

## PRODUCT QUALITY, MARKET SIGNALING AND THE DEVELOPMENT OF EAST-WEST TRADE

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*Countertrade, a contractual form in which there is a two-way flow of goods, occupies a position of significance in East-West trade. In this paper, it is shown that countertrade can solve problems which arise when the quality of Eastern European products is unknown. Using the market signaling literature, a theory is formulated in order to make predictions concerning the use of countertrade. Countertrade will be particularly useful when quality information is important but cannot be obtained directly and when a country has a poor quality reputation. These predictions are supported by empirical tests.*

### INTRODUCTION

During the last decade, there has been a major change in the trade relations between the developed capitalist countries and the nations of Eastern Europe.<sup>1</sup> Spurred by a variety of political and economic decisions, East-West trade has grown at a faster rate than world trade in general. Concurrently, a new contractual form, countertrade, has risen to a significant position. Under countertrade, there is a two-way flow of goods between a single Western company and an Eastern country (with perhaps an offsetting monetary transaction). Precise estimates of the significance of countertrade are difficult to obtain because international trade transactions are not classified by type of contract. However, one Hungarian source has estimated that countertrade agreements accounted for 25-35% of East-West trade in 1977 (*Business Eastern Europe (BEE)*, 1978, p. 280).<sup>2</sup> According to a recent OECD study (1981, p. 57), Eastern European governments view countertrade as a permanent and increasingly important part of their trade relations with the West.

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1. In this paper, Eastern Europe is taken to include Czechoslovakia, the USSR, Hungary, Poland, Bulgaria, Romania, and the German Democratic Republic (GDR). These nations will be referred to collectively as the 'East' and the adjective 'Eastern' will apply to them. The developed capitalist nations are taken to be Canada, U.S.A., Japan, and all Western European nations. These nations will be referred to as the 'West' and the adjective 'Western' will apply to them.

2. *Business Eastern Europe* is a trade journal intended to give Western business people relevant information on developments in Eastern Europe. As such it is regarded in this paper as the most reliable source for qualitative information on recent developments in East-West trade; on the negotiating stances of Eastern countries; and on the attitudes of Western traders.

There are two distinct forms of countertrade: counterpurchase and buy-back.<sup>3</sup> Under buy-back, the Western company sells capital equipment to an Eastern enterprise.<sup>4</sup> The enterprise then uses that equipment to produce output, some of which is bought by that same Western company. Thus, buy-back consists of two contracts, signed at the same time, but implemented over different periods. Under counterpurchase, the item sold by the Western company is not used in the manufacture of the goods bought by the Western company. For counterpurchase, implementation of the two contracts can have any temporal ordering.<sup>5</sup> Of the two types of countertrade, buy-back is the more important (*BEE* 1977, p. 10) and Eastern European countries are emphasizing buy-back (McMillan 1977, p. 1214).

The initiation of countertrade proposals by Eastern European nations can be viewed as a natural response to the pressure to increase exports to the West. Given an historical preference for bilateralism together with the constraint that some Eastern enterprises must earn their own foreign exchange, countertrade is a natural institutional response. Nevertheless, countertrade is often costly to Western companies (*BEE* 1977, p. 10, 1978, p. 289) and can be dropped by Eastern enterprises in return for other considerations (*BEE* 1977, p. 313). Thus, for countertrade to be successful it must offer other advantages apart from being a natural institutional response.

In this paper, market signaling theory is applied to explain the existence of countertrade, and especially buy-back. In section 2, salient points from the signaling literature are reviewed and their relevance to countertrade formulated. In section 3, a simple model is used to delineate the factors which influence the likelihood that countertrade will be used. In section 4, the model's predictions are tested. The paper concludes with some implications of the argument for the development of East-West trade.

#### I. THE RELEVANCE OF MARKET SIGNAL THEORY

When buyers do not know the quality of a specific product, they may attribute average market quality to each item. The average quality of items supplied will increase with price because sellers usually know quality. As Akerlof (1970) has shown, these assumptions will imply that less trade takes place when buyers do not know quality than when quality is easily ascertainable. Prospective Western buyers of Eastern products may be in the same position as buyers in Akerlof's model. Those buyers may have little prior information on the quality of goods made by a particular

3. Further details on countertrade arrangements in general can be found in Matheson, McCarthy and Flanders (1977), McMillan (1977), or St. Charles (1974).

