. However, given their long-term nature, depletion contracts are still in existence and will be for some time. One seller said that it was highly unlikely that they would sell another depletion contract to British Gas and had already moved substantially into new markets. On the other hand, another

³⁸Although until recently investment could be characterized as idiosyncratic since British Gas was the sole customer. Also, some investment in pipelines and infrastructure may be idiosyncratic if it is specific to certain buyers.

³⁹The exception to this might be where gas is produced as a by-product and the seller can't control how much gas will be supplied on a daily basis. The value of the gas is much lower in this case and the buyer will take whatever is produced but he will get it at a cheap price.

seller claimed that their contracts were still on a depletion basis, but that in three years time this would change significantly downwards.

Depletion contracts are governed by a bilateral governance structure, with adaptations being affected within the relationship. British Gas often had rights to the geological information or would send their own experts to examine the field. In a depletion contract the buyer(s) is purchasing all the gas from the field and the duration of the contract is, therefore, the life of the field, usually 20-30 years. These contracts would be terminated once the costs of extracting the gas became greater than the revenue from selling the gas. The seller, therefore, has the right to terminate the contract on the grounds that it is no longer economically viable. However, these contracts also gave the buyer the right to instruct the seller, as long as it was economical, to make new investment and extend the life of a field.⁴⁰ Depletion contracts will stipulate a series of notices of step downs from the plateau of the field and it is the seller who nominates these step downs. Usually the seller will announce a couple of years in advance when the next step down will be.

Depletion contracts are also known as buyer nomination contracts, since the buyer nominates how much gas he will take on a daily basis i.e, the daily contract quantity (DCQ). Contracts will also specify a maximum daily quantity (MDQ) that the buyer can take where this is usually a percentage of the DCQ e.g, MDQ = 130% of DCQ.⁴¹ The MDQ will change over the life of the field as the field is depleted. Contracts will also specify an annual lower limit, for example, the buyer must take at least 80% of the annual quantity. This is the buyers take-or-pay obligation. Typically, if buyers have paid for the gas but not taken it, they are given a credit

⁴⁰These stipulations are known as economic incremental facility (EIF). If the buyer proves that there is such an economic new investment, then the seller can be made to undertake the investment.

⁴¹Contracts may also specify that they will allow the buyer to ask for an excess of the MDQ that the supplier is obliged to provide. For example, this may occur on an extremely cold day. The contract will also specify the terms under which excess gas will be supplied.

against future years take. On the other hand, if buyers fall short of their take obligations their obligations would usually go up in future years. The consensus in the interviews was that sellers will rarely invoke the take-or-pay since this would put strain on the relationship.

The initial price in the contract will be negotiated but is usually determined by the going price in the market at the time. Price is related to volume through the take-or-pay. Buyers will typically want a lower take-or-pay obligation and the sellers will want a higher one. Therefore, a buyer who offers a higher take-or-pay will normally get a price reduction. Contracts contain annual escalator clauses and the index is based on a basket containing the producer price index (PPI), oil, gas oil, fuel oil, and/or electricity, etc.. Some contracts will contain two escalator formulas with different weights and the lower of the two will be implemented. For example, one may be indexed more heavily on PPI and another on the price of oil. Given that contracts are so long-term, this helps to hedge against the escalator becoming out of line with the market.

With one exception, all firms interviewed claimed that price was rarely renegotiated in these long-term contracts since they are underwriting the investment in a field. As to be expected in a bilateral governance structure firms will, therefore, forego adaptations of this kind. Consequently, there is a very big spread of gas prices, from 12p/therm to 30p/therm, depending on when contracts were signed. Renegotiations, however, did occur routinely and were usually related to issue like extending the life of a field; negotiating a new price that makes the extension of the field economical and/or; removing a commodity that was no longer important from the price escalator, etc.. Renegotiations can typically take from one to two years to negotiate amendments.⁴² Given the duration of these contracts, parties to the contractual relationship frequently visit each other in order to ensure the continuity and smooth running of the contract, negotiate amendments and, to discuss volumes for the forthcoming year, etc.. Contracts do not contain arbitration procedures but do specify an experts provision. Therefore, unlike relational

⁴²This will change, however, since contracts are becoming much shorter in length.

contracting, third party participation is encouraged through the use of experts in the case of a disagreement. Typically this may occur over the economic termination clause, where the buyer and the supplier do not agree as to whether the gas is economically recoverable.

