

Common Elements in the Governance of Deregulated Electricity Markets, Telecommunications Markets and Payments Systems

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We use the telecommunications industry and electricity market in New Zealand, and payments systems in Canada and New Zealand to examine the implications of modern network technology for the organisation and governance of deregulated markets. Our analysis identifies natural monopoly components of networks as the key issue for the governance of these markets. We show how technological change has enhanced the scope for competition and reduced the desirability of public management and regulation in network industries. We argue that where natural monopoly or other problems persist private joint ventures are superior to public sector monopoly as a means of organising the activity. Light-handed regulation, in which markets are constrained only by economy-wide competition law, provides for the development of efficient private solutions to the special governance problems of network industries.

1. INTRODUCTION

The markets for telecommunications, electricity and payments services are network industries. By this we mean that they are characterised by multiple delivery nodes which use a common production technology and a central facility for the supply of a key input. Markets may comprise one or more networks that compete using different technologies, and where more than one network exists in a market, they may or may not be connected. Historically it has been assumed that many networks had natural monopoly properties (production costs would be minimized when a single network supplied the whole market). The result has been that heavy regulatory management has complicated the governance structures of network industries and, in many cases, the networks have been internalised within public or community owned vertically integrated monopolies.¹ The common elements in the governance structures of telecommunications, electricity and payments reflect the similarity of the issues associated with networks and the responses of markets and governments to them.

Recent technological change has challenged these notions about the potential for competition within and between networks.² This combined with the centrality of governance arrangements to the performance of network industries has prompted a reconsideration of the optimal governance arrangements, including the rationale for regulation and public ownership. Technological change is proceeding at different speeds in different industries, so we can learn something about the future of all network industries by looking at the recent history and current structure of those that have been most affected by technological change.

In this paper we:

- 1 Provide a framework for the economic analysis of the structure of network industries, focussing on horizontal and vertical relationships and the role of private firms, public enterprises, joint ventures and regulation.

¹ By governance we mean the mechanisms for co-ordination and control that are established by the ownership and regulatory structures associated with markets.

² These notions have also been challenged by improved understanding of governance and political economy issues.

2 Analyse the process by which technical change has affected the optimal organisational structure of network industries and the governance arrangements that flow from them.

3 Provide a typology of network industry structures, and explain how the telecommunications, electricity and payments' networks in New Zealand and elsewhere have evolved in response to technical change.

Our focus is on governance and, in particular, on the role and significance of joint ventures, regulatory intervention, and public/community ownership. Our argument is that technical change has fundamentally altered the characteristics that underlie joint ventures and government ownership/regulation of network industries. As technical change allows networks to be transformed into markets, it is vital that regulatory and ownership structures evolve consistent with this. The impact of technical change is to make privatisation of public or community enterprises operating in networks,³ and the removal of heavy-handed regulation such as rate of return of price caps, necessary for the efficient development of network industries such as telecommunications, electricity and payments. In these circumstances, we argue, private providers operating in a competitive market environment and subject only to standard competition and company laws provide the optimal governance structures for network industries confronted by rapid technical change.

2. TECHNICAL CHANGE: NATURE AND IMPACT

Much of the current technological and organisational change in markets is being driven by very rapid advances in the use of electronics and the application of computer technology to industrial processes.⁴ The implications of this change for industry performance vary between different markets, but all have been affected by reductions in their costs, changes in the availability and quality of information, the creation of new markets, and the opening of

³ Privatisation implies a change in the ownership of the assets, as well as a change in the extent of competition and the governance structures associated with the market.

⁴ The substance of this discussion is unaffected by the sources of technological change. We would argue that there is no unique source or cause, and that technological advance and diffusion are influenced by institutional arrangements. (See Archibugian and Michie (1998) for some discussion of institutional and neoclassical approaches to understanding technical change).

competition within and between markets.⁵ These changes have effected the optimal organisation and governance structures of network industries in two ways. First, they have challenged traditional public policy towards network industries by making competition feasible where natural monopolies existed before. This has occurred through reductions in the cost of technological solutions to interconnection between networks as well as through the potential for competition in the provision of core facilities within networks. In addition, we take the view that the speed and uncertainty of technical change has affected the optimal governance structure as well. We now review the contributing factors.

2.1 Changed Costs

Technological change has lowered costs in networks, increasing the profits of incumbent firms.⁶ Where regulation has allowed it, these markets have attracted new entrants whose activities have been instrumental in the introduction of new products and lower prices for basic services. Technological change may also alter industry cost characteristics influencing, for example, the nature and extent of any economies of scale and scope. These changes may in turn lead to substantial changes in the credibility of the claim of certain industries and firms to natural monopoly status.⁷

For these reasons, industries and networks affected by rapid technological change may experience lower prices and an expansion in output. Substantial industry output growth will affect the functional economies of scope defined by Stigler (1951) and produce specialisation, as those functions that do not enjoy increasing returns are split off. The equipment businesses of telecommunications companies have been shed as output has grown and this may be an example of such specialisation. Another example of output - induced structural change may be infrastructure firms contracting out customer services.

⁵ By competition between markets we mean that the gaps in the chain of substitution possibilities between goods (Tirole, 1988, 12-13) have narrowed or vanished leading to fewer, larger markets: an example is the convergence of modes of communication.

⁶ See Norsworthy and Jang (1992) for analysis of rapid cost reduction in the computing industry and implications for the measurement of productivity.

⁷ For example, empirical work by Shin and J. Ying (1992) concludes that in telecommunications the structure of local service costs is not that of natural monopoly.

The lowered costs and the use of one network by another network industry have provided new sources of competition and certain changes in economies of scope. A prominent example is modern electricity companies' need for electronic communications networks, and the fact that if a new electricity network is established the extra cost of laying cable for telecommunications is negligible. The telecommunication networks of electricity companies can be used for bypass, and thus compete with telecommunications companies. The separation of banking and insurance transaction networks is now artificial.

2.2 Unpredictability and Competition

The timing of the arrival of new technology is unpredictable, as are its costs and characteristics. The prospect of new technology affects investment decisions by incumbent firms and by potential entrants (Choi (1994)). It affects strategic decisionmaking, the best time to invest and is affected by the intensity of prospective competition. Although formal analysis is complex, the more intense the competition, or the more likely is competition, the more rapidly it pays a firm to invest in new technology.⁸ There are competitive dangers in waiting for additional good "news" about new-technology investments.

Uncertainty will also affect pricing and investment and hence market performance. The uncertainty inherent in the arrival of new technology, its future cost and characteristics all combine to complicate investment and pricing decisions. The calculation of average incremental costs, for example, depends critically on expectations of the future – the economic life of capital equipment, and output – and there can be legitimate substantial variations in estimates of average incremental cost, and output that are based on the same information. Furthermore, investment in changed technology is often, of necessity, substantial. Thus, new technology investment decisions often entail considerable size and risk.

The high likelihood of the arrival of new technology and the, often consequent, threat of entry will affect co-operative behaviour among existing firms. Particularly, where entry is economically feasible, the arrival of technology can be viewed as a shock to established arrangements. In this environment, the strong possibility of new technology is likely to

restrict the payoff to firms from committing to co-operative (collusive) arrangements. In competitive network industries there is a trade-off between co-operation - through inter-network access agreements - and competition. The prospect of technological surprises will tend to advance non-co-operative behaviour, and thence competition, among firms more generally.

The rapid, uncertain appearance of new technology reduces a firm's strategic planning horizon for specific investments and provides an incentive to be more cognisant of a portfolio approach to strategic investments. It may also promote the exit and entry of firms and as we shall discuss, dynamically changing joint ventures. The shorter planning horizon is a necessary reaction to the uncertainty in the anticipation of new developments, and of the consequent higher discount rate that can be expected to result. More use of a portfolio approach represents an attempt to manage the risk.

2.3 Asymmetric Information: Rapid Standardisation

Some developments have rendered industry costs more transparent and reduced the problem of specialist knowledge that has always bedevilled managing large organisations.

Existing computer and related technologies now combine many functions and much power in components whose functions can be well understood by non-specialists, even if the technology represented in the components requires very advanced knowledge to comprehend. In addition, these components have become standardised, compatible with different technologies, very reliable and easy to replace. They are often sourced from various suppliers and hence their characteristics are well known by all companies. Of course, specialist personnel are critical to the design and operation of network companies, but their role and importance in managing the company has changed.

In the past, employee knowledge of engineering was very useful in most positions of a telecommunications company, if only for one-off problem solving and communication among employees - in part, because of internally produced equipment and internal company-specific solutions to problems. Now, detailed knowledge of components is inessential for

⁸ See Dixit and Pindyck (1994, 16-19), where the nature of increased competition is made specific.

good management.

This development has a number of implications for organisational governance. Where specialist knowledge is important for the operation of a company there is a communication problem: certain employees know more about aspects of the business than do managers. In economists' jargon there is an asymmetry of information that gives the specialists, perhaps at the expense of managers, more decisionmaking power. This affects company performance because more time and other resources have to be allocated to the task of communication itself when asymmetric information is present: for example, more employee monitoring is required. Within any organisation there must always be employees with different knowledge, but the reduction in the importance of knowledge differences lowers the cost of communicating and monitoring within an organisation. It reduces the importance of organisational-specific knowledge. This change has wide ramifications for organisations and their governance.

The reduction in the importance of organisational-specific knowledge, skills and specialisms reduces the costs of asymmetric information. It means that executives can be drawn from a wider pool of persons, and this should improve management.⁹ The more vigorous competitive environment generated by technological advance will demand CEOs that give companies strategic directions and leadership, rather than direction on technical issues. The risky nature of investments mean that efficient investment decisions will generally be best made by those that are accountable for the outcomes and thus bear the risk.

The availability of standardised, reliable, powerful, multi-task componentry will also affect competition between firms because competitors can more accurately estimate other firms' costs.¹⁰ Improved knowledge of competitors affects competition because it reduces scope for incumbent firms or potential entrants to strategically misrepresent their costs in order to influence other firms' actions. An incumbent's costs will depend upon past investment and hence may be more difficult to calculate than those of an entrant. Various scenarios are possible, but it is likely that better knowledge of costs by all companies will improve the

⁹ See Friedlander et. al. (1992) for a discussion and evaluation of the importance of CEOs' background training and experience for the operation of railways.

