

PROJECTS, PROCUREMENT AND MARKET POWER IN CONSTRUCTION CONTRACTING

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Topics

- Market power, auctions and procurement
- Contractors as price takers
- Clients as price takers
- Subcontractors as price takers
- Project complexity and contracts
- Market power and projects

Definitions

- The definition of a market is: an arrangement where the interaction of demand from buyers and supply from sellers determines the price and quantity of goods and services exchanged.
- The definition of market power is: the ability of a buyer or seller to manipulate prices through control over its demand or supply. The extreme cases are monopoly or monopsony, but a firm can gain market power by controlling a large portion of the market or as a member of an oligopoly.
- Market participants with market power are price makers, while those without are price takers.

Questions

- A wide range of views are held on questions such as the types of markets in the industry, the competitive behavior and role of firms, the relationships between firms and the products and services they provide within those markets. There is, however, universal agreement that building and construction is an industry of projects, made up of a interlinked series of markets for projects of many different types.
- Procurement from an economic perspective follows Laffont and Tirole's *A Theory of Incentives in Procurement and Regulation* (1993), where the supplier has knowledge about costs the buyer does not, and thus has to find ways to infer the supplier's costs, typically through competitive bidding or offering prizes.
- This discussion asks where and in what circumstances are participants in construction procurement and contracting price makers and price takers?

Rules of the Game

- All buying and selling in contracting can be seen as a series of games in which buyers and sellers seek to optimise their returns.
 - Distinction made between one-off and repeated games.
- Strategic behaviour in procurement uses market power, information asymmetry and bargaining to gain leverage.
 - Hidden information and hidden actions mean moral hazard and adverse selection are always possible.
- What may be appropriate for a buyer on one construction project may not be appropriate on another.
 - Projects can be standardised, complicated or complex.
 - Frequency, scale and scope change from project to project.

