COST, QUALITY AND LEARNING BASED GOVERNANCE OF TRANSACTIONS: WESTERN, JAPANESE AND A THIRD WAY

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Abstract

The purpose of the paper is to analyse existing practices of outsourcing by firms, and to explore new ones. Of particular interest is a comparison and evaluation of Western (American/European) and Japanese practices, and a consideration of possible alternatives. Use is made of transaction cost economics (TCE). First, however, TCE is extended with a dimension of learning: an important role of external relations in turbulent environments is to enhance cognitive competence, in an 'external economy of cognitive scope'.

This extended TCE is formalized for an analysis of strategies to minimize risks and maximize returns of transaction relations. Use is made of game theory to identify feasible and stable pairs of strategies, in the form of Nash equilibria. These turn out to include the customary practice in the West. Our interpretation of the 'Japanese way' can not be reconstructed as a Nash equilibrium: what we find is a modified form where the user appropriates benefits from the supplier. We also find a 'Third Way', which is best in the world of rapidly changing and complex global markets that is now emerging. Different conditions require different forms of subcontracting.

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costs, partnerships, learning, Japanese management, spill-overs, gametheory.

Introduction

In the present paragraph we briefly discuss the literature on differences in subcontracting in the West and Japan. This is followed by a summary of the main theory used: transaction cost economics (TCE). That framework is extended with a perspective of learning, with a discussion of the role of partners for learning under present conditions of global markets and rapid technological development. This provides the basis for a model which specifies returns and risks for supplier and user in a subcontracting relation. Subsequently different 'possible worlds' are defined in terms of the model parameters, and for each world Nash equilibria are deduced. It is investigated whether these equilibria reconstruct practices in the West and Japan and perhaps some 'Third Way'.

Many authors have reported fundamental differences in practices of outsourcing by firms in the West (US, EU) and Japan, mostly on the basis of studies in the auto industry. While in some respects European practice is somewhat closer to Japanese practice, it remains more similar to American practice. The past success of Japanese industry appears to be due to some, perhaps considerable, extent to their supplier-user relations. See e.g: Helper (1991), Helper & Levine (1992), Dyer & Ouchi (1993), Cusumano & Fujimoto (1991), Dore (1983, 1986), Womack et. al. (1990), Lamming (1993). Loosely, 'Japanese practice' is characterized by long term relations with only one or two suppliers, governance based on trust rather than detailed contracts, high involvement of supplier is design and development activities, high levels of relation-specific investments, exchange of staff and technology, emphasis on quality and innovation rather than price, while 'Western practice' is the opposite. Our attempt to describe the two forms more precisely yields the following.

The Western stereotype can be characterized as follows: 'closed' with respect to information exchange and 'distant' with respect to commitment in terms of investments. Relations are often adversarial rather than cooperative. Outsourcing is driven primarily by considerations of cost, given minimum requirements of quality, and hence a low price demanded from suppliers,

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regardless of the profit that is then left to them. Not only the specification but also the design and even part of the engineering of inputs is performed by the user, as a blueprint for production by the supplier. Control of design and quality takes precedence over utilization of supplier competence. Transfer of knowledge and technology to and investments in the process of the supplier by the user are evaded. The supplier shields off information about his process and costs.

The Japanese stereotype (with respect to main suppliers), can be characterized as 'dedicated' with respect to information exchange and investment. The prime orientation of relations is cooperative. Relations are restricted or exclusive (single sourcing; single supply). Outsourcing is driven primarily by considerations of quality, in the sense of a good fit to requirements for differentiated products, given a maximum price. The user aims to utilize as much as possible the capacities of the supplier. Therefore he leaves part of the design and engineering, as well as production, to the competence and often the initiative of the supplier, and invites him to contribute to the determination of optimal specifications. This requires specific investments, particularly on the part of the supplier, and to cover for this the user gives certain guarantees (long term contracts, sufficient minimum volume of purchase), but then requires openness on the part of the user concerning technology used, costs and supply to other customers, in order to control for misuse of such guarantees ('open book contracting'). This openness is also required for effective information exchange for cooperation in development and production. Such openness may have negative effects on the bargaining position of the supplier, and to cover for this, the user grants a profit margin to the supplier, deducts this from the price he can afford to pay, thus arrives at the cost at which the input is to be produced ('price minus costing'), transfers knowledge, technology and staff to the user, and jointly they invest in development in order to achieve production at this price-minus-profit cost.

As described, the forms are indeed setreotypes. Helper (1991) and Helper & Levine (1992) showed that in the early days of the American auto industry buyer-supplier relations were like later 'Japanese practice', and recent practice is returning to it, while in Japan 'Japanese practice' may be on the wane. To explain this, Helper argues that the type of relations is determined not

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so much by national culture or tradition as by market structure. Her argument consists of two parts. The first part is that there is trade-off between innovation and power over suppliers. Innovation requires utilization of suppliers' contribution to innovation, by means of their participation in design and development, with ensuing specific investments, exchange of staff and technology, longer term relations, etc. (the 'Japanese form'). But this increases the dependence of the buyer on the supplier, who can then claim a larger share in rents on the buyer's side. The second part of the argument is that when competition in the buyers' market is intense, producers are forced to innovate more, which leads to the 'Japanese form', while in an oligopoly (or a market with high entry barriers), buyers can afford not to do that, and to maintain more and closer competitors in the supplier market, to prevent having to share their oligopoly rents. The historical phenomena indicated above can be explained by the American auto industry moving from intense competition in the early days (1909 - 1904) to oligopoly (with only Ford, GM and Chrysler), which lasted until the inroads of competition from Europe and Japan in the eighties. The Japanese, on the other hand, after having achieved high market power, are now tempted to lower the utilization of supplier competence and increase competiton among them.

The first part of Helper's argument is plausible and will be deepened in this article. The second part is convincing from the perspective of competition in the long term. But in the short term, during a downswing of the business cycle, the auto industry, with its high fixed costs, is confronted with competitive pressure to lower prices, and to achieve this by putting price pressure on their suppliers. This has been exhibited in the recent recession and its effects on the auto industry in Europe. Here the relation between profits and type of relation is reversed: low profits (in recession) put pressure on buyers to put more price pressure on suppliers and renege on longer term commitments if those are in place. This is likely to be destructive of those longer term relations and their corresponding prospects for innovation: trust, once broken, is likely to unravel in

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an accumulation of distrust and defection[1]. But due to the pressure for short term survival in a recession this conduct may nevertheless occur. In other words: we propose that both mechanisms obtain. If in the longer term global competition in the auto markets is to remain, and therefore ongoing innovation is required for long term survival, those players have the best chances of survival who have the means to resist the pressure of short term survival in recessions to break down long term supplier relations.

