REPORT TO
NATIONAL COUNCIL FOR SOVIET AND EAST EUROPEAN RESEARCH

TITLE: AN ESTIMATE OF THE DYNAMIC EFFECTS OF REGIONAL ECONOMIC INTEGRATION

&

HOW EFFECITVE IS THE CMEA?
AN INTERNATIONAL COMPARISON

AUTHORS: Josef C. Brada and Jose A. Mendez

CONTRACTOR: Yale University

PRINCIPAL INVESTIGATOR: J. Michael Montias

COUNCIL CONTRACT NUMBER: 800-9

DATE: February 1988

The work leading to this report was supported by funds provided by the National Council for Soviet and East European Research. The analysis and interpretations contained in the report are those of the author.

NOTE

This report consists of two related papers. In the first paper, the authors identify the dynamic effects of integration and present estimates of the effect of integration on the rate of capital formation and on technological progress in 6 regional economic integrations schemes; the EEC, EFTA, CMEA, CACA, LAFTA, and EACM, on the basis of an econometric model. The second paper constitutes part of a much broader study of the Hungarian economy. In that context the paper examines the static gains from integration and CMEA's ability to generate dynamic gains from integration.

This report is an incidental product of Council Contract No. 800-9, "Industrial Policy in Eastern Europe," Josef C. Brada and J. Michael Montias, Principal Investigators; the Final Report from which has been submitted to the U.S. Government separately.

AN ESTIMATE OF THE DYNAMIC EFFECTS OF REGIONAL ECONOMIC INTEGRATION

I. Introduction

The rapid rates of growth of the member countries of the EEC and EFTA in the 1960s created a presumption that economic integration has an important effect on the level and growth of economic activity. At first the beneficial consequences of economic integration were attributed the so-called static effects. Chief among these is the increase in production arising from the more rational allocation of resources brought about by the elimination of trade barriers among member countries.[1] The belief that the static effects of integration were responsible for the "European miracle" was buttressed by studies showing that, in these two integration schemes, trade creation was much greater than trade diversion.[2]

Unfortunately attempts to quantify the static gains from integration produced a series of estimates notable for their general agreement that such effects were miniscule. The most optimistic estimate placed them at a once-and-for-all increase in GNP of no more than 1 percent; the remainder of the estimates places the gain in GNP at much less.[3] Because the static effects of integration were so small relative to overall growth rates in Western Europe, proponents of integration turned to the so-called dynamic effects to explain the evident success of the EEC and EFTA and to serve as the basis for the promotion to economic integration among other, mainly developing, countries.[4] Unlike the static effects, which produce a once-and-for-all increase in output and thus have a short-lived impact on the growth rate of output, the dynamic effects of integration act to increase the rate of growth of output over a long period. Thus, even if the impact on the rate of growth is relatively small, compounded over a number of years it can represent significant gains in output and welfare.

Although the importance of the dynamic benefits of integration is now a

matter of textbook orthodoxy, the hypothesis that integration leads to more rapid rates of growth of output remains a theoretical plausibility whose existence, not to mention significance, remains to be measured.[5] In this paper we identify the dynamic effects of integration and present estimates of the effect of integration on the rate of capital formation and on technological progress in six regional economic integration schemes. Among them are three schemes made up of developed countries, the European Economic Community (EEC), the European Free Trade Area (EFTA) and the Council for Mutual Economic Assistance (CMEA). The three developing country schemes are the Central American Common Market (CACM), the Latin American Free Trade Area (LAFTA) and the East African Common Market (EACM). These estimates are then employed to calculate the effect of integration on the growth of output in each integration scheme.

II. The Dynamic Effects of Integration

Economic integration increases the rate of growth of the integrating countries in two conceptually different ways. First, the rate of growth of factor inputs may be increased leading to more rapid rates of growth of output. Second, the rate of technological progress within the economic union may be increased so that even if inputs do not increase more rapidly, output nevertheless will grow more rapidly than in the pre-integration period.

Integration is assumed to increase the rate of growth of capital by raising the return to capital and by reducing the risk to investors. The creation of a large multinational market reduces the risk attributed to individual investment project in a national market in two ways. First, the greater heterogeneity of the multinational market should be more likely to provide a sufficiently large group of consumers with particular needs to make the investment successful while

a similar investment constrained to a national market might fail due to the lack of sufficient demand. Second, to the extent that the member countries have asynchronous business cycles or seasonal buying patterns the opportunity to operate plants at rates closer to capacity or to reduce the inventory-to-sales ratio exists. Firms within the union should also be able the realize greater profits from lower production costs caused by economies of scale and the mobility of capital and labor, and, even if factors are not free to move within the integration scheme, free trade will permit firms to relocate production facilities so as to take advantage of factor-price differentials among members. The risk of intra-member trade will also fall relative to other foreign trade because the risk of changes in tariff and nontariff barriers among members is much less than in trade with non-members. Finally, the risk to investors may be reduced through the establishment of a regional capital market that, because of its size and international scope, would be less subject to the imperfections that characterize small, national capital markets.

Of course, in the process of integration there will be both losers and winners. Some firms will be successful and capture a large share of the expanded market and subsequently increase their volume of investment. At the same time other firms, shorn of the protection of tariffs, will prove unable to compete and begin to disinvest. While the proponents of integration argue that in the long run the net effect will be to increase the volume of investment, it may well be that in the period immediately following integration investment will decline. To the extent that firms able to compete within the entire region have some excess capacity before integration, they may view it prudent to serve the new demand at first by operating existing plants more intensively. Only some years after the formation of the trading bloc when the potential of the area-wide market has proven itself will they begin to increase their investment

outlays. In contrast, some inefficient firms may begin to reduce investment outlays before integration takes place in anticipation of losing their market to more efficient producers in the integrating countries while other firms will begin to suffer losses from competition after integration and may thus be forced to curtail their capital outlays. As a result, investment in the integrating countries may actually decline in the first few years following integration and then increase gradually to levels exceeding, ceteris paribus, those of the pre-integration period.

Even if integration were not to lead to higher rates of growth of inputs, the growth rate of output could be increased because integration promoted a higher level of "disembodied" technological progress among member countries.[6] One source of such progress would be economies of scale, since a larger market would permit the use of more specialized equipment and labor. Firms could also become more specialized and thus lower their production costs. As sectors of the economy begin to benefit from economies of scale, their increased demand for inputs or lower output prices stimulate production in other sectors, creating further economies of scale. Thus what began as a static effect for one industry cumulates into a dynamic, economy-wide process. To the extent that a larger market leads to an increase in firm size, the quality of management would also increase. Thus, for example, the "managerial revolution" that took place in the EEC in the 1960s has been attributed, in part, to the growth of firm size that integration engendered.

Regional economic integration also eliminates the protection of monopolistic and oligopolistic industries. After integration, the firms in these industries will have to intensify their efforts to survive and prosper and thus they must become more dynamic and innovative. The ability of firms to innovate through increased research and development outlays will also be improved

through of integration. First, firms will have a larger market over which to amortize their research outlays. Second, larger firms in any case spend more on research than do small ones. Finally, research and development activities themselves are thought to benefit from economies of scale, so that the increase in research outlays ought to yield particularly favorable results.

Economic integration also provides greater scope to entrepreneurship. Since one of the functions of the entrepreneur is to facilitate the transfer of resources from declining industries to those where factor productivity is high and increasing rapidly, the greater the supply of entrepreneurial talent, the more rapidly such resource transfers occur and the more rapidly the economy grows.

III. The Model

Because there are two separate effects of integration to be measured, a system of simultaneous equations was employed. The system consists of an investment function with terms to capture the effects of integration on investment behavior and of a production function that permits integration to influence the rate of technological progress. The two equations are linked by the relationship between investment and the growth of the capital stock.

In both developed and developing countries, investment was modelled by means of an accelerator model. In the case of developing countries the role of inflows of foreign capital was thought to be sufficiently important to warrant the inclusion of this variable in Equation 1. Thus for developing countries:

$$INV_{i,t} = \alpha_0 + \alpha_1 RY_{i,t} + \alpha_2 FY_{i,t} + \alpha_3 CU_{i,t} + \alpha_4 CUDT_{i,t} + e_{i,t} \qquad \text{(Eq. 1a)}$$

and for developed countries:

$$INV_{i,t} = \alpha_0 + \alpha_1 RY_{i,t} + \alpha_3 CU_{i,t} + \alpha_4 CUDT_{i,t} + e_{i,t} \qquad \text{(Eq. 1b)}$$

where

$INV_{i,t}$ = (real gross domestic capital formation/real gross domestic product) in country i in year t,

$RY_{i,t}$ = growth of real gross domestic product in country i in year t,

$FY_{i,t}$ = (real foreign capital inflow/real gross domestic product) in country i in year t,

$CU_{i,t}$ = 0 if country i was not a member of the integration scheme in year t
= 1 otherwise,

$CUDT_{i,t} = (CU_{i,t}/(t-1950))$,

$e_{i,t}$ = error term.

The dummy variable $CU_{i,t}$ measures the permanent or long-term effect of integration on capital formation. However, as mentioned above, integration may have some transitory effects on the volume of investment as well, either by depressing it below its long-term level at the onset of integration or by temporarily raising it above its long-term level. This transitory effect is measured by $CUDT_{i,t}$ a variable that decreases over time. A significant value for α_3 indicates that integration has long-term impact on the level of capital formation in the integrating countries, while a significant value for α_4 indicates that the short-term impact of integration on capital formation was different from the long-term effect.