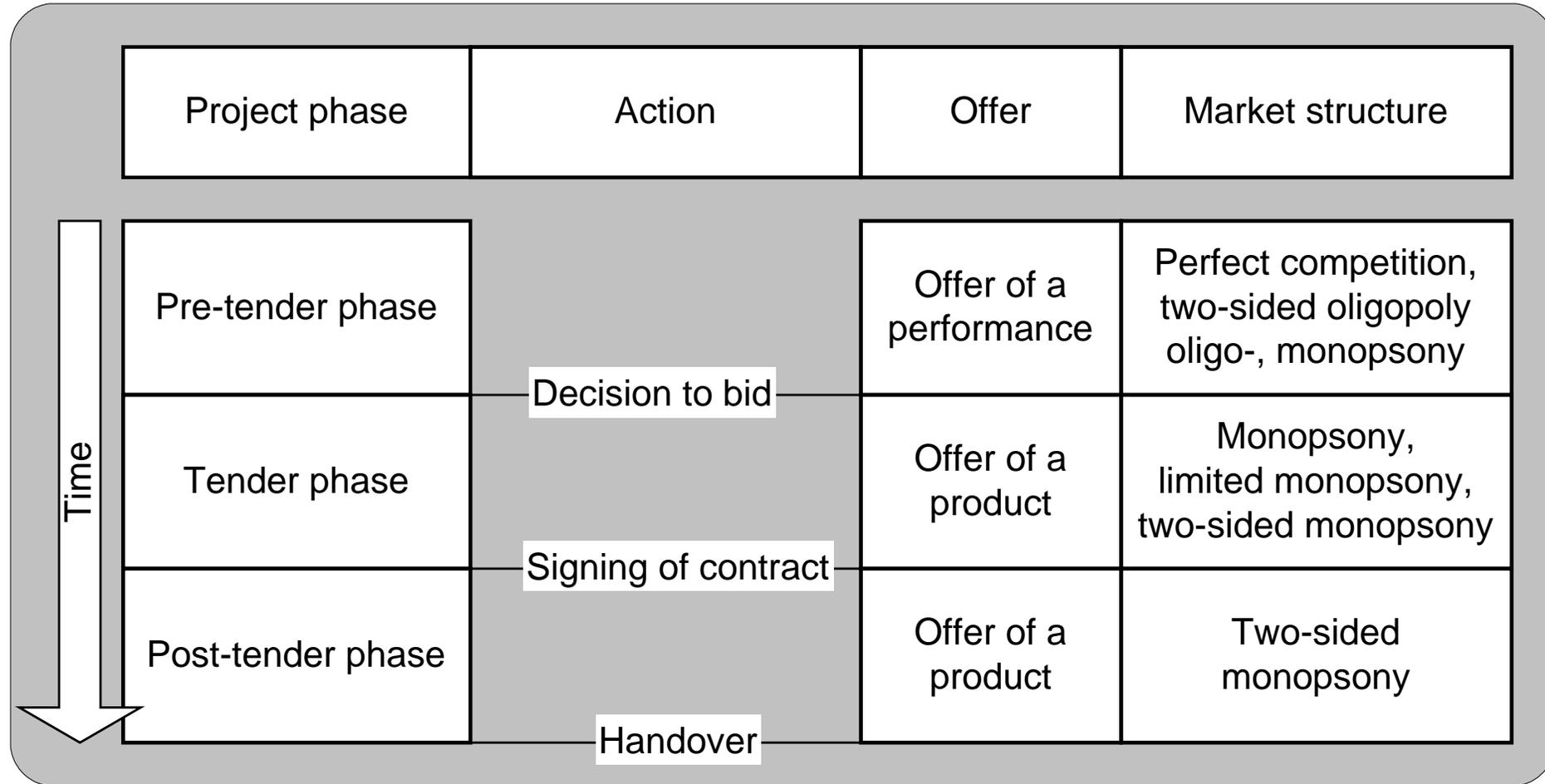


Jean Tirole, Nobel 2014 for
“his analysis of market
power and regulation.”

Projects as Markets

- Can an individual project be a temporary market in its own right?
- The market for a single project is created by a client as they go through the procurement process, regardless of the particular system or method of procurement followed.
- The client is the buyer of a bundle of goods and services from the contractor/s bidding or negotiating for the project, and their interaction on the scope (quantity) and price of the project is resolved when the agreement or contract is exchanged.
- Does the client have buyer power?

The Project Market



Brockmann, C. 2011. 'Collusion and Corruption in the Construction Sector', in *Modern Construction Economics*.

Monopsony

- A market with single buyer is a monopsony (the opposite of a monopoly).
- The treatment of buyer power in economics is concerned with how firms can affect the terms of trade with their suppliers. A buyer has monopsony power if they can reduce the price paid below competitive levels (marginal cost) by withholding demand.
- There is an important distinction between monopsony power and bargaining power, or the bargaining strength that a buyer has with respect to suppliers. The lower price obtained from monopsony power is achieved by actually purchasing less, but with bargaining power it can be achieved by the threat of purchasing less.

Bargaining Power

- The supplier has hidden information about costs the client does not, but the client needs a way to find out supplier costs, typically done by competitive bidding or offering prizes.
- The two other key factors that influence bilateral bargaining are:
 1. The role of information and how extensive the information asymmetries between the different parties, particularly hidden information. An informational advantage is an advantage in terms of bargaining power.
 2. Coordination (tacit or explicit) among suppliers, because the presence/absence of incentives for suppliers to collude may increase/decrease buyer bargaining power.

Contractors as Price Takers

Auctions



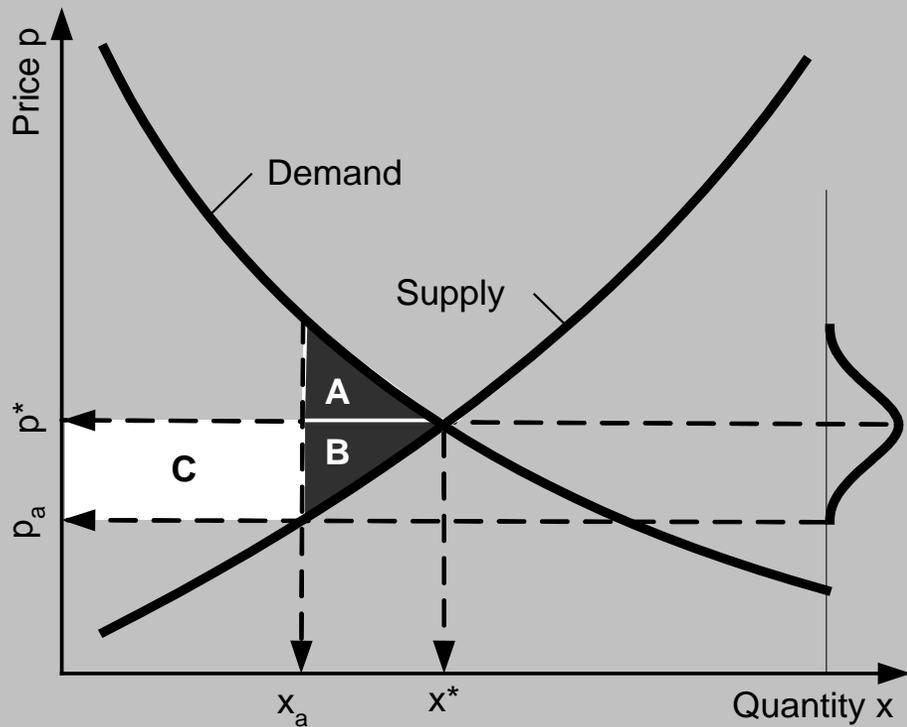
William Vickrey,
Nobel 1996.

