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EXCLUSIVE SAFEGUARDS AND TECHNOLOGY TRANSFER:
Subcontracting Agreements in Eastern Europe's Car Component Industry

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Abstract

We study the rationale for the use of exclusivity to protect transfer of technology in subcontracting agreements. The legal possibility arises through the EU Notice on Subcontracting. Empirically, the link between exclusive agreements and technology transfer among firms in the automotive supply industry in EU candidate countries is surprisingly weak, although with exclusive-supply or exclusive-buying clauses in subcontracting agreements upstream transfer of technology is more likely. Exclusive agreements are often reciprocal, and are typically passed on. Downstream firms are more likely to face and use vertical restraints. Technology trickles upstream: Multinational final assemblers transfer more technology than lower-tier suppliers.

Introduction

To what extent are exclusivity clauses used to protect transfer of technology in subcontracting? In subcontracting relations the buyer (the downstream firm) commissions the seller (the upstream firm) to produce a certain quantity of a component or part that the buyer needs for further processing or resale. Such contracts often involve the transfer of intellectual property or technology from the buyer to the seller; hence the direction of technology transfer is up through the supply chain. Exclusivity clauses may protect both the downstream firm's investment in technology and the upstream firm's specific investment in adapting to the technology. Thus buyers as well as suppliers may be subject to exclusivity clauses.

EU competition policy acknowledges this possibility. The 1978 Notice on Subcontracting represents the Commission's views on subcontracting and clarifies how it will evaluate such vertical agreements. In particular, the Notice mentions that: "[t]o carry out certain subcontracting agreements in accordance with the contractor's instructions, the subcontractor may have to make use of particular technology or equipment which the contractor will have to provide. In order to protect the economic value of such technology or equipment, the contractor may wish to restrict their use by the subcontractor to whatever is necessary for the purpose of the agreement. The question arises whether such restrictions are caught by Article [81(1)]" (EU Commission, 1978).[1]

The Notice on Subcontracting applies when the buyer transfers equipment or know-how to the seller so that the seller can provide the buyer with goods or services that differ from those found already on the market. The buyer may then restrict the use of the equipment or know-how and request that the seller supply the contract goods exclusively to the buyer.

When firms employ vertical restraints (VRs) such as exclusive agreements the outcome may be pro- or anti-competitive. Ideally, an associated efficiency gain such as transfer of technology (TT) results. But exclusive agreements also lend themselves to the creation or abuse of market power, for example by allowing foreclosure of competing supply chains or by facilitating market sharing. Industry characteristics inform the frequency of exclusive agreements. Firms with knowledge-intensive operations have a greater need to protect their investments in innovative assets than those in sectors where technological progress is rare. Global and regional industry dynamics impact on the scope of VRs in relationships between suppliers and assemblers and among suppliers. Regulatory environments also influence vertical restraints. Rules are different between EU competition law and US anti-trust law. Outcomes will be different again in legislations without a competition law; where it is not enforced vigorously, or where such legislation is only emerging. Next to the supply of effective competition rules, demand for the protection of intellectual property rights may influence where, how, and why exclusive agreements come about. In sum, there is a common theoretical rationale for exclusive agreements. But their incidence and frequency is country- (or region-) and industry-specific.

This paper addresses the rationale underlying the Notice on Subcontracting theoretically and empirically. We first model theoretically how technology transfer may be protected by exclusivity and what such efficiency enhancing technology depends upon. We

[1] Article 81(1) prohibits anti-competitive agreements.

then study the frequency and incidence of exclusive agreements in Eastern Europe's car component industry: why do they happen; how typical are they for supply relationships between component manufacturers as well as between them and car assemblers; and how do they relate to the regulatory environment? Answers to these questions concern competition authorities in Eastern Europe and in the European Union (EU). In the context of EU enlargement, they also concern policymakers in Eastern Europe for VRs used by multinational firms in foreign direct investments (FDI) may affect the distribution of gains between countries.

Section 1 reviews the theoretical rationale for and empirical evidence of exclusive agreements. Section 2 illustrates industry trends in the international automotive supplier industry and in car component manufacturing in CEE that influence the structure of inter-firm relations. Section 3 describes how exclusive agreements are regulated in EU competition law and contrasts that with the emerging competition policy in Eastern Europe. Section 4 states the hypotheses and presents the research design along with a database of East European car component manufacturers. Section 5 discusses econometric results and insights from case studies. Section 6 concludes.

1 Technology transfer and vertical restraints

Exclusive agreements are vertical restraints that can go in two directions. A firm may grant exclusivity to its customers and thus not sell to their competitors. Likewise it may request from its customers that they not deal in its rivals' products. Hence in combination with upstream and downstream relations, four different types of exclusive agreements exist (see Figure 1).

[Figure 1 about here]

The reasons why a firm may grant or request exclusivity from either its suppliers (S) or its customers (C) are well known (see Rey and Caballero-Sanz (1996, 30-32) for a recent survey). For example, it may aim to protect a specific investment (in physical or human capital, technology or know-how), or to increase market power through vertical foreclosure or strategies that raise rivals' costs. Bernheim and Whinston (1998) demonstrate that it depends on the setting whether exclusionary contractual provisions are irrelevant, anti-competitive, or efficiency enhancing. Exclusivity is irrelevant when a firm would unilaterally decide to deal in only one good. It is anticompetitive when downstream markets develop sequentially and upstream firms must serve more than one market, since this setting creates contracting externalities in the absence of exclusivity. Exclusivity then internalises the externality but leads to foreclosure of rivals. Finally, exclusivity enhances efficiency when the absence of exclusivity leads to incentive conflicts. Rey and Stiglitz (1995) show that exclusive territories which eliminate intrabrand competition make the perceived demand curve less elastic. This causes producers to increase prices to the detriment of consumer surplus and welfare. Butz and Kleit (2001) argue that a combination of (time-limited) exclusivity and resale price maintenance may enhance efficiency because it increases returns to sales promotion by those who are in the best position to do so.

Exclusivity restrictions to protect intellectual property have been dealt with mainly in the context of licensing contracts. Gallini and Trebilcock (1998) review the trade-off

between giving incentives to innovate through patent legislation that allows the innovator a return from investing in research and development through a temporary monopoly, and competition legislation that aims at maximizing static welfare by introducing as much competition as possible. However, they argue against the presumption that an intellectual property right creates market power since the scope of a patent is not commensurate with the relevant market in antitrust. They further argue that a licensing restriction should in general be permitted if it is not anticompetitive compared with the situation in which the entire licence was not in place. They review the mix of patent law and competition policy in Canada, the European Union and the United States and demonstrate that there is a clear right in these jurisdictions to offer exclusive licensing contracts but not necessarily to anybody, and in particular not to a rival in a concentrated market, since this could lead to de facto market sharing. The European Union is particular in that it does not allow absolute territorial exclusivity due to the market integration that is part of the *raison d'etre* of the EC Treaty. Rey and Winter (1998) argue that in order to assess the welfare effects of exclusivity restrictions in licensing contracts three levels of activity must be evaluated: 1) research and development leading to innovation; 2) diffusion of innovation or transfer of technology; and 3) competition on product markets.

In this paper we focus on technology transfer between firms in subcontracting agreements and only discuss in passing how this affects the incentive to innovate. Thus for the most part we take the existence of the technology for granted and the question is whether it is transferred from a downstream firm to an upstream firm. A firm may transfer technology or know-how upstream in order to get a better or cheaper input. Likewise it may itself receive technology from its customers. This technology transfer will allow the recipient to upgrade its product. When the technology is received from a customer, it will typically require the recipient to tailor its product to that customer, who in turn may request that the technology not be used with rivals' products by insisting on exclusivity in order to prevent free riding on the investment. In addition, if the two firms have to invest in specific (human) capital to carry out this upgrade, exclusive supply contracts may protect the downstream firm's investment in innovation and transfer from being exploited by rivals. Similarly, exclusive dealing contracts protects the subcontractor's specific investment from hold-up. Absent exclusivity, technology transfer and relation-specific investments tend to be undersupplied or will be replaced by equity links (vertical integration), since the implied transfer of residual rights would benefit those investments (Grossman & Hart, 1986; Hart, 1995). For example, if the product is traded between different firms in the same group, the equity link is likely to substitute for the exclusive agreement. González-Díaz, Arruñada & Fernández (2000) thus find that as specificity grows, firms tend to subcontract less. They tend to subcontract more, when output heterogeneity and the use of physical and human capital increases.