While we recognize that the 'Japanese form' is gaining adherence in the West, and that to some extent there may be hybrids, for the sake of clarity we will reconstruct stereotypes of 'Western and Japanese practice'.

For the development of policy of firms, nations and the EU, it is of some importance to answer the following questions:

- How can these differences be understood: why do they arise; what is their rationale
- Is Japanese practice indeed better?
- Should US and EU firms emulate the Japanese, and to what extent are they able to do so, and if not, what are the obstacles
- Is there perhaps a third way, better than both US/EU and Japanese practice
- What would be required to shift to the latter practice

From this we derive the following research questions for the present paper:

- Can we deduce generic forms of outsourcing from theory?
- How do these forms relate to differences in market structure?

- In those forms, can we recognize existing practices and differences between the West and Japan?
- Can we find new alternatives?
- What perspectives or obstacles are there for the transition to novel, better

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[1] Recently, many suppliers have said that after they entered upon the building of longer term relations with some hesitation and suspicion about the "idyllic" prospects that were offered of "partnerships" and "co-makership", during the recession they saw that the suspicions were correct and that they will not make the same mistake again.

forms?

For a theoretical perspective, we will employ transaction cost economics (TCE), but that theory will have to be extended.

TCE

Before we consider extensions and formalization of TCE, a brief summary of its relevant points is perhaps needed. Readers familiar with TCE can skip this paragraph. We concentrate on the main issues, discussed in TCE as developed by Williamson (1975, 1985, 1989), and we will not at each point discuss the criticisms and extensions offered in the literature. However, a crucial extension will be added in the following paragraph.

TCE explains how transaction partners can get 'locked in' to each other as a result of transaction specific investments causing switching costs, and thereby incur risks of opportunistic behaviour, which cannot be prevented due to bounded rationality. These risks are part of the costs of transactions. Note that transaction specificity, (possibility of) opportunism and bounded rationality each form a necessary condition of these risks. For modelling this, it is straightforward to adopt a multiplicative specification: if any of the variables (specificity, opportunism, boundedness of rationality) is zero, their joint effect is zero.

TCE has implications, in particular, for vertical transactions between suppliers and users of goods and services. In the first version of TCE, as set out in Williamson (1975), the central issue was whether a firm should make some input itself, in which case it chooses 'hierarchy' as the 'form of governance', or buy it from an outside producer, in which case it chooses the market as form of governance. In this decision the costs of transaction are to be traded off against the advantages of outsourcing. According to TCE these advantages lie in scale advantages of a specialized outside producer, who produces for a larger market than the needs of a single user, and market incentives arising from the need for the supplier to maintain efficiency for the sake of survival. As a result, when investments are highly transaction specific, the advice from TCE is: make rather than buy, since in the case of buying transaction costs are high while specializ-

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ation advantages of an outside producer are small.

In a later development of the theory (Williamson, 1985), it is recognized that outsourcing may be desirable even when investments are moderately specific, and the ensuing risks involved in dependence may be controlled in a form of governance 'between market and hierarchy'. When transactions are sizable and frequent it is worth while to institute detailed controls in 'bilateral governance'. In case of a smaller volume and frequency of purchase such investments in governance are not efficient, and it is better to call in a third party as arbitrator, in 'trilateral governance'.

The controls in bilateral governance include: reciprocal supply in which both sides incur transaction specific investments symmetrically; joint ownership of transaction specific investments; the provision of guarantees to the most dependent party to ensure that the cost of one-sided specific investment is recouped. Typically, but not necessarily, the weight of specific investments lies with the supplier, who invests in specific machinery, knowledge, procedures, locations in order to offer a product that is specific to the user[2]. Guarantees then include: guaranteed volume, frequency or period of purchase; severance payment in case purchase is stopped prematurely (before the investment is amortized); posting of hostages. The relevant feature of a hostage is that it asymmetrically carries intrinsic value for the giver but not for the receiver. Thereby its advantage over a monetary guarantee, with symmetric value to giver and receiver, is that there is no incentive on the part of the receiver to expropriate the hostage outside the conditions under which it is given, i.e. other than to punish the partner for defection. To the extent that a guarantee has value for both sides, the giver will require control or counter-guarantees against its misuse. If a user participates in the payment for a specific asset for the production of an input, or guarantees volume of purchase, he will want to ensure that the asset is not employed for production for a competitor.

Learning

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[2] For a rigorous discussion of the notion of specificity, see Nooteboom (1993b).

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Due to the force of the emerging economies in East Asia, world markets have become more competitive. In order to escape from extremes of price competition, firms are seeking to further differentiate their products. Differentiation is feasible only if several conditions are satisfied: in consumer demand, production, marketing and supply. In consumer demand, ongoing individualization provides opportunities for differentiation. In production, application of information and communication technology (ICT) yields flexible manufacturing systems, that allow for product differentiation by reducing set-up costs. In logistics, an explosion of stocks, one for each differentiated product, can be prevented by means of 'just in time delivery', which also is enabled by ICT. But to successfully offer many different products to different, increasingly fragmented market segments, one needs complex, detailed and up to date information and competence concerning those market fragments, and concerning technological opportunities in the supply of inputs. Supply is complicated, in particular, by the proliferation of new materials (plastics, metals, ceramics, composites, bio materials). For a single firm, such a detailed and fast changing stock of knowledge concerning market fragments and supply opportunities is not 'sustainable', as Zuscovitch (1994) put it. One needs partner firms that are close to specific markets, and partner firms close to specific sources, who specialize in the required knowledge and make it profitable by sharing it with partners, in networks of partial cooperation. Increasingly, it is impossible to combine product differentiation with organizational autonomy. ICT provides the technical means for rapid, efficient, frequent and increasingly rich communication in networks.

From TCE one can derive the argument that increased uncertainty (concerning future contingencies) makes it more difficult to write closed contracts and therefore would ceteris paribus yield less outsourcing. On the other hand, more uncertainty would require more flexibility of switching between sources, which would plead for more outsourcing, since there is more flexibility in shifting outside supplier relations than investing and divesting internal supply departments, even if outside relations are of the 'Japanese type'. If the main objective is innovation, there is an argument from Langlois and Robertson (1989, quoted in Helper, 1991: 796) that vertical integration favours innovation

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because it promotes communication. Helper (1991: 797) objected that: "Whereas a systemic rearrangement of the production process benefits from vertical integration, product innovation may benefit from decentralization, which gives access to a multiplicity of ideas". Nooteboom (1992, 1995) argued that effective learning between partners requires a balance between cognitive proximity, which is required for understanding, and cognitive distance, which is required for novelty. Here, 'cognitive distance' involves not only spatial and organizational proximity but also proximity in language, objectives, norms, and the like. One can have large cognitive distance at short spatial distance or within an organization. In view of the central importance of learning, let us consider the issue a little more deeply.