Output growth in both developed and developing countries was modelled as depending on the growth of labor and capital inputs, on disembodied technological progress, and on the effect of integration on productivity growth.[7] Thus:

$$RY_{i,t} = \beta_1 RK_{i,t} + \beta_2 RL_{i,t} + \beta_3 CU_{i,t} + \beta_4 T + u_{i,t} \qquad \text{(Eq. 2)}$$

where

RK = rate of growth of capital stock in country i in year t,

RL = rate of growth of population in country i in year t,

T = (t-1950),

$u_{i,t}$ = error term.

The system is closed by an equation linking investment to the growth of capital stock by:

$$RK_{i,t} = (Y_{i,t} \cdot INV_{i,t}/K_{i,t-1}) - \delta K_{i,t-1} \qquad \text{(Eq. 3)}$$

where

$Y_{i,t}$ = real gross domestic product of country in in year t,

$K_{i,t}$ = real capital stock of country i in year t.

IV. Empirical Results

Data for the period 1951-77 were collected for the members of three developing country schemes, the Central American Common Market (CACM), the Latin American Free Trade Area (LAFTA), and the East African Common Market (EACM) as well as for three developed country schemes, the European Free Trade Area (EFTA), the European Economic Community (EEC) and the Council for Mutual Economic Assistance (CMEA).[8] Equations 1, 2 and 3 were estimated for each integration scheme by pooling observations across member countries and over years.

Parameter estivates for Eq. 1 are reported in Table 1. With the exception of LAFTA, the R^2s are reasonable for pooled cross-section data, and the parameter estimates are generally significant. As expected, estimates of α_1 are positive and significant as are those for α_2 in the case of the CACM and EACM, indicating that capital formation is related both to the growth of output and to inflows of foreign capital. The dynamic effects of integration are captured by α_3 and α_4.

With the exception of the CMEA, estimates of α_3 are positive and significant. Thus integration raised the proportion of output devoted to capital formation both in the case of developing and developed country schemes. Also encouraging is the fact that the estimates of α_3 are rather tightly grouped, ranging from 0.028 to 0.048. Among market economies, integration appears to have a positive long-term impact on the rate of growth of capital in integrating countries. The negative α_3 in the case of CMEA may be explained in two ways. First it may simply reflect the discontinuation of the Stalinist investment policies that predominated in CMEA during the early 1950s. Secondly, it should be recognized that one of the goals of CMEA integration was to reduce the investment burden on the member countries by rationalizing investment decisions. Thus we should not expect to see in CMEA the same effect on investment that is evident in integration among market economies.

The transitory effect of integration on investment is significant only in the case of the CACM and LAFTA, where α_4 is negative. Thus in these two integration schemes, the level of investment did not increase in the years immediately following integration by the full amount implied by α_4. Instead, in the CACM in the first year following integration investment rose by 77 percent of its long-term increment and in LAFTA by 79 percent. Thus the negative short-term effects of integration on investment appear not to be too serious.

The effects of increased levels of capital formation on output as well as the effects of integration on technological progress are determined by means of Eq. 2, for which parameter estimates are reported in Table 2. The rate of growth of the capital stock is significant for all market-economy integration schemes. The rate of growth of the population is not significant save for the EFTA. For the developing country schemes, where labor is in surplus, such a conclusion is not surprising; nor is the negative α_2 for the EACM where workers

may have been redundant. α_3, the coefficient for the integration dummy, is significant only in the case of the CACM and the CMEA. In no other integration scheme is there any evidence that technological progress increased following integration. Thus our examination of six integration schemes indicates that integration can provide dynamic benefits in the form of faster rates of growth of the capital stock, but that integration is not likely to increase the rate of technological progress among the integrating countries.

V. Measuring the Gains from Integration

Having thus demonstrated that economic integration does produce some dynamic gains for the integrating countries, we next turn to determining whether such gains are of sufficient magnitude to make economic integration an important mechanism for promoting growth. To do this we compare the GDP that the member countries could have acheived either at the time the integration scheme was terminated or in 1977, the last year of our sample, with and without the dynamic benefits of integration. GDP in the terminal year without integration was computed by means of dynamic simulation of Eqs. 1-3 from the first year of the sample to the terminal year with $CU_{i,t} = 0$ for all years and all countries. Thus the terminal year GDPs for all member countries reflect no dynamic effects of integration. The terminal year GDP with dynamic effects of integration was also calculated by means of Eqs. 1-3, but this time with $CU_{i,t} = 1$ for those years in which each individual country belonged to the integration scheme. Only those values of α_3, α_4, and β_3 that were significantly different from zero were employed in these calculations.

The results are reported in Table 3. Although terminal-year GDP was calculated on a country-by-country basis, for brevity we have summed these and report them only by integration schemes. Thus in the CACM, for example, due to dynamic gains from integration over the period 1961-77, member countries' GDPs in 1977

were 4.3 percent higher than they would have been had CACM not been formed. Of this gain, 1.2 percentage points were due to the higher level of capital formation and 3.1 percentage points were the result of increased technological progress.[9] With the exception of the CMEA, the technological progress term was significant for the remainder of the integration schemes and therefore the only gains from integration come from higher rates of capital formation.

In view of the fact that the gains reported in Table 3 represent the cumulation of, in most cases, over 10 years of integration the modest increases in terminal year GDP over the no-integration level of GDP indicates that the dynamic effects of integration cannot explain the rapid rates of growth experienced by West European countries and that, in fact, the dynamic effects of economic integration cannot greatly increase the growth rate of output. On the other hand, the inability of the dynamic effects of integration to make a marked impact on the growth of output should not be interpreted to mean that the welfare effects of integration are unimportant. For example, since the CACM raised the GDP of member countries by 4.3 percent in the terminal year, a rough approximation suggests that over the entire integration period 1961-77 GDP was about 1.5 percent higher than it would have otherwise been. Thus the dynamic gains may be viewed as being equal to 1.5 percent of GDP for a period of 17 years. Such a sum, even with the inclusion of a discount factor suggests that, when measured in terms of long-run consumption possibilities, the dynamic effects of integration can bring about a significant gain in welfare for the integrating countries.

FOOTNOTES

[1]See Viner (1950), Lipsey (1960) and Meade (1968).

[2]Aitken (1973) and Balassa (1967) provide more recent evidence that reconfirms earlier findings.

[3]Lipsey (1960) and Johnson (1958) provide the higher estimate in the case of the UK. More pessimistic estimates are those of Scitovsky (1958) who put the static gains of integration to Common Market members at less than 0.05 percent of their GNP and Janssen (1961) and Wemelsfeld (1960) who put the gains of joining the EEC to be 0.1 percent of GNP for Italy and 0.18 percent for the Federal Republic of Germany.

[4]The view that the gains from integration were largely dynamic was first put forward by Scitovsky (1958).

[5]See, for example, Walter and Areskoug (1981) Chapter 14 or Salvatore (1983) Chapter 10.

[6]Elliot and Wood (1981) argue that the formation of the EEC had an important effect on the rate of technological progress among member countries.

[7]Population was used as a proxy for labor both on the basis of data availability and because for developing countries it may be more meaningful.

[8]Member countries and the years in which they joined/left each integration scheme are:

CACM: Guatemala (61), El Salvador (61), Honduras (61-69), Nicaragua (62), Costa Rica (63).

LAFTA: Mexico (60), Argentina (60), Brazil (60), Paraguay (60), Uruguay (60), Bolivia (67), Chile (60), Colombia (61), Ecuador (61), Peru (60), Venezuela (65).

EACM: Kenya (67-72*), Uganda (67-72*), Tanzania (67-72*), (*de facto though not de jure).

EFTA: Austria (60), Denmark (60-72), Norway (60), Portugal (60), Sweden (60), Switzerland (60), United Kingdom (60-72).

EEC: Belgium (59), Luxembourg (59), France (59), Germany (59), Italy (59), Netherlands (59), Denmark (73), United Kingdom (73).

CMEA: Bulgaria, Czechoslovakia, GDR, Hungary, Poland, Romania, USSR. The CMEA was formed in 1949, but we have assumed that integration effects of CMEA integration should only be evident after serious efforts at integration were begun and thus take 1964 as the starting date of CMEA.

Data for the EACM begin in 1957, for Argentina in 1952, Chile and Paraguay in 1953 and Uruguay in 1955.

[9]Technological progress also influences the rate of investment by raising RY. However, this interaction term was negligible in the two cases where it occurred.

REFERENCES

Aitken, N. D., "The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis." American Economic Review, Vol. 63, No. 5: 881-92.

Balassa, B., "Trade Creation and Trade Diversion in the EEC." Economic Journal, Vol. 77 (1967): 1-21.

Elliott, R. F. and P. W. Wood, "The International Transfer of Technology and Western European Integration." In R. G. Hawkins and A. J. Prasad, (eds.), Research in International Business and Finance, Volume II: Technology Transfer and Economic Development. (Greenwich CT: JAI Press, 1981).

Janssen, L. H., Free Trade and Customs Union (Tilburg, Leiden: Economisch Sociologisch Instituut, 1961).