4. Capital equipment includes such intangibles as the know-how to use a specific technology.

5. If credit is needed by the Eastern enterprise, it is negotiated through the usual financial channels (Matheson, McCarthy, and Flanders (1977), p. 1282). Of course, the existence of the countertrade deal may make credit easier to obtain.

Eastern enterprise and there may be no direct way to obtain quality information. Buyers may estimate quality at the average level for the enterprise's country.<sup>6</sup> Thus, following Akerlof's predictions, the market equilibrium may be such that Eastern enterprises do not find it worthwhile to export high quality goods to the West.

Consider an Eastern country which has a poor quality reputation but which wants to begin selling higher quality goods in Western markets. Enterprises in that country must discourage buyers from using country-of-origin to judge quality. Spence (1974) has shown that, if quality cannot be directly observed, sellers have an incentive to convey information by indirect methods: to signal quality. It is the central thesis of this paper that, under some circumstances, a countertrade contract will be such a signal.

A Western company which sells an item of capital equipment will sometimes know the quality of items made on its equipment. The company will usually have designed and manufactured the equipment and often will have had the most experience in using the equipment.<sup>7</sup> The company may know how much the quality of output varies with quality of labor input. Possibly, input quality will influence output quantity but not output quality. In such a case, the use of the capital equipment made by the Western company will be a signal of product quality by the enterprise. Therefore, in every buy-back deal there is a potential quality signal.

For many durable goods, a crucial element of quality is speed of after-sales service and reliability of supply of spare-parts. An Eastern enterprise without previous experience in the West will need to signal its intentions about these elements of product quality. One way to signal such intentions would be for the enterprise to place itself in a position of dependence on the Western company. The enterprise will be dependent on the company if that company is a supplier of capital equipment. Capital equipment requires technological updates and after-sales service which the Western company can threaten to withhold should the need arise. If the company is able to impose large costs on the enterprise, it can be more confident that the enterprise will be reliable in the future. By placing themselves in a position of mutual dependence, the two parties are signaling the reliability of their future conduct.

Mutual dependence is less likely to be an element of counterpurchase than buy-back. Often under counterpurchase, two different Eastern enterprises participate in the two trade flows and the Western company does not necessarily sell capital equipment. Then mutual dependence could be absent. In contrast, buy-back is always conducted between one enterprise and one company and always involves a Western sale of capital equipment. Thus, in examining the market signaling advantages of countertrade, one must focus on buy-back.

6. Later, I provide evidence that buyers make such assumptions.

7. 'Turnkey' factories are often supplied by the company which uses the equipment in the West.

The foregoing argument has used two unsubstantiated assumptions: (i) that Eastern European countries do have a poor quality reputation and (ii) that country-of-origin is used as a quality signal in the absence of other quality information. It is appropriate to provide some justification for these assumptions before proceeding further.<sup>8</sup>

The literature on East-West trade is replete with references to the poor quality of East European products (see, for example: Brown and Marer (1973, p. 191), Brown and Neuberger (1968, p. 15), Karcz (1973, p. 214), and Pryor (1963, p. 176)). Moreover, poor quality in non-priority sectors is a consequence of the economic management used in centrally-planned economies (Kornai 1959, p. 57). The cause of poor quality being systemic, prospective Western buyers would be thoroughly rational in assuming, in the absence of contrary information, that Eastern European goods are of poor quality. However, quality reputations are not the same for all Eastern European countries. The products of the GDR and Czechoslovakia are generally regarded as superior in quality to those of other Eastern countries (*BEE* 1971, pp. 57, 204, 301 and 1978, pp. 140, 201, 283). Montias (1976, p. 31) rates these two countries as the only Eastern European nations to penetrate Western markets for manufactured goods.

