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**Have North-South Growth Linkages Changed?**

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**Abstract**

This paper provides preliminary econometric evidence suggesting that the traditional trade-based business cycle linkages between the North and the South have changed. Many countries in the South, in particular in Asia, appear to have become more resilient to cyclical movements in the North, and to have come to play a more significant role in sustaining global activity, in particular during the 1991-93 slowdown. A number of factors may have contributed to these changes: improved domestic policies and more open trade and exchange regimes; closer financial linkages with the North and a substantial increase in capital flows; a marked rise in inter-regional trade; and greater diversification of the exports of the South.

**JEL Classification Number:**  
C32, E37, F02

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### Summary

The relationship between industrial countries (the North) and developing countries (the South) has often been described as one of one-way dependence, with growth in the South being driven by that in the North. Despite the sluggish growth in the industrial countries in the early 1990s, however, the developing countries as a group have sustained rapid growth. This suggests that the conventional wisdom of the North pulling the South needs to be re-examined. Moreover, the linkages between the North and the South are also being affected by changes in their relative economic weight: if the developing countries continue to grow at current rates--about 6 percent a year--they are likely to account for a greater proportion of global output than the industrial countries by the middle of the next decade. This paper examines whether the recent divergence between growth rates in the North and the South represents a structural break in the traditional North-South relationship. It also discusses some of the reasons for the greater resilience of the South to output fluctuations in the North, and whether this development has benefited the North.

The empirical results suggest that, at least until recently, business cycles in the North and in the South have been relatively synchronized, with recessions in the North typically lowering growth in the South. Since the late 1980s, however, the short-run relationship between growth in the two regions appears to have changed, with the South becoming more resilient to cyclical movements in the North. A decomposition of developing country growth by region suggests that this greater resilience of the South mostly reflects stronger economic performance in Asia.

A number of factors have contributed to improved performance and sustained growth in the South. Structural reform policies, especially in the areas of trade liberalization and the removal of distortions in domestic product and financial markets, have raised productivity and attracted large inflows of foreign capital. For many developing countries, greater diversification of exports and export markets has resulted in a substantial increase in intraregional trade. The increasing integration of world financial markets and the greater openness of many developing country financial markets have strengthened financial linkages between industrial and developing countries. With more open capital markets, weak activity and low interest rates in the industrial countries in the early 1990s resulted in higher capital inflows and investment in many developing countries, offsetting the adverse effects on trade during the cyclical downturn in the industrial countries.

## I. Introduction

Despite the sluggish growth in the industrial countries--the North--in the early 1990s, many developing countries--in the South--managed to sustain rapid growth.<sup>2</sup> This apparent resilience of growth in developing countries to the recent economic downturn in the industrial countries suggests that the conventional wisdom of the North pulling the South needs to be re-examined.<sup>3</sup> The increasing weight of the South in the world economy also implies that the developing countries may now have a more significant impact on economic developments in the North. Moreover, this effect can be expected to become more powerful over time. On the assumption that growth in the developing countries is sustained at around 6 percent a year, and that industrial countries continue to grow at around 2½ percent per year--broadly in line with past trends and current estimates of potential output growth--the share of global output produced by the developing countries could surpass that produced by the industrial countries by the year 2004 (Chart 1).

The apparent change in North-South linkages can be attributed to a number of factors. Traditional trade linkages have been deepened and new linkages developed by more open trade and exchange regimes, increased diversification of developing country exports, and closer financial linkages. While most capital inflows to developing countries originate from the North, some of the recent increase in capital inflows also reflects the growing role of some developing countries as suppliers of capital to other developing countries.

In this paper we present a preliminary examination of a number of related questions: (i) What is the relationship between growth in the North and in the South, and does the recent divergence in growth rates represent a structural break in this relationship? (ii) To what extent is the South more resilient to output fluctuations in the North, and how much has the North benefited from higher growth in the South? And (iii), what are the main factors behind the apparent change in North-South linkages?