Johnson, H. G., "The Gains from Free Trade with Europe: An Estimate." Manchester School, Vol. 26, No. 3 (1958): 171-81.

Lipsey, R. G., "The Theory of Customs Unions: A General Survey." Economic Journal, Vol. 60 (1960): 496-513.

Meade, J. E., The Theory of Customs Unions (Amsterdam: North Holland, 1968).

Salvatore, D., International Economics (New York: Macmillan, 1983).

Scitovsky, T., Economic Theory and West European Integration (Winchester, MA: Allen and Unwin, 1958).

Viner, J., The Customs Union Issue (New York: Carnegie Endowment for International Peace, 1950).

Walter, I. and K. Areskoug, International Economics (New York: Wiley & Sons, 1981).

Wenmelsfelder, J., "The Short-term Effect of Lowering Import Duties in Germany." Economic Journal, Vol. 60 (1960): 94-104.

DATA APPENDIX

Except as noted below, all data were obtained from various issues of IMF, International Financial Statistics. Nominal values were converted to 1975 prices by using the consumer price index reported for each country.

The initial period capital stock, K_0, was calculated by multiplying the initial year level of output, Y_0, by the period average incremental capital-output ratio, $\overline{ICOR}$. The latter was estimated using the following formula under the assumption that an increase in capital would lead to an increase in output over three periods:

$$\overline{ICOR} = \sum_{t=1}^{T} (3INV_t \; / \; dlY_t + dlY_{t+1} + dlY_{t+2}) \div T$$

where "dl" represents the change in the variable that follows.

Real foreign capital inflows were taken as the sum of net factor payments abroad and imports less exports.

Other data sources were used for the following countries:

CACM. Data for all variables from 1951-1959 for Nicaragua were derived from J. Nugent, Economic Integration in Central America: Empirical Applications (Baltimore: Johns Hopkins, 1975).

EACM. For all three countries, data for real gross domestic product and real gross domestic capital formation was obtained from various issues of the UN, National Income Accounts. Real capital inflows were computed as the deficit on the trade balance. Data for exports and imports were derived from the Historical Series found in UN, Yearbook of International Trade Statistics. These are comparable to lines 70 and 71 of the IMF, International Financial Statistics.

CMEA. Population astimates were obtained from the UN, Demographic Yearbook. Gross national product and gross capital formation data were obtained from the Wharton Centrally Planned Economies Data Book (Washington, DC: Wharton Econometrics, 1982).

TABLE 1

Parameter Estimates for Equation 1

Integration Scheme	α_0	RY α_1	FY α_2	CU α_3	CUDT α_4	R^2	Number of Observations
CACM	0.121 (19.97)	0.398 (5.43)	0.494 (5.95)	0.038 (2.92)	-0.523 (-2.38)	0.426	130
LAFTA	0.162 (29.78)	0.110 (4.04)	0.094 (1.32)	0.032 (2.79)	-0.407 (-2.19)	0.093	277
EACM	0.143 (26.11)	0.162 (4.04)	0.348 (6.32)	0.048 (2.39)	-0.441 (-1.03)	0.570	60
EEC	0.191 (47.78)	0.260 (4.79)	----	0.028 (3.76)	0.197 (1.69)	0.383	208
EFTA	0.191 (22.60)	0.416 (3.64)	----	0.039 (2.82)	0.026 (0.12)	0.206	182
CMEA	0.442 (10.99)	0.944 (2.02)	----	-0.281 (-2.68)	1.049 (0.51)	0.162	179

t-ratios in parentheses.

TABLE 2

Parameter Estimates for Equation 2

Integration Scheme	RK β_1	RL β_2	CU β_3	TIME β_4
CACM	1.553	0.092	0.021	-0.001
	(4.78)	(0.22)	(2.14)	(-1.59)
LAFTA	0.955	0.561	0.030	-0.001
	(1.68)	(0.71)	(1.36)	(-0.44)
EACM	1.913	-1.213	-0.016	-0.001
	(2.10)	(-0.94)	(-0.44)	(-0.26)
EEC	1.094	0.142	0.003	-0.001
	(4.06)	(0.17)	(0.45)	(-2.66)
EFTA	0.980	0.377	0.008	-0.001
	(4.72)	(4.23)	(1.45)	(-4.05)
CMEA	0.273	0.256	0.037	-0.002
	(0.86)	(0.51)	(2.48)	(1.66)

t-ratios in parentheses

R^2 not reported due to constraint $\beta_0 = 0.0$

TABLE 3

Increase In Terminal-Year Gross Domestic Product Due to Dynamic Effects of Integration
(as percentage of terminal year GDP without integration)

Integration Scheme		Increase in GDP Due to Higher Investment Level	Increase in GDP Due to Higher Rate of Techno-logical Progress	Total = 1 + 2
CACM	1961-77[a]	1.2	3.1	4.3
LAFTA	1960-77[b]	1.1	NS	1.1
EACM	1967-72	3.0	NS	3.0
EEC	1959-77[c]	1.1	NS	1.1
EFTA	1960-77[d]	0.9	NS	0.9
CMEA	1964-77	-0.4	5.0	4.6

Notes: NS = Technological progress coefficient not significant.

[a] Except Honduras 1961-69; Nicaragua, 1962-; Costa Rica, 1963-.

[b] Except Colombia and Ecuador, 1961-; Venezuela, 1965-; Bolivia, 1967-.

[c] Except Denmark and United Kingdom, 1973-.

[d] Except Denmark and United Kingdom, 1960-72.

HOW EFFECTIVE IS THE CMEA?
AN INTERNATIONAL COMPARISON

INTRODUCTION

Although Hungary's trade with the developed market economies is of importance because it permits Hungary to acquire technology not available from its partner countries in the Council for Mutual Economic Assistance (CMEA) and because trade with the West may impose some competitive pressures on Hungarian firms, it is trade with CMEA that forms the foundation for Hungary's trade policy and for the overall success of the Hungarian economy. Not only does the volume of trade with CMEA encompass the majority of Hungary's imports and exports (Table 1), but such trade is also vital to Hungary's ability to develop new and dynamic industries (Brada 1984, forthcoming). Thus, whether or not Hungary's efforts at reform and restructuring will prove successful depends, to a large extent, on the environment within CMEA for the expansion of trade and for the promotion of specialization and technological progress.

The ability of the CMEA to meet Hungary's foreign trade needs in turn, depends on its ability to generate the static and dynamic gains that economists identity as the main benefits from regional integration. In the next section of the paper we examine the static gains from integration, in the form of increased intra-member trade, that CMEA generates. We conclude that, in terms of gross trade creation among members, the CMEA appears to be a relatively effective integration scheme. In Section II we examine CMEA's ability to generate dynamic gains from integration, and, again, we conclude that CMEA compares well on this score when judged against its objectives and agains the performance of other integration schemes. Based on these findings we then examine the rationalle for

Table 1

HUNGARIAN TRADE BY REGIONS (%)

	Exports		Imports	
Year	CMEA	Developed Market Economies	CMEA	Developed Market Economies
1960	61.6	22.0	63.2	24.3
1970	66.9	27.2	62.5	27.1
1975	68.5	21.8	63.5	27.4
1980	51.5	35.1	47.3	40.2
1983	54.4	33.0	52.6	34.4

Sources: Vienna Institute for Comparative Economic Studies, Comecon Foreign Trade Data, 1982. (London: MacMillan, 1983) and Hungarian Central Statistical Office, Hungary Today. (Budapest: Statistical Publishing House, 1985).

Hungary's participation within CMEA and the political economy of future intra-CMEA relations.

I. STATIC GAINS FROM INTEGRATION: INCREASING TRADE AMONG INTEGRATING COUNTRIES[1]

Static gains from integration arise from the increase in intra-member trade that results from the lowering of barriers to trade among the integrating countries. The increased volume of trade lowers prices in importing countries and brings about a more rational allocation of resources. At the same time, there may be losses associated with integration if trade with efficient non-members is reduced in favor of trade with less-efficient members of the integration scheme. Thus, to judge the efficacy of CMEA as an integration scheme we need to reach an understanding both of the trade creation effects of CMEA integration and of the diversion of CMEA members' trade from non-member countries.

In this section, we first compare the ability of the CMEA to promote intra-member trade to that of integration schemes among developed and developing market economies. Then we examine, from the Hungarian standpoint, the impact tht the CMEA's trade diversion may have on Hungary's share of the static gains from integration.

THE MODEL

With the exception of Balassa's (1967) study of trade creation and diversion in the EEC, the common approach to quantifying the effects of integration on trade flows has been to utilize the so-called gravity equation. The gravity equation has proven popular for

several reasons. First it provides an empirically tractable general equilibrium framework for modelling bilateral trade flows. Second it has a sound theoretical basis, Bergstrand (1985), and it has proved useful in a variety of applications; Geraci and Prewo (1977), Linnemann (1966), Poyhonen (1963) and Tinbergen (1962). In its basic form the model is written as:

$$\log X_{ij} = A + a_1 \log Y_i + a_2 \log Y_j + a_3 \log N_i + a_4 \log N_j + a_5 D_{ij} + \log e_{ij} \qquad \text{Eq. 1}$$

where X_{ij} = value of exports from country i to country j

A = constant

Y_i, Y_j = income in the exporting and importing countries

N_i, N_j = population in the exporting and importing countries

D_{ij} = distance between countries i and j

e_{ij} = lognormal error term.