To fix ideas, we present a simple extension of a standard model of oligopoly. Two downstream firms, 1 and 2, engage in price competition with differentiated products. We assume that they face the following inverse demand curve:

$$p_i = \alpha_i - \beta q_i - \gamma q_j, \quad \alpha_i > 0, \beta > |\gamma| \geq 0 \quad , \quad i, j = 1,2; i \neq j \qquad (1)$$

where p_i is the price set by firm i, q_i is the corresponding number of units sold, α_i is the demand intercept and, if different from α_j, a measure of vertical product differentiation. The relation between the parameters γ and β measures how close (horizontal) substitutes the

products are. If γ/β is close to unity, products are almost perfect substitutes and price competition is fierce; if $\gamma = 0$, products are independent in demand and the downstream firms are essentially monopolists; if $\gamma < 0$, products are complements and the two firms are in fact not competitors but complementors.

We assume that the marginal cost of downstream i is c_i. How these costs are related to upstream firms will become apparent below. It may now be shown that, conditional on both firms being active, gross equilibrium profits are:

$$\Pi_i(\alpha_1,\alpha_2,c_1,c_2)=\frac{\beta^2-\gamma^2}{\beta}q_i^2 \;w.\, q_i=\frac{\beta}{\beta^2-\gamma^2}\frac{\left(1-\frac{1}{2}\left[\frac{\gamma}{\beta}\right]^2\right)\frac{\alpha_i-c_i}{2}-\frac{1}{2}\frac{\gamma}{\beta}\frac{\alpha_j-c_j}{2}}{1-\left(\frac{1}{2}\frac{\gamma}{\beta}\right)^2} \qquad (2)$$

From (2) we observe that in this particular model a process innovation that leads to a reduction of c_i of 1 will have the same effect on each firms profit as a product innovation that increases the vertical product differentiation parameter, α_i, by 1. Such innovation will affect own profits positively:

$$\frac{d\Pi_i}{d\alpha_i}=-\frac{d\Pi_i}{dc_i}=q_i\frac{1-\frac{1}{2}\left(\frac{\gamma}{\beta}\right)^2}{1-\left(\frac{1}{2}\frac{\gamma}{\beta}\right)^2}>0;\quad i=1,2 \qquad (3)$$

and the rival's profits adversely:

$$\frac{d\Pi_j}{d\alpha_i}=-\frac{d\Pi_j}{dc_i}=-q_j\frac{\frac{1}{2}\frac{\gamma}{\beta}}{1-\left(\frac{1}{2}\frac{\gamma}{\beta}\right)^2}<0;\quad i,j=1,2;\quad i\neq j \qquad (4)$$

If both firms get access to the technology so that $d\alpha_i = d\alpha_j$ and/or $dc_i = dc_j$, then the effect on the equilibrium profits is positive and equal to

$$\frac{d\Pi_i}{d\alpha_i}+\frac{d\Pi_i}{d\alpha_j}=q_i\frac{1+\frac{1}{2}\frac{\gamma}{\beta}\left(1-\frac{\gamma}{\beta}\right)}{1-\left(\frac{1}{2}\frac{\gamma}{\beta}\right)^2}>0;\quad i,j=1,2;\quad i\neq j \qquad (5)$$

Total industry profits go up if the technology is disseminated to all industry participants, but the innovator will profit more if the supplier agrees to exclusivity in the delivery contract. Thus, if the innovator is free to choose, she will contract for technology against exclusive supply. If there are any costs involved in transferring the technology to the supplier, it may clearly be the case that technology is only transferred upstream provided that exclusivity be guaranteed.

Assume for simplicity that there are many potential upstream producers of components that *ex ante* are equally efficient. Without transfer of technology each of them would have to undertake a relationship-specific investment of size K to adjust their production to work with a particular downstream customer. Any supplier would then have a marginal cost of c and their input would lead downstream firms to produce a vertical quality of α. Since there are many upstream firms, downstream firms will be able to negotiate a contract that keeps any upstream firm at normal (or zero) profits: This may be done by means of a two-part pricing scheme that is optimally set such that the fixed payment covers K while the per-unit payment is exactly c. Thus without technology transfer, downstream net equilibrium profits are really $\Pi_i(\alpha,\alpha,c,c) - K$, $i = 1,2$.

Assume now that downstream firm 1 possesses a technology that – if transferred to its upstream subcontractor – will either give rise to improved vertical product differentiation ($\alpha' > \alpha$) or to a lowering of the marginal cost of producing the component ($c' < c$) or both. Assume that it costs downstream firm 1 τ to transfer the technology. This amount could for example represent the management or engineering time spent on explaining the technology or the knowhow to the upstream firm. With no exclusivity, the upstream firm will surely use the technology with the other downstream firm, since it represents a competitive advantage over other upstream firms. In this case firm 1's profit will be $\Pi_1(\alpha',\alpha',c',c') - K - \tau$.

Finally, we note that if the contract foresees exclusive supply as a precondition for the transfer of the technology, then firm 1 will get net profits of $\Pi_1(\alpha',\alpha,c',c) - K - \tau$, so we expect to see technology transfer protected by exclusive supply since it follows from (4) that

$$\Pi_1(\alpha',\alpha',c',c') - K - \tau < \Pi_1(\alpha',\alpha,c',c) - K - \tau \qquad (6)$$

Note that the left-hand side of (6) may well be negative while the right-hand side is positive when products are fairly homogeneous and competition thus fierce (γ/β is close to unity). In that case the technology transfer will not happen without exclusive supply clauses. Also observe that firm 1 has an alternative to subcontracting with exclusive supply: not to transfer technology. This will be optimal when

$$\Pi_1(\alpha',\alpha,c',c) - K - \tau < \Pi_1(\alpha,\alpha,c,c) - K \qquad (7)$$

Thus we expect to observe exclusive supply subcontracting with technology transfer only if the technology allows the receiver to upgrade product or process significantly.

This section reviewed the theoretical rationale behind exclusivity to protect technology transfer and related investments in subcontracting agreements. The next section gives a brief account of industry characteristics of car component manufacturing.

2 The Scope for Vertical Restraints in the Automotive Sector

In the 1990s cost reduction strategies by car assemblers changed the car component industry. Outside sourcing increased, ultimately raising the size and the scope of the suppliers of key components. The interdependence of assemblers and suppliers intensified even though carmakers sold off their component arms. Longer-term relationships through global supply deals replaced annual bidding contests in which carmakers tried to play their suppliers off against each other. Assemblers began to allow suppliers earlier access to new vehicle design in order to pass on R&D projects they did not want to do themselves (Lewis & Wright, 1999). Consolidation in the industry promoted the emergence of fewer but increasingly powerful component suppliers, so-called system integrators; this, in turn, shifted the bargaining between suppliers and assemblers in favour of the former. In components, the fastest growth area is electronic on-board systems, an example of the rising technological contribution to the value of a car. It suggests that the scope for technology sharing – between assemblers and system integrators – and technology transfer – between one or both of the former and lower-tier suppliers – is on the rise (Bursa et al., 1997; Virag & Mount, 1998). Opportunities for investments in relation-specific assets are likely to increase, with attendant consequences for the use of vertical restraints.