- In a first-price procurement auction, the low bidder is awarded the contract.
- In a common-values auction, the cost of performing the contract is common to all bidders but is uncertain, bids are based on estimates, and this sort of auction is said to give rise to the “winner’s curse”.
 - Bidding estimated cost can result in a loss because the lowest of several independent estimates of the actual cost, on average, is less than the actual cost.
 - Rational bidders avoid the winner’s curse by bidding above their cost estimates.
- The problem with first-price sealed bid auctions is that increasing the bid too little results in lost revenue to the contractor, while too much loses the competition. Vickrey proposed using a second-price sealed bid auction where the lowest bidder is awarded the contract at the second lowest price.

Procurement

- First-price sealed bid auctions are widely used for building and construction projects, and are the basis of procurement systems that use competitive tendering.
- However such sealed-bid auctions can be affected by uncertainty, cognitive bias like over-optimistic assumptions, technical errors in estimating and scheduling, and subject to information asymmetries between clients and contractors.
- Bids typically cover a range and, if normally distributed, there will be a winning bid below the average of all bids. That average or median estimate of project costs has the highest probability of being the actual cost, and can be taken as the market price.

Client Surplus



A : Clients Deadweight Loss
B : Contractors Deadweight Loss
C : Clients Additional Surplus

- The auction price P_a is below the equilibrium price P^* due to cognitive biases and errors.
 - 1. It augments the clients' surplus (C) by the same amount that it reduces the contractors' surplus.
 - 2. There is a decrease in both surpluses (A+B), a deadweight loss.
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- This deadweight loss is a reduction in social welfare.

Brockmann, C. 2011. 'Collusion and Corruption in the Construction Sector', in *Modern Construction Economics*.

Contractors as Price Takers?

- Brockmann concludes clients have market power, and the industry's response to their use of that power is to collude in a variety of ways.
 - He also, uniquely, argues for regulation of buyer power.
- Widespread evidence of collusion in the construction industry would suggest this, in some circumstances, can be the case:
 - The Japanese *dango* system of market sharing on public works;
 - The Dutch industry cartel (650 companies fined €239 by NMa in 2003);
 - The lift and elevator cartel (EU Competition Commission €992 fine in 2007);
 - Montreal's 'Fabulous 14' control almost 80% of public work;
 - The Scandinavian 'Big 3' do around 70% of all building and construction;
 - Steel, cement and concrete industries are repeat offenders in many countries;
 - Australian fire installers, unsuccessful tender fees and housing contractors.

Office of Fair Trading

- The number of cases between competition regulators and construction contractors and suppliers, and their industry associations, implies a structural problem in the industry, not just the actions of a few 'bad apples'.
- Charges brought against 112 firms by the OFT in 2008 were the culmination of a four-year effort. Began in 2007 as an investigation of the roofing industry in the Midlands, and quickly spread.
- Ultimately, the OFT raided 57 businesses and received 37 leniency applications, but the underlying problem was larger than those figures suggest.
- The OFT eventually had to cut off the investigation because it was uncovering more cartel behaviour than the agency could process, given its resources.

OECD Roundtable 2008

“Because of the very large number of small firms, the entire industry is often characterized as unconcentrated. That description is too broad, however, because not all construction companies do overlapping work and some segments are much less fragmented than others. For example, a limited number of general contractors are capable of managing the very large projects, whereas there are a great many small subcontractors. Competition among large general contractors and among specialty firms seems to be oligopolistic, while rivalry among small contractors who do basic labour tends to be closer to perfect competition.”