The lack of a dynamic perspective on the role of transaction relations in learning and innovation in TCE is a fundamental shortcoming (Nooteboom, 1992). Williamson himself (1985, p.143-144) granted that from a dynamic perspective Transaction Cost Economics (TCE) requires further development: ".. *the study of economic organisation in a regime of rapid innovation poses much more difficult issues than those addressed here ... New hybrid forms of organisation may appear in response to such a condition ... Much more study of the relations between organisation and innovation is needed*". Since at present business is labouring under such a regime of rapid innovation, such progress in TCE is of some importance. Since innovation entails change of knowledge, an adequate dynamic theory of transactions requires a theory of knowledge and learning. Thus, we must consider the role of transaction relations in the change of knowledge.

Nooteboom (1992) indicated the need to cooperate with partners from a constructivist epistemological perspective. Epistemological subjects perform cognition, which consists of perception, interpretation and evaluation, on the basis of categories which they have developed on the basis of interaction with their physical and social environment. By consequence, cognition is path-dependent and to some extent idiosyncratic. Cognition varies across subjects to the extent that they have developed their categories in different environments. Conversely: cognition will be more uniform in stable, shared environments. In

present conditions of rapid technological and market change cognitions vary considerably.

You cannot react to opportunities and threats if your categories are not fit to deal with them. Thus firms may make rather than buy inputs simply because no external firm has the proper ability to acquire the necessary competence, and conversely firms may have to buy rather than make because they themselves lack such ability. In the short term competence may be bought by taking over a firm, but then there is a risk of a break-down of the acquired competence when it is adjusted to fit in the firm that does the take-over. From the constructivist view, the merging of different firms entails a possibly very difficult integration of different categorial systems. There may be an impossibility here which is comparable to the impossibility of crossing different species, arising from different evolutionary paths. This is reflected in the experience that many mergers and acquisitions fail.

In fact, a whole new dimension is added to the existence of the firm and the value of external partners. Due to increased volatility of technology and markets firms need to focus more on core competencies (Prahalad & Hamel, 1990). In order to be effective, one needs a focus of cognition and action. Trying to see, understand and do everything yields inaction and certain defeat in the market. Quite apart from transaction costs, a firm is needed to function as a focusing device. The problem of such a focus is, however, that one is in danger of missing out on the perception and interpretation of relevant threats and opportunities. Thus one needs outside partners, with a different but complementary categorial apparatus, to pick up and translate relevant developments, as a form of external intelligence.

In other words, after Williamson's argument, following Commons (1934), that we should take transaction as the basic unit of analysis, I proposed that in view of the importance of innovation we may now have to consider perception (and interpretation and evaluation) as the basic unit. Firms are needed to focus and thereby limit perceptions in order to produce action; transactions between firms serve to complement limited perceptions.

The crux of the argument lies in what could appropriately be called

'external economy of cognitive scope' (EECS):

> Level of competence is enhanced if at least two different entities connect their activities, on the basis of different, complementary cognitive abilities.

Learning may take four different forms. The first results from engaging in transactions with multiple partners, which generates varied experience, even if the partners do not actively engage in transfer of competence to the focal agent. The second is that the focal agent learns by transfer of competence from his partner, which operates regardless of whether transfer is reciprocal: one benefits from transfer from the partner even if one does not transfer one's own know-how to him. The third form is more varied learning by transfer from the partner when the partner in his turn derives competence from various other sources, in a network which may include competitors of the focal agent. One may need intermediate linkages to bridge a large cognitive distance. The fourth form results from joint development with the partner: one benefits only if one also contributes. In contrast with the other forms, the fourth form is not subject to problems of free riding (Nooteboom, 1995).

AS noted in the literature (see e.g. Williamson, 1991), information or technology transfer also entails a risk. This risk is that through the contact with a supplier or customer competitive advantage in the form of proprietary knowledge or technology may indirectly 'spill over' to competitors. The risk is greater to the extent that knowledge consists of codified information, and smaller to the extent that it is tacit. However, even in the case of tacit knowledge, spill-over may occur if cooperation entails that specialist teams are stationed at the partner's location. Transfer of competence requires control of this risk. The size of this risk depends on the pattern of the network of relations in which a firm is embedded. In particular, spill-over risk is higher to the extent that your partner has multiple partners who might be your competitors.

Specification of returns

Transactions yield value, in the form of returns from exchange, and carry risks, of 'hold up' (due to dependence incurred as a result of specific assets) and spillovers. For the purpose of our exploration of generic forms of subcontracting, we make specifications for boundary cases, in terms of dichotomous variables: whether or not the user engages in price-minus costing (PMCOS); whether or not the supplier engages in open-book contracting (OPEN) and specific investments (SPEC); whether or not there are multiple suppliers (MULSUP) for the user and muliple customers for the supplier (MULCUS); and whether or not the user transfers knowledge to the supplier (UTRAN) and vice versa (STRAN). In these dichotomous variables 1 indicates 'yes' and 0 'no'.

An important side condition must be mentioned:

one cannot have information transfer without openness. In other words:
STRAN = 1 implies OPEN = 1.   (1)

We normalize the surplus of exchange at 2 for a standard product, i.e. if it is not tailored to the specific demand of the user, and is produced at the volume required for the user. In this case each side will obtain a return of 1 if the surplus is distributed equally. Deviations from this 'focal point' depend on bargaining positions, which are determined by price-minus costing, open-book contracting and access to alternative transaction partners, as will be explained below. If scale effects are important, both sides obtain additional benefits when the supplier produces at a larger volume.   This requires that assets are non-specific (can be used for production for other customers) (SPEC = 0) and that there are multiple users (MULCUS = 1). If product differentiation is important, both sides obtain additional benefit when there is specificity of supplier assets (which is assumed to be required for differentiated products) (SPEC = 1)[3]. In other words: we are creating a choice between specialized production for a

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[3] The implicit assumption is that specific (i.e. differentiated) products require specific investments on the part of the supplier. Nooteboom (1993a) shows that the two don't necessarily go together. However, they typically do, and it is then that interesting, problematic issues of governance arise.