The plan of the paper is as follows. Section II provides a brief review of the literature on North-South linkages and presents the traditional arguments and evidence on the dependence of the South on the North. We examine the causes of this dependence and give estimates of the effect of external shocks on Southern growth. Section III examines whether output levels in the two regions move together in the long run and estimates a two-equation error-correction model of North-South growth interactions. The objective is to provide a framework to assess the interactions between growth in the two regions in order to test for structural breaks and to simulate the effects of shocks. The results indicate that output levels in the two regions are cointegrated (i.e., move together in the long run) but there is evidence

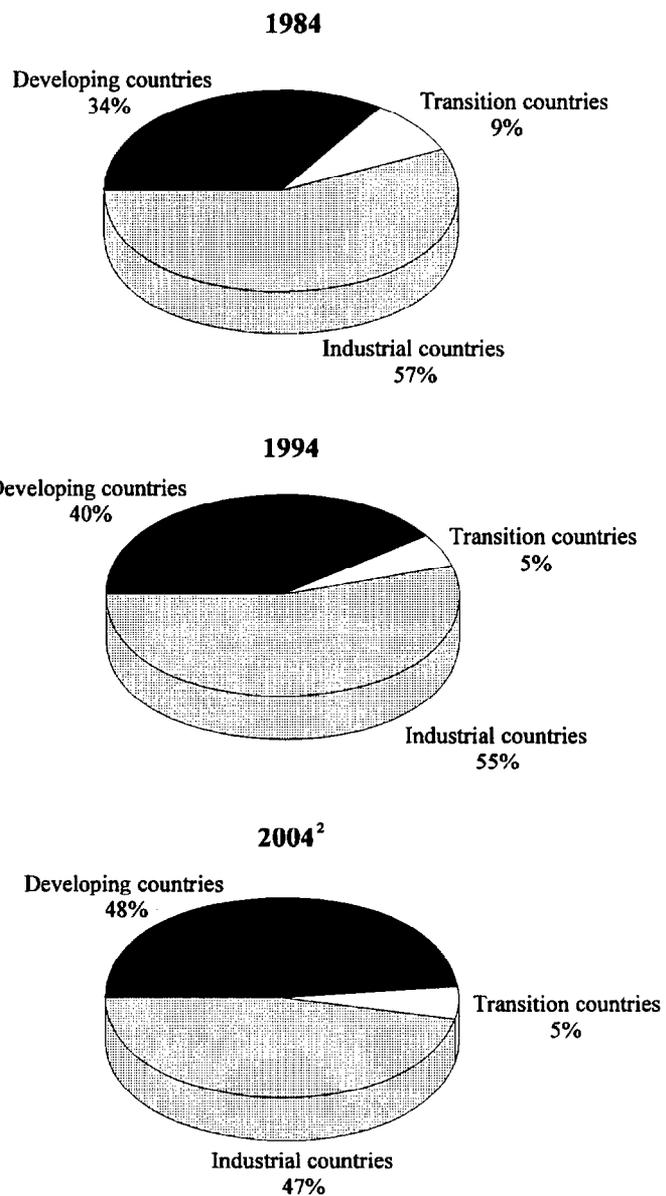
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<sup>2</sup>The classification of countries is given in the introduction of the statistical appendix of the October 1995 *World Economic Outlook*. The third group of countries in that classification--the countries in transition to a market economy--are not discussed in this paper.

<sup>3</sup>See also World Bank (1995) for a recent analysis of the reverse linkages between the North and the South.

**Chart 1. Shares of World Output<sup>1</sup>**  
(In percent)

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<sup>1</sup>Based on real PPP weights in 1987 dollars.

<sup>2</sup>Assuming annual growth rates of 2 1/2 percent in the industrial countries, 6 1/2 percent in the developing countries, and 6 percent in the transition countries.

of a structural break in the short-run relationship around 1988. We then examine the extent to which there are differences in the interactions between the North and the different regions of the South, highlighting in particular the extent to which growth in Asia accounts for the structural break. Section IV discusses some of the reasons for the breakdown in the relationship. These are based largely on factors that have contributed to relatively strong growth in the developing countries, particularly in Asia and in the Western Hemisphere.