Given the foregoing, it is not surprising that country quality reputations affect market behavior. The following is typical of advice by *Business Eastern Europe* (1977, p. 187): "Romanian goods from the Romanian machine-building industry must be heavily discounted on Western markets because of poor after-sales service." The discounting on Western markets shows that country-of-origin is being used as a signal.<sup>9</sup> Statistical studies provide similar evidence. When comparing prices of Eastern goods sold on Western markets to the prices of exactly equivalent Western goods, Eastern goods have lower prices. The price differential is greatest on machinery, less on non-machinery manufactured goods, and least on raw materials. (Marer (1972) has summarized the results of a number of studies. Similar evidence can be found in Brada and Wipf (1976).) Not only can the lower prices be explained by the use of country-of-origin to judge quality, but also the discount is highest on those goods for which quality is most important. There is also evidence that the meaning of the country-of-origin signal varies within Eastern Europe. Czechoslovakian goods command higher prices in OECD markets than equivalent Polish, Hungarian, or Romanian goods (Brada and Wipf (1976, p. 130). Use of a superior country-of-origin quality signal for Czechoslovakian goods would account for such a result.

8. Note that these assumptions are sufficient, but not necessary, conditions justifying the importance of good-specific signals. Thus, the argument that buy-back is an important signal does not necessarily depend on these assumptions.

9. Country-of-origin is also used in Western markets. Reynolds and Gregory (1965, p. 190) observe that Puerto Rican manufacturers disguise the origin of their products when selling on the local market "because consumers will not buy the local product (if they can identify it as such) because of the poor reputation for quality."

## II. A MODEL OF THE FACTORS INFLUENCING THE FORMATION OF BUY-BACK DEALS

In this section, I present a model of negotiations between an Eastern enterprise and a Western firm. The model is suggestive of, rather than a complete description of, the factors influencing contract choice. Construction of a complete model would be most cumbersome in view of the variety of institutional arrangements within Eastern Europe. As the model's conclusions are unsurprising and are later subjected to testing, little would be gained from a lengthier description of the behavior of Eastern enterprises.

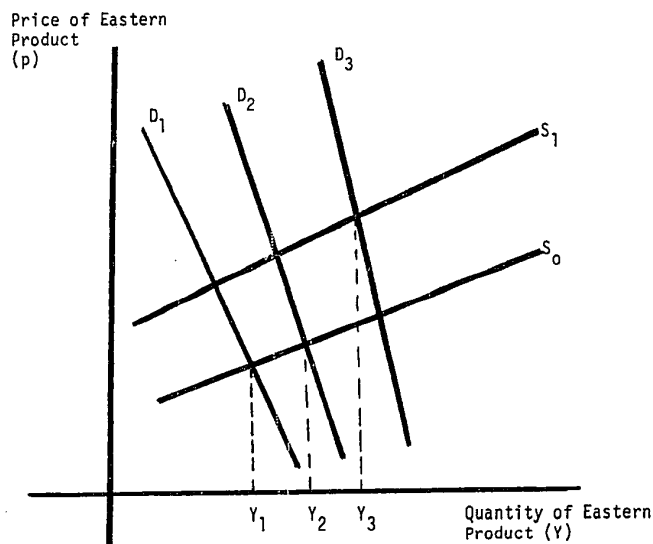
An Eastern *enterprise* is negotiating to buy a *factory* from a Western *company* and concurrently trying to sell the product made in that factory to the Western company. (In the following, the underlined words will be used without the geographical adjectives.) The following assumptions are used:

- (a) The factory is available only on Western markets, which are competitive.
- (b) The enterprise will choose between 100% buy-back or no buy-back.<sup>10</sup> The company is an "arrangement-taker" in that it offers various contracts and allows the enterprise to choose between them.
- (c) The objective of the enterprise is to maximize output sold subject to a profit constraint set by higher authorities. This is one of many enterprise goals which have been followed in Eastern Europe. Assuming maximization of output leads to a simple diagrammatic analysis. However, the same results are obtained if maximization of profits or revenues is the goal.
- (d) The product is produced under non-increasing returns to scale.
- (e) The product has quality  $\mu^*$ . Exact knowledge of quality can be obtained by paying  $c$  per unit, the cost of tests ( $c$  may be infinite). The company selling the factory knows product quality.<sup>11</sup>
- (f) In the absence of buy-back and quality testing, a buyer of the product assumes quality equals  $\bar{\mu}$  ( $< \mu^*$ ), average product quality in the enterprise's country.
- (g) A company concluding a buy-back deal does not use the product and must resell it. The company can signal  $\mu^*$  by using trademarks or guarantees. Costs incurred in this selling process are embodied in the factory's price.
- (h) After the conclusion of a buy-back deal, the enterprise can convince potential buyers that product quality equals  $\mu^*$  by informing buyers

10. This assumption simplifies the analysis by limiting possible outcomes to two alternatives instead of a whole spectrum of contracts.