The automotive sector in CEE is highly integrated with the world, and especially European, car industry. Car and car component manufacturing consistently attracted a large share of the sectoral distribution of inward direct investment (UNCTAD, 1999). Western component manufacturers followed car assemblers to the East in exchange for the promise of potentially group-wide supply contracts. To this end, they acquired or teamed up with local firms, thus facilitating the consolidation of the formerly moribund eastern automotive industry into internationally competitive manufacturers of both cars and components. In the second half of the 1990s, trade in parts became the fastest growing component of CEE's external trade; of this, automotive parts were the most important. For example, in Poland their share in total exports and imports of parts to the EU rose by about 60 per cent in 1993-7. The import and export share of components and final assemblies in this sector also increased (21 per cent for imports from and fourfold for exports to the EU in the case of Poland). This suggests that many producers in CEE have become part of an intra-product division of labour organised around networks centred in the EU (Kaminski & Ng, 1999; see also Eichengreen & Kohl, 1998). The emergence of these networks through foreign direct investments and intra- or inter-firm trade opens up possibilities for technology transfer and, thus, lends itself to making use of vertical restraints. The presence of East-West supply networks means that products of East European manufacturers may end up on West European markets. They thus become a potential concern for EU competition authorities. The next section explains the relevant legal basis.

3 Exclusivity and technology transfer in European competition policy

The European Commission (1978) exempts from the general prohibition of anti-competitive restraints – embodied in Article 81(1) of the Treaty of Amsterdam – exclusive agreements provided they cover products whose manufacture requires making use of a firm's proprietary knowledge, machinery, or equipment. Article 81(1) does *a priori* not apply to a sub-contracting agreement through which the sub-contractor receives intellectual property rights, know-how, documents, dies, or tools belonging to the contractor as long as the subcontractor

uses these assets to manufacture a product that differs with respect to form, functionality, or composition from the product found on the (spot) market. It is thus material to the *a priori* presumption of legality that exclusivity be granted in return for a (broadly defined) transfer of technology.

Furthermore, the subcontractor (or supplier) must not already be an independent producer of the product covered by the agreement and not be able to source the technology freely elsewhere. Instead, he must use technical knowledge, designs, or other specific documentation provided by the contractor (or customer), allowing him to manufacture a different product. Stipulations that the subcontractor must use the technology or equipment exclusively for the purposes of the contracting agreement and/or that goods or services resulting from the technology transfer may only be supplied to the contractor do not violate Article 81 if the above conditions are met. It is thus important for firms wanting to impose exclusive agreements that they can rationalise them in terms of technology transfer. For further discussion of the Commission's Notice, see Goyder (1993, 301-3) and Van Bael & Bellis (1990, Appendix 42).

In light of enlargement, EU regulation of VRs is becoming increasingly important for Eastern Europe. Candidate countries must adopt the *acquis communautaire* prior to accession. Therefore they are modeling their competition laws on the EU Treaty. That is difficult in itself. Effective enforcement is even more difficult. For obvious reasons, competition policy has no tradition in the transition economies. Rules and regulations against the abuse of market power have been slow in coming. According to the EBRD's review of a decade of transition (1999), competition legislation and enforcement capabilities have made the least progress of all market reforms in Eastern Europe over the last decade. Despite gradual legislative convergence towards EU law in the current pre-accession phase, competition culture in Eastern Europe is still rudimentary (Dutz and Vagliasindi 2000, Møllgaard and Lorentzen 2001). This was even more so in the beginning of the transition when European multinationals (MNEs) began to invest in the East. They did so in a regulatory environment that was clearly different both from their home environment and from the rules that will govern competition in the candidate countries at the very latest just prior to joining the EU. It is still the case that Eastern Europe's car component manufacturers are largely ignorant of or do not care about competition rules regarding vertical restraints. To the extent this spills over into business practices, the contracts that we observe empirically provide a *laisser-faire* benchmark that may be an indication of how such contracts would look in the EU if they were not regulated by competition rules.

4 Research design and data

In this section we explain our data and research design. The data are based on a survey and case studies of car component manufacturers in six East European countries (see Appendix A for the survey questionnaire). In late 1999 and through the spring of 2000, the questionnaire went to all Polish firms with more than 20 employees that the National Statistical Office, in accordance with NACE codes, classifies as car component manufacturers. In Czech Republic, Hungary, Romania, Slovakia, and Slovenia, the respective trade associations permitted access to their membership directories. The survey covers all the relevant locations of the automotive supply sector in the candidate countries, accounting for the bulk of Eastern Europe's automotive supply output and export. The country-weighted average return rate is close to 50

per cent. Local teams obtained this high rate through intense follow-up phone canvassing. The questionnaire contains 24 questions on exclusive agreements and technology transfer, and other international business variables. Most responses are binary (YES/NO); some are on an integer Likert scale from 1 to 5; one is a percentage; while a few are not easily codifiable. Local partners translated the questionnaire from the original English version into their local language. As a test of the reliability of the translations native speakers unknown to the local partners translated the questionnaires back into English. Appendix B provides a summary of descriptive statistic of the data.

From the previous sections we derive three hypotheses:

1 *Technology transfer is more likely if protected by exclusivity clauses.*

Ceteris paribus, the likelihood of technology transfer to suppliers (TTS) should increase if the responding firm (to our questionnaire) requests exclusivity that its supplier grants (ERS). Similarly, the likelihood of technology transfer to the respondent firm from its customers (TTC) should increase if it agrees to their exclusivity requests (ECR).

2 *If technology transfer involves relationship-specific investments, it is protected by exclusivity or internalised through equity links.*

The presence of exclusivity clauses should relate positively with the complexity of the product or R&D in the case of TT but not when none takes place. This is on the assumption that more complex products require more relationship-specific investments. Further, customers should transfer less technology if the respondent firm is owned by a multinational (or foreign) firm since global players are more advanced than domestically-owned firms.

3 *Where competition is more intense, exclusivity is likely to protect technology transfer.*

Section 1 showed that more competition would make it less likely that technology is transferred unless protected by exclusivity. What matters here is in what sorts of generic inputs, components, or parts respondent firms produce; in which markets they sell them; and what competition in these markets looks like.

The two key variables, exclusivity and technology transfer, are binary. They take on the values YES (1) and NO (0). This means that tests of our hypotheses use logit models (see Hutcheson & Sofroniou (1999) for an introduction and Liao (1994) for a guide on how to interpret probability models such as the logit model).

The (multiple) logit model is specified as

$$\ln\left[\frac{\Pr(y=1)}{1-\Pr(y=1)}\right] = \sum_i B_i x_i$$

where Pr(y = 1) is the probability that the response variable takes on the value 1 (as opposed to 0), B_0 is the coefficient to the constant and B_i is the coefficient to the i'th explanatory variable x_i. The interpretation of the model is that the odds may be written as

$$\frac{\Pr(y=1)}{1-\Pr(y=1)} = \prod_{i=0}^{k} e^{B_i x_i}$$

where $\mathbf{x} = (x_1, x_2, \ldots x_k)$ is the vector of explanatory variables. Thus if B_1 is negative the odds of observing y = 1 decrease as the explanatory variable increases *ceteris paribus*. If, for example, $B_1 = -.6931$ so that $e^{B1} = .5$, then the odds of observing y = 1 is half as big if $x_1 = 1$ as when $x_1 = 0$. The tables below report both B_1 and e^{B1}. Many of the explanatory variables are themselves binary or take on integer values on a Likert scale. In this case the corresponding e^{B1} may be interpreted as the change in the odds of y = 1 that follows from the presence of the attribute represented by x_1 or from an increase by one unit in the attribute represented by the scale, respectively.

5 Results

5.1 Descriptive statistics

Firms export 44 per cent of what they produce. They sell mostly to final assemblers (who are often MNEs), but half of them sell to suppliers and a relatively large number sells directly to retailers (in the aftermarket). Note that a respondent firm may have several types of customers (i.e. both final assemblers and other suppliers). Domestic ownership is predominant with two thirds of the cases. Firms source mostly both at home and abroad. Technology is an important characteristic of automotive supply networks in Eastern Europe. 61 per cent of the sample receive technology, and 47 per cent transfer. Roughly two thirds of the firms engage in some form of R&D. However, on average products are regarded as only weakly complex. Exclusivity is also widespread. It is more frequent the closer the supply chain gets to final assembly. Thus, customers request exclusivity from the respondent in 36 per cent of the cases and the respondent in turn requests it from its customers in 19 per cent of the cases. Similarly, customers are subject to exclusivity requests by respondents – and, respectively, respondents to those by suppliers – in roughly half as many cases. The unconditional probability that a respondent firm has no experience with exclusivity at all is 39 percent. This demonstrates that TT and VRs are frequent phenomena in Eastern Europe's automotive component industry.