The income and population variables represent the trading countries' endowments and tastes. Since greater productive capacity and income promote trade, a_1 and a_2 are expected to be positive. Large countries have more diversified production and thus satisfy a greater proportion of domestic demand while small countries tend to be more specialized and thus more dependent on trade, suggesting that a_3 should be negative (Leamer and Stern, 1970, pp. 152-3). The population of the importing country should have a positive effect on the volume of trade, since a larger population permits a greater division of labor and diversity of production enabling imports to compete with domestic goods at more stages of the production process.

Moreover, a large market better compensates exporters for the cost of acquiring information and establishing a sales and distribution network. Thus a_4 should be positive.

The distance variable represents resistance to trade. This resistance has an economic element, consisting of transportation and information costs; a structural element reflecting differences in consumption patterns and resource endowments as, for example, between temperate and tropical countries; and a policy element including the effects of economic integration. Because the structural factors are ambiguous in their effect, with differences in endowments promoting trade but differences in consumption hindering it, we focus our attention on the other two factors by improving on the way that the effects of integration on resistance to trade are specified.

Researchers have used the gravity equation to measure the trade-augmenting effects of integration in two ways. The more common, used by Tinbergen (1962), Aitken (1973) and Hewett (1976), is to employ a set of dummy variables to measure the effect of integration on intra-member trade. Whenever two members of a preferential trading group trade with each other, the dummy is equal to 2; when trade is with or among non-members the dummy equals 1. The larger the value of the coefficient of the dummy variable, the greater the volume of intra-member trade relative to "normal" or non-preferential trade and the more effective the integration scheme. An alternative approach, employed by Pelzman (1977), is to choose a pre-integration period on the basis of which Equation 1 is estimated. The parameter estimates are then employed to project expected intra-member trade during the post-integration period. The excess of actual intra-member trade

over the expected volume of trade is attributed to the effect of integration. While either approach is acceptable when one or a few integration schemes, made up of countries at similar levels of development, of similar size and with the same economic system, are analyzed, both methods break down when we turn to the more heterogeneous sample of countries required to compare the effects of integration among developed and developing market countries and among the members of the CMEA.

The effect of integration on intra-member trade is influenced by three sets of factors. The first of these is the environment, which we take to mean the physical and economic characteristics of the integrating countries and their economic relations with the rest of the world. For example, countries close to each other should experience, ceteris paribus, a greater post-integration stimulus to mutual trade than would two integrating countries that are far from each other. A second influence on the effectiveness of integration is the economic system of the integrating countries. The literature on the trade behavior of the planned economies suggests that such economies will trade less, ceteris paribus, than comparable market economies. Finally, there is the element of policy; some integration schemes lower barriers against intra-member trade to a greater degree than do others and thus are more effective in increasing intra-member exchanges. When we deal with a homogenous group of countries, we can assume that the integration dummies or the difference between actual and predicted trade flows do not reflect systemic differences; nor do we expect that environmental factors change sharply over time or differ appreciably between integration schemes. Thus the coefficients

of the integration dummies or the differences between expected and actual post-integration trade can safely be attributed to the policy variable, economic integration. However, with a more heterogeneous sample, estimates of the effect of integration will become tainted at best and swamped at worst by the differences in system and environment that exist among the various integration schemes.

In order to overcome these difficulties, we modify the gravity equation to take into account environmental effects on the effectiveness of integration. The two environmental variables we model are distance among integrating countries and their level of development. The hypothesis that distance among integrating countries will influence the amount by which intra-member trade increases is based on many of the same arguments employed to include distance as a trade resistance variable. For example, if countries A, B and C agree to reduce trade barriers among themselves, and A and B are close to each other but both are distant from C then the degree of integration and consequently the increase in trade should be greater between A and B than between A and C or B and C. In part this will occur because for some bulky or highly perishable products trade between A and B might become feasible while remaining uneconomic between A and C. The larger distance between A and C will also place businesses in C at a disadvantage vis-a-vis those in B in assessing and reacting to market opportunities in country A, since they will have less precise information about A and less direct acquaintance with the culture and economy of country A. Thus they will be less successful in penetrating A's markets. Finally, countries close to each other are likely to have greater cultural similarities and also

relatively similar climates, leading to similar patterns of consumption and production, that, in turn, lead to greater opportunities for exchanges of products (Linder, 1961). Consequently, an integration scheme with relatively small distances among members should stimulate intra-member trade more, ceteris paribus, than one consisting of countries located far from each other.

The level of development should also have a positive impact on the effects of integration largely because less developed countries have a structural bias against trade and thus benefit less from integration. Their production is concentrated in subsistence agriculture and in services, neither of which enter into international trade. The bulk of their trade is thus with countries of differing levels of development and consists of exchanges of agricultural products and raw materials for manufacturers. Developed countries' production, concentrated in manufactures, permits both complementary trade (manufactures for raw materials) as well as a large measure of intra-industry exchanges of manufactured goods.

To measure these environmental influences on trade flows we respecify Equation 1 as:

$$\log X_{ij} = A + a_1 \log Y_i + a_2 \log Y_j + a_3 \log N_i + a_4 \log N_j + a_5 \log D_{ij} + b \log Q_{ij} + c_1 P_{ij} \log(Y_i/N_i)(Y_j/N_j) + c_2 P_{ij} \log D_{ij} + \log e_{ij} \qquad \text{Eq. 2}$$

where $Q_{ij} = 2$ and $P_{ij} = 1$ if countries i and j belong to the same preference area and = 1 and 0 respectively when countries i and j belong to different or no preference areas. The coefficient c_1 measures the effect of per capita incomes on the effectiveness of

integration. If the coefficient is positive, then the effect of integration on inter-member trade increases with the level of development of the integrating countries, reflecting the higher proportion of tradables in their output. The coefficient c_2 measures the effect of distance on the trade augmenting power of a customs union. The greater the distance among members, the smaller, ceteris paribus, is the augmentation of their trade with each other.

EMPIRICAL RESULTS

Data was collected for the trade of the member countries of the European Economic Community (EEC), European Free Trade Area (EFTA), Central American Common Market (CAM), Latin American Free Trade Area (LAFTA), and the Andean Pact with each other and with eighteen developed and developing countries belonging to no integration scheme.[2] Trade flows of the CMEA countries were not employed in estimating the parameters of Equation 2 since, due to systemic differences between them and the other countries in the sample, the trade of the CMEA was not expected to follow the regime implied by parameters estimated on the basis of the trade of market economies. Because the observations could not be pooled over time, it was necessary to estimate parameters for Equation 2 for each year and these parameter estimates are presented in Table 2. The coefficients for income and population have the epected signs, and these as well as a_5, the coefficient for distance, are similar to those reported by Aitken and Hewett, whose samples were restricted to industrialized countries. With the exception of the constant term the coefficients are relatively stable over time.

Estimates of the values of the coefficients measuring integration effects are reported from 1960 onward, since that year marks the founding of EFTA and LAFTA as well as the first year of operation of the EEC. The estimates of b, the parameter of the coefficient for the integration dummy, Q_{ij}, are not significant in the early years of integration. This is to be expected since it is likely to require some time before traders can take advantage of the opportunities offered by reductions in barriers to intra-member trade. With the passage of time, the magnitude and significance of b increase, reflecting the gradual increase in intra-member trade as the effects of integration make themselves felt. The value of b reaches its peak in 1969, and then declines until 1972 when an upward trend in its value asserts itself. The post-1968 decline may reflect the delayed effects of the Kennedy Round tariff cuts which should have reduced the tendency of integration to promote inter-member trade at the expense of trade with outsiders.

The coefficient for per capita incomes of integrating countries, c_1, is generally positive and significant. This means that, ceteris paribus, integration among high per capita income, or developed, countries causes a greater increase in inter-member trade than does integration among low-income countries. The value of c_1 falls over time and after 1973 is not significantly different from zero. This we attribute to the effects of the worldwide increase in the prices of fuels and raw materials, since this increase then caused complementary trade in such goods among countries of different income levels to be weighted more heavily in total trade than competitive trade flows among developed countries. Finally, c_2, the coefficient of the

distance dummy is negative. This indicates that the effects of integration on trade are diminished as the distance between integrating countries is increased. The absolute value of c_2 declines over time, although the coefficient remains statistically significant. This implies that some of the obstacles to integration among countries more distant from each other, caused, for example, by a lack of knowledge regarding trading opportunities, are dissipated over time as traders gain more information.

The ratio of post- to pre-integration trade is given by 2 exp $(b + c_1 (Y^*/N^*)^2 + c_2 D^*)$ where Y* and N* are the average income and population of the integrating countries and D* the average distance among them. This number represents the amount of intra-union trade creation expected in a customs union among countries of a given level of per capita incomes and inter-member distance assuming that the policies adopted to promote integration were of the same effectiveness as that of the average of those adopted by the five integration schemes in our sample. Table 3 presents the total value of $b + c_1 (Y^*/N^*) + c_2 D^*$ as well as of its components for each integration scheme for each year of its existence.