11. This assumption is not intended to imply that the seller of any factory will always know quality but rather that we are restricting attention to the case where the seller has such knowledge.

FIGURE 1

Demand and Supply for the Eastern Product ( $Y$ )

about the actions of the company involved in the deal. The original contract is thus a further signal.<sup>12</sup>

The decision facing an enterprise is represented in figure 1. There will be two supply curves for the Eastern product because costs are higher under buy-back than when the factory is bought for cash:  $S_1$  following buy-back, and  $S_0$  relevant after a cash purchase. Under the foregoing assumptions, both supply curves will be coincident with the relevant long-run average cost curves (counting minimum profits as costs). There are three demand curves for the product.<sup>13</sup>  $D_1(p, \bar{\mu})$  is relevant if no buyer ascertains quality ( $p$  is product price).  $D_2(p, \mu^*, c)$  is demand when buyers pay  $c$  to test quality.  $D_3(p, \mu^*)$  is demand after a buy-back deal has been concluded. The demand curves have the following properties:

$$\frac{\partial D_i}{\partial p} < 0, \quad i = 1, 2, 3; \quad \frac{\partial D_1}{\partial \bar{\mu}} > 0; \quad \frac{\partial D_i}{\partial \mu^*} > 0; \quad i = 2, 3; \quad \frac{\partial D_2}{\partial c} < 0;$$

$D_1(p, \bar{\mu}) < D_3(p, \mu^*)$  for  $\mu^* > \bar{\mu}$ ; and  $D_3(p, \mu^*) > D_2(p, \mu^*, c)$  for all  $p, \mu^*$ , and  $c$ .

12. Assumptions (g) and (h) can be changed without changing the conclusions. In particular, one could change (g) to include a situation in which the company uses the product as a production input. Or, (h) could be replaced with a much weaker assumption, in which buyers buying direct from the Eastern company assume product quality is between  $\bar{\mu}$  and  $\mu^*$ . Any changes in (h) and (g), however, would necessitate a different formulation of the model.

13. No explicit assumption is made about market structure. All one need assume is that competitors of the enterprise react in an unchanging manner to the enterprise's price changes.

On figure 1, the intersection of  $D_3$  and  $S_1$  gives the price-output combination for buy-back. The intersection of  $D_2$  and  $S_0$  gives the price-output combination when buyers test for quality. The intersection of  $D_1$  and  $S_0$  is relevant when buyers do not ascertain product quality. The outputs of the Eastern enterprise in each situation ( $Y_1$ ,  $Y_2$ , and  $Y_3$ ) can be ordered by magnitude in any pattern. (The situation depicted is one in which a buy-back deal is best.) An immediate conclusion from the model is that if nothing is learned from buy-back then  $D_1 = D_3$  and  $Y_1 > Y_3$ , so that buy-back is inferior. A market signal is a necessary condition for the use of buy-back.

To obtain testable hypotheses, simple comparative statics results can be derived. When  $c$  decreases,  $D_2$  moves to the right and the probability that  $Y_2$  will be to the right of  $Y_3$  increases. Hence, the likelihood of buy-back declines. Thus, buy-back is more likely the higher the cost of testing product quality. The second testable hypothesis focuses on the country quality signal,  $\bar{\mu}$ . If  $\bar{\mu}$  increases,  $D_1$  moves to the right. Thus, the probability that  $Y_1$  is to the right of  $Y_3$  is higher for enterprises in countries with a higher quality reputation. Hence, buy-back is more likely the lower is the Eastern country's quality reputation.