5.2 Econometric findings

Support for the three hypotheses is mixed. Some findings support and some contradict the hypothesised links between exclusivity and technology transfer, the importance of complexity for exclusive clauses in subcontracting, and the significance of the degree of competition. Upstream observations approach the hypothesised relationships more than those downstream. What matters for technology transfer is, prominently, the strategic importance of technology as perceived by individual firms; a supply relation with multinational firms and final assemblers; and multinational control qua ownership over these supply networks. What matters for exclusivity is mostly a tit-for-tat – firms that impose exclusivity are also subject to it. A key finding is that the abuse of exclusivity clauses for anti-competitive purposes seems to be more of a "family affair" in the sense that it mostly involves East European, as opposed to international firms. A detailed discussion of the results follows.

The first two logit models explain the occurrence of technology transfer to suppliers (TTS) and from customers (TTC). The latter four explain the use of the corresponding safeguard exclusivity clauses, ERS and ECR, respectively, conditional on the presence and absence of technology transfer.

The first logit regression analyzes the link between technology transfer to suppliers, exclusivity clauses with suppliers, and other relevant variables included in the questionnaire. TTS occurred in 46.9 percent of 409 cases (see Table 1 and Appendix C for more details). The most noteworthy finding is that the safeguard exclusivity clause (ERS: exclusivity requested by the respondent and granted by the supplier) does not enter the regression significantly. On the other hand, the opposing safeguard, ESR, that might protect the supplier's relationship-specific investment in adapting to the technology, does enter with the right sign and is borderline significant. There is collinearity between these two variables. Without ERS, ESR becomes significant at a 5-percent level; if ESR is left out, the p-value of ERS is 0.136. This weakly confirms the first hypothesis.

[Table 1 about here]

The two sources of technology, namely technology received from customers (TTC) and own R&D, are highly significant. This means that technology recipients or generators are three to four times more likely to transfer technology to their own suppliers. Product complexity matters, too, but is weakly insignificant. This is due to multicollinearity with R&D.[2] If R&D is left out in the TTS regression, complexity becomes significant at a level of 0.03. Furthermore, if the respondent is part of a multinational corporation, the firm is twice as likely to transfer technology to its suppliers. Multinationals are thus not only an important locus of technology generation but an engine of technology diffusion through the supply chain. These findings are consistent with our second hypothesis.[3]

Further results illustrate the significance of the structure and dynamics of supply chains and the position respondent firms occupy therein. Firms that accord strategic importance to the technology they receive from customers are more likely to transfer technology on to their suppliers (Upgrade). Thus, technology is on the move through the supply chain rather than being relegated to upper-tier firms only. Multinational customers exert a push effect on technology diffusion because they, along with customers that are final assemblers, make it more likely that technology is kept on the move rather than exhausted at any level of the supply hierarchy (Customer is MNE).[4] By contrast, the extent to which firms concentrate more on the domestic market influences how likely they are to transfer technology to their suppliers (Mktdom). They are also less likely to transfer technology to (predominantly) foreign suppliers who, certainly during the 1990s and also for the time being, are more advanced than their East European counterparts. Hence, along with international ownership, international focus matters for the technology intensity of supply relationships.[5]

[2] Indeed, an independent logit model (not reported) explaining R&D shows that an increase in perceived complexity by one unit on a Likert scale from 1 to 5 raises the odds of R&D.

[3] Competition (Compdom and Compglobal) is not significant (and not reported in Table 2 where it is insignificant, too). But this does not reject the third hypothesis which proposed that TT is more likely to be protected through exclusivity in the presence of competition. For a fuller treatment see below.

[4] MNEs and final assemblers among customers are significantly and positively correlated (not reported here).

[5] The regression also shows that TTS is less likely the more the respondent agrees that "capabilities and competencies of suppliers are high" (Good suppliers); and more likely if it finds that "Relationships between suppliers and buyers are strong" (Good relations). This may be a bit of a tautology: If you transfer technology to your suppliers, relationships with these are strong, and the other way round. However, it may also indicate a positive role for long-term vertical relations for technology transfer.

The second logit regression has the same structure as the first except that it substitutes TTS through TTC, namely technology transfer from customers. TTC occurred in 60.9 percent of 409 cases (see Table 2 and Appendix D for more details). The most noteworthy finding is that the safeguard exclusivity clauses, ECR and ERC, do not enter the regression significantly and have the wrong sign. There is collinearity between these two variables. Without ERC, ECR achieves a p-value of 0.118; if ECR is left out, ERC obtains a p-value of 0.234. In both cases, the sign is negative. This contradicts our first hypothesis.

[Table 2 about here]

Another unexpected result is that product complexity and R&D are insignificant and have the wrong sign. Eliminating one of these variables does nothing much for the significance of the other, respectively. On the other hand, firms that are part of MNEs receive less TTC (Part of MNE). One way to interpret this is that they receive it from their parents instead of from independent customers. This is consistent with the second hypothesis because being part of an MNE constitutes an equity link that protects intra-group transfers of technology and obviates the need for exclusivity clauses. Firms with mostly foreign competitors are also less likely to receive technology from their customers. Since foreign competitors are on the whole more competitive than East European suppliers, this does not contradict the third hypothesis (but of course does not confirm it, either) which states that more competitive markets increase the likelihood that TT is accompanied by exclusivity clauses. As in the upstream regression (TTS), the strategic perception of technology (Upgrade) matters for TT, and so do MNE and final assembler customers (Customer is MNE).[6]

So far, evidence of the link between TT on the one hand and exclusivity and other relevant variables on the other, is mixed at best. This calls for a more detailed analysis of the use of exclusivity. The two safeguards most easily defendable on efficiency grounds are ERS (for TTS) and ECR (for TTC). In the following two regressions the sample is split according to whether technology transfer takes place or not.

[Table 3 about here]

Exclusivity requested by the respondent and granted by a supplier (ERS) happens in only 7.5 percent of the cases (see Table 3 and Appendix E). The results indeed mostly show that different variables are associated with ERS depending on the presence of TTS. A prominent exception is the countervailing safeguard, ESR. Hence, exclusivity clauses are reciprocal regardless of the incidence of technology transfer to suppliers. Technology-related variables such as R&D, complexity, and TTC do not matter when TTS takes place. By contrast, one of them – technology transferred by the customers – does matter in the absence of TTS. This may mean that downstream assemblers impose choices regarding the identity of lower-tier firms with whom their immediate suppliers may contract. In any event, these findings clearly contradict the second hypothesis.

Downstream exclusivity (ERC, ECR) tends to get passed on with TTS. By contrast, without TTS exclusivity appears an upstream phenomenon only. This suggests that downstream firms – with a higher percentage of foreign firms, MNEs, and final assemblers –

[6] MNEs and final assemblers among customers are significantly and positively correlated (not reported here).

fit more easily into an efficiency explanation whereas lower-tier suppliers – with a higher percentage of domestically-owned firms – do not. Together with additional evidence reviewed below, this means that the abuse of exclusivity clauses appears homemade rather than imported.

What matters also is where customers and suppliers are located. As in the first regression, where global focus was important in explaining TTS, here it matters in explaining ERS. Firms that supply customers anywhere outside the key regional and international markets are less likely to impose exclusivity on their suppliers (MktROW). By definition they must be marginal suppliers outside of global supply networks, and thus there are fewer quality constraints on whom they source from. Absent TTS, the use of exclusivity depends on the firms' position in the supply chain. The more local their suppliers (SourceDom), the smaller their customers (CustSuppliers), and the more local their competitors (RivalDom), the more likely they are to impose exclusivity clauses. This clearly does not square with an efficiency explanation of exclusivity; abuse of market power is a more convincing explanation. This contradicts the first hypothesis.