British Gas still purchases most of the gas in the industry. However, competition is emerging and contracts are changing. These new markets can be broken into two groups; industrial and commercial users and, the power generation market.⁴³ The value and length of contracts differs significantly between these two classes of customers. The power generators can provide long term contracts that are similar to what British Gas used to be able to provide and the duration of these contracts is typically 8-15 years. These contracts are referred to as supply contracts. They are the same as depletion contracts (i.e, escalator clauses, take-or-pay, MDQ, etc.), expect for one main difference, they don't have to deal with the decline period of the field. Supply in this case is rectangular and volumes are fixed i.e, there are no step downs. Figure 3 provide an illustration of the difference between depletion contracts and supply contracts.

It used to be the case that when British Gas was a monopsonist it could often dictate the timing of investment because of the clauses dealing with economic recovery of the gas. With supply contracts, not only is the seller's investment underwritten, but it also gives the seller the freedom to decide how he wants to manage the field. However, some long-term supply contracts do have dedication clause: the buyer gets what comes out of the ground and the seller is required only to sell to them. However, there are substitution sources the seller can use and the seller can supply from a different source as long as the buyer gets the volume of gas he has contracted for. It is now frequently becoming the case, therefore, that gas is being sold independently of the field. Another way in which the market has changed is that the seller no longer has to have enough gas to meet the MDQ. Since not all customers peaks will coincide they only have to meet a proportion of the MDQ.

⁴³Sellers can also sell into their downstream marketing firms.

If a seller lost one of their power generators as a customer it would take them a long time to replace him⁴⁴, whereas with industrial & commercial customers it would only take a short time. This degree of lock-in is symmetrical. A power generator would find that it would take a long time to replace a supplier. The reason for this is because their demand is much greater and it would be difficult to replace all their lost supply at short notice since there is not much uncontracted gas around at the moment. However, it would not require any new investment by either party since a highly integrated transportation network already exists.

There are significant differences in contracts between industrial and commercial users and power generators. Contracts with industrial and commercial users are short term, typically one to three years. The value of these contracts per customer are also much smaller. Contracts with industrial and commercial users may specify exclusive supply i.e. the customer guarantees not to purchase gas from another supplier or to switch during the contract period. Whereas, the power generators do purchase gas from other suppliers. In some cases, these contracts do not contain take-or-pay obligations and where they do the this obligation is usually quite low, between 50-75%. With smaller customers this obligation is typically on the low end of this range. Whereas in longer term contracts the take-or-pay obligation can be applied to future years, this is not possible in this case given the short term nature of contracts. However, a seller would rarely invoke the take-or-pay since industrial consumers cannot take the gas if they have no demand. Take-or-pay obligations are never really applied. If they were, sellers claimed it would mean that you were not going to do business again with this customer.

Short term contracts with industrial and commercial users are typically fixed price and do not contain escalator clauses. These contracts could take various forms. One year contracts, and some two year contracts, were fixed price. Where contracts were three years in length, in

⁴⁴However, this may not be the case right now because of the dash for gas. Although a seller may find that he could replace the buyer fairly quickly this would not normally be the case.

some cases, price could be negotiated annually and the buyer given an option to terminate the contract after one year. In this case the buyer can implement the break clause after the first year with anywhere from one to three months notice. In other cases, these contracts were two to three years and were fixed price contracts with specified fixed price increases each year. These contracts, on the other hand, contained price reopeners and if the customer could provide evidence of having a lower price, the seller has an option to match.

The important aspect of these contracts is that they rely on market governance. Price reopeners and annual negotiations implies that outside options protects parties against opportunism. Changes in market circumstances are quickly reflected in price and quantity for these customers. The product is non-specific and alternative buyers and sellers are easily obtainable for short term contracts. As the gas market opens up even further, some sellers claim that they envisage a spot market developing for gas. Although investments in this industry are non-specific, the long duration of contracts required to underwrite investment necessitates more elaborate governance structures. As more competition emerges in this market and if a spot market does develop, then gas contracts will become more classical in nature with market governance regulating these transactions.

7. Conclusion

One of the key factors in the study of transaction costs economics is the concept of opportunism. This research has examined if empirically, through the use of case studies, there is support for Williamson's heuristic model of transaction costs and governance structures/contractual relations. The principle dimensions by which transactions are characterized are the frequency of exchange, the degree of transaction-specific investment, and uncertainty. Firms were interviewed about their contractual relationships with their customers

or suppliers, and a detailed questionnaire was filled out. Four different industries were selected since this allowed the degree of transaction specific investment and transaction costs to differ across these industries and across firms within an industry. This research has found strong support for Williamson's model.