Before turning to the tests, two qualifications must be made. First, if institutional pressure for countertrade is strong, enterprises may sign countertrade contracts solely because of this pressure. One should not conclude that market signaling is the sole reason for countertrade. The appropriate conclusion from the above analysis is that the signaling property of buy-back will influence both the pattern of countertrade and the extent to which it is regarded as successful by Eastern European authorities.

Second, the Eastern enterprise need not be aware that the quality signal is a property of successful buy-back. A signal can have an appropriate effect even when the signaler is unaware of the information being conveyed. Thus, the model is consistent with a scenario in which countertrade began as an institutional response to changing trade conditions. Given some negotiating flexibility, countertrade proposals in which signaling was an element would succeed while others would fail. The pattern of successes and failures predicted by the foregoing hypotheses would occur even if Eastern negotiators did not understand the element of signaling in countertrade.

### III. TESTS OF THE EFFECTS OF MARKET SIGNALING ON TRADE PATTERNS

For the tests, it is necessary to identify goods for which quality signals are important. Quality signals will be important determinants of market behavior if two conditions are satisfied. First, the buyer must think that quality is crucial to a good's performance and that quality could vary.

Second, quality must be difficult to ascertain before purchase. Thus, the following characteristics of goods are important:

- (a) *Durability*.<sup>14</sup> The more durable a good, the less likely that it can be used in a normal manner and quality ascertained before purchase. Also, durable goods usually require after-sales service and supply of spare parts, the reliability of which cannot be tested before sale.
- (b) *Indivisibility*. The greater the value of the smallest testable unit, the more expensive is randomized testing requiring destruction.
- (c) *Proportion of raw material in total value*. The greater the manufacturing input relative to raw material input, the more quality depends on decisions made by the manufacturer. Therefore, quality variation will be more likely.

The exact identification of goods for which a signal is necessary would involve extended study. However, it is easy to identify one product group which is more likely to contain goods with the above characteristics than other groups. As this study examines trade flows, the Standard International Trade Classification (SITC) is a natural tool for classification purposes (see United Nations 1975). Of the one digit SITC groups, group 7, Machinery and Transport Equipment, has a large proportion of the goods that have the characteristics which make quality signaling important. In Appendix I, the use of group 7 goods as those which require signals is given further justification.<sup>15</sup>

The tests use data on countertrade contracts. As that data is from a nonstandard source (*Business Eastern Europe*), a brief description of the data is required. A lengthier description is contained in Appendix II. Each week BEE describes contracts signed between Western companies and Eastern enterprises. The descriptions are detailed enough to obtain the following information: (a) whether the contracts are counterpurchase, buy-back, or for cash, and (b) the SITC group for any Eastern European export, or potential export, connected with the contract. For contracts listed during 1977-78, the following information was found:<sup>16</sup>

- (i) The SITC group of the good to be produced on the capital equipment sold to an Eastern enterprise for cash ('the product group of a cash deal').

14. By durability I do not mean the opposite to perishable but rather the fact that the product is normally used over an extended period of time.

15. There is ample evidence that East European group 7 exports to the West are low compared to both Eastern European production of these goods and to the Eastern European level of development (see, for example, Kadar 1977). Thus, the use of group 7 and the interpretation of East-West trade given in the opening paragraphs of section 2 are consistent.

16. For countertrade contracts before 1977, information is available in Matheson, McCarthy and Flanders (1977). Therefore, as the numbers of buy-back and counterpurchase contracts signed during 1977-78 were small compared to the number of cash contracts, the sample has been augmented with pre-1977 countertrade contracts. This augmentation is for the tests of Hypotheses 1 and 2 but *not* for Hypotheses 3 and 4 for which it is important to have a measure of the relative importance of buy-back versus cash and counterpurchase contracts.



- (ii) The SITC group of the Eastern product to be exported in a buy-back agreement ('the product group of a buy-back deal').
- (iii) The SITC group of the Eastern product to be exported in a counterpurchase agreement ('the product group of a counterpurchase deal').