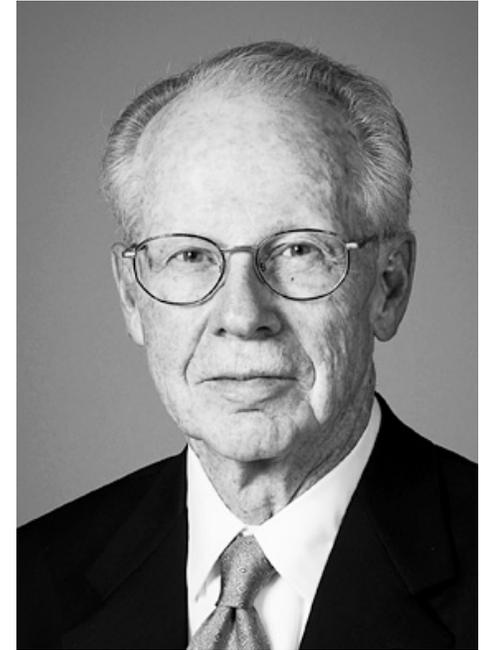
“... when relevant markets are defined, as opposed to considering the whole industry, competition is often limited because many firms are specialized or cannot compete on large projects ... limited competition and substantial entry barriers can facilitate many different types of anticompetitive conduct, including unilateral and horizontal varieties. In addition, procurement procedures for construction projects are often conducive to collusion.”

Two Views on Procurement

- This might be called the regulator's view, a quasi-legal series of repeated games between monopsonist clients and oligopolistic contractors within a defective institutional framework (that has nevertheless been in use for millennia).
- Two responses from industry are the cost uncertainty and ruinous competition arguments:
 - Ruinous competition, or cut-throat competition, describes a situation where competition results in prices that do not cover costs of production, particularly fixed costs.
- While there are some elements of truth in this, these are over-simplified views of how the industry often, but not always, works in practice:
 - Do clients really believe they have market power?
 - Do contractors actually run businesses that cannot be profitable?

Fundamental Transformation

- For a buyer to have substantial market power they must be able to switch to an alternative supplier, or self supply, without incurring substantial sunk costs.
- Once a contract is signed the client loses that power, which is Williamson's Fundamental Transformation in TCE. Contractors do not have to collude to have market power, particularly if the contract allows payment for cost increases during construction.
- However, prior to signing clients can potentially exercise market power through their choice of procurement method and type of contract. Those, in turn, are affected by the type and characteristics of each project.



Oliver Williamson, Nobel 2009 for “his analysis of economic governance, especially the boundaries of the firm”.

Client as Price Taker

Cox 2009

Figure 1 The four sourcing options for buyers

Focus of buyer relationship with the supplier	Proactive	Supplier development	Supply chain management
	Reactive	Supplier selection	Supply chain sourcing
		First-tier	Supply chain

Level of work scope with supplier and supply chain

© CBSP, University of Birmingham (2002)
Source: Cox et al. (2003, p.5)

Reactive – short term, arm’s length, transactional.
Proactive – collaborative with dedicated investment.

First tier - one supplier only, no buyer involvement.
Supply chain - the buyer selects from suppliers in as many tiers as possible, on basis of value.

“In construction supplier selection (one tier, short term) would cover the majority of cases, and supplier development (one tier, collaborative) most of the rest.”

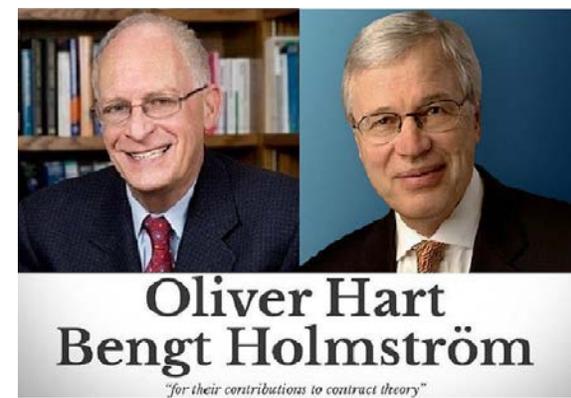
Cox, A. *Strategic Management of Construction Procurement*, in O'Brien, W.J. et al. (eds) 2009. *Construction Supply Chain Management Handbook*.