Where investment was non-specific, we found transactions were governed by classical contracting and market governance structures. Market governance is appropriate in this case since alternative buyers and suppliers are easily obtainable and the market protects against opportunism. In accordance with Williamson's model, we also found that where investment was idiosyncratic but transactions occasional, as in the mechanical engineering industry, neoclassical contracting and trilateral governance structures regulate these transactions. In these cases, third party participation is encouraged through the specification of arbitration procedures in the event of disputes. On the other hand, where transactions were recurrent, more elaborate governance structures could be supported, and highly-specific bilateral governance structures were found in this case.

We find also find that a critical dimension that is omitted from the model is market structure. By affecting the number of alternative sellers and buyers, and hence the risks of opportunism, we find that market structure also has important consequences for the nature of contractual relations to be found governing firms' transactions. Where markets have few firms on one side of the relationship, although investment could be characterized as non-specific, few outside options exist. In this case the risks of opportunism are high. The dominant firm in this case may foregone engaging in opportunistic behaviour in order to encourage efficient investment in the industry. Elaborate bilateral governance structures are therefore found to be governing these transactions. As these case studies have shown, transaction costs economics is crucial to our understanding of the organization of economic activity.

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		<i>Investment Characteristics</i>		
		<i>Non-specific</i>	<i>Mixed</i>	<i>Idiosyncratic</i>
<i>Frequency</i>	<i>Occasional</i>	Purchasing standard equipment	Purchasing customized equipment	Constructing a plant
	<i>Recurrent</i>	Purchasing standard material	Purchasing customized material	Site-specific transfer of intermediate product across successive stages

Figure 1. Illustrative commercial transactions. Source: Williamson (1986) p.112.

		<i>Investment Characteristics</i>		
		<i>Non-specific</i>	<i>Mixed</i>	<i>Idiosyncratic</i>
<i>Frequency</i>	<i>Occasional</i>	Market governance (Classical contracting)	Trilateral governance (neoclassical contracting)	
	<i>Recurrent</i>		Bilateral governance (Relational contracting)	Unified governance

Figure 2. Matching governance structures with commercial transactions. Source: Williamson (1986) p. 117.

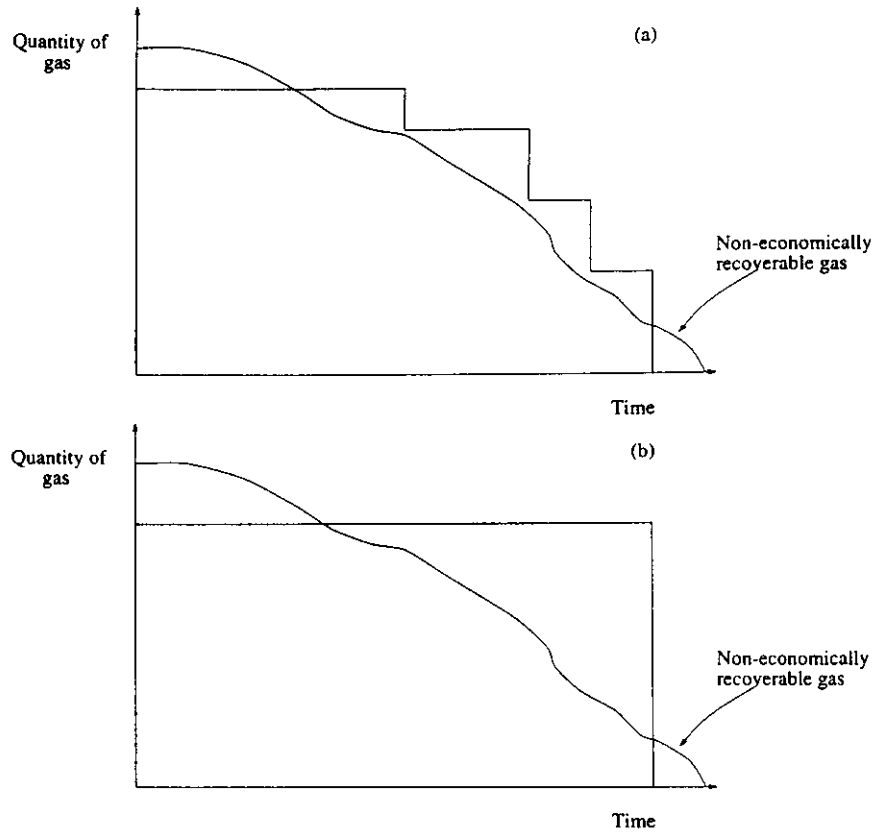


Figure 3. Depletion contracts (a) and Supply contracts (b)

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