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differentiated product and large scale production for a standard product.

Having multiple partners (MULCUS; MULSUP) can yield benefits for several reasons: better bargaining position (as already indicated) and greater flexibility, due to opportunities to switch between partners, spread of risks and learning from varied transactions. Learning from a partner is much enhanced when he actively contributes to the transfer of competence ('transfer': STRAN or UTRAN = 1). When variety of sources of information is important, the utility of the sources is increased to the extent that the source itself has multiple partners ('varied learning': STRAN.MULCUS = 1; UTRAN.MULSUP = 1). A yet more intensive form of learning arises when the two partners jointly produce competence ('joint development': STRAN.UTRAN = 1). Next to these positive benefits, transfer of competence carries risk of spillover: the risk that through the partner information or competence spills over to a competitor. This can happen only if the partner himself has multiple partners ('spill-over': STRAN.MULSUP = 1; UTRAN.MULCUS = 1).

With respect to bargaining position we choose an asymmetrical specification: only the supplier risks loss of bargaining position and hence share of the surplus due to being open ('open book contracting'; OPEN = 1). This risk can be eliminated by the user (U) granting a profit margin to S ('price-minus costing'; PMCOS = 1), or by the supplier by keeping access to multiple customers (to create a credible threat of switching to another customer; MULCUS = 1). The size of this risk is indicated by the parameter b. If S has strong and unique competencies to offer, b is small or zero.

The inclusion of all these effects yields the following specification, under side condition (1):

for the supplier:

SRET = 1 - b(1-PMCOS).OPEN.(1-MULCUS)	bargaining
+ sS.(1-SPEC).MULCUS	scale
+ dS.SPEC	specific product
+ mS.MULCUS	multiple partners
+ tS.URAN	transfer

$$+ \text{vS.UTRAN.MULSUP} \qquad\qquad \text{varied learning}$$
$$+ \text{jS.UTRAN.STRAN} \qquad\qquad \text{joint development}$$
$$- \text{rS.STRAN.MULSUP} \qquad\qquad \text{spill-over risk}$$

$$(2)$$

where: SRET = return for the supplier

b<1, sS, dS, mS, tS, vS, jS and rS are coëfficients indicating the weights of the several components of returns to the supplier

For the user:
$$\text{URET} = 1 + \text{b(1-PMCOS).OPEN.(1-MULCUS)} \qquad \text{bargaining}$$
$$+ \text{sU.(1-SPEC).MULCUS} \qquad\qquad \text{scale}$$
$$+ \text{dU.SPEC} \qquad\qquad \text{differentiated product}$$
$$+ \text{mU.MULSUP} \qquad\qquad \text{multiple partners}$$
$$+ \text{tU,STRAN} \qquad\qquad \text{transfer}$$
$$+ \text{vU.STRAN.MULCUS} \qquad\qquad \text{varied learning}$$
$$+ \text{jU.UTRAN.STRAN} \qquad\qquad \text{joint development}$$
$$- \text{rS.UTRAN.MULCUS} \qquad\qquad \text{spill-over risk}$$

$$(3)$$

where: URET = return for the user

The subscript U refers to the user

When the coefficients are used without subscripts (S, U), they refer to both partners.

The items of 'transfer, varied learning and joint development' represent a specification of the concept of 'external economy of cognitive scope' (EECS) that we developed before.

Concerning the risk of spill-over, note that spill-over can be blocked by exclusive relations: by requiring the partner not to engage in other contacts for the same product. Note that even when there is no direct linkage of one's partner to one's competitors, information might still spill over to competitors through other linkages, such as through a supplier in a different but related market, or a customer of the customer, who is strongly linked to a competitor. But at least

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direct spill-over is blocked: it will take longer for information to reach a competitor, and in the longer process of transmission there is more attrition of meaning (i.e. distortion through interpretation in different categorial systems) and a greater chance of obsolescence.

Hold-up risk

Next to risks in bargaining and risk of spill-over, transactions entail the 'hold-up'risk familiar from TCE, as a result of specific investments, in the form of:

- loss of specific assets , to the extent that one participates in their finance

- payment of guarantees, or loss of hostages committed to protect specific assets of the partner

- loss due to pressure to compromise on cost, price or quality, due to opportunism which preys on dependence created by unprotected specific assets.

This risk arises for S if he engages in specific investments (SPEC = 1) and U neither participates in ownership nor gives guarantees (PART+GUAR = 0). It arises for U if he participates/guarantees, while S does not provide openness for U to control for misuse of ownership or guarantees (OPEN = 0).

In our formalization we take boundedness of rationality for granted, under all conditions, so that it need not be indicated. Opportunism, however, although its presence, latency or absence is difficult to identify prior to a relationship, need not always obtain, and may be identifiable to some extent on the basis of experience with a relation or public reputation.

We focus on the characteristic case of user-supplier relations, where the user produces a differentiated product, and in order to provide high quality of adjustment to user needs the supplier needs to conduct more specific investments than the user. Note that the user may also need to make specific adjustments, to receive the product or to contribute to its development. We assume that the size of these specific investments is much less than those for the supplier. Note also that even if the user requires no specific investments at all, specificity of invest-

ment on the part of the supplier also makes the user dependent to some extent: if supply is discontinued, the user will incur loss of quality, because he has to buy a substitute that conforms less closely to specifications, or higher cost, because conformance to specifications requires purchase at a more expensive source, or delay, because a substitute source first needs to invest to conform to specifications, or some combination of these. However, typically this risk is smaller than the risk of loss of investment and switching costs faced by the supplier. If symmetry of specific investments does occur, the problem of the risk of hold-up becomes much less because there is a threat of retaliation. So it is both more realistic and more interesting to assume asymmetry in the form of larger specific investments on the part of the supplier.

Unlike risks of bargaining and spill-over, hold-up risk has not been incorporated as a cost in the functions of return (2,3). The reason for this is that it appears to be of a different order, in the sense that firms generally seem unwilling to run any sizeable hold-up risk, at any level of returns. In other words: they do not want to submit to possible opportunism of the partner as a result of dependence ensuing from specific investments. We will, however, also consider the situation of trust: agents accept the risk of hold-up, on basis of the belief that hold-up will not occur.