## II. North-South Linkages

The relationship between the North and the South has traditionally been described as one of one-way dependence, with growth in the South being driven by developments in the North. This section examines the nature of this dependence and how it has been incorporated in theoretical and empirical models of North-South linkages. It also discusses some recent developments that suggest that the traditional analyses of North-South linkages may no longer be valid.

As an illustration of the historical importance for the South of growth in the North, simulations based on the developing country model used for the IMF's *World Economic Outlook* suggest that a one percentage point increase in industrial country annual growth leads, on average, to an increase of around 0.3 percentage points in growth in the South, primarily as a result of higher exports to the North.<sup>4</sup> The effect varies across countries depending on their degree of openness and the extent of diversification of their exports.

A more comprehensive measure of the impact of the North on the South can be obtained by using a composite external conditions index, such as that discussed in the May 1994 *World Economic Outlook*. This index is defined as a weighted average of growth in industrial countries, a representative industrial-country interest rate, and the terms of trade facing developing countries. The weights are based on the long-run elasticities of output in the developing countries to each of these three factors, with the elasticities taken from the *World Economic Outlook* developing country model. Fluctuations in external conditions are estimated to explain around 30 percent of the variation in growth in the South during the period 1984-93. This figure is somewhat higher (around 40 percent) for low-growth, primary commodity exporting countries in the South.<sup>5</sup>

Traditional analyses of North-South linkages emphasize the asymmetric nature of the interaction between the two regions, and argue that this arises as a result of the dependence of

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<sup>4</sup>For a description of this model, see Kumar, Samiei, and Bassett (1993).

<sup>5</sup>Other approaches yield similar results. For example, a recent study on the comparative economic performance of Brazil and Korea suggests that external factors account for less than 20 percent of output variations in both countries (see Hoffmaister and Roldos (1996)), much lower than the proportion for developing countries as a group.

the South on Northern capital goods, finance, technology, and export markets. The terms of trade of the South play a crucial role in this analysis. An improvement in the terms of trade increases the ability of the South to purchase goods from the North, but it also leads to lower demand for goods produced in the South. Moreover, countries that are mainly dependent on exports of primary commodities are particularly vulnerable to external shocks, given the higher volatility and secular decline of commodity prices compared with the prices of manufactured goods.

Some early analyses of North-South linkages suggested that the asymmetric relationship between the North and the South could be detrimental to growth in the latter region. Dependence and unequal exchange models (see, for example, Frank (1967) and Emmanuel (1972)) argued that interactions of the South with the North disadvantage the former because of the relative abundance of labor in the South, with low marginal products in traditional sectors and, therefore, relatively low real wages--often at subsistence levels. As a result, increased trade between the two regions, by encouraging productivity growth, is likely to raise wages in the North but not in the South, thus benefiting workers in the North possibly at the expense of those workers in the South. These studies have typically focused on case studies rather than rigorous modeling, and have lost their appeal in recent years in view of the pervasive evidence of the success of export-led growth strategies, particularly among Asian countries.

Most formal models of North-South interactions assume that the South specializes in the production and export of primary commodities, while the North specializes in manufactured goods. Findlay (1980), for example, developed a neo-classical model with full employment in the North, and a surplus of labor in the South. In this model growth in the North is assumed to be determined exogenously by technical progress and the growth of the labor force, and steady-state growth in the South is independent of domestic conditions because of surplus labor in the South. He therefore concludes that trade is the engine of growth for the South but the pace of the engine is set by growth in the North. A drawback of this model, however, is that it ignores the role of financial linkages, which have become increasingly important in recent years.

Macroeconomic aspects of North-South interactions are emphasized in the structuralist model developed by Taylor (1983) which allows for capital flows to the South and incorporates a third region representing oil-exporting countries. Output in the North is demand-determined in the short run, while output in the South is determined by (inelastic) supply conditions. Increases in capital flows to the South, by allowing higher imports benefit the externally-constrained South in the short run, while increases in exports to the South raise growth and capacity utilization in the North. In the long run, the North retains its role as the engine of growth for the South.