Overall the differences between the six integration schemes reported in column 2 are relatively small, indicating that differences in per capita incomes explain little of the difference in the ability of integration schemes to stimulate intra-member trade. They also decline with time, in large part because of the decreasing value of c_1. Rather, the principal environmental source of such differences is, as the data in column 3 suggest, the difference in average inter-member distance, which varies from 306 miles for CACM to 9,173 miles for LAFTA. As a result CACM, although made up of the

least-developed countries in our sample, is expected to increase intra-member by a factor somewhat greater than is the EFTA. LAFTA, on the other hand, is expected to have a relatively minor impact on intra-member trade largely because of the great distances among members. In terms of environmental factors promoting intra-member trade, the CMEA compares favorably with the EEC and EFTA. While per capita incomes are somewhat lower in CMEA (Column 2), inter-member distances within CMEA are less than those in EFTA although somewhat greater than those in the EEC (Column 3). Thus, for example, the EEC was expected to raise intra-member trade by a factor of $2^{\cdot 2.25} = 4.8$ in 1962, 8.6 in 1970 and 6.6 in 1977. The EFTA was expected to raise inter-member trade by $2^{\cdot 1.66} = 3.2$ in 1962, 5.5 in 1970 and 4.6 in 1977. For the CMEA, the comparable figures are 3.0 for 1962, 5.5 for 1970 and 5.2 for 1977. Thus in terms of level of development and distance among members the CMEA clearly has the potential to raise intra-member trade to levels observed in the EEC and EFTA if the CMEA integration mechanism were as effective as those of the other two integration schemes.

Having thus demonstrated the importance of environmental factors for the effectiveness of regional integration schemes, we turn to an analysis of the policies by which integration has been promoted. Among the six integration schemes in our sample there are important differences in integration policies. Among these differences are the type of integration scheme, such as a free trade area or a common market; the extent to which non-trade barriers are lowered among members; and the height of tariffs imposed on imports from non-members; and the economic system of the integrating countries. Our

procedure in comparing the effectiveness of integration policies followed by the six integration schemes in our sample is to determine whether the actual increase in intra-member trade is greater than that predicted in Table 3. Since increases in trade predicted by Table 3 reflect environmental differences between integration schemes but assume identical integration policies for all schemes, any difference between predicted and actual increase in intra-member trade thus reflects differences in the effectiveness of the policies adopted by each integration scheme. The ratio of actual to expected pre-integration trade for the i-th integration scheme can be expressed as:

$$2^{b(i)} = \frac{\text{actual post-integration trade}}{\text{expected pre-integration trade}} \qquad \text{Eq. 2}$$

$$b(i) = (b + \pi(i)) + c_1 (Y^*/N^*)^2 + c_2 D^* \qquad \text{Eq. 3}$$

where $\pi(i)$ measures the difference between the effectiveness of the i-th integration scheme's policies and the effectiveness of the average integration policy. The results are reported in Table 4, for selected years only to save space.

For four integration schemes, CMEA, the EEC, LAFTA and the Andean Pact, the $\pi(i)$s are negative indicating integration policies of less than average effectiveness. As may be seen from column 4, CMEA and the EEC achieved increases in trade that were equal to roughly 60 percent of the potential gains that could have been achieved with policies of "average" effectiveness given the characteristics of the integrating countries. LAFTA and the Andean Pact also implemented integration policies of less than average effectiveness. Although the $\pi(i)$s for

these two schemes fluctuate more than those for CMEA and EEC, they bracket them, suggesting that integration policies in Latin America were about as effective as those in the two European schemes and that the differences in trade creation between the two European and the two Latin American schemes evident in column 1 reflect largely environmental factors. The EFTA and CACM, on the other hand, appear to have implemented policies above average effectiveness, with those of CACM appearing to be more effective than those of EFTA.

In sum, then, we can conclude that CMEA integration has generated as much of an increase in inter-member trade as have customs unions among developed market economies when environmental factors are taken into account. Despite this evident success, CMEA integration has been criticized by Bergson (1980), Desai (1985) and Holzman (1976, 1985) as an unsuccessful customs union, on that is, to use Holzman's words "...a losing proposition in economic terms." (1976, p. 59). The basis for this argument is the low level of trade of CMEA countries with non-members, which to CMEA critics reflects trade diversion within CMEA.

This diversion of trade towards higher cost producers within CMEA and away from low cost producers in non-member countries can, however, impose losses only on those CMEA members whose terms of trade are worse than they would be if their trade was cleared at world market prices (WMPs) and on those non-member countries that could have supplied goods at lower prices. Within the CMEA, it is evident that machinery and consumer manufactures have been the categories of commodities where the majority of the diversion from non-CMEA suppliers to CMEA producers has taken place. The supply

of fuels and raw materials has come largely from the Soviet Union, but at relatively, and often absolutely, lower than world market prices. Consequently, it is the Soviet Union that suffers from trade diversion; the more developed CMEA members, including Hungary, do not suffer from trade diversion within CMEA. In fact, they may benefit in the sense that trade diversion has enabled them to shift resources to industry, where labor productivity and factor productivity growth are both higher than in agriculture and services.[3] Consequently, from Hungary's standpoint, it is unlikely that trade diverion within CMEA is a serious source of static losses from integration, and, as a result it is likely to enjoy static gains from integration that reflect the relative success of the CMEA in promoting inter-member trade.

DYNAMIC GAINS FROM INTEGRATION[4]

In addition to the static gains from trade described above, economic integration is alleged to be the source of dynamic gains that have a long-run effect on the growth of the integrating countries. The increase in growth results from two conceptually different effects. The first of these is an increase in the rate of growth of factor inputs, particularly that of capital. The second effect is an increase in technological progress, usually measured as the growth of total factor productivity.

In market economies integration increases the volume of investment and thus the growth of the capital stock by increasing the return and lowering the risk to investors. The creation of a large multinational market reduces the risk attributed to individual

investment project in a national market in two ways. First, the greater heterogeneity of the multinational market should be more likely to provide a sufficiently large group of consumers with particular needs to make the investment successful while a similar investment constrained to a national market might fail due to the lack of sufficient demand. Second, to the extent that the member countries have asynchronous business cycles or seasonal buying patterns the opportunity to operate plants at rates closer to capacity or to reduce the inventory-to-sales ratio exists. Firms within the union should also be able to realize greater profits from lower production costs caused by economies of scale and the mobility of capital and labor, and, even if factors are not free to move within the integration scheme, free trade will permit firms to relocate production facilities so as to take advantage of factor-price differentials among members. The risk of intra-member trade will also fall relative to other foreign trade because the risk of changes in tariff and nontariff barriers among members is much less than in trade with non-members. Finally, the risk to investors may be reduced through the establishment of a regional capital market that, because of its size and international scope, would be less subject to the imperfections that characterize small, national capital markets.

Of course, in the process of integration there will be both losers and winners. Some firms will be successful and capture a large share of the expanded market and subsequently increase their volume of investment. At the same time other firms, shorn of the protection of tariffs, will prove unable to compete and begin to disinvest. To the extent that firms able to compete within the entire region have some

excess capacity before integration, they may view it prudent to serve the new demand at first by operating existing plants more intensively. Only some years after the formation of the trading bloc when the potential of the area-wide market has proven itself will they begin to increase their investment outlays. In contrast, some inefficient firms may begin to reduce investment outlays before integration takes place in anticipation of losing their market to more efficient producers in the integrating countries while other firms will begin to suffer losses from competition after integration and may thus be forced to curtail their capital outlays. As a result, investment in the integrating countries may actually decline in the first few years following integration and then increase gradually to levels exceeding, ceteris paribus, those of the pre-integration period.

While the above mechanisms may well apply to market economies, they are clearly not relevant to the member countries of CMEA. In the latter, the volume of investment is set by the state with little regard to the risk-return calculus. Moreover, the difficulty in CMEA countries has been to rein in the growth of investment rather than to stimulate it. Indeed, one of the objectives of the CMEA is to reduce the level of investment in member countries by promoting specialization and by eliminating the need for investments by one member country that needlessly duplicate capacity being constructed by other members. Consequently with regard to the growth of inputs, the dynamic effects of CMEA must be reviewed in a way opposite from that employed for market economies.

Even if integration were not to lead to higher rates of growth of inputs, the growth rate of output could be increased because

integration promoted a higher level of "disembodied" technological progress among member countries. One source of such progress would be economies of scale, since a larger market would permit the use of more specialized equipment and labor. Firms could also become more specialized and thus lower their production costs. As sectors of the economy begin to benefit from economies of scale, their increased demand for inputs or lower output prices stimulate production in other sectors, creating further economies of scale. Thus what began as a static effect for one industry cumulates into a dynamic, economy-wide process. To the extent that a larger market leads to an increase in firm size, the quality of management would also increase.

Regional economic integration also eliminates the protection of monopolistic and oligopolistic industries. After integration, the firms in these industries will have to intensify their efforts to survive and prosper and thus they must become more dynamic and innovative. The ability of firms to innovate through increased research and development outlays will also be improved through integration. First, firms will have a larger market over which to amortize their research outlays. Second, larger firms in any case spend more on research than do small ones. Finally, research and development activities themselves are thought to benefit from economies of scale, so that the increase in research outlays ought to yield particularly favorable results.