The following specification of hold-up risk appears to capture the main issues, derived from TCE

For the supplier:

$$SR = [\{1-(PART+GUAR)\}.SPEC].UOPP \quad \text{specificity risk} \quad (4)$$

where: SR = supplier risk

PART+GUAR = indicator whether the user participates in the payment for specific investments[4] (PART) or gives guarantees for return on

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[4] We assume that in the case that the user participates in the payment for a specific asset, the supplier retains the power to dispose of the asset, even if the user pays 100%. Otherwise the supplier may again incur a serious risk in that the user could at any moment withdraw the specific asset to employ it elsewhere (Cf. Semlinger, 1991). This

specific investments is guaranteed by the user (including the supply of hostages) (GUAR)

UOPP = indicator of opportunism on the part of the user

For the user:

UR = [(PART+GUAR).SPEC.(1-OPEN)].SOPP specificity risk   (5)

where: UR = user risk

OPEN = indicator of control by the user of misuse of participation in assets or guarantees, on the basis of the supplier's openness to inspection ('open book contracting')

SOPP = indicator of opportunism on the part of the supplier

Formula (4) shows that to eliminate hold-up risk, the supplier has the following strategic options:

-        avoid opportunism (UOPP=0), e.g. by doing business only with family or close friends, or clan members, or with firms with a reliable reputation for low opportunism

-        demand full financial participation or guarantees, or a combination of the two from the user (GUAR+PART=1)

-        do not engage in specific investment (SPEC=0)

According (5), the user has the following strategic options to eliminate hold-up risk:

-        avoid opportunism (SOPP=0)

-        refuse to yield financial participation or guarantees (GUAR+PART=0)

-        demand full control of misuse of guarantees (OPEN=1)

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aspect could be included explicitly in the specification of the model, for example by specifying that the maximum for the variable PART is not 1 but 1/2, on the assumption that when it exceeds 50%, ownership passes to the user. However, at this point we prefer to keep the model as simple as possible.

Possible worlds and stereotypes

The central question for this research is the following:

> *Can the stereotypes of Western and Japanese contracting be reconstructed as Nash equilibria in some plausible worlds, how efficient are they, and is there an alternative that is better than both, in any plausible world?*

By 'plausible worlds' we mean worlds that are realistic in the sense that they are consistent and capture the core characteristics of worlds that exist, have existed or may soon exist in some significant part of the world. One world is designed to give 'Western contracting' a chance of being an appropriate strategy, and a second world is designed to give 'Japanese contracting' a chance.

We now specify the stereotypes of Western and Japanese contracting and 'possible worlds', in terms of values of the parameters in the models (2,3,4,5). Subsequently we analyse what Nash equilibria obtain in those worlds, and see whether they correspond to Western and Japanese contracting.

Our reconstruction of the 'Western' and 'Japanese' stereotypes in terms of the variables from the model are as follows:

> *Western contracting*: PMCOS = OPEN = PART+GUAR = SPEC = UTRAN = STRAN = 0; MULCUS = MULSUP = 1. In other words: Users do not grant margins to suppliers, suppliers do not engage in open book contracting, users do not supply guarantees to cover specific investments by the supplier, the supplier does not engage in specific investments, there is no transfer of competence between them, and they engage in multiple sourcing and multiple supply.

> *Japanese contracting* is characterized as the opposite: PMCOS = OPEN =
> GUAR+PART = UTRAN = STRAN = 1; MULCUS = MULSUP = 0.

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Users and suppliers work closely together, allowing mutual profit, covering for each other's risks and mutually transferring know-how, and they engage in exclusive relations (single sourcing; single supply). To prevent misunderstanding: single sourcing and supply mean exclusiveness only for the duration of a given model of a given product. For different models, a given input is likely to be sourced from among different suppliers, to maintain incentives for ongoing improvement and to keep monitoring the accomplishments in the market more widely (Kamath & Liker, 1994).

The possible worlds that we propose as plausible ones are the following:

The world of the *clan* (W1): Here there is no opportunism (SOPP = UOPP = 0), due to actors being tied together in clans, with pervasive trust based on norms, values and rules, kinship relations, social control or the need to maintain reputation (cf. Ouchi, 1980; Nooteboom, 1994). This eliminates hold-up risk (see 4, 5), and this world thereby becomes something of a 'degenerate' case.

This world can also be used to represent the situation where agents accept hold-up risk even where it is not eliminated by lack of opportunism.

The *'Fordist world'* (W2): standard products and stable markets and technology. In this world there is no global competition, little need for product differentiation, integrated firms, and a focus on price, cost and economy of scale. There is advantage in the flexibility, bargaining position and varied contracting with multiple partners. Due to stability and homogeneity of perceptions there is no great need for learning by transfer from other firms. In terms of the earlier discussion: EECS is not relevant. In terms of model parameters it is characterized as follows: for both U and S: $s > d$; $m > t,v,j$. This world is expected to favour 'Western contracting'.

The *'world of efficient quality'* (W3): High quality is required in terms of close fit to specifications of differentiated products. Due to differentiated products there is limited economy of scale, and there is a premium on specific inputs and corresponding assets, and close cooperation between supplier and user, for optimal use of complementary competencies. Turbulence, in terms of change of markets and technology, is limited, so that learning from many outside partners is not essential. In terms of the model parameters: for U and S: $d > s$; $t,j > m,v$. This world is expected to favour 'Japanese contracting'. Risk of spill-over exceeds the benefits of transfer:

$r > t+v+j$.

The world of *'raplex: rapid change and complexity'* (W3): intense competition in global markets, differentiated products (in both input and output markets), fast technological development. In this world, like the previous one, there is a need for specific investments to produce differentiated products, but in addition all forms of learning from outside partners are important (EECS): d, t, m, v, j are all important and the benefits from transfer exceed the risk of spillover: $t+v+j > r$. Within this world we recognize special cases, where the risk of spill-over is small from three different causes:

'radical speed' (W4a): change is so fast, that the life cycle of products is shorter than the development time of new products. Here spill-over does not matter: by the time that sensitive information reaches a competitor, through linkages in the network of one's partner it is obsolete.

'monitoring against spill-over'(W4b): there are technologies to monitor what happens to competence transferred so that their spill-over can be controlled.

'radical differentiation' (W4c): competing producers are so radically differentiated that they cannot greatly benefit from information that spills over from them.

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This world is designed to capture conditions that are presently emerging in the industrialized world. In this world we are curious to see what equilibria come out, as some 'Third way' next to the 'Western' and 'Japanese' forms of contracting, and to see in what respects   it differs from those two.

Outcomes

We now use game theory for a derivation of Nash equilibria, which are interpreted as 'generic forms of contracting', in each of the possible worlds specified.