The oil shocks and commodity price inflation of the 1970s and the 1980s and related debt problems led to greater emphasis in the literature on the role of short-run and financial aspects of North-South linkages. A number of studies in the late 1980s emphasized the role

of the boom in commodity prices in spurring inflation, and eventually anti-inflationary policies in the North (see, for example, Kanbur and Vines (1986), Murshed and Sen (1989), Darity (1987), and Currie and Vines (1988)). The resulting recession in the North, as well as the trade surplus of the oil-exporting countries in the South, are argued to have been important factors that contributed to the debt crisis in the non-oil South. These studies also stress the potential usefulness of commodity price stabilization schemes, and the importance of co-operation between the two regions.

Econometric estimates of North-South linkages have also suggested a stronger influence of the North on the South than *vice versa*. For example, the model estimated in Beenstock (1988) suggests that the spillover effects on the South of a rise in demand in the North are greater than the reverse. Similarly the disequilibrium model in Samiei (1988) indicates how imports of the non-oil South from the North are often constrained by export revenue. The severity of these balance of payments constraints depends to a large extent on the level of activity, and therefore import demand, in the North.

Recent literature on North-South linkages emphasizes the changing pattern in North-South interactions, the increasing importance of the South for growth in the world economy, and the increasing importance of financial relative to trade linkages (see, for example, Vines and Currie (1995)). Financial linkages have strengthened mainly owing to the increase in capital flows to the South, associated with the liberalization of financial markets in many countries of the South. High growth in many developing countries in recent years and the associated rise in the share of world output produced in the South have also changed the nature of the interdependence between the two regions (Mohammed (1994)). Increasingly, the relationship between the North and the South is perceived as one of interdependence, with the South playing a more active role in sustaining growth in the world economy. As a result, policies in the South are more likely to have a significant impact on output in the North. For example, trade liberalization in the South is likely to increase income in the North as export markets expand, while also benefiting the South by increasing competition, reducing costs, spurring innovation, and increasing resilience. Trade liberalization has also contributed to more efficient production, increases in saving and thus productive capacity, and higher foreign investment in the South (Cooper (1995)).

Recent studies on the determinants of long-run economic growth emphasize the importance of a complex set of domestic and external factors. Evidence from cross-sectional studies suggests that growth is strongly influenced by the level of education of the labor force, financial repression, political and civil unrest, distortions arising from government intervention, and macroeconomic instability, especially high inflation rates that often stem from excessive public deficits (Barro and Sala-i-Martin (1994)). While higher levels of education increase growth, distortions caused by political and macroeconomic instability and by excessive government intervention reduce growth.

### III. A Time-Series Analysis of Growth Linkages

This section examines output and growth linkages between the North and the South, with a view to assessing whether there has been a structural change in this relationship. Chart 2 plots the growth rates for the North and the South over the past three decades. The two variables move together for most of the period, with the North generally leading the South, except during the late 1980s and early 1990s when growth in the South has been sustained despite weak growth in the North. The presence of a break is corroborated by the econometric evidence reported below. It is important to emphasize at the outset, however, that any empirical analysis is hampered by the extent of aggregation and by the relatively small number of observations following the period when a structural break may have occurred. Accordingly, the results in this section should only be interpreted as preliminary evidence of changing North-South relationships.

The time series analysis attempts to characterize the long-run nature of growth linkages between the two regions and the short-run cyclical interactions, rather than explain the determinants of growth in the two regions which, as emphasized above, are likely to include a complex set of factors. We first examine the relationship between output growth in the North and the South and then extend the analysis by dividing the South into Asia and Other South.<sup>6</sup>

#### 1. The long-run relationship

Standard unit root tests suggest that although the growth rate of output in the two regions is stationary, the log-levels of output are not.<sup>7</sup> It is possible, nonetheless, that a linear combination of the two output levels is stationary, implying that the two series are cointegrated. In that case, the dynamic relationship between the two output levels can be summarized by an error correction model that combines the long-run co-movements of output with the short-run cyclical movements (see Engle and Granger (1987)).