Economic integration also provides greater scope to entrepreneurship. Since one of the functions of the entrepreneur is to facilitate the transfer of resources from declining industries to those where factor productivity is high and increasing rapidly, the

greater the supply of entrepreneurial talent, the more rapidly such resource transfers occur and the more rapidly the economy grows. With regard to this second set of dynamic effects, the objectives of CME members and market economies are identical. CMEA integration, specialization and scientific cooperation are all seen as important stimuli to the technological progress of member countries.

THE MODEL

Because there are two separate effects of integration to be measured, a system of simultaneous equations was employed. The system consists of an investment function with terms to capture the effects of integration on investment behavior and of a production function that permits integration to influence the rate of technological progress. The two equations are linked by the relationship between investment and the growth of the capital stock. Dynamic effects of integration are estimated by means of these equations for the CMEA and, for purposes of comparison, for the EEC, EFTA, LAFTA, CACM, and the East African Common Market (EACM).[5]

In all countries, investment was modelled by means of an accelerator model. In the case of developing countries the role of inflows of foreign capital was thought to be sufficiently important to warrent the inclusion of this variable in Equation 5. Thus for developing countries:

$$INV_{i,t} = a_0 + a_1 RY_{i,t} + a_2 FY_{i,t} + a_3 CU_{i,t} + a_4 CUDT_{i,t} + e_{i,t} \quad \text{(Eq. 5a)}$$

and for developed countries:

$$INV_{i,t} = a_0 + a_1 RY_{i,t} + a_3 CU_{i,t} + a_4 CUDT_{i,t} + e_{i,t} \qquad \text{(Eq. 5b)}$$

where

$INV_{i,t}$ = (real gross domestic capital formation/real gross domestic product) in country i in year t,

$RY_{i,t}$ = growth of real gross domestic product in country i in year t,

$FY_{i,t}$ = (real foreign capital inflow/real gross domestic product) in country i in year t,

$CU_{i,t}$ = 0 if country i was not a member of the integration scheme in year t,
= 1 otherwise,

$CUDT_{i,t}$ = $(CU_{i,t}/(t-1950))$,

$e_{i,t}$ = error term.

The dummy variable $CU_{i,t}$ measures the permanent or long-term of integration on capital formation. However, as mentioned above, integration may have some transitory effects on the volume of investment as well, either by depressing it below its long-term level at the onset of integration or by temporarily raising it above its long-term level. This transitory effect is measured by $CUDT_{i,t}$ a variable that decreases over time. A significant value for a_3 indicates that integration has long-term impact on the level of capital formation in the integrating countries, while a significant value for a_4 indicates that the short-term impact of integration on capital formation was different from the long-term effect.

Output growth in both developed and developing countries was modelled as depending on the growth of labor and capital inputs, on

disembodied technological progress, and on the effect of integration on productivity growth.

Thus:

$$RY_{i,t} = b_1 RK_{i,t} = b_2 RL_{i,t} + b_3 CU_{i,t} + b_4 T + u_{i,t} \qquad \text{(Eq. 6)}$$

where

RK = rate of growth of capital stock in country i in year t,

RL = rate of growth of population in country i in year t,

T = (t-1950),

$u_{i,t}$ = error term.

The system is closed by an equation linking investment to the growth of capital stock by:

$$RK_{i,t} = (Y_{i,t} \cdot INV_{i,t}/K_{i,t-1}) - K_{i,t-1} \qquad \text{(Eq. 7)}$$

where

$Y_{i,t}$ = real gross domestic product of country in year t,

$K_{i,t}$ = real capital stock of country i in year t.

EMPIRICAL RESULTS

Data for the period 1951-77 were collected for the members all integration schemes. Equations 5, 6, and 7 were estimated for each integration scheme by pooling observations across member countries and over years.

Parameter estimates for Eq. 5 are reported in Table 5. With the exception of LAFTA, the R^2s are reasonable for pooled cross-section data, and the parameter estimates are generally significant. As expected, estimates of a_1 are positive and significant as are those for a_2 in the case of the CACM and EACM, indicating that capital formation is related both to the growth of output and to inflows of

foreign capital. The dynamic effects of integration are captured by a_3 and a_4. With the exception of the CMEA, estimates of a_3 are positive and significant. Thus integration raised the proportion of output devoted to capital formation both in the case of developing and developed market country schemes. Also encouraging is the fact that the estimates of a_3 are rather tightly grouped, ranging from 0.028 to 0.048. Among market economies, integration thus appears to have a positive long-term impact on the rate of growth of capital in integrating countries. The estimate of a_3 for CMEA is negative and significant, while that of a_4 is not significantly different from zero. This indicates that CMEA integration measures begun in the early 1960s did in fact serve to reduce the volume of investment by promoting specialization and by coordinating the investment efforts of member countries.

The effects of increased levels of capital formation on output as well as the effects of integration on technological progress are determined by means of Eq. 6, for which parameter estimates are reported in Table 6. The rate of growth of the capital stock is significant for all market-economy integration schemes. The rate of growth of the population is not significant save for the EFTA. For the developing country schemes, where labor is in surplus, such a conclusion is not surprising; nor is the negative b_2 for the EACM where workers may have been redundant. The coefficient for the integration dummy, b_3, is significant only in the case of the CACM and the CMEA. In no other integration scheme is there any evidence that technological progress increased following integration. Thus, with regard to fostering technological progress, CMEA appears to have been

considerably more successful than its generally more favorably regarded counterparts among developed and developing market economies.

MEASURING THE GAINS FROM INTEGRATION

Having thus demonstrated that economic integration does produce some dynamic gains for the integrating countries, we next turn to determining whether such gains are of sufficient magnitude to make economic integration an important mechanism for promoting growth. To do this we compare the GDP that the member countries could have achieved either at the time the integration scheme was terminated or in 1977, the last year of our sample, with and without the dynamic benefits of integration. GDP in the terminal year without integration was computed by means of dynamic simulation of Eqs. 5-7 from the first year of the sample to the terminal year with $CU_{i,t} = 0$ for all years and all countries. Thus the terminal year GDPs for all member countries reflect no dynamic effects of integration. The terminal year GDP with dynamic effects of integration was also calculated by means of Eqs. 5-7, but this time with $CU_{i,t} = 1$ for those years in which each individual country belonged to the integration scheme. Only those values of a_3, a_4, and b_3 that were significantly different from zero were employed in these calculations.

The results are reported in Table 7. Although terminal-year GDP was calculated on a country-by-country basis, for brevity we sum the results for each integration scheme. As may be seen, the CMEA achieves the greates gain from the increase in technological progress as well as the greatest total gain from integration because the gains from technology are sufficiently large to offset the negative effect

of slower capital growth, the latter being, in any case, intentional.

CONCLUSIONS

Our comparative examination of the CMEA leads us to conclude that CMEA integration has been considerably more successful than its critics have been willing to grant. When compared with integration schemes among market economies, the CMEA does well in terms of inter-member trade expansion and outperforms western integration schemes in the provision of dynamic gains in the form of an increase in factor productivity growth of its members' economies. Hungary's participation in CMEA would thus appear to be based on a perception of these advantages and to offer the Hungarian economy the opportunity to develop new products and new industries that will find a stable and profitable outlet on the CMEA market.

Table 2

PARAMETER ESTIMATES FOR EQUATION 2

Coefficients of Independent Variable

Year	Constant	D_{ij}	Y_i	Y_j	N_i	N_j	Q_{ij}	$P_{ij}\frac{Y_i}{N_i}\frac{Y_j}{N_j}$	$P_{ij}D_{ij}$	R^2	F	Obs.
1960	-1.028	-0.252 (-3.08)	1.035 (9.53)	0.251 (5.54)	-0.249 (-1.79)	0.451 (6.18)	1.501 (0.26)	0.344 (1.64)	-0.698 (-2.71)	.506	70.64	561
1961	-1.000	-0.224 (3.42)	1.031 (13.43)	0.212 (5.62)	-0.253 (-2.50)	0.475 (8.44)	3.301 (1.05)	0.328 (2.84)	-0.860 (-5.55)	.591	134.75	756
1962	-1.187	-0.265 (-3.89)	1.039 (13.81)	0.230 (5.98)	-0.223 (-2.28)	0.529 (9.03)	1.916 (0.68)	0.286 (2.75)	-0.629 (-4.33)	.607	144.50	737
1963	-1.578	-0.183 (-2.73)	1.033 (14.11)	0.224 (6.08)	-0.290 (-3.02)	0.492 (8.86)	3.668 (1.40)	0.247 (2.56)	-0.701 (-5.18)	.600	145.78	788
1964	-0.324	-0.296 (-4.18)	0.964 (13.35)	0.231 (5.86)	-0.230 (-2.46)	0.479 (8.16)	2.614 (0.94)	0.268 (2.72)	-0.631 (-4.35)	.562	130.20	821
1965	-0.757	-0.274 (-3.03)	0.995 (10.57)	0.220 (4.79)	-0.242 (-1.99)	0.524 (7.57)	6.628 (2.09)	0.119 (1.00)	-0.718 (-4.42)	.533	91.63	652
1966	0.046	-0.364 (-5.34)	1.066 (14.66)	0.188 (4.99)	-0.402 (-4.18)	0.494 (8.79)	5.093 (1.95)	0.140 (1.51)	-0.630 (-4.76)	.593	149.87	833
1967	-0.648	-0.365 (-4.95)	1.165 (14.94)	0.178 (4.29)	-0.461 (-4.52)	0.462 (7.60)	6.106 (2.24)	0.102 (1.08)	-0.642 (-4.55)	.601	148.76	798
1968	-1.592	-0.370 (-5.03)	1.175 (14.47)	0.196 (4.48)	-0.214 (-1.84)	0.525 (8.21)	10.680 (3.92)	-0.011 (-0.12)	-0.858 (-5.78)	.700	192.10	668
1969	-1.122	-0.458 (-6.30)	1.231 (16.05)	0.188 (4.45)	-0.406 (-3.99)	0.584 (9.35)	7.713 (2.83)	0.081 (0.86)	-0.754 (-5.44)	.640	184.27	837
1970	0.974	-0.543 (-8.09)	1.092 (15.80)	0.157 (3.94)	-0.291 (-3.05)	0.574 (9.57)	3.772 (1.85)	0.194 (2.13)	-0.619 (-4.40)	.651	199.69	864