A major question in a model of this type is how to weigh risks against returns. As shown, risks of bargaining and spill-over were integrated as costs in the functions of net revenue (3,4). Hold-up risk is treated separately, with risk being either zero or unity; either absent or complete. In this setting, in the determination of equilibria we focus on outcomes in case of risk aversity, where agents first exclude strategies that yield (full) hold-up risk, and then go for maximum returns. However, we also discuss what outcomes are under acceptance of risk.

In W1 (*clan world*) we have:
The advantage of W1 is that there can be dedicated products (SPEC = 1) without the need for measures of 'governance' to protect against hold-up risk (PART+GUAR). Also, in this world of mutual trust risks of spill-over are likely to be small, either because partnership is restricted (MULCUS = MULSUP = 0), or even if there are multiple partners risk of spill-over is limited. Spill-over may still occur accidentally, but not due to opportunism or the use of sensitive information from the partner as a hostage. But restricted partnership also implies a weakness, because it entails that the scope for learning is limited. The clan regime only works if no one can defect and get out ('hit and run'), and there is no outside competition. In due course, this is expected to lead to lack of innovation and backwardness. In this world there are several outcomes, depend-

ing on the model parameters, as follows[5]:

> *clan contracting*. It is characterized by the following parameter values.
> SOPP = UOPP = 0; PMCOS = OPEN = UTRAN = STRAN = 1.
> If s > d: SPEC = 0 and MULCUS = 1; RET = 1+s+m+t+v+j, risks are zero.
> If d > s: SPEC = 1 and PART+GUAR = 1; RET = 1+d+m+t+v+j, risks are zero. Here RET indicates returns for both S and U

These outcomes also obtain in other worlds in the case that agents accept hold-up risk.

In W2 ('*Fordist world*') we have:
Since scale is more important than product differentiation (s > d), the highest returns are reached (according to (2) and (3)) for: SPEC = 0 and MULCUS = 1. Since there are no specific investments there is no need for guarantees: PART+GUAR = 0 (see (4)), and therefore there also is no need for S to be open in order to provide control of such guarantees for U (OPEN = 0; see (5)). But according to (1) this precludes STRAN = 1. U will then set MULSUP = 1, to obtain benefit m. According to the definition of W2 (m dominates remaining parameters; in particular mU > vU) this is higher than the benefit that U would have obtained from STRAN = 1 combined with MULCUS = 1, so there is no reason for U to get STRAN = 1, which would require OPEN = 1 (1). This in spite of the fact that S could afford to do that without losing bargaining position, without needing a margin granted by U (PMCOS = 0), since he can maintain that with the threat of shifting to a different partner (MULCUS = 1) (see (2)). Thus we arrive at the only Nash equilibrium in W2:

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[5] We hesitate to discuss these outcomes in terms of Nash equilibria, because it is arguable that they do not apply in this world. Non-cooperative game theory analyses the utilization that agents make of opportunities to take opportunistic action. But in the present 'clan world', trust prevails, and trust may be defined as the inclination **not** to employ opportunities for opportunism, even though one may have a material interest in doing so (Nooteboom, 1994c).

> *Standard products with multiple partners and no transfer* ('Western form'). In model parameters: PMCOS = OPEN = STRAN = UTRAN = PART+GUAR = SPEC = 0; MULCUS = MULSUP = 1. RET = 1+s+m.

Note that this is <u>identical to our reconstruction of the stereotype of 'Western contracting'</u>, so that we can conclude:

> In the Fordist world Western contracting yields an efficient Nash equilibrium.

in W4 (*raplex: rapid change and complexity*, with low risk of spill-over relative to the benefits of learning), there is no reason why agents should not set the relevant parameters to achieve 'full learning' (m+t+v+j): STRAN = UTRAN = MULSUP = MULCUS = 1. By (1) this requires OPEN = 1, but according to (2) the loss of bargaining position by S that this might entail is averted by MULCUS = 1, and there is no need for a guaranteed margin for S (PMCOS = 0). To achieve advantages of differentiated product requires SPEC = 1, but to eliminate hold-up risk for S (4) this requires PART+GUAR = 1, but to eliminate hold-up risk for U (5) this requires OPEN = 1. Thus we arrive at:

> *Cooperation with multiple partners and full learning*: SPEC = PART+GUAR = OPEN = SPEC = STRAN = UTRAN = MULSUP = MULCUS = 1; PMCOS = 0.

We call this form of contracting the 'Third way', since it presents an alternative to the stereotypes of Western and Japanese contracting.
This is a Nash equilibrium: given the conditions of the world considered, and the parameters chosen by the partner, no-one can improve his position.

In W3 (*efficient quality*) we run into problems: there the 'Japanese form' does not emerge as a Nash equilibrium, and thus our expectation here is not fulfilled. We spend a separate paragraph on the issues involved.

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Problems with Japanese contracting

In W3 (*efficient quality*), our expectation was that Japanese contracting would constitute an efficient equilibrium. Let us consider that possibility.

Since in this world product differentiation is more important than scale, the aim is SPEC = 1. For S to eliminate the hold-up risk involved (4), he requires guarantees (PART+GUAR = 1), but (5) then U requires the opportunity to monitor S for misuse of such guarantees (OPEN = 1). This also opens the possibility for the transfer of competence by S (STRAN = 1) that is important in this world. In this world spill-over risks dominate the benefits of learning. To eliminate that risk for S (2) this requires that U does not engage in multiple partnerships (MULSUP = 0). In this world the return from joint development (j) dominates remaining parameters; in particular $j > m$. Therefore UTRAN = 1, and to eliminate spill-over risk for U (3), this requires MULCUS = 0.

The alternative would have been UTRAN = 0 combined with MULCUS = 1, which together with STRAN = 1 would have yielded U the return v, but would have led S to set STRAN = 0, to avoid spill-over risk, so that U would lose j, and the loss would have exceeded the gain m ($j > m$). Since OPEN = 1, and MULCUS = 0, according to (2) not to lose bargaining position S requires U to grant him a margin (PMCOS = 1). Thus we arrive at the Japanese form of contracting:

> *Cooperation in exclusive partnerships* ('Japanese form'). PMCOS = OPEN = SPEC = PART+GUAR = STRAN = UTRAN = 1; MULSUP = MULCUS = 0;
> RET = 1+d+t+j.

Given the conditions of world W3 this form of contracting is efficient, but as we will demonstrate below, it does not constitute a Nash equilibrium.