For each hypothesis tested, three overlapping sets of data were used in order to ensure that the results do not solely reflect one country's experience. Hungary and the Soviet Union account for a disproportionate share of the contracts. The policies of both these countries are not typical of Eastern Europe. As the Soviet Union has relied heavily on the export of raw materials, one would not expect its data to provide strong support for the signaling hypotheses. Hungary has liberalized its economy and allowed more flexibility in negotiations than other Eastern European countries. If the hypotheses are correct one would expect strong results for Hungary. Thus, to ensure that the results are not unduly affected by the specific policies of these two countries, three data sets are used. First, the results are presented for all 7 Eastern European countries. Then the Soviet Union is excluded from the data in order to focus on the countries which have not been able to rely on exports of natural resources. Then Hungary is also excluded in order to ensure that its data do not dominate the results.

The results to be tested were derived in the previous section. It was predicted that buy-back contracts will be more likely to be chosen when a quality signal is necessary and other contractual forms are more likely to be chosen when quality is more easily ascertainable. Since group 7 goods have been identified as those for which a quality signal is necessary, a natural hypothesis is:

*Hypothesis 1.* The proportion of all buy back contracts which involve a product from group 7 will be greater than the proportion of all cash contracts which involve a product from group 7.

The test results for this hypothesis are presented in the first three lines of table 1. When all 7 countries are included in the data, 59% of all the buy-back contracts involve an Eastern product which is classified in SITC group 7. In contrast, 26% of cash contracts involve a group 7 product. The usual test statistic for a difference between proportions, which has a standard normal distribution, equals 6.3. The critical points (which apply to all the tests) are 2.33 for a 99% significance level and 1.64 for a 95% significance level. Thus, all three sets of data strongly support hypothesis 1.

There is a possible objection to hypothesis 1 as a test of the influence of signaling. The product in a buy-back contract is always exported. In contrast, there is no assumption that the product made on a piece of capital equipment bought in a cash deal is exported. Thus, if for any reason group 7 products are more readily exportable than other products, the data would support hypothesis 1 even if there were no signaling effects of buy-back. As the Eastern product in a counterpurchase contract is exported,

TABLE 1  
Test Results

| Hypothesis Tested | Test Statistics            | COUNTRIES USED IN THE DATA SET |                |                          |
|-------------------|----------------------------|--------------------------------|----------------|--------------------------|
|                   |                            | 7 (all)                        | 6 (excl. USSR) | 5 (excl. USSR & Hungary) |
| 1                 | Buy-back Proportion        | 0.59                           | 0.62           | 0.56                     |
|                   | Cash Proportion            | 0.26                           | 0.30           | 0.29                     |
|                   | Standardized difference    | 6.30**                         | 5.11**         | 3.23**                   |
| 2                 | Buy-back Proportion        | 0.59                           | 0.62           | 0.56                     |
|                   | Counterpurchase Proportion | 0.20                           | 0.28           | 0.33                     |
|                   | Standardized difference    | 4.86**                         | 3.76**         | 1.90*                    |
| 3                 | High-signal Proportion     | 0.14                           | 0.14           | 0.14                     |
|                   | Low-signal Proportion      | 0.20                           | 0.31           | 0.13                     |
|                   | Standardized difference    | 0.92                           | 2.29**         | -0.15                    |
| 4                 | High-signal Proportion     | 0.38                           | 0.38           | 0.38                     |
|                   | Low-signal Proportion      | 0.64                           | 0.73           | 0.58                     |
|                   | Standardized difference    | 1.75*                          | 2.53**         | 1.14                     |

\*\* = significant at the 99% level; \* = significant at the 95% level.

the objection can be countered by comparing the patterns of counterpurchase and buy-back contracts. Market signals are more likely to be important determinants of buy-back contracts than of counterpurchase contracts. Therefore, one would test:

*Hypothesis 2.* The proportion of all buy-back contracts which involve a product from group 7 will be greater than the proportion of all counterpurchase contracts which involve a product from group 7.

Two of the test statistics (see table 1) are significant at the 99% level and the other at the 95% level. The results of Hypotheses 1 and 2 together give strong support to the signaling interpretation of countertrade. The fact that the least significant test statistic, for both hypotheses, is the one in which Hungary is excluded, provides additional support for that interpretation. As Hungarian enterprises have more negotiating flexibility than other East European enterprises, that country's data should show the strongest effects of signaling. Nevertheless, the results in the last column of table 1 ensure that signaling phenomena also affect the data of other countries.