Table 2 Con't

PARAMETER ESTIMATES FOR EQUATION 2

Coefficients of Independent Variables

Year	Constant	D_{ij}	Y_i	Y_j	N_i	N_j	Q_{ij}	$P_{ij}\frac{Y_i}{N_i}\frac{Y_j}{N_j}$	$P_{ij}D_{ij}$	R^2	F	Obs.
1971	1.245	-0.539 (-8.56)	1.035 (16.53)	0.154 (4.12)	-0.221 (-2.54)	0.577 (10.31)	2.650 (1.04)	0.208 (2.59)	-0.536 (-4.09)	.682	226.93	838
1972	1.622	-0.573 (-8.12)	1.051 (15.60)	0.140 (3.53)	-0.276 (-2.88)	0.619 (10.36)	3.031 (1.14)	0.190 (2.34)	-0.565 (-4.08)	.683	217.33	815
1973	2.711	-0.581 (-8.64)	0.972 (15.92)	0.136 (3.59)	-0.089 (-1.02)	0.477 (8.41)	4.679 (1.87)	0.104 (1.85)	-0.630 (-4.91)	.693	215.31	774
1974	2.980	-0.550 (-8.56)	0.942 (16.51)	0.129 (3.64)	-0.080 (-0.98)	0.460 (8.70)	4.214 (1.78)	0.079 (1.13)	-0.504 (-4.11)	.707	233.79	785
1975	2.202	-0.548 (-7.56)	1.084 (16.31)	0.111 (2.82)	-0.238 (-2.62)	0.485 (8.29)	4.195 (1.54)	0.042 (0.52)	-0.418 (-3.02)	.674	202.73	795
1976	1.606	-0.472 (-7.39)	1.034 (17.98)	0.146 (4.15)	-0.185 (-2.42)	0.442 (8.57)	4.831 (1.97)	0.058 (0.83)	-0.525 (-4.25)	.706	234.55	789
1977	0.584	-0.421 (-6.08)	1.093 (17.95)	0.162 (4.07)	-0.210 (-2.55)	0.390 (6.86)	5.348 (1.97)	0.047 (0.61)	-0.553 (-4.03)	.669	199.79	800

Numbers in parenthesis are t-values.

Table 3

ENVIRONMENTAL EFFECTS ON THE ABILITY OF INTEGRATION TO AUGMENT INTER-MEMBER TRADE

Year	b (1)	$c_1 (Y*/N*)^2$ (2)	$c_3 D*$ (3)	Total Effect (4)
		ANDREAN PACT		
1970	3.77	2.35	-4.61	1.51
1971	2.65	2.54	-2.60	2.59
1972	3.03	2.34	-4.22	1.15
1973	4.68	1.41	-4.68	1.41
1974	4.21	1.06	-3.79	1.48
1975	4.20	0.57	-3.14	1.63
1976	4.83	0.79	-3.95	1.67
1977	5.35	0.65	-4.05	1.95
		CACM		
1961	3.30	3.57	-4.50	2.37
1962	1.92	3.15	-3.39	1.69
1963	3.67	2.79	-4.01	2.45
1964	2.61	3.05	-3.62	2.04
1965	6.63	1.36	-4.11	3.88
1966	5.09	1.62	-3.61	3.10
1967	6.11	1.19	-3.67	3.63
1968	10.68	-0.13	-4.91	5.65
1969	7.71	0.95	-4.32	4.34
1970	3.77	2.31	-3.58	2.50
1971	2.65	2.51	-3.10	1.76
1972	3.03	2.32	-3.27	2.08
1973	4.68	1.30	-3.65	2.33
1974	4.21	1.01	-2.92	2.30
1975	4.20	0.55	-2.42	2.33
1976	4.83	0.78	-3.04	2.57
1977	5.35	0.65	-3.20	2.80
		CMEA		
1962	1.92	3.89	-4.22	1.59
1963	3.67	3.38	-4.71	2.34
1964	2.61	3.70	-4.24	2.07
1965	6.63	1.66	-4.82	3.47
1966	5.09	1.97	-4.23	2.83
1967	6.11	1.45	-4.31	3.25
1968	10.68	-0.16	-5.76	4.76
1969	7.71	1.77	-5.06	3.82
1970	3.77	2.85	-4.15	2.47
1971	2.65	3.09	-3.60	2.14

Table 3 Con't

Year	b (1)	$c_1 (Y^*/N^*)^2$ (2)	$c_2 D^*$ (3)	Total Effect (4)
		CMEA Con't		
1972	3.03	2.85	-3.79	2.09
1973	4.68	1.58	-4.23	2.03
1974	4.21	1.22	-3.39	2.04
1975	4.20	0.66	-2.81	2.05
1976	4.83	0.92	-3.53	2.22
1977	5.35	0.75	-3.72	2.38
		EEC		
1960	1.50	4.77	-4.27	2.00
1961	3.30	4.64	-5.15	2.79
1962	1.92	4.09	-3.76	2.25
1963	3.67	3.58	-4.20	3.05
1964	2.61	3.94	-3.78	2.77
1965	6.63	1.77	-4.34	4.06
1966	5.09	2.10	-3.77	3.42
1967	6.11	1.54	-3.84	3.81
1968	10.68	-0.17	-5.14	5.37
1969	7.71	1.25	-4.51	4.45
1970	3.77	3.05	-3.71	3.11
1971	2.65	3.34	-3.21	2.78
1972	3.03	3.09	-3.38	2.74
1973	4.68	1.74	-3.95	2.47
1974	4.21	1.35	-3.17	2.39
1975	4.20	0.72	-2.63	2.29
1976	4.83	1.01	-3.30	2.54
1977	5.35	0.84	-3.47	2.72
		EFTA		
1960	1.50	4.84	-4.96	1.38
1961	3.30	4.73	-6.05	1.98
1962	1.92	4.17	-4.43	1.66
1963	3.67	3.63	-4.93	2.37
1964	2.61	3.98	-4.45	2.14
1965	6.63	1.76	-5.12	3.27
1966	5.09	2.12	-4.44	2.77
1967	6.11	1.55	-4.53	3.13
1968	10.68	-0.17	-6.05	4.46
1969	7.71	-1.26	-5.32	3.65
1970	3.77	3.06	-4.37	2.46
1971	2.65	3.35	-3.78	2.22
1972	3.03	3.10	-3.98	2.15
1973	4.68	1.74	-4.56	1.86

Table 3 Con't

Year	b (1)	$C_1 (Y^*/N^*)^2$ (2)	$C_2 D^*$ (3)	Total Effect (4)
		EFTA Con't		
1974	4.21	1.36	-3.65	1.92
1975	4.20	0.73	-3.03	1.90
1976	4.83	1.02	-3.80	2.05
1977	5.35	0.84	-4.00	2.19
		LAFTA		
1960	1.50	4.04	-5.72	-0.18
1961	3.30	3.88	-7.02	0.16
1962	1.92	3.34	-5.14	0.12
1963	3.67	2.92	-5.72	0.87
1964	2.61	3.21	-5.15	1.67
1965	6.63	1.44	-5.87	2.20
1966	5.09	1.73	-5.15	1.67
1967	6.11	1.24	-5.24	2.11
1968	10.68	-0.14	-6.95	3.59
1969	7.71	1.02	-6.18	2.55
1970	3.77	2.46	-5.08	1.15
1971	2.65	2.66	-4.39	0.92
1972	3.03	2.48	-4.63	0.88
1973	4.68	1.46	-5.13	1.01
1974	4.21	1.11	-4.10	1.22
1975	4.20	0.57	-3.40	1.37
1976	4.83	0.79	-4.27	1.35
1977	5.35	0.65	-4.50	1.50