¹⁰ In telecommunications, costs can be estimated very accurately, Richard Simnett (Bellcore, 1996) personal communication.

vigour of entry.¹¹

2.4 New Markets and Products

Perhaps the most evident economic outcomes of technical change appear in the creation of new products and markets. As it relaxes existing constraints and opens up possibilities it can generate competition. Spot markets in electricity, for example, would not be economically feasible without recent developments in electronics and telecommunications.

3. NETWORK CHARACTERISTICS AND GOVERNANCE STRUCTURES

In networks, complementary goods or services are combined to produce composite products. Economides (1993) argues that complementarity is the essential relationship defining a network, while compatibility and co-ordination are the components required to realise the complementarity. In addition, it is often claimed that networks are characterised by externalities resulting from the fact that the network becomes more valuable as its coverage is increased (they exhibit positive critical mass).

Networks are also characterised by facilities that are natural monopolies. In the industries considered in this paper, pylons, underground sleeves and cables for the distribution of electricity, telecommunications cables, and the switches and messaging systems that form the backbone of the electronic payments system have all been viewed as facilities that, once in place, could not efficiently be duplicated.

The key characteristics of the network industries that we consider are depicted in Table 1. They reveal great similarities across the three industries. They also represent the more limited view of network characteristics than that of some writers who would ascribe to network externalities some standard characteristics of markets that are simply a consequence of exchange in a standard market setting (for example, see Economides' (1993, 90) discussion

¹¹ Changing asymmetric information will also influence the efficiency of regulation, and even the relative efficiency of state owned and private but regulated firms. This point of Willig (1993) is developed by Evans(1998).

of financial exchange networks). Thus, we limit our depiction of an externality in demand to the standard

Table 1: Network Characteristics

Key Characteristics		Networks		
		Payments(P)	Telecommunications(T)	Electricity(E)
<i>Costs</i>	High Fixed	yes	yes	yes
	Low Marginal	yes	yes	yes
	Short Run Marginal Cost	Flat then abrupt	Flat then abrupt	Flat then abrupt
<i>Network Externality</i>	Message necessarily follows all available routes	no	no	yes
	In Demand	yes	yes	no
<i>Technological Change</i>	Speed of	fast	fast	moderate
<i>Economies</i>	Scale	yes	yes	yes
	Scope	P&T	P&T&E	P&T&E
<i>Traffic</i>	Unidirectional	not usually	no	Normally has been
	Multidirectional	usually	yes	increasingly
	Message necessarily identified	yes	yes	no
<i>Active Traffic Management</i>		automated	automated	human/ automated
<i>Risk</i>	Cost of system failure (for any reason)	very high	very high	very high
	System failure causes physical damage to system/non-system equipment	no	no	yes
	Externalities in failure	?	?	?
	Security (as in defence of fraud)	yes	an issue	an issue
<i>Compatibility</i>	Typically required for other networks	yes	yes	yes
<i>Nature of the Product</i>	Usage/characteristics measurable with existing technology	yes	yes	yes
	Customer willingness to pay directly measurable to prices	yes	yes	yes
	Message identifiability	yes	yes	no
	Final(F)/ Intermediate(I) Demand	I	I&F	I&F
<i>Bypass</i>	By alt. network @ feasible cost	yes	yes	to a degree
	By other modes	cash, e-cash	electronic and standard mail	oil/gas/insulation, etc

one that there are externalities where the addition of one or more consumers to the network raises the (expected) utility of other customers even at existing prices.

The exact nature and importance of network externalities is a matter of some controversy in the economic literature. It is best summarised by the two articles - Katz and Shapiro (1994) and Liebowitz and Margolis (1994). There are those that would place great weight on special externalities (Katz and Shapiro op cit) and those that regard networks simply as examples of markets in general equilibrium. We consider that the latter view generally results from plausible market definitions and that it is in accord with evidence. Under this view the key feature of networks is that all or part of them has the natural monopoly characteristic - that the market will not support duplicate or parallel networks.

3.1 Governance

The governance structure of a market consists of mechanisms for control and co-ordination associated with patterns of ownership and regulation. Where a firm has a monopoly, the governance arrangements for that firm will be synonymous with those for the market. Where publicly owned firms operate in the market, the government regulation and the structure of the industry become intertwined.

We distinguish between governance structures that have centralised and de-centralised control and co-ordination. An extreme form of centralised control is that which has been associated with centrally planned economies. Here control and co-ordination are the direct responsibility of government and governance is economy-wide. Centralised control has ranged from central allocation of finance, subsidies in accordance with centrally determined strategic directions, to centrally planned control processes that have these features plus detailed production plans and targets that serve as criteria for performance. While there have been some, now somewhat tarnished, successes in countries (Japan) that adopted industrial strategic central planning, there have been widespread failures of the more extreme versions of centralised control and co-ordination (countries of Eastern Europe). In many other western economies industry governance has been devolved to the industry level. Here centralised control appears, as firms (industries) owned by the government, or firms privately owned and subject to industry regulation through an industry specific regulatory body. It is

characterised by a lack of open entry: it typically requires some regulatory/statutory conditions or constraints protection for incumbent(s). For much of the last century network industries have been commonly governed by industry-specific centralised control.

In general, the framework for the governance of network industries may be divided into four categories:

- 4 Light-handed regulation. Here, the governance structure is provided by the operations of private sector firms and the contractual relationships associated with the market. The role of government is confined to the establishment of a framework for property rights and competition policy. This structure includes voluntary industry self-regulation and joint ventures between competing firms. The key feature of this regime is open entry and an underlying presumption that competition is desirable. Light-handed regulation precludes statutory restraints on entry and on-going specific regulation based on the state of the market.
- 5 Government recognition of industry self-regulation. This governance structure provides statutory recognition of policies agreed by market participants. It encourages co-operation among market participants, as well as the planning of development and competition.
- 6 Heavy government regulation of private market activity. The governance structure established here is shaped by regulatory policies and interventions that are industry specific, and may include restrictions on competitive strategies, requirements to undertake certain activities or to implement cross-subsidies, and restrictions on rates of return.
- 7 Direct public sector provision of services, including community and government ownership of firms, and legislative recognition of state monopoly provision of the service. This governance structure implies both government regulation and government ownership.

For network industries, the governance structures of the past have been determined by a complex range of efficiency and other objectives. For example, the choice of heavy regulation or government monopoly provision in some network industries may have reflected the natural monopoly status of the market. This was often linked to a desire to implement cross-subsidies for different consumers and to meet the demands of certain interest groups

(including the regulated firms). In addition, government intervention was often explicitly justified by concerns about security of supply and the safety of the services provided in the market (especially where these were regarded as having economy-wide impacts).

There are two important common characteristics of private sector and government-dominated governance structures. The first is that in market economies the discipline of self-regulation is available under both forms of governance. The second common feature is that there is always the threat of government action that materially changes the rules of the markets. In the case of light-handed regulation the imposition of further price controls and regulation remains an ongoing threat to market participants. In the case of government control, there is the threat to market participants of changes in the regulatory constraints and processes. The features that most set the two industry governance arrangements apart are that, under light-handed regulation:

- there is no industry-specific regulatory body that continuously regulates using market information, and
- and no legal barriers to open entry.

Neither of these will apply in cases of full government control of the market.

3.2 Firms and Markets

In the absence of government intervention, owners of firms will determine the governance arrangements of markets. To do this the owners of firms will make choices about three fundamental issues: the extent to which co-ordination will be achieved by centralisation, the boundaries of the firm, and the extent to which they will engage in co-operation with competing firms. In this section we consider the first two choices, leaving the consideration of co-operation through joint ventures to section 3.3.

Co-ordination of the activities of the agents employed by the firm may be achieved by allowing them to act independently produce in response to incentives and minimal monitoring. Alternatively, a centralised system approach to co-ordination provides explicit instructions to agents and involves intensive monitoring to ensure compliance. The balance will vary in response to the nature of the organization, the decisions and functions being

undertaken,¹² and the importance of asymmetric information in the particular market being considered. Services that are hard to quantify and assess often require a different balance between incentive and monitoring contracts, and thus different concomitant governance structures, than those of measurable goods and services (Brock and Evans (1996), and Holmstrom and Milgrom (1991)). However, networks transmit quantifiable outputs, and hence measurability of their outputs carries no special implications for the specification of their governance arrangements. In consequence, the private sector model of voluntary governance can serve as a benchmark for the application of the principles of governance to network industries.

Firms engage in a series of discrete functions that determine the scope of their activities. It is usually argued that the boundaries of the firm are determined by transaction costs that are determined by the specificity of assets, frequency of transactions, costs of monitoring and contract enforcement, and the number of transacting parties (Coase 1937; Williamson 1989). Where there are high transactions costs associated with contracting for services or products, they will be internalised within the firm. Stigler (1951) has pointed out that while the activities of the firm may be characterised by economies of scale, increases in the size of markets will make it feasible for firms to spin off to the market those activities for which economies of scale are not present. Firms are constantly reassessing which activities are optimally conducted within the firm.

3.3 Joint Ventures

In network industries, joint ventures are commonly used to provide inputs that their members use to produce outputs that are sold in a market where other members of the joint venture will be competitors. Joint ventures provide for vertical integration without the need for each individual firm in the market to undertake the activity independently.

Joint ventures are often explained as a response to a co-ordination problem or the need for standardisation. (Carlton and Frankel 1995; McMillan 1997). In addition, it seems likely that joint ventures in network industries relate to asymmetric information and

¹² Complementary activities and strategic planning, for example, are typically best carried out with a degree of centralized control in order to achieve gains in co-ordination.

complementarities within the network. For example, the potential for holdup and other forms of opportunism may be too great to allow a private independent firm to undertake the functions of the joint venture. However, each of these problems would, in the standard transactions cost-based theory of the firm, be used as a basis for internalising production within the firm. Why are joint ventures used instead?

While each firm would like to internalise the activity for the reasons outlined above, the natural monopoly property means that minimum average cost in the activity is achieved at a level of output greater than or equal to the whole market. Since control of this activity by an individual firm will raise the potential for monopoly profits, a joint venture offers the possibility of minimising costs while at the same time dealing with the monopoly problem created by the size of the market and the technology prevailing at the time.