The first problem is that we are in a prisoner's dilemma (PD) situation: from the position indicated both parties are tempted to engage in multiple

partnerships, in order to gain additional benefit (m). But this creates risks of spill-over (2,3), and to eliminate this, transfer of competence is stopped (STRAN = UTRAN = 0), and in W3 the gain (m) is less than the loss (j), so that both sides are worse off. Yet this is what agents will choose, for fear that if one does not and the partner does, one loses too much.

An opportunity to get out of the PD arises in a repeated game, by threatening an end to the relation if the partner does not maintain an exclusive relation. This may yield mutual cooperation in maintaining exclusiveness by 'tit-for-tat' or some equivalent procedure (Axelrod, 1984).

But there is another problem that cannot be solved. Why would U accept that he must provide a guaranteed margin to S? Suppose that he does not, and puts PMCOS = 0? Then returns would be as follows:

$$SRET = 1-b+dS+tS+jS; \quad URET = 1+b+dU+tU+jU \qquad (6)$$

In an attempt to prevent this, S may threaten to revert to multiple customers (MULCUS = 0), to restore bargaining position[6]. But is this a credible threat? To eliminate spill-over risk U would set UTRAN = 0, and to capture benefit m he would set MULSUP = 1, and to protect himself against spill-over risk S would set STRAN = 0. Returns would then be as follows:

$$SRET = 1+dS+mS; \quad URET = 1+dU+mU \qquad (7)$$

The threat by S to revert to this is credible only if it would make him better off. This is the case only if:

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[6] An alternative is to threaten to close himself to inspection by U (set OPEN = 0). But this is even less credible than setting MULCUS = 1, because he would pay a double price for that. The first is that U would withdraw his guarantees (PART+ GUAR = 0), and then S would have to stop specific investments (SPEC = 0), so that both sides would lose the advantage of differentiated products. The second is that it would prevent transfer (STRAN = 0), which would induce U also to withdraw his transfer (UTRAN = 0), and both sides would then revert to multiple relations (MULSUP = MULCUS = 1), and thereby lose the benefits from transfer.

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b>tS+jS-mS (note that in the present world W3 tS and jS dominate mS) (8)

But b, which denotes the loss that S may incur as a result of loss of bargaining position, can be influenced by U. U could refund S so as to lower b to just below tS+jS-mS. Then condition (8) is not satisfied, and it is better for S to accept the loss according to (6). Substituting b = tS+jS-mS, we then find:

SRET = 1+dS+mS; URET = 1+dU+tU+jU+tS+jS-mS   (9)

In other words: U can appropriate all the benefits from transfer (t) and joint production (j), and we wind up at the equilibrium:

> *One-sided benefit in exclusive cooperation*, with OPEN = SPEC = PART+GUAR = STRAN = UTRAN = 1; PMCOS = MULSUP = MULCUS = 0;
> SRET = 1+dS+mS; URET = 1+dU+tU+tS+jU+jS-mS

Is this, rather than the original reconstruction, the reality of Japanese contracting? Let us call it the 'modified Japanese form'.

One way to avoid this result is to assume that tS+jS < mS, so that (8) is fulfilled. But that means a departure from W3: we no longer have t and j > m for both U and S. At least for S there is less benefit in transfer from U and joint production than from having multiple partners. Let us define world 5 (W5) as a world where: d > s; m > t,v,j. The corresponding equilibrium would be:

> *Differentiated products with multiple partners and no transfer*, with PMCOS = UTRAN = STRAN = 0; OPEN = PART+GUAR = SPEC = MULCUS = MULSUP = 1; RET = 1+d+m.

We might consider yet another world (W6), where for U the benefit of transfer and joint production does exceed the benefit from multiple partners, but for S it does not: d > s for U and S; mS > tS+jS; tU+jU > mU. Since transfer from U to S is of no value to S, S might as well engage in multiple partnerships. That

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enhances the value of S as a source to U. By offering a side payment e, U could get S to cooperate in transferring competence to U. Then returns would be as follows:

$$SRET = 1+dS+mS+e; \quad URET = 1+dU+tU+vU-e \qquad (10)$$

How large would the side payment e be? S could threaten not to give the transfer to U (STRAN = 0). In that case U would respond by engaging in multiple partnership (MULSUP = 1), and returns would be as follows:

$$SRET = 1+dS+mS; \quad URET = 1+dU+mU \qquad (11)$$

As a result, S could push the value of e up to just below the difference in return to U:

$$e = tU+vU-mU \qquad (12)$$

The outcome would thus be:

> *Differentiated products with leading supplier*, with U benefiting from a one-sided transfer from a supplier who is a valuable source of competence and maintains multiple customers, but the supplier appropriating most of that benefit: PMCOS = UTRAN = MULSUP = 0; OPEN = PART+GUAR = SPEC = STRAN = MULCUS = 1; SRET = 1+dS+mS-+tU+vU-mU; URET = 1+dU+mU

A final possibility to try and 'save' the Japanese form is to assume that there is no risk of the supplier losing bargaining position if he is open to the user (OPEN = 1) and has no multiple customers (MULCUS = 0): in (2,3) b = 0. We label this world W7. This might be interpreted as a situation where the product or competence offered by the supplier is so strong and unique that he can effectively threaten not to engage upon the relation at all. Or in other words: the supplier

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has a strong monopoly. But then he would not need a guarantee for margin either, and we would still have PMCOS = 0, rather than 1, as specified in the original 'Japanese form'. In W7 the outcome would be:

> *Differentiated products with monopolistic supplier*, with OPEN = SPEC = PART+GUAR = STRAN = UTRAN = 1; MULSUP = MULCUS = PMCOS = 0. RET = 1+d+t+j

Our conclusion is:

> The 'Japanese' form of contracting, in its original reconstruction (picked up from the applied literature) is dubious, in the sense that with our model we have not been able to design a world where a guaranteed margin from the user to the supplier is part of an equilibrium. Thereby we have not been able to reconstruct the 'Japanese form' as a viable practice. Cooperative relations in exclusive partnerships with mutual transfer either deteriorate to appropriation of the benefits by the user, or require monopoly on the part of the supplier, or shift to one-sided transfer from a leading and technologically independent supplier,

Game tree

We can now piece together the tree for the game in extended form, as illustrated in figure 1. To limit complexity we do not include the worlds that were added later (W5, W6, W7). Also, paths that do not lead to equilibrium are truncated.