Table 4

EFFECTS OF POLICY ON INTRA-MEMBER TRADE FLOWS
IN REGIONAL INTEGRATION

Integration Scheme	Year	$b(i)$ (1)	$b+c_1(Y^*/N^*)+c_2D^*$ (2)	$\pi(i)$ (3)	$2^{\pi(i)}$ (4)
Andean Pact	1970	1.01	1.51	-0.50	0.71
	1973	-0.27	1.41	-1.68	0.31
	1976	0.91	1.67	-0.76	0.59
CACM	1970	4.00	2.50	1.50	2.83
	1973	3.07	2.33	0.74	1.67
	1976	3.13	2.57	0.56	1.47
CMEA	1970	1.62	2.47	-0.85	0.55
	1973	1.36	2.03	-0.67	0.63
	1976	1.46	2.22	-0.76	0.59
EEC	1970	2.35	3.11	-0.76	0.59
	1973	1.73	2.47	-0.74	0.60
	1976	1.77	2.54	-0.77	0.59
EFTA	1970	2.50	2.46	0.04	1.03
	1973	2.34	1.86	0.48	1.39
	1976	1.91	2.05	-0.14	0.91
LAFTA	1970	0.63	1.15	-0.52	0.70
	1973	-0.34	1.01	-1.35	0.39
	1976	0.53	1.35	-0.82	0.57

TABLE 5

Parameter Estimates for Equation 5

Integration Scheme	a_0	RY a_1	FY a_2	CU a_3	CUDT a_4	R^2	Number of Observations
CACM	0.121 (19.97)	0.398 (5.43)	0.494 (5.95)	0.038 (2.92)	-0.523 (-2.38)	0.426	130
LAFTA	0.162 (29.78)	0.110 (4.04)	0.094 (1.32)	0.032 (2.79)	-0.407 (-2.19)	0.093	277
EACM	0.143 (26.11)	0.162 (4.04)	0.348 (6.32)	0.048 (2.39)	-0.441 (-1.03)	0.570	60
EEC	0.191 (47.78)	0.260 (4.79)	----	0.028 (3.76)	0.197 (1.69)	0.383	208
EFTA	0.191 (22.60)	0.416 (3.64)	----	0.039 (2.82)	0.026 (0.12)	0.206	182
CMEA	0.442 (10.99)	0.944 (2.02)	----	-0.281 (-2.68)	1.049 (0.51)	0.162	179

t-ratios in parentheses.

TABLE 6

Parameter Estimates for Equation 6

Integration Scheme	RK b_1	RL b_2	CU b_3	TIME b_4
CACM	1.553	0.092	0.021	-0.001
	(4.78)	(0.22)	(2.14)	(-1.59)
LAFTA	0.955	0.561	0.030	-0.001
	(1.68)	(0.71)	(1.36)	(-0.44)
EACM	1.913	-1.213	-0.016	-0.001
	(2.10)	(-0.94)	(-0.44)	(-0.26)
EEC	1.094	0.142	0.003	-0.001
	(4.06)	(0.17)	(0.45)	(-2.66)
EFTA	0.980	0.377	0.008	-0.001
	(4.72)	(4.23)	(1.45)	(-4.05)
CMEA	0.273	0.256	0.037	-0.002
	(0.86)	(0.51)	(2.48)	(1.66)

t-ratios in parentheses

R^2 not reported due to constraint $b_0 = 0.0$

TABLE 7

Increase In Terminal-Year Gross Domestic Product Due to Dynamic Effects of Integration
(as percentage of terminal year GDP without integration)

Integration Scheme		(1) Increase in GDP Due to Higher Investment Level	(2) Increase in GDP Due to Higher Rate of Techno-logical Progress	Total = 1 + 2
CACM	1961-77[a]	1.2	3.1	4.3
LAFTA	1960-77[b]	1.1	NS	1.1
EACM	1967-72	3.0	NS	3.0
EEC	1959-77[c]	1.1	NS	1.1
EFTA	1960-77[d]	0.9	NS	0.9
CMEA	1964-77	-0.4	5.0	4.6

Notes: NS = Technological progress coefficient not significant.

[a]Except Honduras 1961-69; Nicaragua, 1962-; Costa Rica, 1963-.

[b]Except Colombia and Ecuador, 1961-; Venezuela, 1965-; Bolivia, 1967-.

[c]Except Denmark and United Kingdom, 1973-.

[d]Except Denmark and United Kingdom, 1960-72.

Footnotes

* Brada wishes to acknowledge financial support from the National Council for Soviet and East European Research for the research underlying this paper.

[1] This section substantially extends results first reported in Brada and Mendez (1985).

[2] The countries in the sample with dates they joined (and left) a particular integration scheme are:

CACM: Guatemala (1961), El Salvador (1961), Hunduras (1961/1970), Nicaragua (1962), Costa Rica (1963).

LAFTA: Mexico (1960), Argentina (1960), Brazil (1960), Paraguay (1960), Uruguay (1960), Bolivia* (1967), Chile* (1960), Colombia* (1961), Ecuador* (1961), Peru* (1960), Venezuela* (1965).

Andean Pact: The members of LAFTA marketd by an asterisk joined the Andean Pact in 1970, save Venezuela which joined in 1974.

CMEA: Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, USSR. The CMEA was officially formed in 1949 although serious integration measures were not instituted until the early 1960s.

EEC: Belgium-Luxembourg (1959), France (1959), Italy (1959), Netherlands (1959), Federal Republic of Germany (1959), Denmark (1973), United Kingdom (1973).

EFTA: Austria (1960), Denmark (1960/1973), Norway (1960), Portugal (1960), Sweden (1960), Switzerland (1960), United Kingdom (1960/1973).

Non-members: Algeria, Egypt, Zaire, Nigeria, South Africa, Iraq, Iran, Saudi Arabia, Hong Kong, Singapore, Japan, Canada, Panama, United States, Greece, Spain, Turkey, Ireland.

[3] The costs of this trade diversion have been estimated by Marrese and Vanous (1983), although their interpretation does not follow the customs union approach. See, however, Brada (1985).

[4] This section reports, in greater detail for the CMEA, the results of Brada and Mendez (1987).

[5] The member countries of EACM and the years they joined and left the union are:

Kenya (1967/1972*), Uganda (1967/1972*), Tanzania (1967/1972*). (* = defacto, not de jure). For the other integration schemes, see footnote 2.

References

Aitken, Norman D., "The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis." American Economic Review, Vol. LXIII, No. 5 (December 1973), pp. 881-892.

Balassa, Bela, "Trade Creation and Trade Diversion in the EEC." Economic Journal, Vol. 77 (March 1967), pp. 1-21.

Bergson, Abram, "The Geometry of Comecon Trade," European Economic Review, Vol. 14, No. 3, (1980), pp. 291-306.

Bergstrand, Jeffrey H., "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence." Review of Economics and Statistics, Vol. 67, No. 3 (August, 1985) pp. 474-481.

Brada, Josef C., "Industrial Policy in Hungary: Lessons for America." Cato Journal, Vol. 4, No. 2, (Fall, 1984), pp. 485-505.

Brada, Josef C., "Soviet Subsidization of Eastern Europe: the Primacy of Economics over Politics?" Journal of Comparative Economics, Vol. 9, No. 1, (March, 1985), pp. 80-92.

Brada, Josef C., "Industrial Policy in Eastern Europe." In J.C. Brada, E.A. Hewett and T.A. Wolf (eds.), Economic Adjustment and Reform in Eastern Europe and the Soviet Union (forthcoming).

Brada, Josef C. and Jose A. Mendez, "Economic Integration Among Developed, Developing and Centrally Planned Economies: A Comparative Analysis." Review of Economics and Statistics, Vol. LXVII, No. 4 (November, 1985), pp. 549-556.

Brada, Josef C. and Jose A. Mendez, "An Estimate of the Dynamic Effects of Economic Integration." Review of Economics and Statistics (forthcoming).

Desai, Padma, "Is the Soviet Union Subsidizing Eastern Europe?" European Economic Review, Vol. 29, No. 4, (December, 1985).

Geraci, Vincent J. and Wilfried Prewo, "Bilateral Trade Flows and Transport Costs." Review of Economics and Statistics, Vol. 59, No. 1 (February 1977), pp. 67-74.

Hewett, Edward A., "A Gravity Model of CMEA Trade." in Josef C. Brada, (ed.), Quantitative and Analytical Studies in East-West Economic Relations, (Bloomington: International Development Research Center, 1976).

Holzman, Franklyn D. International Trade Under Communism. (New York: Basic Books, 1976).

Holzman, Franklyn D. "Comecon: A Trade-Destroying Customs Union?" Journal of Comparative Economics, Vol. 9, No. 4, (December, 1985), pp. 410-423.

Leamer, Edward A and Robert M. Stern, Quantitative International Economics, (Boston: Allyn and Bacon, 1970).

Linder, Stefan B., An Essay on Trade and Transformation, (New York: John Wiley and Sons, 1961).

Linnemann, Hans, An Econometric Study of International Trade Flows (Amsterdam: North-Holland Publishing Co., 1966).

Marrese, Michael and Jan Vanous, Soviet Subsidization of Trade with Eastern Europe: A Soviet Perspective, (Berkeley: University of California Institute of International Studies, 1983).

Pelzman, Joseph, "Trade Creation and Trade Diversion in the Council for Mutual Economic Assistance: 1954-70." American Economic Review, Vol. LXVII, No. 4 (September 1977), pp. 713-722.

Poyhonen, P., "A Tentative Model of the Volume of Trade Between Countries," Weltwirtschaftliches Archiv, Band 90, Heft 1 (1963), pp. 93-100.

Tinbergen, Jan, Shaping the World Economy: Suggestions for an International Economic Policy, (New York: The Twentieth Century Fund, 1962).