An extension of the natural monopoly property explains why a joint venture is used instead of the services being provided by an independent supplier. The services are may be unique to a single network, involve large capital investment, and there will be the potential for opportunism on the part of potential providers of the services or free riding by some market participants.¹³ Supply by firms involved in horizontally linked markets outside the network may be precluded by regulatory barriers. These may make it very costly for any individual firm (either independent or operating in the output market) to bear the risk associated with the supply of the inputs to the market. In these circumstances, joint ventures will be risk-sharing agreements.

We argue that joint ventures provide the efficient approach to vertical integration in the presence of natural monopoly and downstream competition on product and cost variety. We regard voluntary industry joint ventures as superior to public provision of core services because, absent regulation, the services of the joint venture will be contestable. Any member of the joint venture may adopt an independent strategy, and third party competitors may enter to provide competing services.

¹³ Referring to the case of joint ventures in R and D, Philips (1995, 73) suggests that to the extent that joint ventures are successful their main feature is that they internalize spillovers and eliminate free riding.

Much of the recent work on joint ventures has, however, focussed on the potential for the joint venture partners to invoke rules that reduce competition and consumer welfare (Carlton and Salop (1996), Carlton and Frankel (1995), Evans and Schmalensee (1995)). Economides and Salop (1992: 107) argue that the efficiency implications of joint ownership of a firm producing an input for a network involves a tradeoff between the welfare gains from vertical integration of complementary products and the losses from horizontal integration of competing products. Carlton and Salop (1996 : 330 – 335) outline three types of competitive harm that may result from the activities of a joint venture.

1 Output Market Exclusion. Exclusionary access rules may be used to disadvantage rivals by limiting their ability to compete in the output markets for which the services provided by the joint venture are complementary. Here, the number of existing and competing members of the joint venture may not be the issue. If a new entrant wishes to access the joint venture facility to introduce a new technology into the output market, then the incumbents may attempt to exclude them from accessing the joint venture facility. This strategy may provide a means of keeping prices in the output market higher than they would otherwise have been.

2 Input Market Exclusion. If the joint venture agreement precludes members purchasing inputs from any other source, then it will limit the contestability of the input market. This may be especially important if growth in the size of the market or technological change make it efficient for the input market to be served by more than one firm.

3 Supporting Price Coordination. Joint ventures may provide a vehicle within which participants in the output market agree to raise prices or limit output. Joint ventures may be particularly effective in the cartelisation of an industry because they can use the threat of expulsion from participation in the input market to discipline members. Provision for exclusive purchase from the joint venture may preclude any firm competing in the output market by finding an alternative and lower cost supplier of the input. Finally, it may be possible for the joint venture agreement to exclude partners from offering in the output market new products that do not use the inputs of the joint venture.

3.4 Joint Ventures and the Governance of Markets

In the markets considered in this paper government intervention has been common. In these industries, joint venture arrangements have often been sanctioned by government. Indeed, sanction of a joint venture arrangement has often been combined with a public interest mandate to plan the evolution of the system.¹⁴ Other motivations run from the apparently efficient (concerns with safety) to those that are clearly redistributive in nature. The ability of a joint venture to result in competitive harm will be positively to the strength of the mandate and any exclusivity that government regulation bestows on it. Below we consider the case of both the New Zealand electricity market and the Canadian and Australian payments systems as examples of network markets where government sanctioned joint ventures have, or may have, the potential to introduce competitive harm.

4. THE EVOLUTION OF NETWORK GOVERNANCE STRUCTURES

Figure 1 provides a diagrammatic representation of the alternative market structures associated with network industries such as telecommunications, electricity and financial payments. We distinguish between an input market (where the natural monopoly occurs) and output market (where there is the potential for some competing privately owned firms to operate) and the consumer products produced.¹⁵

The single network version of the market may be structured in two ways. In the first, the whole network is internalised within a vertically integrated monopoly which could be governed by rate of return regulation (if privately owned) or a government-owned entity. The second alternative arises from the existence of private profit maximising firms competing in the output market, and a joint venture established by these firms in the input market. There are also two possibilities for competing networks. The first is that there would be two competing vertically integrated firms (in which case one might be government owned, or both might be subject to rate of return regulation). The second alternative is that there are two competing networks, each with a joint venture supplying inputs to the market.

¹⁴ This is in complete accord with the Milgrom and Roberts (1992, 106-113) idea that centralized decision making may be efficient where product development is taking place.

¹⁵ The issues represented in Figure 1 would not be altered if the joint venture occurred in the output market rather than the input market.

Figure 1 also provides a representation of competing networks. The networks may either be internalised within vertically integrated firms or each network can consist of competing firms who obtain inputs from separate joint ventures. Here, the two networks produce inputs that are direct competitors but are technologically incompatible. The result is that the networks compete directly, and interconnection between them is not possible. Examples include Visa / Mastercard, and Analogue/GSM cellular services.

The final alternative completes the transformation of the network to a market. Here, the inputs to product A are provided by a number of competing third party producers who also provide inputs to related products such as B and C. The output market changes because of the potential for firms in related industries to enter, utilise the output of the competitive input market, and produce complementary products to those originally associated with the network. Freed from the constraints provided by a single complementary input and the restrictions of compatibility, positive size externalities associated with the network are transferred to a wider market.

Competition within and across networks hinges crucially on three developments:

1. Low cost technological solutions to compatibility problems, so that providers of a service in one network may compete with service providers in another network.
2. Convergence in technologies that allows firms in related areas to enter the input and output markets, bringing increased competition and a wider range of inputs and products within the scope of the network.
3. Growth in the size of the market which makes it feasible to provide competitive provision of inputs.

The pattern of competition network characteristics and governance possibilities is depicted in Table 2.

4.1 Implications of Rapid Technological Advance for Governance.

Let us start with an optimal industry governance structure that is in static equilibrium and ask the question: how will it change with an increase in the rate of technological change? The following propositions suggest themselves.

- 1 The rapid standardisation of components and the concomitant reduction in requirement for firm-specific knowledge; suggests that the optimal firm size will get smaller. More transactions can be left to the market place, and contracting out becomes more attractive.
- 2 Extensive and rapid output growth may lead to more specialisation (Stigler (1951)). This too supports the proposition that there will be more contracting out and divestiture of activities.
- 3 To the extent that centralised control requires lines of communication and mechanisms of enforcement that require time to process and implement decisions, more rapid technological change shifts that balance of centralisation from centralised to de-centralised where decisionmaking is more responsive to local information.