Bargaining Power

- The issue here, of a project as a market with the client as a single buyer, is the relative bargaining power on the buyer and seller sides.
- The construction client can be in a weak bargaining position because there is no market price available as a reference point when negotiating with potential suppliers. Thus procurement is an information discovery process, with the client getting bidders to reveal prices.
- Inderst and Mazzarotto suggest a definition of buyer power as the bargaining strength that a buyer has with respect to suppliers with whom it trades, where bargaining strength depends on the ability to credibly threaten to impose an opportunity cost if it is not granted a concession.

Inderst and Mazzarotto (2008) 'Buyer power in distribution', in Collins, W.D. (Ed.), *Issues in Competition Law and Policy*, 3. Chicago: ABA Section of Antitrust Law, 1953-1978.

Incentives



- Construction contracts are also a bilateral incentive problem, with opportunities for information exchange and strategic interaction. Contracting becomes worthwhile when there is a temporal element to exchange, but using contracts for exchanges that depend on future events requires a commitment mechanism.
 - The 2016 Nobel to Hart and Holmstrom was for incomplete contracts and incentives respectively.
- For clients, construction procurement and contracts involve issues of:
 1. Moral hazard and hidden action.
 2. Adverse selection and hidden information.
 3. Incompleteness and property rights.
- In each case the client has limited or no access to relevant information. The less experienced the client the less informed they are likely to be.

Contractual Incompleteness

- Hart argued the level of specification of a project is the determining factor in the type of contract that should be used. Based on his work in developing incentive theory and incomplete contract theory.
 - Hart (1995) *Firms, Contracts, and Financial Structure*, and Grossman and Hart (1986) 'The costs and benefits of ownership: A theory of vertical and lateral integration', *Journal of Political Economy*.
- “Should the buyer of a customized good use competitive bidding or negotiation to select a contractor? ... Auctions may perform poorly when projects are complex, contractual design is incomplete and there are few available bidders. Furthermore, auctions may stifle communication between buyers and sellers, preventing the buyer from utilizing the contractor’s expertise when designing the project.”
 - Bajari, P., McMillan, J. and Tadelis, S. (2008) 'Auctions versus negotiations in procurement: an empirical analysis', *Journal of Law, Economics, and Organization*.

Bajari and Tadelis

- They consider (in *Handbook of Procurement*, 2006) the procurer's decisions on how much to invest in design costs at the outset, because a more detailed and accurate design reduces the need to renegotiate changes, and the choice of a fixed-price or cost-plus payment structure. Their conclusions are:
 1. For simple well specified projects, where contractual incompleteness is negligible and performance is easy to verify, favour fixed-price contracts awarded by competitive tender;
 2. For complex and incompletely specified projects favour a cost-plus contract awarded using negotiation with a reputable supplier;
 3. For moderately complex projects that can be specified at moderate costs favour a more complete design, selective tender and fixed-price contract. If potential suppliers are scarce then save on design costs with a cost-plus contract.

Bajari, P. and Tadelis, S. (2006). 'Incentives and award procedures: Competitive tendering versus negotiations in procurement' in Dimitri, N., Piga, G. and Spagnolo, G. (Eds) *Handbook of Procurement*.

The Ratchet Effect

- Laffont and Tirole (1986, 1988) analysed short-run contracting under information asymmetry, where the regulator (client) is unable to write any long-run contract with the regulated firm (contractor), but instead has to govern the relationship by a series of short-run, one-period contracts.
- This gives rise to the ratchet effect: If an agent works hard and shows a good result, the principal may demand even better results in the future therefore, anticipating this, the agent has little incentive to work hard in the first place.
- The firm will also be reluctant to reveal that its costs are low, fearing that its information rents will be expropriated.

Laffont and Tirole (1986) 'Using cost observation to regulate firms', *Journal of Political Economy* and (1988) 'The dynamics of incentive contracts', *Econometrica*.

Subcontractors as Price Takers

Market power in the supply chain

A Multiplicity of Market Types

Construction	Perfect Competition	Monopolistic competition	Oligopoly
Subcontractors	Labour based subcontracting	Mechanical services (HVAC), demolition	Lifts, building automation, facades
Contractors	Many small and medium contractors	Some medium sized contractors	Large head contractors

The fragmented nature of construction activity means that, on a construction project, there can be a range of market structures, with various different forms of relationships, interaction and contracts between them.