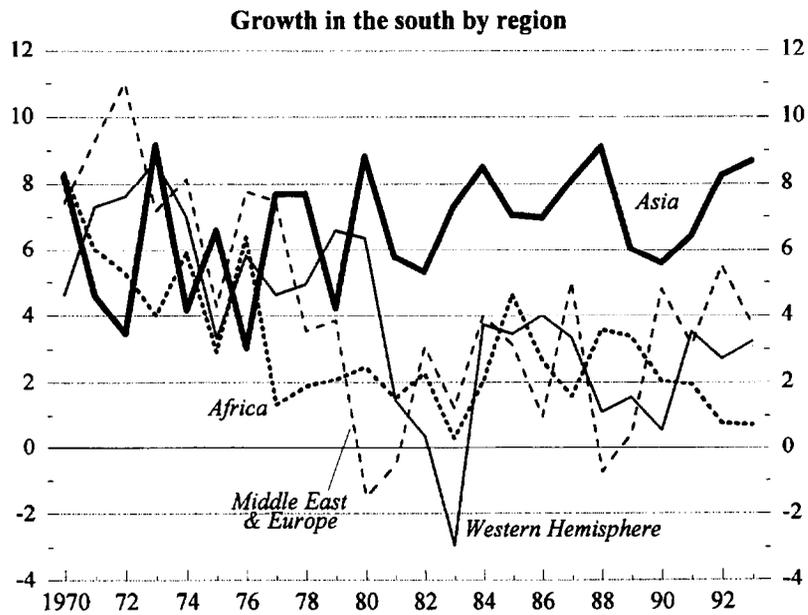
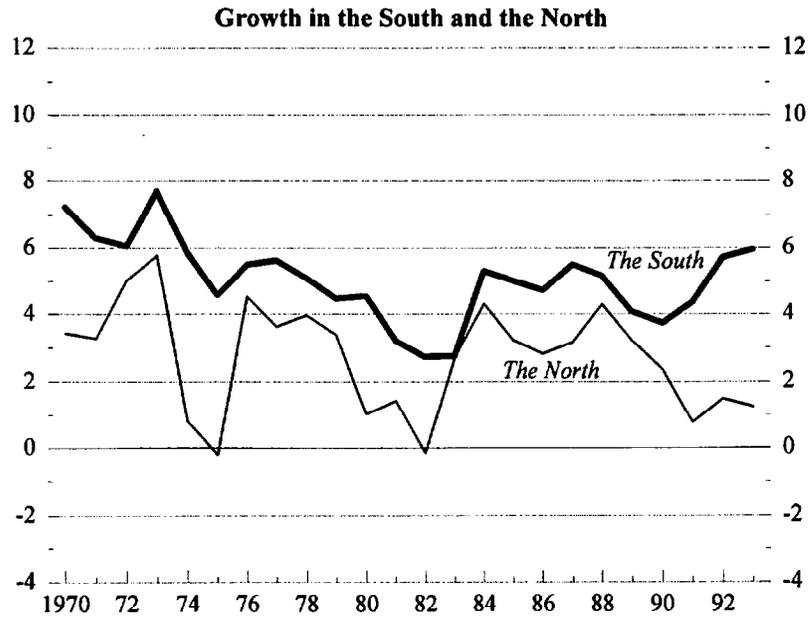
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<sup>6</sup>Output levels for each region are calculated as the aggregate of the level of output in individual countries evaluated at PPP dollars; all data are from the IMF's World Economic Outlook database.

<sup>7</sup>The Augmented Dickey Fuller test yields values of -2.57 and -1.03 for the logarithms of output levels in the North and the South, respectively, and -3.14 and -2.62 for the growth rates. These results indicate that output levels in the two regions are non-stationary while growth in the North is stationary. The evidence for stationarity of growth in the South is borderline, but because the short length of the sample implies that the power of the tests is low, it is reasonable to assume that growth in the South is also stationary.