The second prediction of the theory focuses on the notion of a national quality reputation. The model showed that the higher the country-of-origin quality signal the less likely that enterprises would use buy-back. The GDR and Czechoslovakia were identified as two countries with high quality reputations relative to the rest of Eastern Europe. Therefore, one can test the effects of country-of-origin signals by examining the following hypothesis:<sup>17</sup>

*Hypothesis 3.* Let GDR and Czechoslovakia constitute the high signal group and Romania, Poland, Hungary, USSR, and Bulgaria the low signal group. Then the high signal group has a lower ratio of buy-back deals to all factory sales (*i.e.*, the sum of cash and buy-back deals) than the low signal group.

With Hungary included and the Soviet Union excluded, the test statistic for Hypothesis 3 is significant. For the two other sets of data, the test statistic is not significant. The results may be a reflection of the fact that enterprises in countries other than Hungary do not have much flexibility in avoiding institutional pressure for countertrade. Thus, one is led to seek a test which is not affected by this pressure: a comparison of counterpurchase and buy-back. As signaling is more likely to be a property of buy-back than of counterpurchase, buy-back will be more important relative to counterpurchase in low signal countries than high signal countries. Thus, one would test:

*Hypothesis 4.* The proportion of all countertrade contracts which are buy-back contracts is higher for low signal than high signal countries.

Two of the statistics support the hypothesis significantly. However, when the Soviet Union and Hungary are excluded, the statistic is non-significant. (In the non-significant case, the difference of proportions has the expected sign. The standard errors are large due to the small number of contracts.) The test results for hypothesis 4 support the prediction that a country-of-origin quality signal affects trade patterns and that buy-back may be a means of overcoming a poor quality reputation.

17. See footnote 16 for the data included in this test. In formulating the test, it would have been appropriate to ensure that the test results are not due to the differing policies of companies which trade in different Eastern European countries. However, it is impossible to control for company behavior because each Western company accounts for only a small number (often one) of contracts. Nevertheless, there are a number of examples in the data of Western companies using different contractual forms in different countries. Thus, insofar as one can ascertain from the data, the results are not due to the preferences (geographical or contractual) of Western companies.

## IV. CONCLUSION

The statistical results of section 3 support the theory that informational difficulties, and therefore market signals, affect the pattern of East-West trade. The results show that countertrade, and especially buy-back, can play an important role when quality information is unobtainable. In light of these results, the usual conclusion, that countertrade is a retreat towards bilateralism without any significant advantage (OECD 1981, p. 7), should be reevaluated.

Two further conclusions can be drawn. The first is based on the argument that knowledge of a production process can lead to an estimate of product quality. Presumably, this argument is relevant for trade relationships between any countries. Thus, in intra-Western trade there must be an institution which plays a role analogous to countertrade. The multinational corporation could be such an institution.<sup>18</sup> Thus, the presence of countertrade in East-West trade may be a result of the absence of multinational corporations in Eastern Europe.

One can also conclude that countertrade may lead to a gradual improvement in Eastern European trade performance. Every high quality good sold in the West will change Western perceptions of East European quality. As the country-of-origin signals change, it will become easier for Eastern enterprises to sell goods in the West. Thus, a buy-back contract is not only an investment in Western technology but also an investment in a country's quality reputation.

## APPENDIX I:

## The Use of Group 7

The strongest argument for using group 7 goods as those for which signaling is necessary is that all goods in group 7 are durable and most durable goods are in group 7. The test results are primarily due to a different pattern of behavior in group 7 (machinery and transport equipment) than in group 5 (chemicals) and 6 (manufactured goods classified chiefly by material). The names of these groups indicate that the use of group 7 is appropriate.