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figure 1: game tree

```
                                  UOPP = SOPP
                                       *

                          1                0; W1: clan world
                                                  SOPP=UOPP=0

                                                  $
                            . U: PMCOS      clan contracting
                                            RET=1+max(s,d)+m+t+v+j
                    1              0

                               . S: OPEN


                          1                0   W2: Fordist
                                                    world
                                                    s>d; m>t,v,j


                          .                        .
       W3: efficient           W4: raplex          |
           quality                 d>s;            |
           d>s                      r<t+v+j         |
      r>t+v+j .                     .               |
      t,j > m,v|                    |               |
               |....................|...............|....U: PART+GUAR
               |                    |               |
           1|  0                1|  0            1  |0
               |                    |               |
               |....................|...............|....S: SPEC
               |                    |               |
           1|  0                    |0           1  |0
               |                    |               |
               |....................|...............|....U,S: STRAN
               |                    |               |        UTRAN
           1|  0                1|  0            1  |0
               |                    |               |
               |....................|...............|....U,S: MULCUS
               |                    |               |         MULSUP
           1  |0                 1  |0          1   | 0
               $                    $               $
         SRET=1+dS+mS         RET=1+d+m+t+v+j    RET=1+s+m
    URET=1+d+tU+tS+jU+jS-mS     Third way        Western
    Modified Japanese form:                      contracting
       One-sided benefit
    in exclusive cooperation
```

Conclusions

The conclusions are of course only valid within the constraints set in the specification of the model. Two characteristic assumptions in the model are assumptions of asymmetry:

-   specific investments arise only on the side of the supplier, if they do
-   the supplier runs a risk of loss of bargaining power if he does not satisfy any of the following conditions: unique product offering of high quality, closure to inspection by the user, access to alternative customers

These features have been chosen because they appear in descriptions in the applied literature (e.g: Lamming, 1993; Kamath & Liker, 1994).

Another characteristic is a focus on the aversion of (full) risk of 'hold-up'. Perhaps this is a relic from standard TCE, which focuses on hold-up risk, but it does seem in accordance with observations that firms set great value on evading too much dependence and the corresponding risk of hold-up.

The model aims to express all the key issues from the theory of TCE, extended with a perspective of learning of different sorts.

Formal reconstructions have been made of the stereotypes of 'Western' and 'Japanese' forms of contracting. Plausible worlds have been specified in which these forms seem relevant.

The analysis yields the following results:

-   The stereotype of 'Western contracting' is found to be an efficient Nash equilibrium in the 'Fordist world'. It is efficient in the sense that it yields maximal benefits if benefits from transfer (t) varied learning (v) and joint development (j) are zero, which is consistent with this world view.
-   The stereotype of 'Japanese contracting' is found not to be an efficient equilibrium in the world of 'efficient quality', which was designed to give this form a maximal chance. Exclusive relations of mutual transfer and joint development in the production of differentiated products tend to fall back in the appropriation of the benefits by the user, with the user failing to guarantee a margin for the supplier. Does this represent the

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reality of Japanese contracting? Of course, one may attempt to adjust the model or invent different worlds in a further attempt to reconstruct the 'Japanese form' as defined before.

- In the 'raplex' world of rapid change and complexity, where product differentiation is more important than scale and learning is important, in all forms (m, t, v, j > 0), both the Western and (modified) Japanese forms are surpassed in efficiency by the 'Third Way': mutual transfer with multiple partners and full learning. However, this requires either that learning is so important that any risk for spill-over is accepted, or that speed of change is so fast as to eliminate spill-over risk, or that firms develop a technology of monitoring against spill-over. Of course, the latter condition of monitoring for spill-over is easier specified than fulfilled. It would entail some 'flagging' of information transferred to the partner.

The 'Third Way' resembles Western contracting in its orientation to multiple partnerships, and the absence of guarantees for supplier margin (price-minus costing). It resembles Japanese contracting in its orientation towards specific investments with guarantees, open book contracting, mutual transfer of competence and cooperation in development.

A familiar question in game theory is how equilibria are attained: by anticipation and calculation, bargaining, trial and error, or evolution. Evolution seems most likely here, and this seems to agree with history. In the West, the form of 'Western contracting' evolved in a 'Fordist world'. Once evolved, the form is difficult to change, because it has become embedded as 'normal practice'. A generation of buyers has been trained to go for minimum price. It is difficult for them to adopt a practice where price becomes a boundary condition rather than the central objective, guarantees are given to cover specific assets, the focus is on optimal usage of joint expertise, specifications are not a dogma but are subject to comment, improvement and initiative from the supplier, and gains from improvement are shared. They find it difficult to accept such a break of principles, and are not trained to have sufficient competence to implement them. 'Japanese contracting' has evolved from a different perspective on markets and

efficiency. The Japanese may have become so used to exclusive contracting, in closed networks of relationships ('Keiretsu'), that they find it difficult to widen their perspective to different partners and mutual monitoring for spill-over. However, on the basis of empirical evidence, if not the present analysis, practitioners from both sides may be moved to change their ways, to adjust to the present 'raplex' world of global markets.

Some conclusions for policy are the following:

- there is no single most efficient and strategically viable solution (in the sense that it constitutes a Nash equilibrium) in all possible worlds.

- The Western form was good in the Fordist world, but not in the present world of global markets

- The Japanese form appears to less equitable than is described in the applied literature: it falls back in lack of guarantee of supplier profit and expropriation of benefit by the user. Apart from this asymmetry in the distribution of surplus, joint efficiency is higher than in the Western form, when markets require a shift from a focus on scale to a focus on differentiated products and mutual use of competence between partners, but it offers insufficient learning in the present world of 'raplex' global markets.

- The raplex world of global markets requires a Third Way. But this is viable only if speed of change (in markets and technology) is radical or a technology is developed to monitor spill-overs. It resembles the Japanese way in its orientation to openness, specific assets covered by guarantees, and mutual transfer of competence between partners, and this requires a transformation of practice in the West. However, it is closer to the Western perspective in its orientation to multiple partners. The Japanese would need to open up their more exclusive relations.

There are many opportunities for further research:

- explore alternative specifications of the model; perhaps in further attempts to reconstruct the original specification of the 'Japanese form' as a Nash equilibrium

- exploit the rich source of hypotheses that are conditional on certain

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worlds, to test them in empirical work

- relax the extremes of dichotomous variables, in a more continuous analysis
- in such an analysis, make an explicit trade-off between returns and hold-up risk
- extend the analysis of interaction to multiple partners in a network
- allow for lack of information on strategies and outcomes
- make an explicit model of the development of different forms in different worlds towards evolutionary equilibria

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