Figure 1: Diagrammatic Representation of Market Structures

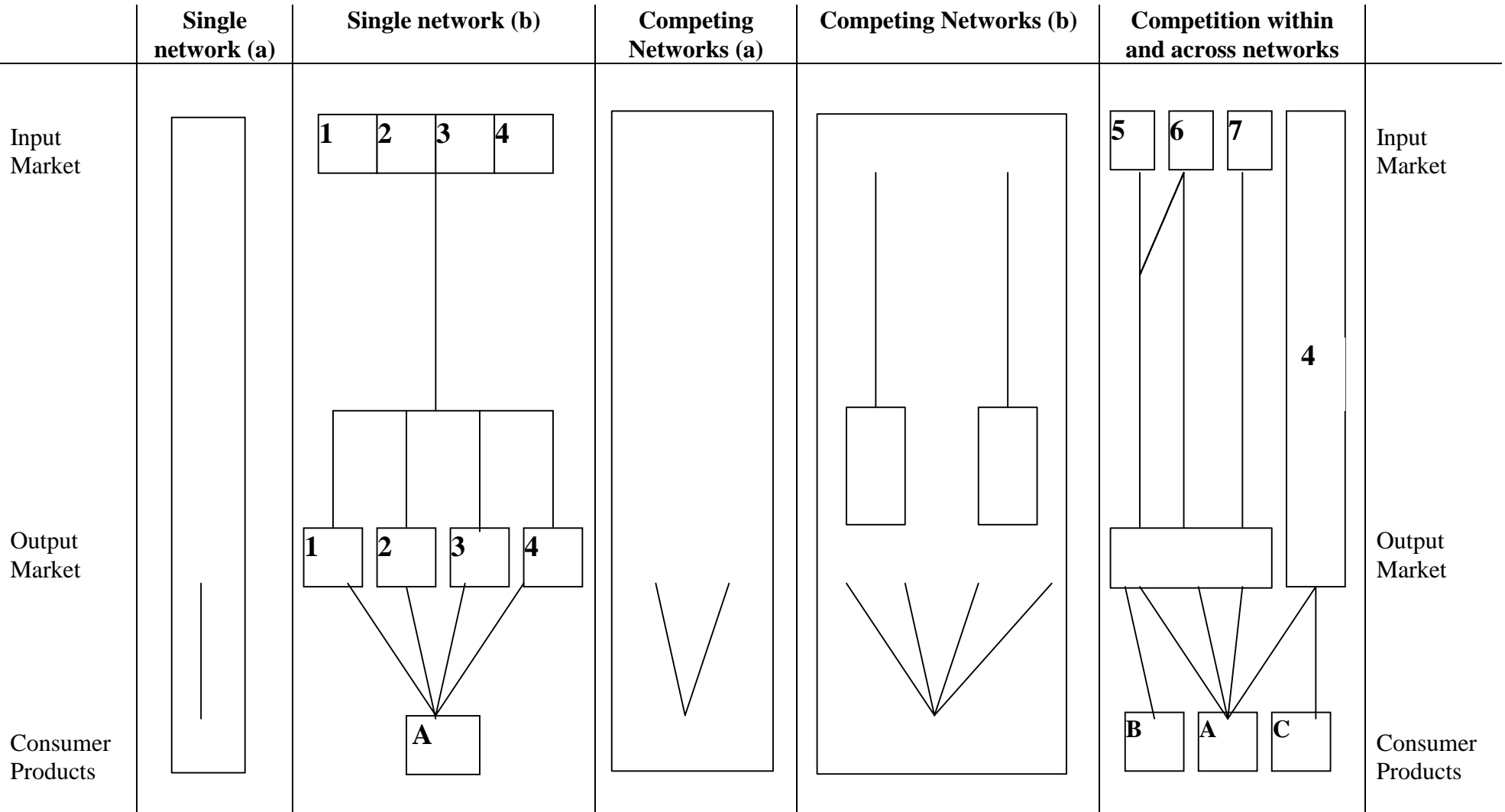


Table 2

<p align="center">Network Market Structure</p>	<p align="center">Potential Governance Arrangements</p>	<p align="center">Network Features – Complementarily, compatibility of technology and externalities</p>	<p align="center">Competition Issues</p>
<p>Single Network (a)</p>	<ul style="list-style-type: none"> • Regulated monopoly Government-owned monopoly 	<ul style="list-style-type: none"> • Single technology controlled by the incumbent 	<ul style="list-style-type: none"> • Contestability is ruled out by regulatory mandate
<p>Single Network (b)</p>	<ul style="list-style-type: none"> • Joint venture with private competition in part of the market 	<ul style="list-style-type: none"> • Single technology in the input market 	<ul style="list-style-type: none"> • Contestability may be limited in input and output markets by terms of the joint venture
<p>Competing Networks (a)</p>	<ul style="list-style-type: none"> • Heavy-handed regulation • Government or community ownership possible in part of the market 		<ul style="list-style-type: none"> • Competition limited by regulation and the lack of clarity in the incentives of public/community ownership
<p>Competing Networks (b)</p>	<ul style="list-style-type: none"> • Two or more joint ventures or competing private firms 	<ul style="list-style-type: none"> • Networks use different technologies which limits complementarity and compatibility to the individual networks 	<ul style="list-style-type: none"> • Consolidation of networks may not raise competitive issues if it is feasible for entrants or members of existing networks to establish new joint ventures in the market.
<p>Competition Within and Across Networks</p>	<ul style="list-style-type: none"> • Competing firms may be vertically or horizontally integrated but niche 	<ul style="list-style-type: none"> • Technological capacity and competition make interconnection, 	<ul style="list-style-type: none"> • Market is fully contestable. Light-handed regulation via competition policy and

suppliers of individual
services make by-pass
feasible across the market

complementaries and network
externalities feasible across the
whole market

consumer protection may be
the maximum regulatory
intervention

1 Generally investments are large and carry high risks that stem from legitimate divergences in expectations. Internalising the risk requires that the investment decision be made by those that bear the outcomes.¹⁶ It suggests that bodies, eg stakeholders such as regulators, that do not carry the risk directly should not make investment decisions.

2 Shortened planning horizons are likely to affect the need for the co-ordination function. To the extent that this occurs jointly with firms using imported technology – technology that is not grown within the company, and although new, consists of standardised components – less centralised co-ordination will be required and a more de-centralised governance structure may become efficient.

3 Emerging new markets and changing sources of economies of scope suggest a shift in balance from centralised to de-centralised control. Centralised control has to span the markets across which economies of scope are (potentially) developing if they are to be adopted, as it becomes efficient for adoption to occur.

These changes serve to undermine the rationale for, and the feasibility of, joint venture and/or public monopoly management of the network. Convergence in technologies undermines the ability of the network manager to contain activity within the technology of that network. It reduces the specificity of the assets, and as a consequence, reduces the gains from managerial co-ordination within the network. Convergence in technologies also puts pricing pressure on the activities of the network and makes it difficult for the incumbents in the market to continue to compete within the technological and pricing constraints imposed by the network. Co-ordination within networks and the viability of joint ventures will be undermined by a large increase in the firms who wish to be members of or to utilise the facilities of the joint venture, as well as by the potential to use alternative technologies.

Management of risk that internalises investment outcomes with investors requires limiting the direct role of stakeholders – consumers and political interest groups – in investment decisions. This further implies a shift from specific to light-handed regulation.

¹⁶ See Hathaway (1997) for the argument that enterprise risk should not be spread beyond the enterprise itself, even if it is government ownership.

For these reasons, pressure for dissolution of a centralised network structure will come from members of the joint venture, who are constrained by the co-operative framework in meeting the competition that they face. This will be particularly important if some members of the joint venture are less able to meet this competition, and attempt to use the joint venture and regulatory recognition of it to insulate themselves from competition. If the network contains some element of public monopoly provision, then pressure comes from two sources. Services that are close substitutes for the outputs of the original network will emerge in unregulated markets. Consumer awareness of these alternative services will result in switching and a concomitant reduction in market share for the original network. The pressure that this provides to obtain greater efficiency in the operation of the original network often results in privatisation, which is in itself a necessary step in the transition from network to market.

5 ELECTRICITY , TELECOMMUNICATIONS, AND PAYMENTS NETWORKS

5.1 Electricity

The reform of the New Zealand Electricity industry has lagged behind that of other sectors (see Evans, Grimes, Wilkinson and Teece (1996)), and both public policy and the structure of the industry are still evolving. Technological advances of the last five years have made feasible a range of new approaches to competition in electricity markets, and these are now central to the reform that is being undertaken.

In 1903 the Government passed legislation vesting in it the sole right to use water for generating electricity (see Beeche (1950) and Speer (1962)). From about this time it began investing in electricity plants and acquiring those existing plants that were privately held. The special-purpose Government department that owned and managed generation and the national transmission grid dates from 1961. Distribution networks were typically of a community trust form, or departments within local government. The path of change is illustrated, in Table 3.

To date, New Zealand's standard light-handed regulatory regime has been applicable to the electricity market: open entry is permitted and there has been no industry-specific price control. Any consumer is able to choose their supplier. Final purchase of electricity sourced

from outside a retail area is currently 7% of total electricity dispersed by retail companies.¹⁷ This represents some discipline on the pricing of area retailers but the extent of this effect will depend upon the existence of other barriers to entry.

Culy, Read and Wright (1995) report that real wholesale electricity prices declined by 8 percent between 1987 and 1991, and that between 1991 and 1995 they were roughly constant in real terms. More recent data¹⁸ indicate that the wholesale price of electricity has declined in real terms between 1995 and 1997 by approximately 10 percent. During this time there has been substantial price re-balancing as residential prices have increased in real terms, whereas the

¹⁷ See Ministry of Commerce, *Electricity Information Disclosure Statistics*, 1997, p.19

¹⁸ Source, Ministry of Commerce, unpublished paper,(1998).

Table 3
Evolution of the New Zealand Electricity Industry

1961 to 1987 generation and transmission - Vertically Integrated Monopolist Central-Government Department distribution - 94 electricity supply authorities Trusts and Local-Government Entities
1987-94 generation & transmission - Vertically Integrated Monopolist corporatised as an SOE distribution – local government entities corporatised
1998 generation – 2 SOEs transmission - SOE distribution (37): 7 listed companies, 28 community trusts, 2 co-operatives spot market from 1 October 1996 Production 36,000m.GWh. (1998)

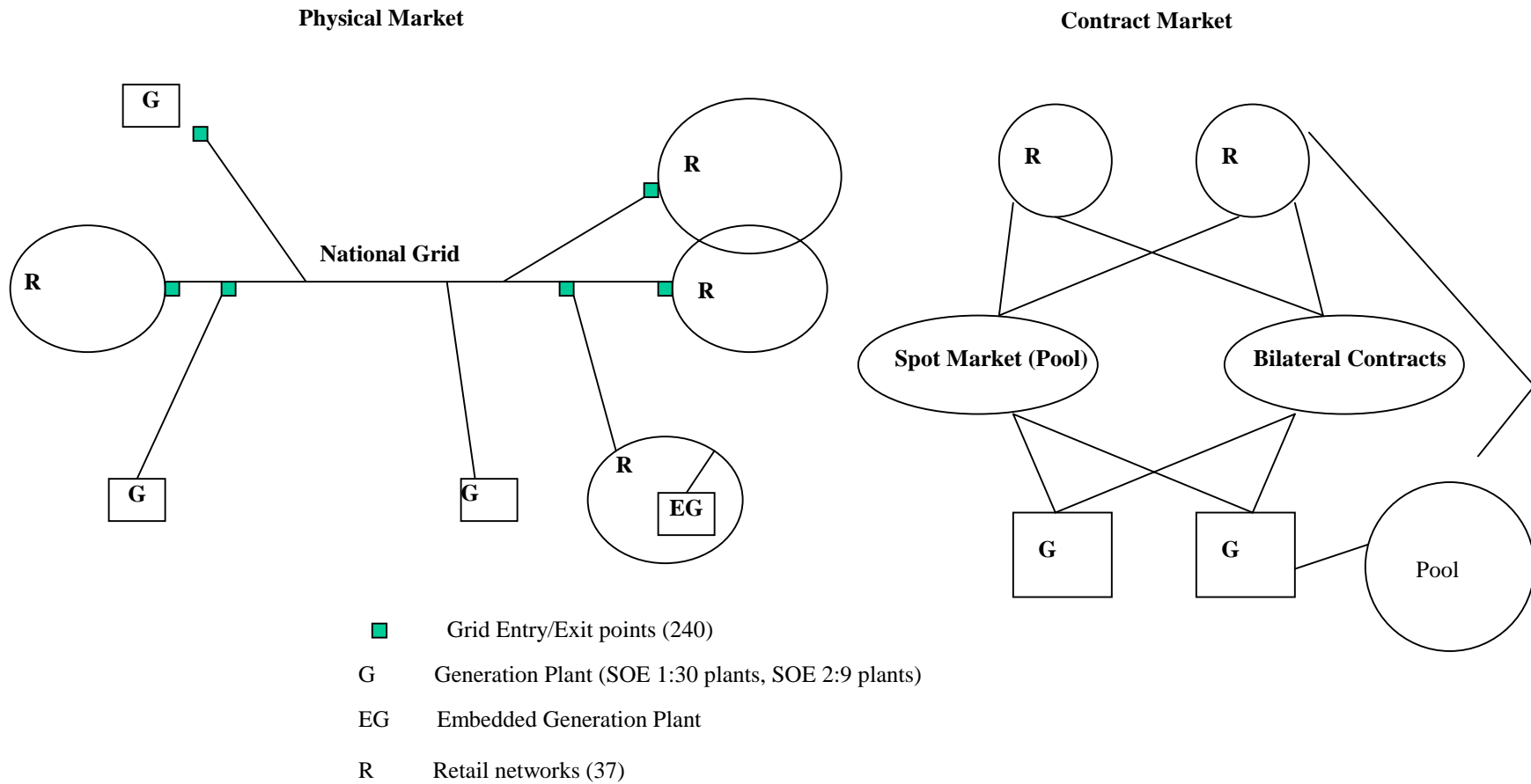
price for commercial users has declined. Prior to 1988 New Zealand cross-subsidised households and even now the price for commercial and residential customers is very similar. A number of distribution firms have merged and this will facilitate exploiting the economies of scale (see Giles and Wyatt (1992)) that were estimated to be present in the electricity supply authorities prior to the reforms.