Concealment

- McAfee and McMillan found that, in a first-price sealed-bid auction with independent private values, the expected revenue to the seller is greater if the number of bidders is concealed.
- Thus risk-seeking subcontractors will be more likely to win the work, and at lower margins, if contractors do not reveal the number of subcontract bids they receive.
- This is a useful insight into bidding and competitive behavior by both contractors and subcontractors. Contractors can exercise market power through the process of subcontracting, and the outcome will be the same as if they had exercised bargaining power with their suppliers.

McAfee, P.R. and McMillan, J. 1987. 'Auction and bidding', *J. of Economic Literature*.

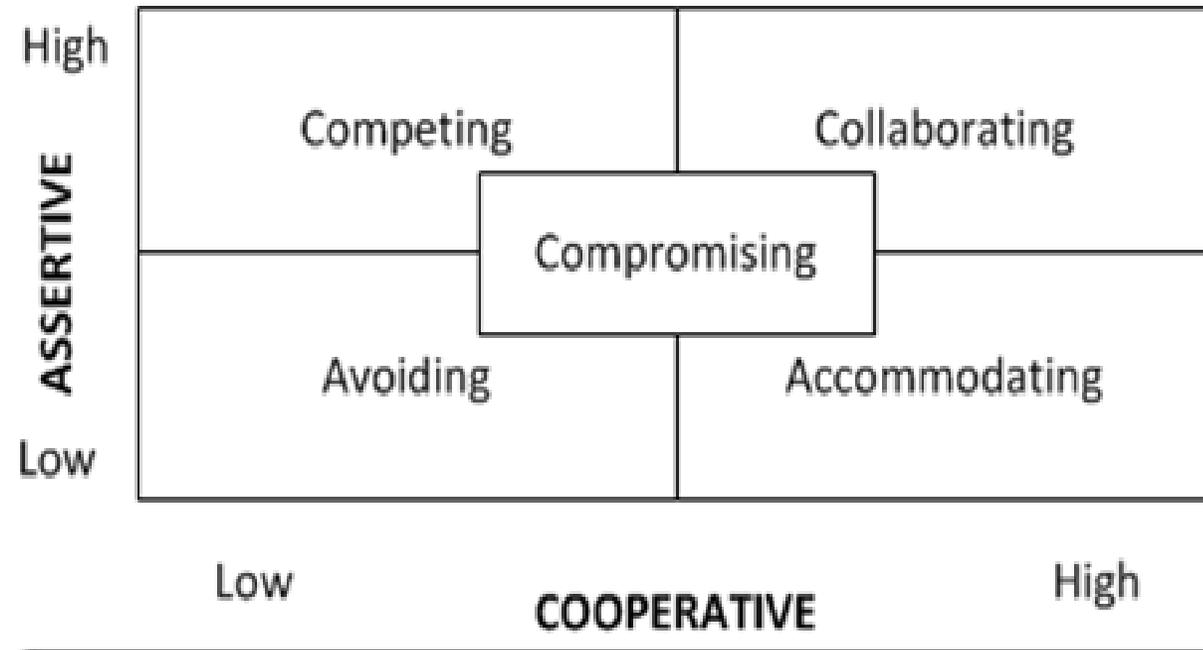
Supply Chain Relationships

- A contractor negotiating with potential subcontractors does have knowledge of their current prices, and often, but not always, has access to alternative suppliers and subcontractors. Therefore the contractor potentially has bargaining power.
- If the subcontractors are hired at marginal cost then allocative efficiency will be maximized, but if the contractor has used their position to increase profits at the expense of subcontractors this will no longer be the case.
 - Another situation where an auction can lead to the winning bidder's award price being below the equilibrium price, in a perfectly competitive market.
- However, some suppliers are also large firms in oligopolies, or a long-term contract can be more relational. Across the project sub-markets for labour, materials and components there is a range of market structures and product differentiation.

Management Style

Rahim's five conflict management styles can be applied to supply chain and subcontractor relationships and contracts. Different suppliers will have degrees of market power, and different relationships with the contractor.

Rahim, M.A. 1983. A measure of styles of handling interpersonal conflict, *Academy of Management Journal*.



Project Complexity and Contracts

Product Differentiation

- In an industry like manufacturing, one of the important characteristics is the extent of product differentiation, which allows a seller some degree of market power.
- In building and construction, differentiation is between different types of projects, not different types of products.
- A construction project is both a physical product and a bundle of services, like project management and technical services. Often classified by function, here differentiated by level of complexity.