Exclusivity requested by the customer and granted by the respondent (ECR) occurred in 36.3 percent of the cases (see Table 4 and Appendix F). As previously, reciprocity rules regardless of whether or not respondent firms receive technology from customers (ERC). Complexity matters, too, but opposite to what was expected; it makes ECR more likely only in the absence of TTC.[7] This contradicts the second hypothesis.

[Table 4 about here]

With TTC, ECR is more likely, if the domestic market (MktDom) is more important. This again shows that exclusivity is more of a domestic than an international phenomenon. Being part of a multinational corporation on the other hand reduces the likelihood of being subject to exclusivity clauses by customers, independently of whether the customers transfer technology or not. This probably has to do with the an improved bargaining position that follows from being part of a multinational, or because respondent (affiliate) firms sell to their headquarters.

In sum, exclusivity is often unrelated to transfer of technology. Transfer to suppliers does increase if protected by exclusivity clauses (ESR or ERS). But the likelihood of receiving technology from customers is not significantly related to exclusive safeguards (ECR or ERC). Technology from own R&D or received from customers (TTC) results in more technology being transferred further upstream (TTS). International customers and especially MNEs and final assemblers affect technology transfer positively. The higher the strategic importance of technology for a firm's own product or process improvements, the more likely it is that the firm that makes this judgement transfers technology further. Exclusivity requests are likely to be reciprocated and passed on upstream. Absent TT, the use of exclusivity clauses is predominantly a domestic problem. It is more likely if suppliers are domestic; if customers are other suppliers (and that means, relatively small); if main rivals are domestic; and if the domestic market is more important. This suggests that the involved firms are unaware that

[7] One explanation for this could be that conditioning on TTC = 1 takes all technology related explanations out of that subsample but that some are left in the subsample for which TTC = 0. More complex products require better coordination such as relationship-specific investments between downstream and upstream firms and, hence, vertical restraints even in the absence of transfer of technology.

they may breach local competition rules, or that they are rationally breaching rules that at present are not vigorously enforced.

5.3 Case Studies

To throw further light on the puzzle of why the evidence of the link between TT and exclusivity clauses appeared so mixed, firms that had reported VRs were contacted in Czech Republic, Hungary, Poland, and Slovenia. More than 30 case studies are summarised here. Interviews in the four countries were held in the same format (see Appendix G). They focused on

- the way in which complexity, technology transfer, and vertical restraints are related
- how firms bargain about exclusive agreements
- what determines each party's bargaining position
- the direction and extent of efficiency gains.

The interviewed firms broadly fall into three categories. Two of these actually or potentially enhance efficiency while one has anti-competitive effects. In the first group, firms impose VRs to protect TT. Hence, the transfer and the restraint have the same direction. These cases confirm the efficiency explanation of exclusive agreements. In the second group, firms transfer technology to their suppliers. This requires the recipient firm to invest, for example in equipment, to be able to put the transferred technology to work. To insure itself against hold-up by the transferring firm, the supplier then imposes exclusivity. Thus, technology transfer and vertical restraints do not have the same direction in these cases. However, as in the first group, the effect of the exclusivity condition is likely to be pro-competitive. In the third group, firms do *not* transfer technology but demand exclusivity all the same. Indeed, these firms that impose or are subject to VRs confirm that product complexity, a low relative distance to the international technology frontier, or proprietary technology assets are not at all associated with the exclusivity of which they are part.

Insofar as they are on the receiving end of VRs, this raises the question why firms would subject themselves to such an asymmetric arrangement. Not much choice, is the answer. For firms in a sorry financial state or with the need to build up a relationship with a potentially large customer, there are no first-best alternatives, and so they go for second-best. This means, *inter alia*, extremely unfavourable sourcing conditions and restrictions on their customer base in exchange for guaranteeing some degree of capacity utilisation, plus in the best cases access to new markets, increases in productivity and profitability, or simply a breathing space for restructuring. For the individual firm, this sometimes turns out to be less onerous over time because with an improving bargaining position it manages to renegotiate the stipulations of the exclusive agreement.

This summary glimpse at results from our case studies confirms a number of insights hinted at in the econometric analysis. First, exclusivity in inter-firm relationships exists even in the absence of technology transfer. Firms that impose them do so because exclusivity allows them to increase market power. Firms that accept them do so either because the alternative is bankruptcy or because the potential VR partner insists on it – a first-best alternative is unavailable. Second, VRs may lead to higher prices. Third, when they lead to lower prices, it is not clear from our analysis whether these gains are passed on down the value chain to the final user. Fourth, the terms of the VR depend on the relative bargaining

power of each party to the agreement. In East-West business relationships, as firms in transition economies restructure successfully, their control over resources may change over time, and with this the terms of the VR. The graduation away from VRs unassociated with technology transfer does not guarantee a more competitive market (only a different distribution of profits), but it does make it more likely. Fifth, competition authorities in Eastern Europe as well as the European Commission appear to be largely unaware of these practices. None of the sample firms had notified the respective authorities of its VR agreement, and only one professed to be familiar with the relevant legislation. Sixth, in the area of competition policy, the institutional remake of Eastern Europe has some way to go before it resembles EU practice. VR agreements are typically tacit rather than formalised into contracts. Dawnraids are no answer if anti-competitive practices never make it onto a – however well hidden – piece of paper.

6 Conclusion

Our main results are, loosely put, that exclusive agreements are an important feature of contracts in Eastern Europe's automotive supply industry. Furthermore, in a laisser-faire environment, TT only partially justifies exclusive agreements. Efficiency is only one motive behind vertical restraints. Other factors explain why and how they come about. Exclusive agreements come in bundles, are to some extent reciprocal, and are passed on up- or downstream. When faced with a request for exclusivity by its customer, a firm seems likely to respond in kind. Also, the imposition of exclusive agreements at one point of the value chain appears to translate into other exclusivity clauses further up or further down, thus linking different tiers of suppliers and assemblers. First-tier suppliers are more prone to request exclusivity from their customers – because asset specificity rises downstream – while lower-tier suppliers are more likely to request it from their suppliers – because technological intensity falls downstream. Likewise, firms that are technology recipients are more likely than those that are not to also pass on knowledge to other firms. Both of these findings suggest that technological competence is diffused along the automotive value chain, especially among upper-tier suppliers and assemblers, and that firms organise in networks.

Exclusivity and technology transfer are only weakly linked. If the supplier or the respondent requests exclusivity, then the respondent is more likely to transfer technology to suppliers. Domestically, the rationale for exclusivity is often not the protection of technology or knowledge transfer but rather the protection of market power or the use of bargaining power to influence the *cui bono* in inter-firm relations. In other cases – this is the benign version – the protection is merely aimed at assuaging hold-up problems and thus without anti-competitive intent. Some evidence exists that R&D or complexity matter to the exclusivity that the respondent requests of customers in which case it may be efficiency enhancing or pro-competitive.

That exclusivity in contracts and TT do not explain each other more strongly was an unexpected result that may herald a problem for car assemblers and component suppliers. With pre-accession in full swing (and, thus, the gradual extension of EU law in CEE) firms had better think hard about the justification for exclusive agreements. For competition authorities will surely ask questions about them.

For business practice and public policy, this translates into a series of challenges. Regulators need to understand the cause and the impact of vertical restraints. Managers in

Eastern Europe of multinational and of domestic firms need to ensure that exclusive agreements they struck in the past adhere to EU law. The impact and the legality of vertical restraints prominently depend on the extent to which they are linked to technology transfer. For policymakers and local managers in Eastern Europe, vertical restraints ideally foster the embeddedness of foreign firms and support local capabilities of product or process improvements. For foreign investors, they ideally protect their knowledge assets in what continue to be relatively risky markets.