New Zealand has retained public ownership of generation and transmission, and its division of generation into two companies provides only limited competition. In addition, it is likely that the dominance of community trust ownership in the retail distribution sector has adversely affected the performance of that sector.¹⁹ New Zealand's absence of price

¹⁹ Culy, Read and Wright (1995, 59-71) canvas reasons for this choice of structure. It is well known that the trust form of ownership and governance means that the objectives of the board and managers are quite unclear and, for community trusts, open to political influence. It also limits capital market disciplines on management. In fact, 7% may represent considerable "wheeling" for that subset of customers for which "wheeling" is currently economically feasible. The situation is changing as the cost and nature of meters change.

regulation for households allows price re-balancing to continue and for price signals to be imparted to

Figure 2



Notes: There are also associated communication networks

The Grid serves both the pool (93% of total MWH, 1997) and bilateral contracts

consumers.²⁰ It remains to be assessed the extent to which wheeling, additional generation, and gas competition affect market performance.

The governance structure of the New Zealand electricity market does not include a statutory industry-specific regulator, or specific price control. There are three sets of market rules. The Grid Operation Security Policy (GOSP) is implemented by the state-owned enterprise (SOE) managing transmission (Transpower). The development of GOSP is conducted by Transpower jointly with the market administrator (the joint venture Electricity Market Company, EMCO). EMCO has the responsibility for administering the rules of metering and reconciliation that apply to the entire wholesale market. It also manages the electricity spot market.

The electricity spot market, or pool, has its own governance structure. The physical networks and contractual networks, including those applicable to the pool, are schematically described in Figure 2. Participation in the pool is voluntary. The operation (see Figure 3) of the pool is specified in the NZEM rules. These rules specify all aspects of the participation in, and operation of, the spot market. Service providers (eg. the Grid Operator, the Dispatcher, Pricing Clearing and Settlement functions) provide the services required for the operation of the pool under fixed term contracts under the rules of NZEM.

The entire governance structure (see Figure 4) of the pool exists by virtue of contractual obligations set out under rules developed by the market participants through their joint venture company EMCO. There is no statutory specification of governance. EMCO manages the rule development process as well as administration of the rules. It has played a significant role in the development of the spot market. It services a committee (the Market Surveillance Committee (MSC): MSC members are chosen by market participants²¹) that supervises spot market monitoring (against the rules) and acts in a judicial capacity with respect to breaches and interpretations of the rules. The MSC has very extensive powers, and its decisions are

²⁰ A Bill that split retail electricity entities into line and energy firms was enacted in June 1998. It exacerbates the trust ownership and governance problems.

²¹ One factor in the choice of members of the Market Surveillance Committee is independence from the day-to-day operation of the electricity market. This could in itself be an interesting subject for a study of governance design.

subject to appeal, again to an industry appointed judicial board. Thus, for electricity a joint venture company has played a significant role in market development and administration. While it has

Figure 3: Spot Electricity Market (Pool) Process

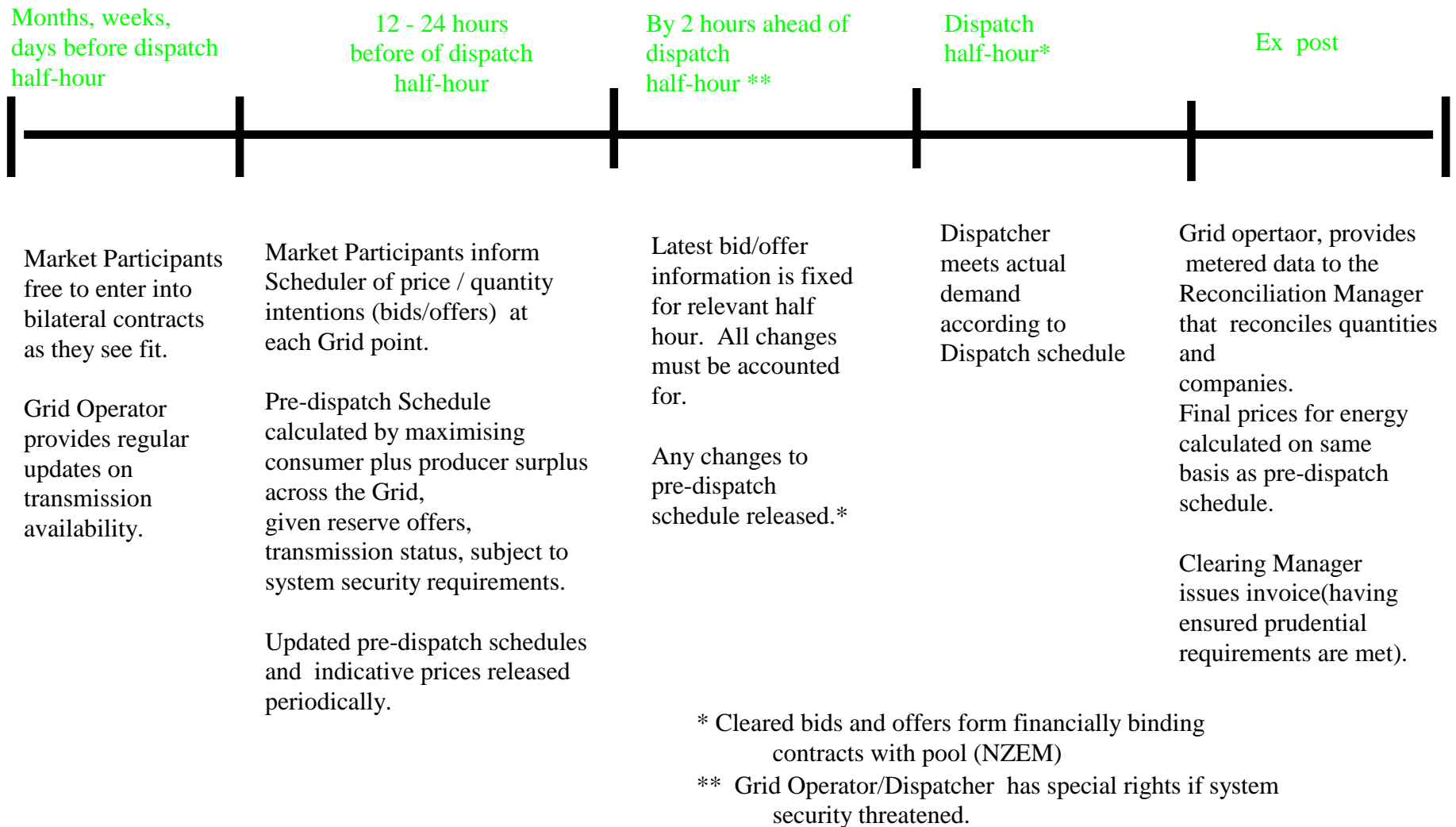
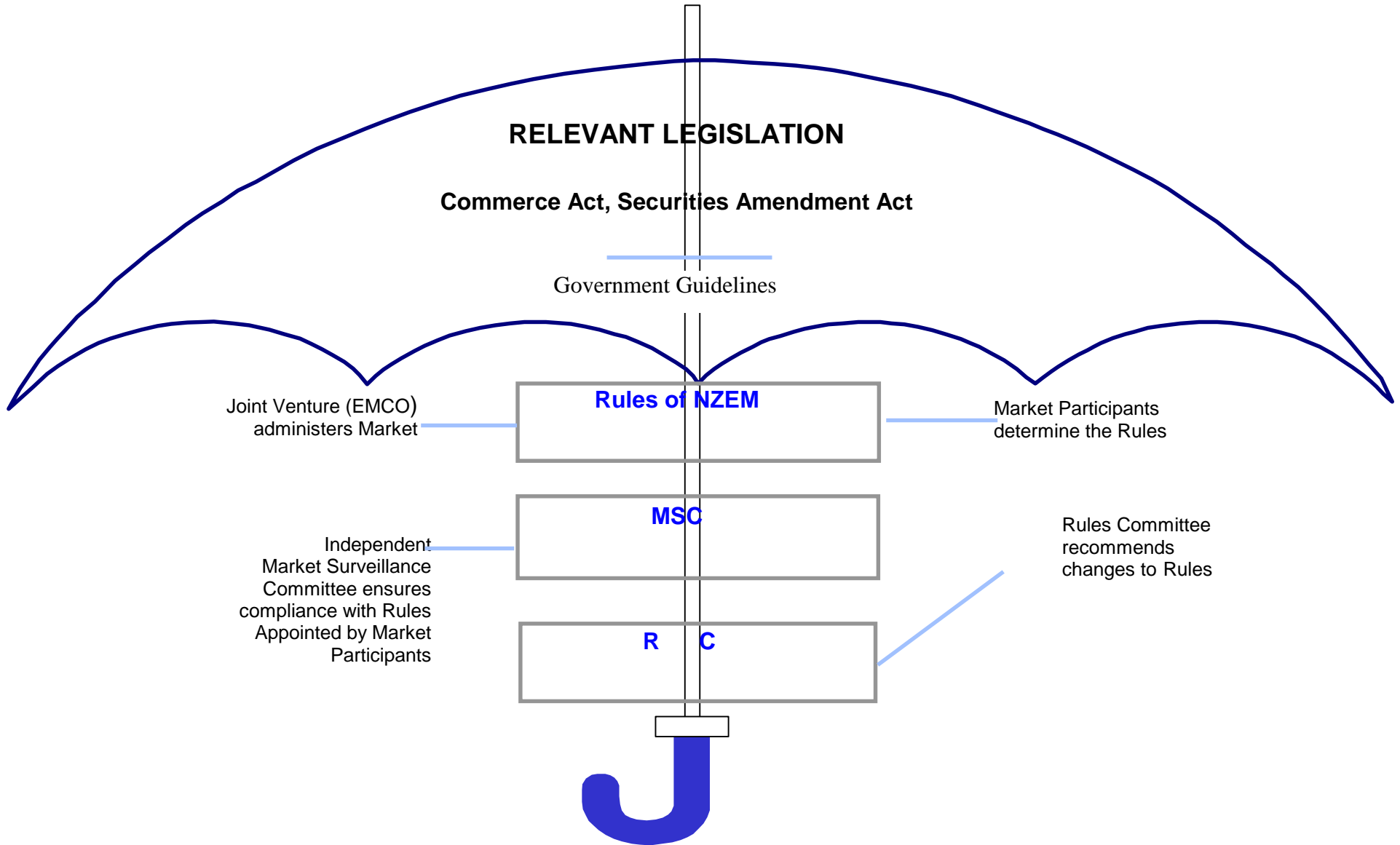


Figure 4 NZEM Governance



not owned significant infrastructure assets it has created a market through its co-ordination of the design and implementation of the rules that define the operation of a market that relies on companies that do possess these assets.