Evidence from other research can also be used. Nelson (1974) has distinguished between search goods and experience goods. Search goods are those whose quality can be ascertained before purchase. Experience goods are those goods whose quality can be ascertained only by experience. Nelson also distinguishes between experience durable and experience non-durable: the latter group consisting of goods which can be sampled at

18. The argument would be consistent with Williamson's (1975) organizational theories. The information problems solved by countertrade can, in a Western context, be solved by internalization of trade in a hierarchical organization.

small cost. Thus, “experience durable” goods are ones for which quality signals are important. Thus, if the use of group 7 is appropriate, Nelson’s experience durable goods will be in group 7 while experience non-durable and search goods will not. Of 40 goods classified by Nelson (1974, p. 739), 35 classifications are consistent with this prediction, 3 are inconsistent and 2 are ambiguous. The use of group 7 is broadly consistent with Nelson’s work.

#### APPENDIX II:

##### The Data

This appendix supplements the text’s description of data collection by listing the rules employed in interpreting the *BEE* contract descriptions.

- (a) The only *BEE* entries used were those in which it was explicitly stated that contracts had been signed.
- (b) Where there was no mention of countertrade it was assumed that the sale was for cash (this assumption, if inappropriate, would only bias the tests toward acceptance of the null hypothesis).
- (c) The SITC group was found by comparing the *BEE* description to the United Nations classification tables (see United Nations, 1975). In a small number of cases, it was not possible to find the SITC group number. In such cases, the contract was not included in the sample.
- (d) For a few cases, the exports in a counterpurchase contract consisted of an assortment of goods. If the goods were either all in group 7 or all not in group 7 the counterpurchase was counted as one contract. If some goods were in 7 and others not, the contract was counted twice, once in 7 and once outside 7.
- (e) Buy-back is only possible if the Eastern product is exportable. To include in cash sales only contracts in which buy-back would have been possible, cash sales were excluded if the product to be made in Eastern Europe as a result of the contract was not exportable.
- (f) Buy-back is only possible when a complete salable item is made on the Western equipment. To include in cash sales only contracts in which buy-back would have been possible, cash sales were excluded if the item sold was only peripheral to the production process.
- (g) Production process licenses were counted as sales of capital equipment for two reasons. First, knowledge of the production process provides the signal, and a license is evidence of this knowledge. Second, *BEE* estimates that 98 % of license sales are eventually followed by sales of equipment.

The data collected using these rules is presented in table 2.

TABLE 2

## The Structure of Countertrade

| (1)<br>Country | (2)<br>Type of Contract | (3)<br>Number of<br>Contracts in<br>SITC Group 7 | (4)<br>Number of<br>Contracts in<br>SITC Groups<br>0-6, 8, 9 | (5)<br>Total<br>Contracts<br>Signed in<br>1977-78 |
|----------------|-------------------------|--|--|---|
| Poland         | Cash                    | 19   | 20   | 39  |
|                | Buy-back                | 15   | 14   | 8   |
|                | Counterpurchase         | 2  | 11   | 4   |
| Hungary        | Cash                    | 18   | 38   | 56  |
|                | Buy-back                | 42   | 22   | 47  |
|                | Counterpurchase         | 2  | 11   | 13  |
| Romania        | Cash                    | 6  | 23   | 29  |
|                | Buy-back                | 7  | 0  | 3   |
|                | Counterpurchase         | 2  | 0  | 2   |
| Bulgaria       | Cash                    | 2  | 3  | 5   |
|                | Buy-back                | 0  | 0  | 0   |
|                | Counterpurchase         | 3  | 1  | 2   |
| Czechoslovakia | Cash                    | 2  | 14   | 16  |
|                | Buy-back                | 1  | 0  | 1   |
|                | Counterpurchase         | 1  | 2  | 2   |
| GDR            | Cash                    | 1  | 14   | 15  |
|                | Buy-back                | 1  | 5  | 4   |
|                | Counterpurchase         | 2  | 6  | 6   |
| USSR           | Cash                    | 26   | 100  | 126   |
|                | Buy-back                | 1  | 6  | 7   |
|                | Counterpurchase         | 0  | 16   | 16  |

SOURCES: 1977-78 issue of *Business Eastern Europe*; Matheson, McCarthy, and Flanders (1977), pp.1304-11.

NOTE: The data in column (5) only includes contracts listed in the first source. The data for buy-back and counterpurchase in columns (3) and (4) includes contracts listed in both sources.

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