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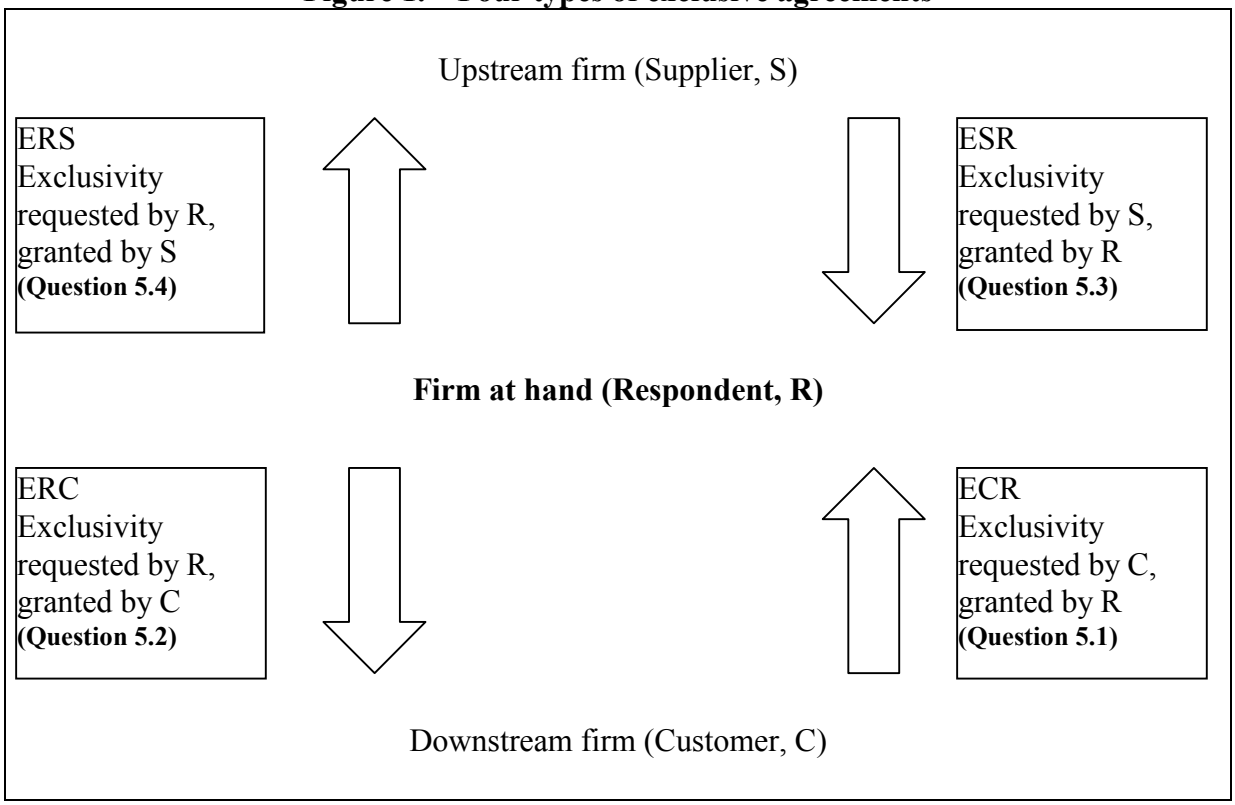
Figure 1. – Four types of exclusive agreements



Note: Questions 5.1-4 refer to our survey of which more below.

Table 1. – Preferred logit regression explaining technology transfer to suppliers (TTS)

X_i	B_i	S.E.	z-Statistic	Sig.	Exp(B_i)
Constant	-2.451	0.846	-2.898	0.004	0.086
TTC	1.112	0.281	3.957	0.000	3.042
ESR	0.500	0.317	1.576	0.115	1.649
ERS	0.453	0.491	0.923	0.356	1.573
Complexity	0.181	0.113	1.591	0.112	1.199
Compdom	-0.128	0.091	-1.409	0.159	0.880
Compglobal	-0.127	0.119	-1.067	0.286	0.881
R&D	1.431	0.263	5.442	0.000	4.184
Upgrade	0.173	0.101	1.716	0.086	1.189
Part of MNE	0.753	0.292	2.582	0.010	2.123
Foreign suppliers	-0.880	0.349	-2.524	0.012	0.415
Good suppliers	-0.220	0.125	-1.754	0.079	0.803
Good relations	0.235	0.119	1.969	0.049	1.265
Mkt domestic	-0.188	0.098	-1.914	0.056	0.828
Customer is MNE	0.649	0.283	2.293	0.022	1.915

Note: The McFadden R^2 is .217. For a summary of the model, see Appendix C.

Table 2. – Preferred logit regression explaining technology transfer from buyers

x_i	B_i	S.E.	z-Statistic	Sig.	Exp(B_i)
Constant	-2.034	0.578	-3.516	0.000	0.131
TTS	1.205	0.270	3.792	0.000	2.786
ECR	-0.340	0.279	-1.222	0.222	0.711
ERC	-0.284	0.340	-0.836	0.403	0.753
Complexity	-0.056	0.122	-0.459	0.647	0.946
Rivals foreign	-0.412	0.267	-1.544	0.123	0.662
R&D	-0.017	0.273	-0.062	0.951	0.983
Upgrade	0.884	0.103	8.553	0.000	2.421
Part of MNE	-0.987	0.308	-3.202	0.001	0.373
Good relations	0.187	0.123	-1.523	0.128	0.823
Customer is MNE	0.923	0.295	3.125	0.002	2.517

Note: The McFadden R^2 is .277. For a summary of the model, see Appendix D.

Table 3 – Preferred logit regressions explaining occurrence of ERS

	TTS = 0		TTS = 1	
x_i	B_i	Sig.	B_i	Sig.
Constant	-3.693	.072	-2.175	0.164
ESR	3.649	0.000	1.256	0.065
Complexity	0.200	0.582	-0.176	0.588
CustSuppliers	1.761	0.045	0.763	0.234
MktROW	-0.769	0.025	-0.345	0.133
RivalDom	2.446	0.022	-0.691	0.518
SourceDom	1.927	0.038	[0.414	0.593]
SourceMix	[-.393	0.600]	-1.210	0.083
TTC	-1.613	0.068	0.442	0.582
ERC	0.515	0.549	1.396	0.049
ECR	-0.680	0.444	1.625	0.031

Note: Sample sizes: 218 for TTS = 0; 193 for TTS = 1. McFadden R^2 are 0.443 and 0.345 respectively. Note that there are only 13 and 18 occurrences of ERS = 1 in the two samples. Variables SourceDom and SourceMix enter significantly in each of the regressions but due to multicollinearity not at the same time. For ease of comparison the estimate in brackets indicate what happens if the significant variable is replaced by the other variable. For a summary of the models, see Appendix E.

Table 4. – Preferred logit regressions explaining occurrence of ECR

	TTC = 0		TTC = 1	
x_i	B_i	Sig.	B_i	Sig.
Constant	-1.267	0.050	-1.768	0.005
ERC	1.305	0.002	1.815	0.000
ESR	[2.124	0.000]	[0.735	0.030]
Complexity	0.286	0.067	0.011	0.931
CustAssemblers	-0.546	0.137	0.544	0.122
MarketDom	0.014	0.919	0.237	0.044
MNE	-0.590	0.155	-0.663	0.059

Note: Sample sizes: 160 for TTC = 0; 249 for TTC = 1. McFadden R^2 are 0.080 and 0.127, respectively. ECR increases with the presence of ERC or ESR, but not both, due to collinearity. The ESR coefficients reported in brackets are not part of the regression but result when ESR replaces ECR in the model. For a summary of the models, see Appendix F.

Appendix A: The qustionnaire

Questionnaire for Car Component Suppliers

Purpose

To understand the existence, frequency, and effect of vertical restraints in the car component supplier industry.

---

1 Product and sales

1.1 What do you produce?

……

1.2 Please indicate how well the following statement describes the nature of your product:

(1 = strongly disagree; 5 = strongly agree)

"Our product is highly complex and technical." [ ]

1.3 What are your major markets? (Please rank in order of importance: 1>2>3>4>5.)

Domestic	[ ]
CEEC&CIS	[ ]
EU	[ ]
Other OECD	[ ]
Rest of world	[ ]

2 Ownership

2.1

Domestic	[ ]
Foreign	[ ]
Mixed	[ ]

(Please tick as appropriate.)