Electricity poses risk management issues that are of at least as much import as any of the networks we consider. They are of concern to market participants and consumers directly. In addition, they have been of such political concern that they have affected the speed with which a devolved system has been allowed to develop. While GOSP specifies the operating standards of the grid, under pool and non-pool contracts, there is to be no specific assumption of risk unless it is specified in contracts. That is, market participants are free to contract for risk and thus the allocation of risk will reflect participants' abilities and willingness to accept risk. This is a recent aspect of the market and it is currently developing as past practices increasingly come under scrutiny.

In electricity there has been a joint venture company co-ordinating the development of the market, most specifically developing the pool. The starting point was the centralised control of a vertically integrated state owned company. The joint venture company, EMCO, assumed the market development role to conduct the centralised control and co-ordination function. Its continuing role in market administration and on-going market development is evolving.

The pool is voluntary; thus there are open entry and exit constraints on its exercise of market power. Furthermore there exists the possibility of the establishment of other local pools by local retail and generating companies. This too constrains the actions of the current pool. It can be anticipated that these constraints will become more intense with entry into all facets of the electricity business. Additional members increase the internal co-ordination problems for the joint venture. More profit-maximising participants in the market as a whole will add to the competitive constraints on pool organisation. As we have argued, the rapidity of technological change shortens planning horizons and individual company action will generally be quicker than actions arrived at under a joint venture. These factors suggest that unless there are very great natural monopoly characteristics solved by the pool that the electricity market will evolve to a decentralised market system providing open entry is sustained. This process may be greatly facilitated by the fact that the joint venture company

itself does not own any infrastructure assets.²² The inclusion of such assets in the joint venture - as may have been expected given the specific nature of some of certain of these assets and a common rationale for joint ventures (Phlips (1995, 173-4)) – may have delayed any joint venture dissolution driven by competitive forces.

To date, the basic lesson of the New Zealand model is that governance arrangements that predispose effective co-ordination and control can be constructed under voluntary contracting among de-centralised decision-makers.

5.2 Telecommunications

Deregulation has had more impact on the structure and governance of telecommunications than on any other network industry in New Zealand. The transition from Government department to SOE in 1987, then to privatisation as Telecom New Zealand Limited in 1990 has been described elsewhere (for example, Wilson (1994), Evans, Grimes, Wilkinson and Teece (1996)). There has been no price control, excepting the constraints on urban and rural service provision and access pricing proscribed by the Kiwi share since privatisation in 1990.

Competition by firms with significant New Zealand infrastructure commenced in 1991 when Clear Corporation used fiber-optic cable of the then New Zealand Railways to bypass the Telecom network.²³ It entered an interconnection contract with Telecom and has provided domestic and international long distance services from that time. In 1995, an interconnection contract was agreed between Telecom and Clear which enables Clear to offer local service. This year, a company, Saturn, has introduced a cable and telephony service to residential households in the Wellington region. BellSouth started its GSM cell-phone service in 1994, and now has very extensive coverage, in competition with that of Telecom. Further competition is provided by a number of firms, including Telstra, that do not have significant infrastructure of their own in New Zealand. In addition, there are internet and data service providers with interconnection agreements and infrastructure some of which includes

²² It does have an information system that keeps any subscriber continuously up-to-date with the state of New Zealand's electricity system, including the state of the hydro-lakes.

²³ Clear Corporation is held by MCI International, British Telecom, BCL (an SOE) and Todd Corporation. Since 1991 Clear has put in a wire network that bypasses much of Telecom's network, excepting the residential local loop.

wireless communications. There are a number of firms that conduct arbitrage, especially in the international toll market. The generally very satisfactory performance of the market is reviewed by Evans, Grimes, Wilkinson and Teece (1996) and Spiller and Gardilli (1997).

Perhaps the most contentious part of the performance of the telecommunications market has been the time required establishing an interconnection agreement for local service between Telecom and Clear. A core part of the dispute was Telecom's proposal to use Baumol's (1983) efficient component pricing (ECP) rule. While there is not space here to evaluate the delay in the agreement of the interconnection contract, or the efficiency of the ECP rule, it should be noted that this rule has never actually been implemented in New Zealand agreements. Much of the literature on the Clear-Telecom dispute does not properly recognise the strategic game that took place; a game that included the government because of the government's potential to step in and regulate prices. This agreement was one of the first of its kind worldwide and hence very protracted negotiations could have been expected. The network linkages created by the interconnection agreements that existed in March 1998 are described in Figure 5. They indicate that the telecommunication networks have a variety of interconnection points and that under these agreements some traffic can bypass the Telecom network entirely.

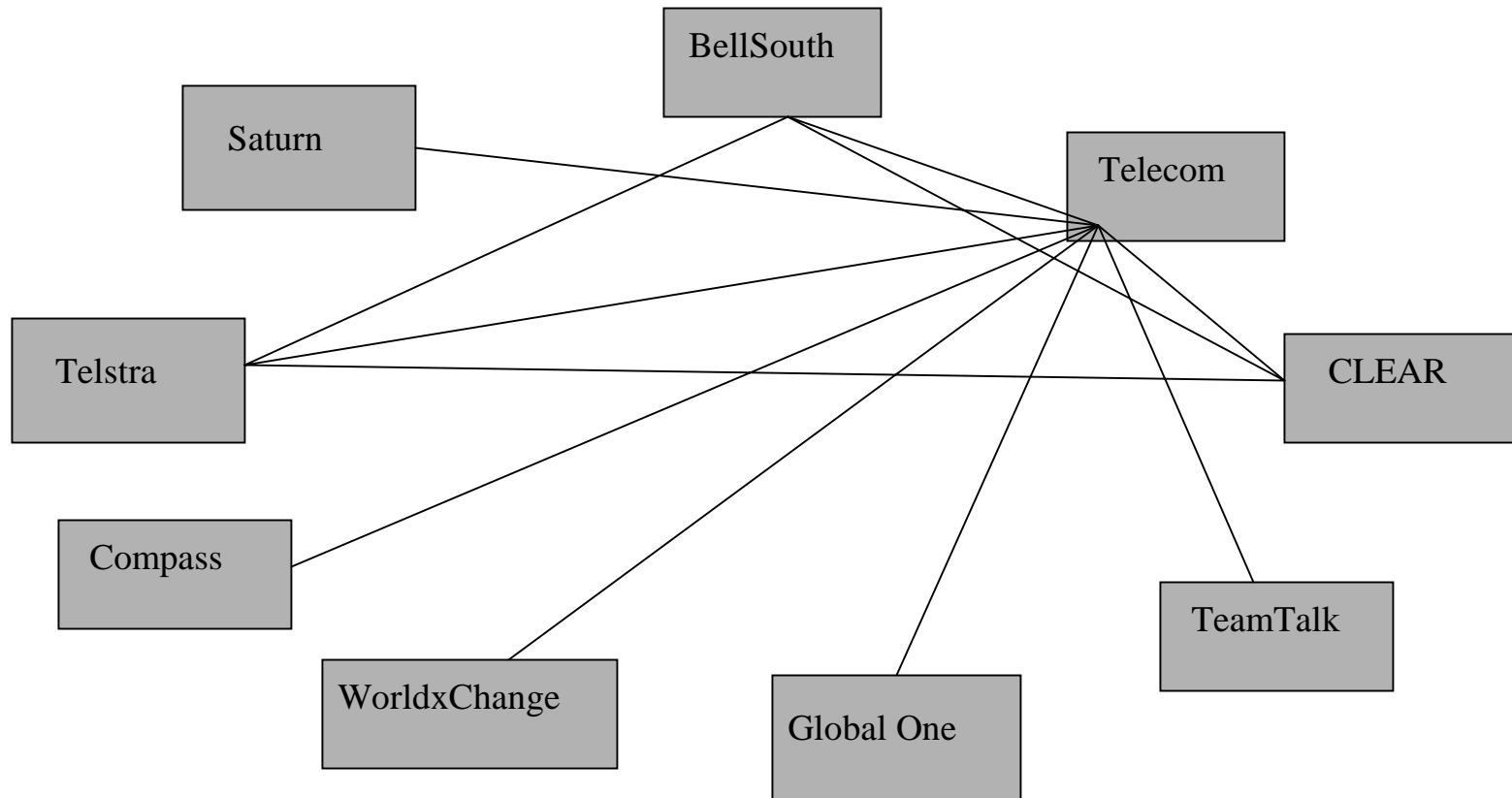
In telecommunications there has been no overall governing body. The incumbent Telecom, and the operation of the Commerce Act 1986 have achieved co-ordination at the outset of de-regulation. In 1990 Telecom set the network compatibility standards and, de facto, provided operational governance of the market. As competitors have entered, they have increasingly imposed constraints on the actions available to Telecom and shifted the market to one of governance with de-centralised control and co-ordination. The Telecommunications Act of 1987 proscribes interconnection and tariff disclosure regulations on Telecom.

The driving force for change in telecommunications has been substantial declines in costs, changes in economies of scale and scope, the rapid, low-cost, standardisation of network components and the emergence of new products. Telecommunications is only once removed from the electronics revolution and it reflects all the factors that we listed earlier as technological change determinants of governance. We have argued that these factors generally predispose efficient governance that has de-centralised control and co-ordination. If

this argument were to be accepted, how would this decentralisation take place and be implemented?