Complexity Factors

- *Project definition.* With conventional procurement full or nearly complete documentation is provided, but an EOI might only have the purpose of the project and no details on design.
- *Technology* to be used or incorporated in the project. Established technology that has been successfully used is low risk but new technology can have implementation, performance and reliability issues, particularly if early stage.
- *Materials, components and production systems.* As with technology, if well-understood with established performance these are low risk, while new ones are higher risk.
- *Project organization and management.* The traditional form is hierarchical, with the project managed in a top-down manner through budgets, schedules and breakdown structures. Other forms of project networks cross organizational boundaries and have coordination issues.
- *Supply chains* reflect the technology and materials used in the project. Simple supply chains are mainly single tier and local while complex ones tend to be multi-tier and global.
- *Site issues and the external, regulatory environment.*

Three Project Types

- Simple or standardised projects are low risk with minimal technical requirements. These commodity-type projects have well-known structural features and other components, their design and location do not present any particular challenges to the project team and suppliers, and the construction methods and project management requirements are not exceptional.
 - Examples are car parks and basic commercial and industrial buildings.
- Complicated projects are challenging, each in its own specific way, because they are not standardised and one or more of the complexity factors is significant.
- Complex projects often have a form of non-traditional organisation to cope with a high degree of uncertainty, typically with a networked group of specialists and significant coordination and integration requirements.
 - Hobday's Complex Product Systems approach works well here.