2.2 Are you part of a multinational firm? Yes [ ] No [ ]

2.2.1 If yes, in which country is this firm headquartered?

……..

3 Competition and market structure

3.1 Where are your main competitors?

At home	[ ]
Abroad	[ ]
Both	[ ]

(Please tick as appropriate.)

3.2 Please indicate how well the following statements describe your business environment:
(1 = strongly disagree; 5 = strongly agree)

a) "Domestic competition is intense." [ ]

b) "Global competition is intense." [ ]

4 Value chain

4.1 Inputs

4.1.1 What do you source?

……

4.1.2 From whom do you source?

Domestic suppliers [ ]
Foreign suppliers [ ]
Both [ ]

4.1.3 Please indicate how well the following statement describes your business environment:
(1 = strongly disagree; 5 = strongly agree)

a) "Capabilities and competence of suppliers are high." [ ]
b) "Relationships between suppliers and buyers are strong." [ ]

4.2 Output

4.2.1 Who buys your product?

(Please tick as appropriate.)

Other suppliers [ ]
Final assemblers [ ]
Retailers [ ]

4.2.2 Are there MNEs among your customers? Yes [ ]
No [ ]

4.2.2.1 If yes, in which country are they headquartered?

……

5 Vertical restraints

5.1 Do (some of) your customers request that you not sell to their competitors?

Yes [ ]
No [ ]

5.2 Do you request that (some of) your customers not buy your product from alternative suppliers?

Yes [ ]
No [ ]

5.3 Do (some of) your suppliers request that you not purchase their product from other suppliers?

Yes [ ]
No [ ]

5.4 Do you request that (some of) your suppliers not sell their product to your competitors?

Yes [ ]
No [ ]

6 Technology

6.1 Do you undertake R&D? Yes [ ]
No [ ]

6.2 Do you pass on technology and/or knowledge to your suppliers? Yes [ ]
No [ ]

6.3 Do you receive technology and/or knowledge from your buyers? Yes [ ]
No [ ]

6.4 Please indicate how well the following statements describe technology transfer with your buyers:
(1= strongly disagree; 5 = strongly agree)

a) "The technology transfer allows us to upgrade what we make and how we make it." [ ]

Appendix B: Descriptive statistics

Table B.1 – Descriptive statistics of the questionnaire-based database

Questions	Number of observations	Minimum	Maximum	Mean	Standard deviation
Complexity	413	1	5	3.50	1.10
Export share	311	0	100	43.82	35.99
Ownership					
Domestic	413	0	1	.62	.48
Foreign	413	0	1	.26	.44
Mixed	413	0	1	.12	.32
Part of MNE	412	0	1	.28	.45
Value chain					
Source…					
…at home	413	0	1	.16	.37
…abroad	413	0	1	.16	.37
…both	413	0	1	.68	.47
Sell to…					
…suppliers	413	0	2	.48	.51
…assemblers	413	0	4	.76	.46
…retailers	413	0	1	.43	.50
…MNEs	413	0	1	.71	.45
Exclusivity (see Figure 1)					
ECR	411	0	1	.36	.48
ERC	413	0	1	.19	.40
ESR	413	0	1	.19	.39
ERS	413	0	1	.08	.26
Technology transfer					
Do R&D?	413	0	2	.64	.49
TT…					
…to supplier	413	0	1	.47	.50
…from buyer	413	0	1	.61	.49
…important?	413	1	5	3.36	1.44

Table B.2 – Correlation coefficients between exclusive agreement and technology transfer

Pearson Correlation	ECR	ERC	ESR	ERS	TTS	TTC
ECR	1.000	.310 **	.219 **	.185 **	-.035	-.034
Significance	.	.000	.000	.000	.481	.497
N	412	412	412	412	412	412
ERC	.310 **	1.000	.410 **	.020	.020	-.023
Significance	.000	.	.000	.687	.687	.644
N	412	414	414	414	414	414
ESR	.219 **	.410 **	1.000	.359 **	.087	.013
Significance	.000	.000	.	.000	.076	.793
N	412	414	414	414	414	414
ERS	.185 **	.302 **	.359 **	1.000	.065	-.036
Significance	.000	.000	.000	.	.189	.464
N	412	414	414	414	414	414
TTS	-.035	.020	.087	.065	1.000	.301 **
Significance	.481	.687	.076	.189	.	.000
N	412	414	414	414	414	414
TTC	-.034	-.023	.013	-.036	.301 **	1.000
Significance	.497	.644	.793	.464	.000	.
N	412	414	414	414	414	414

** Correlation is significant at the 0.01 level (2 tailed)

Appendix C: Logit regression explaining technology transfer to suppliers (TTS)

Dependent Variable: TTS
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/23/02 Time: 11:34
Sample(adjusted): 1 439
Included observations: 409
Excluded observations: 30 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.451000	0.845602	-2.898528	0.0037
TTC	1.112447	0.281143	3.956865	0.0001
ESR	0.500213	0.317399	1.575974	0.1150
ERS	0.453433	0.491047	0.923400	0.3558
COMPLEXITY	0.181221	0.113889	1.591206	0.1116
COMPDOM	-0.128235	0.090980	-1.409487	0.1587
COMPGLOBAL	-0.127035	0.119060	-1.066980	0.2860
RD	1.431300	0.263010	5.441997	0.0000
UPGRADE	0.172933	0.100774	1.716047	0.0862
MNE	0.753028	0.291588	2.582503	0.0098
SOURCEFOR	-0.880201	0.348695	-2.524269	0.0116
GOODSUPPLIERS	-0.219755	0.125279	-1.754134	0.0794
GOODRELATIONS	0.235052	0.119399	1.968629	0.0490
MKTDOM	-0.188455	0.098458	-1.914061	0.0556
CUSTMNE	0.649466	0.283229	2.293074	0.0218

Mean dependent var	0.469438	S.D. dependent var	0.499676
S.E. of regression	0.436073	Akaike info criterion	1.155278
Sum squared resid	74.92300	Schwarz criterion	1.302480
Log likelihood	-221.2543	Hannan-Quinn criter.	1.213520
Restr. log likelihood	-282.7327	Avg. log likelihood	-0.540964
LR statistic (14 df)	122.9568	McFadden R-squared	0.217444
Probability(LR stat)	0.000000		
Obs with Dep=0	217	Total obs	409
Obs with Dep=1	192		

Appendix D: Logit regression explaining technology transfer from customers (TTC)

Dependent Variable: TTC
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/23/02 Time: 14:18
Sample(adjusted): 1 439
Included observations: 409
Excluded observations: 30 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.033601	0.578448	-3.515617	0.0004
TTS	1.024659	0.270244	3.791602	0.0001
ECR	-0.340463	0.278614	-1.221989	0.2217
ERC	-0.284109	0.339847	-0.835993	0.4032
COMPLEXITY	-0.055849	0.121790	-0.458572	0.6465
RIVALFOR	-0.412157	0.266938	-1.544018	0.1226
RD	-0.016958	0.273303	-0.062048	0.9505
UPGRADE	0.884499	0.103410	8.553323	0.0000
CUSTMNE	0.922971	0.295374	3.124757	0.0018
MNE	-0.986513	0.308080	-3.202135	0.0014
GOODRELATIONS	-0.186896	0.122684	-1.523399	0.1277

Mean dependent var	0.608802	S.D. dependent var	0.488616
S.E. of regression	0.404811	Akaike info criterion	1.021623
Sum squared resid	65.22114	Schwarz criterion	1.129571
Log likelihood	-197.9219	Hannan-Quinn criter.	1.064334
Restr. log likelihood	-273.7359	Avg. log likelihood	-0.483917
LR statistic (10 df)	151.6280	McFadden R-squared	0.276960
Probability(LR stat)	0.000000		
Obs with Dep=0	160	Total obs	409
Obs with Dep=1	249		

Appendix E: Logit regressions explaining exclusivity requested by the respondent and granted by the supplier (ERS)