The vastly lowered costs and changed technology of delivery makes (partial) network bypass possible. New technology enables technologies to be bypassed by low-cost connection between different modes of transfer: that is, it can, and does, make different networks compatible. Viable network bypass strikes at the core of the assumption that networks are natural monopolies. It stimulates entry and it constrains the actions of an incumbent to the extent that bypass is a credible threat. Thus, there is a mechanism and incentive for new firms to enter whether or not they have new products. De-centralised control is implemented by means of interconnection. Open entry and bypass provide an incentive for incumbents to

Figure 5: Telecommunications Network Interconnection



Publicly Notified as of March 1998 (Source: Report by Bell-Gully). Does not include Internet System Providers

seriously entertain interconnection contracts, as can the threat of alternative new technologies. These are private de-centralised incentives, that, in the New Zealand market, has led to the pattern of interconnections depicted in Figure 5 and vigorous competition in most aspects of telecommunications.

As with very many industries there is a tension between co-operation and competition in telecommunications. Carter and Wright (1994) suggest that interconnection contracts may be used as a collusive device to keep final prices up. However, as we have argued, the expectations and uncertainty of technological change are likely to inhibit collusive arrangements. Furthermore, the considerable numbers of players in the market, and the easy entry and exit of arbitrage firms that trade-off price differentials within and across countries mean that co-ordination is likely to be very difficult to maintain. In any event, collusion can be addressed by remedies and penalties available under competition policy rather than through the introduction of centralised control.

As with electricity, telecommunications has moved to contracting with external organisations rather than integration within a single entity. Also as is the case with electricity, the efficient governance regime for telecommunications has moved to one of de-centralised control and co-ordination.

5.3 Payments System

The payments system provides a mechanism by which demand accessible funds held with financial institutions may be transferred to a third party. In addition, it provides for the settlement of the obligations arising between individual financial institutions as a result of the payment institutions provided by their customers each day. The payments system may be divided into four functional components:

- Payment instruments such as cheques, bank machines (ATM), point of sale direct debit (EFTPOS) terminals, and credit cards.
- Clearing systems for the receipt, processing and netting of these instructions for the transfer of value.

- Settlement systems which receive information from clearing systems, and send instructions for the transfer of net values.
- Settlement accounts at the central bank, in which individual institutions hold the funds used to achieve the ultimate transfer of net value associated with the payment instructions throughout the economy.

There is a long history of both government regulation and joint ventures in the operation of payments systems.

Before the creation of central banks, the clearing of paper payment instruments was undertaken in clearing houses which were usually joint ventures of the banks operating in the major financial centres. Out of this practice grew a tradition of government recognition of joint venture clearing arrangements in the payments system, and this persisted after central banks assumed the role of providing settlement accounts. Government regulation of banking and the payments system has increased during the 20th century, driven to a significant extent by the need to manage the risk of public guarantees of deposits and of the settlement system. In our view, however, public policy in many countries takes too little account of the capacity for competition and technical change (such as has made it feasible to settle gross transactions in real time) to ameliorate the risks of payment system failure that current public policy attempts to address.

Government regulation of payments systems often reflects the historical fact that banks were the sole providers of payments instruments, and the only institutions with the incentives to develop the facilities associated with the core of the payments system. Today, convergence across the financial system means that a range of other types of institutions, including insurers, mutual funds and consumer credit organizations manage liquid balances for customers. This has created a demand for much wider direct participation in the payments system than is provided where access is restricted to banks. By access we mean the ability to provide customers with payment instruments that enter directly into the clearing and settlement process.

New Zealand

Since the mid 1980s New Zealand has had the least-regulated financial system of any country, including the payments system. There is no specific legislation or regulatory requirements governing the payments system in New Zealand, with the operation of individual networks being governed only by the conditions agreed between the participants and the application of commercial law / competition policy. The central bank, the Reserve Bank of New Zealand, is not involved in the management of the payments system except through its role as the operator of the settlement accounts and the Austraclear settlement system. The Reserve Bank is on record as indicating that even though only registered banks operate settlement accounts at this time, an account would be provided to any institution that was able to demonstrate the need and

Table 4: Ownership and Functions of Networks in the New Zealand Payments System

1. Who Owns What System:

Bank:	ANZ	BNZ	National	Westpac Trust	ASB	Countrywide	TSB	Hongkong and Shanghai	Citibank	Bankers Trust	Reserve Bank		
Network:													
ISL	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner	Owner				
ETSL		Owner	Owner	Owner	Owner								
KITS	Owner	Owner	Owner	Owner	Owner	Owner		Owner	Owner	Owner			
Austraclear											Owner		

2. What Each System Clears:

Clears:	Inter-change Cheques	Direct Debits	Direct Credit	Automatic Payments	ATM transactions	Telephone Banking	Off site Electronic Banking	EFTPOS transactions	Electronic Credit Card Transactions	High Value NZD Payments	Cash Transfers (overseas clients/banks)	Cash Transfers (domestic clients/banks)	Securities Transactions
Network:													
ISL	xxxxxxx	xxxxxx	xxxxxxx	xxxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx						
ETSL								xxxxxxx	xxxxxxxxxxx				
ANZ								xxxxxxx	xxxxxxxxxxx				
KITS										xxxxxxx	xxxxxxxxxxx		
Austraclear												xxxxxxxxxxx	xxxxxxx

the technological capacity to operate it.²⁴

Thus, while the actual provision of payment services in New Zealand is at present provided only by registered banks, their position in the payments system is fully contestable. With respect to retail payments instruments, non-bank institutions may enter into commercial arrangements to issue credit, EFTPOS or ATM cards by having these cleared and settled by institutions that are direct participants in clearing and settlement. A range of institutions that are not registered banks issue different types of payment instruments under such commercial arrangements, and these enter directly into the payments system for clearing and settlement.

There are at present five different messaging systems providing for payment instruments to be presented electronically. The ownership and functions of these networks are set out in Table 4.

Figure 6 shows the workings of the New Zealand Interchange Payments System in 1998, headed by the various transactions that are processed. It is interesting to note here that over the past five years there has been an increasing trend towards the use of electronic payment methods - in particular, EFTPOS use grew from 8% of transactions in 1993, to 24% in 1997.²⁵

There are six switches, or systems, that interchange transactions, and retail banks in New Zealand own (with varying shareholdings), and/or operate, the following:

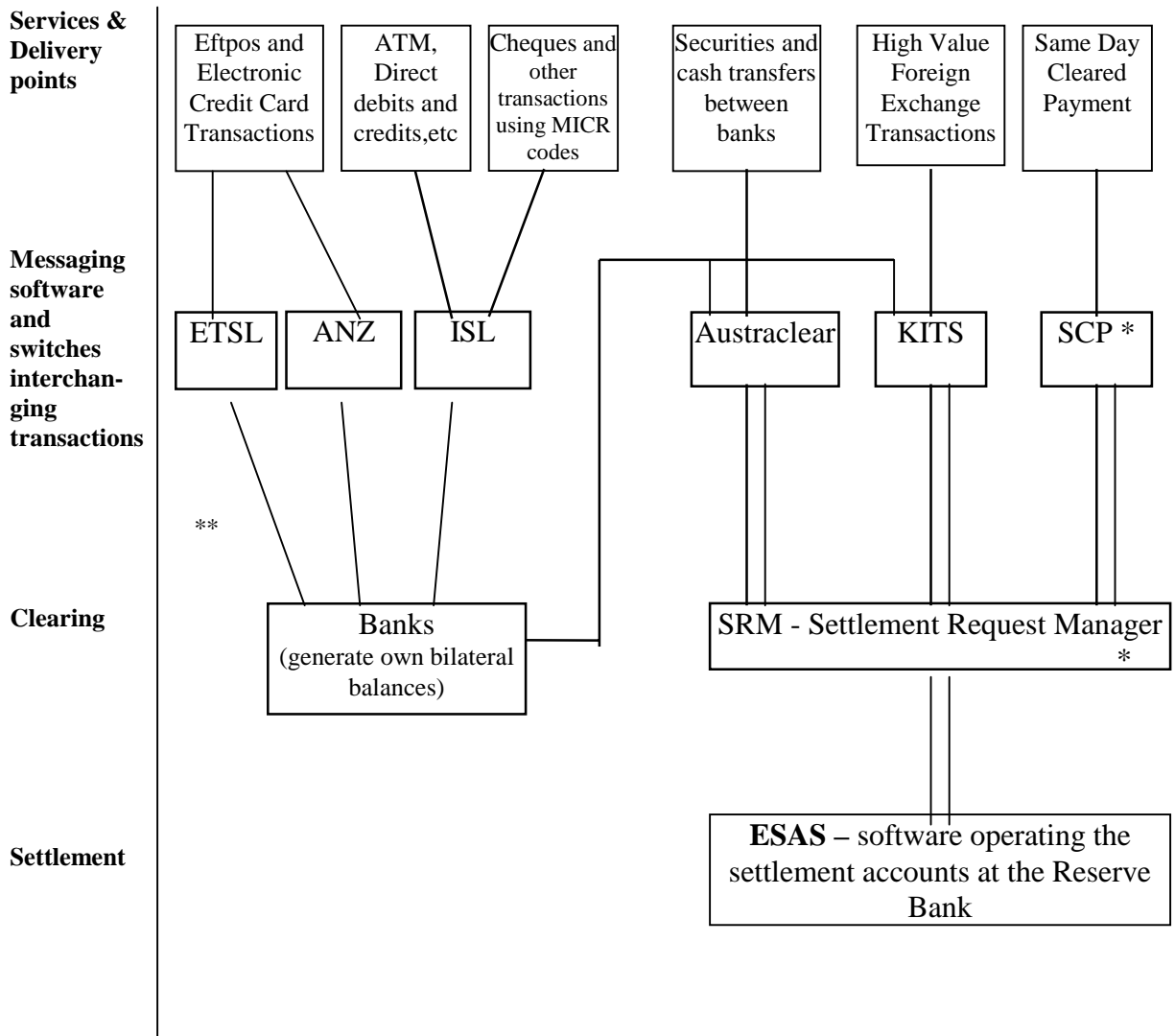
- Interchange and Settlement Ltd (ISL),
- Kiwi Inter-bank Transfer System (KITS),
- Electronic Transaction Services Limited (ETSL), and
- Same-Day Cleared Payments - a new system, not fully implemented at present.