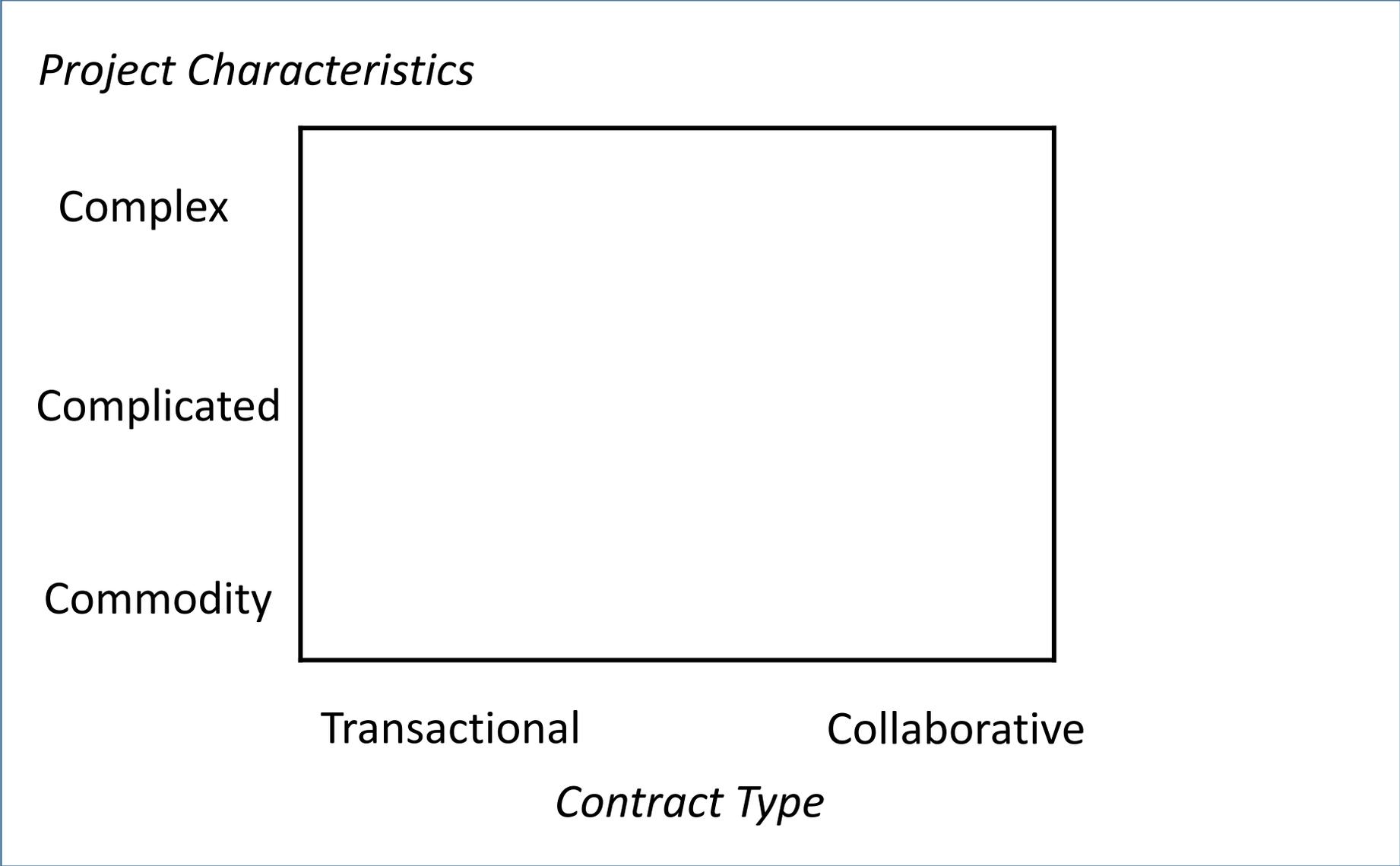
Three Types of Contract

Albano et al. (in *Handbook of Procurement* 2006) have three categories of contract:

1. Fixed-price contracts are appropriate for projects involving little complexity and uncertainty such as standardised products or services.
2. Where flexibility is important cost reimbursement contracts reduce the cost of renegotiation in the case of design failures, rework, unanticipated site and environmental conditions, or changes in regulatory requirements. These contracts lack incentives for the contractor to contain costs, although they can be capped, and may not select the most efficient supplier.
3. Incentive contracts are target cost contracts with a profit adjustment formula and are somewhere between fixed-price contracts and cost reimbursement contracts. They have higher transaction costs for the contractor, who has to accurately estimate production costs, and the client, who has to measure quality levels and performance. These contracts address the principal-agent problem.

Albano, L.A., Calzolari, G., Dini, R., Iossa, E. and Spagnolo, G. (2006). 'Procurement contracting strategies', in Dimitri, N., Piga, G. and Spagnolo, G. (Eds) *Handbook of Procurement*.

Project Variables



Production Costs

<i>Project Characteristics</i>	
Complex	Incentive Contracts Client and contractor know target costs Contractor knows client investment
Complicated	Cost-Plus Contracts Neither client or contractor know what their final costs will be
Commodity	Fixed Price Contracts Clients discover contractor's prices/costs Contractors know supplier prices/costs
	Transactional Collaborative
	<i>Contract Type</i>

Market Power Across Project Types

<i>Project Characteristics</i>	
Complex	Price Makers ??????????
Complicated	Price Makers Possible for clients with auction and contract, but information asymmetry favours contractors
Commodity	Price Makers Clients on bidders Contractors in supply chain
	Transactional Collaborative
	<i>Contract Type</i>

Information and Market Power

- Within each of the three project and contract categories, do clients or contractors have market power? The key issue is whether one party knows, can observe, or can find out, the other's production costs. Are there information rents or hidden information?
 - Clients use tendering and auctions to discover costs, but contractors can also see how much effort or investment the client is putting into determining market prices.
 - A client might know market prices, however this is not the same as knowing contractor and supplier production costs. Contracts can be used to reveal contractor costs and provide incentives.
 - A contractor will generally know subcontractor and supplier prices and, to an extent, costs. They also control access, which can give them bargaining power.
- In building and construction we find a diversity of project and market types, and research from four branches of economics can be applied to the analysis of markets and market power in the industry. That research supports competitive tendering and fixed-price contracts for commodity projects, but not for complicated or complex ones.

Theories

Contracting under information asymmetry

<i>Project Characteristics</i>	
Complex	Agency Theory Incomplete Contracts
Complicated	Incomplete contracts Auction Theory
Commodity	Auction Theory Transaction Cost Economics

Transactional Collaborative

Contract Type

Coda

- Theory suggests limited use of first-price auctions for tendering and fixed-price contracts for procurement, but these are commonly used around the world.
- While suitable for commodity projects that can be reasonably accurately priced, when used for complicated and complex projects information asymmetry strongly favours contractors in construction procurement.
 - 100 years ago architects and engineers were central to building and construction, but contractors are at the core of the modern industry.
- Clients can counter contractor market power by becoming more informed, through investment in developing project design and cost estimates.
 - This would not be worth doing for commodity projects, but the payoff increases as projects get larger and more complex.
 - Some major private sector clients have internal design and project management capabilities, or use procurement systems like contractor panels and framework agreements.