E.1 TTS = 0

Dependent Variable: ERS
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/23/02 Time: 14:12
Sample(adjusted): 5 439 IF TTS = 0
Included observations: 218 after adjusting endpoints
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-3.693164	2.049465	-1.802013	0.0715
ESR	3.648818	0.964781	3.782017	0.0002
COMPLEXITY	0.200405	0.364455	0.549876	0.5824
CUSTSUPPLIERS	1.760973	0.880058	2.000973	0.0454
MKTROW	-0.768729	0.342129	-2.246894	0.0246
RIVALDOM	2.446404	1.064474	2.298227	0.0215
SOURCEDOM	1.926935	0.927559	2.077426	0.0378
TTC	-1.613037	0.884947	-1.822749	0.0683
ERC	0.514789	0.858910	0.599351	0.5489
ECR	-0.679946	0.888787	-0.765027	0.4443

Mean dependent var	0.059633	S.D. dependent var	0.237351
S.E. of regression	0.192704	Akaike info criterion	0.343246
Sum squared resid	7.724017	Schwarz criterion	0.498498
Log likelihood	-27.41377	Hannan-Quinn criter.	0.405954
Restr. log likelihood	-49.25854	Avg. log likelihood	-0.125751
LR statistic (9 df)	43.68953	McFadden R-squared	0.443472
Probability(LR stat)	1.61E-06		
Obs with Dep=0	205	Total obs	218
Obs with Dep=1	13		

E.2 TTS = 1

Dependent Variable: ERS
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/23/02 Time: 14:12
Sample(adjusted): 1 437 IF TTS = 1
Included observations: 193 after adjusting endpoints
Convergence achieved after 7 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-2.875325	1.535739	-1.872275	0.0612
ESR	1.215165	0.663338	1.831893	0.0670
COMPLEXITY	-0.262694	0.310527	-0.845960	0.3976
CUSTSUPPLIERS	0.568175	0.608749	0.933349	0.3506
MKTROW	-0.306708	0.224839	-1.364124	0.1725
RIVALDOM	-0.352112	1.029094	-0.342157	0.7322
SOURCEDOM	0.414206	0.774670	0.534688	0.5929
TTC	0.554526	0.792476	0.699738	0.4841
ERC	1.550892	0.681542	2.275563	0.0229
ECR	1.473166	0.721288	2.042410	0.0411

Mean dependent var	0.093264	S.D. dependent var	0.291559
S.E. of regression	0.255373	Akaike info criterion	0.523979
Sum squared resid	11.93439	Schwarz criterion	0.693031
Log likelihood	-40.56401	Hannan-Quinn criter.	0.592440
Restr. log likelihood	-59.83497	Avg. log likelihood	-0.210176
LR statistic (9 df)	38.54192	McFadden R-squared	0.322069
Probability(LR stat)	1.39E-05		
Obs with Dep=0	175	Total obs	193
Obs with Dep=1	18		

Appendix F: Logit regressions explaining exclusivity requested by the customer and granted by the respondent (ECR)

F.1 TTC = 0

Dependent Variable: ECR
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/25/02 Time: 20:38
Sample(adjusted): 3 439 IF TTC = 0
Included observations: 161 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.266549	0.647221	-1.956902	0.0504
ERC	1.305764	0.424935	3.072856	0.0021
COMPLEXITY	0.286226	0.156151	1.833005	0.0668
CUSTASSEMBLERS	-0.546470	0.367375	-1.487499	0.1369
MKTDOM	0.013984	0.137918	0.101397	0.9192
MNE	-0.589899	0.415050	-1.421271	0.1552

Mean dependent var	0.385093	S.D. dependent var	0.488136
S.E. of regression	0.469835	Akaike info criterion	1.300446
Sum squared resid	34.21551	Schwarz criterion	1.415280
Log likelihood	-98.68587	Hannan-Quinn criter.	1.347073
Restr. log likelihood	-107.3069	Avg. log likelihood	-0.612956
LR statistic (5 df)	17.24208	McFadden R-squared	0.080340
Probability(LR stat)	0.004063		

Obs with Dep=0	99	Total obs	161
Obs with Dep=1	62		

F.2 TTC = 1

Dependent Variable: ECR
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 07/23/02 Time: 12:23
Sample(adjusted): 1 437 IF TTC = 1
Included observations: 249 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.868895	0.769759	-2.427898	0.0152
ERC	1.856177	0.377420	4.918067	0.0000
COMPLEXITY	0.027427	0.140427	0.195313	0.8451
CUSTASSEMBLERS	0.578458	0.354617	1.631219	0.1028
GOODSUPPLIERS	0.068586	0.147141	0.466124	0.6411
MKTDOM	0.241871	0.123291	1.961796	0.0498
MNE	-0.693249	0.366019	-1.894026	0.0582
SOURCEFOR	0.009077	0.450748	0.020139	0.9839
RD	-0.355276	0.314870	-1.128327	0.2592

Mean dependent var	0.349398	S.D. dependent var	0.477740
S.E. of regression	0.441034	Akaike info criterion	1.196335
Sum squared resid	46.68269	Schwarz criterion	1.323472
Log likelihood	-139.9437	Hannan-Quinn criter.	1.247510
Restr. log likelihood	-161.1212	Avg. log likelihood	-0.562023
LR statistic (8 df)	42.35490	McFadden R-squared	0.131438
Probability(LR stat)	1.16E-06		
Obs with Dep=0	162	Total obs	249
Obs with Dep=1	87		

Appendix G:

SEMI-STRUCTURED INTERVIEW WITH

SELECT CAR COMPONENT SUPPLIERS (OR THEIR CUSTOMERS)[8]

Purpose

To understand

- in what way complexity, technology transfer, and vertical restraints are (or are not) related
- how firms bargain about exclusive agreements
- what determines each firm's bargaining position
- to what extent the (efficiency) gains resulting from the interaction between firms remain exclusive to the directly involved parties, spill-over to other firms, and/or are passed on to consumers.

A Complexity

1. What does the complexity of the product consist of?
2. Where does the international technology frontier lie in this product area? Who drives it (i.e. who are the main players)? Where is innovation most likely to come from in this area? [To frame your questions please make use of the background material about individual product categories in the FT survey on the automotive supply industry.]
3. How distant are you from this frontier? Why? What is your best bet of bridging the gap?

B Technology transfer

I. If you are a technology transfer recipient…

1. … what exactly is being transferred?
2. … does it upgrade what you make (product), how you make it (process), or something else?
3. … is the upgrade incremental (i.e. based on your previous capabilities) or does it introduce a genuinely new competence?
4. … could you have (easily) acquired this technology on the open market?
5. … did you produce this or a similar technology even prior to the transfer from your partner?

1. If you are not a technology transfer recipient…
1. …why not?

[8] Only interview an assembler if you have one of its suppliers among your other case studies.

Note: Sections C-D only for firms who have VRs in place.

C Vertical restraints

1. What does the VR consist of (i.e. what does the agreement say: scope, sanctions etc.)? How long is it valid for?
2. Why did you consent to an exclusive agreement?
3. Are you familiar with regulations concerning VRs in your country/in the EU?
4. Did you notify any authorities about the VR? If no, why not? If yes, how did they react?

D Bargaining

1. Is the agreement a standard contract specific only to the relationship in question (i.e. supplier to firm X must not sell to anyone else), or does it reflect your own situation as a manufacturer in terms of where you source from; who you sell to; who and where your competitors are; who and where your VR-party's competitors are?
2. Did you negotiate the agreement or did you just sign up to it? Did you change any of its provisions? Which?
3. Did you have problems (financial or otherwise) when you agreed to the VR?
4. Were you familiar with VRs or was this your first exclusive agreement?

E Gains from relationship

1. Has the relationship with your partner (i.e. the firm that imposes a VR, transfers technology, or both) improved what you make and how you make it, or how you get your product to the (which) market(s)? Has it broadened your value-added scope?
2. Have you become more productive?
3. Have you become more profitable?
4. Have you lowered prices? If yes, who benefited from this?
5. Has the relationship with your partner changed your relationships with other suppliers or customers? In what way?