The Settlement Request Manager (SRM) which sits between the payment switches and ESAS is also operated by the retail banks, since it is managed by Interchange and Settlement Limited. SRM provides banks with the capacity to manage their flow of payments.

²⁴ New Zealand provides registered bank status to institutions who meet international capital adequacy standards and certain disclosure requirements, but it is not necessary to be a registered bank to undertake the business of banking.

²⁵ Figures from the New Zealand Bankers Association.

Figure 6: The New Zealand Interchange Payments System in 1998



* Managed by Interchange and Settlement Limited (ISL)

** Various Data Processing Companies provide these companies with services at this stage, in order to get transaction information to the banks.

Electronic Transactions Services Ltd (ETSL) and the ANZ operated system, compete directly in the processing of EFTPOS and electronic credit card transactions.²⁶ Presently 80% of EFTPOS merchants are attached to the ETSL network. The ANZ switch was previously owned by BNZ and ANZ but when these two companies separated, the latter retained control and now operate it to gain greater flexibility and to aid its strategy to acquire more business.

As is shown in Figure 6, transaction information is independently collated by the three entities ETSL, ANZ, and ISL, at the end of each day and is then sent to the banks so they can calculate their balances with each of the other banks. From 7am the next morning, banks settle their bilateral balances through Austraclear to the Settlement Request Manager and subsequently the Exchange Settlement Account System (ESAS).

There are two features of the New Zealand payments system that are of particular interest. First, the use of third party processors of the information from the different clearing systems indicates the economies of scope that exist in this activity. Second, the competition between ETSL and the switch operated by ANZ demonstrates the feasibility of competition and bypass in these key elements of the payment system. It also demonstrates the importance of the absence of any regulatory enforcement of participation in the ETSL joint venture.

It is planned that all payment switches be linked to SRM and hence ESAS, to facilitate a greater degree of certainty in the payments system. However at present only KITS, Austraclear (and SCP) have access to SRM and ESAS at the Reserve Bank. In this sense it is feasible for these systems to compete, though at present their activities are largely divided along functional lines. KITS was owned by four of the major New Zealand banks, but as part of the transition to real time gross settlement all banks are becoming participants in it. It provides multilateral net settlement for high value payments associated primarily with foreign exchange transactions. Participation in the Austraclear system is open to any organisation of good standing that operates in the securities markets, and this currently includes banks, brokers, financial institutions and corporates. Austraclear provides the mechanism for the

²⁶ Note that Telecom NZ Ltd provide the telecommunications services linking terminals to the ETSL and ANZ systems, and also from ETSL and ANZ to the bank and credit card company computers.

settlement of the daily net obligations determined within ISL. SCP, once fully implemented, will be specifically tailored for “real estate” transactions.

Canada

The structure of the Canadian payments system is functionally similar to that of New Zealand (Figure 7). A wide variety of payment instruments operate with purpose-built messaging and clearing systems, and these are joint ventures rather than proprietary. Until the creation of the real time gross settlement system, the ACSS provides the only mechanism for the settlement of payment instructions in Canada.

There are however, two key differences between the governance of the payments system in Canada and New Zealand. The first difference is that in Canada the core settlement technology of the payments system is managed by the Canadian Payments Association under the authority provided by legislation. The *Canadian Payments Association Act* of 1980 provides banks and near-bank financial institutions with an exclusive mandate to “establish and operate a national clearings and settlement system and to plan the evolution of the national payments system”. The justification for this mandate lay in the presumption that the core communication system of an efficient electronic payments system would be a natural monopoly, and should be managed by a joint venture consisting of all regulated deposit-taking institutions.

The *Act* also gives the Canadian Payments Association the right to pass rules associated with the operation of the payments system that, when signed by the Governor in Council, have the force of law. The provisions of the Act, and the rules and by-laws adopted by the Canadian payments association have in many instances had the effect of restricting the ability of non-members of the CPA to issue payment instruments that may enter directly into the clearing and settlement process (Mathewson and Quigley 1997). The argument is that the safety of the

payments system requires that only CPA members enter payment items for clearing and settlement.

A second difference between the New Zealand and Canadian payment systems is that under the Payment clearing and Settlement Act 1996, the Bank of Canada is given an explicit role in minimising systemic risk in the payments system and in guaranteeing the ultimate stability of the settlement system.

The Canadian payments system therefore provides an example of a market where governance arrangements continue to reflect the view that electronic payments networks would be natural monopolies and that private management is inconsistent with the required levels of safety and security. The resulting government guarantee of the settlement system, and the statutory monopoly power given to joint venture arrangements within the Canadian Payments association do not, in our view, provide for the optimal governance arrangements in a marketplace that is being affected by rapid technological change. By comparison with New Zealand and other industrialised countries the Canadian approach has:

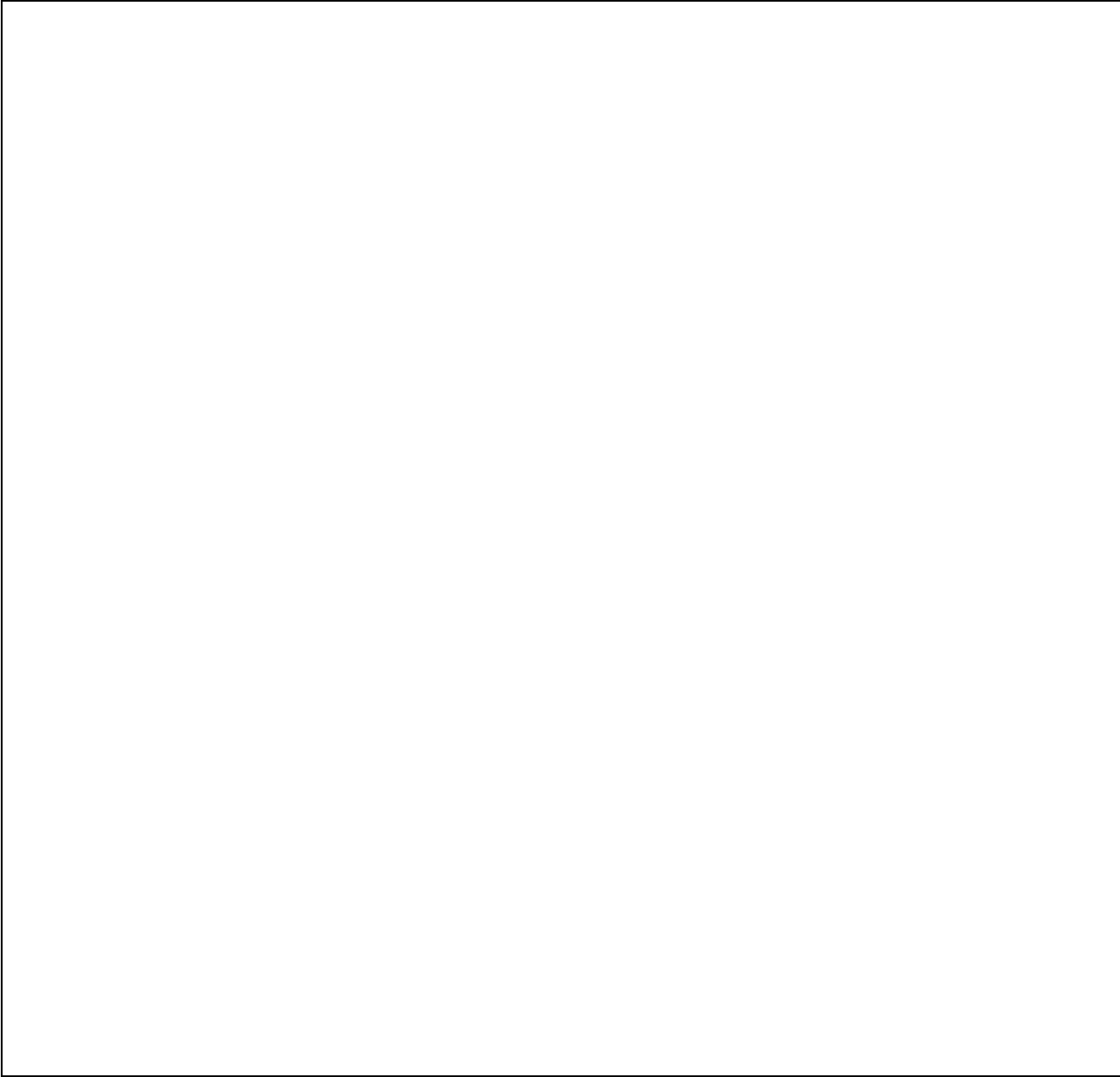
- a) slowed innovation and entry of new players in the provision of payment instruments,
- b) allowed the development of rules which advantage the incumbents over potential new entrants, and
- c) restricted the development of direct competition in the provision of messaging, clearing and settlement services (see Mathewson and Quigley, 1997).

6. CONCLUSION

We have argued that technical change has removed the key natural monopoly problems associated with network industries by reducing the costs of technical solutions to interconnection, making by-pass feasible, and providing the potential for the entry of competing suppliers of services. In addition, we have suggested that the prospect of technical change and entry has required a reassessment of strategy in network industries, especially the payoff to co-operation in joint ventures.

In a world in which competition within and across networks is feasible, what remains of the traditional view that network industries require heavy-handed regulation and public ownership? Public ownership and heavy regulation inhibit the introduction of new technologies, and encourage the use of industry-wide co-operation to solve co-ordination and compatibility problems. The benefits of open entry and competition are illustrated by the experience of New Zealand telecommunications, electricity and payment industries. Our view is that a light-handed regulatory regime is necessary both to establish the potential benefits from competition and technical change, as well as to actually obtain the benefits associated with them. Light-handed regulatory regimes and competition among private sector firms represent the optimal governance arrangements for network industries.

Figure 7: Payments Systems in Canada



SOURCE: DISCUSSION PAPER #1, CANADIAN PAYMENT SYSTEMS ADVISORY COMMITTEE – BANK OF CANADA.

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