### Chart 2. Output Growth<sup>1</sup>

(In percent)



<sup>1</sup>Defined as the annual rate of change in aggregate output in each region in constant PPP dollars.

We use Johansen's maximum likelihood procedure to test whether output in the North and in the South are cointegrated.<sup>8</sup> The results of the maximal eigenvalue test and the trace test are somewhat mixed: at the 10 percent significance level, the maximal eigenvalue test supports cointegration while the trace test marginally rejects it (Table 1, Panel A). The results therefore provide only weak evidence of a long-run relationship, possibly reflecting a break in the relationship. However, additional evidence provided by the significance of the error-correction term in the dynamic specification of the model for the North leads us to conclude that these series cointegrate (see Section III.2). The magnitude of the cointegrating coefficient (0.57) reflects the fact that long-run output growth in the North has been lower over the past 25 years--roughly 40 percent lower--than in the South.

## 2. Cyclical effects

Since both output in the North and in the South can be described as random walks with drift, and appear to have a common trend, output linkages can be summarized by an Error-Correction Model (ECM) (Engle and Granger (1987)). This model combines the long-run North-South relationship with the short-run cyclical dynamics and is represented by the following equations:

$$\Delta y_t^n = \alpha^{nn} \Delta y_{t-1}^n + \alpha^{ns} \Delta y_{t-1}^s + \rho^n (y_{t-1}^n - \beta y_{t-1}^s) + u_t^n, \quad (1)$$

$$\Delta y_t^s = \alpha^{sn} \Delta y_{t-1}^n + \alpha^{ss} \Delta y_{t-1}^s + \rho^s (y_{t-1}^s - \beta y_{t-1}^n) + u_t^s, \quad (2)$$

where  $y_t$  is the logarithm of output,  $\Delta$  is the first-difference operator,  $\alpha$ 's are the short-run coefficients,  $\rho$ 's are the error-correction coefficients, and  $\beta$  is the cointegrating coefficient (from Table 1). The random error term,  $u_t$ , satisfies the standard OLS properties, and the superscripts  $n$  and  $s$  refer to the North and the South, respectively. According to these equations, output growth in each region reflects the long-run relationship (summarized by the cointegrating equation) as well as cyclical developments in growth in the two regions.

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<sup>8</sup>See Johansen (1990) and Johansen and Juselius (1990).

Table 1. Long-Run Growth Linkages: Cointegration Estimates, Annual Data 1967-93

(Based on a VAR model with two lags and  
unrestricted deterministic components)

A. North-South Model

Cointegration test based  
on maximal eigenvalue

<u>Hypothesis</u>		Test Statistic
Null	Alternative	
r=0	r=1	10.87*
r=1	r=2	1.21

Cointegration test based on  
the trace statistic

<u>Hypothesis</u>		Test Statistic
Null	Alternative	
r=0	r ≥ 1	12.08
r ≤ 1	r ≥ 2	1.21

Estimated cointegration vector:  $y^n = 0.574y^s$

B. North-Asia-Other South Model

Cointegration test based  
on maximal eigenvalue

<u>Hypothesis</u>		Test Statistic
Null	Alternative	
r=0	r=1	19.76*
r=1	r=2	8.35
r=2	r=3	4.65

Cointegration test based on  
the trace statistic

<u>Hypothesis</u>		Test Statistic
Null	Alternative	
r=0	r ≥ 1	32.76*
r ≤ 1	r ≥ 2	13.00
r ≤ 2	r ≥ 3	4.65

Estimated cointegration vector:  $y^n = 0.330y^a + 0.205y^o$

Note:  $y$  denotes the log level of output in the region and the superscripts  $n$ ,  $s$ ,  $a$  and  $o$  denote North, South, Asia, and Other South respectively. The number of cointegrating vectors is denoted by  $r$ , and an asterisk denotes that the null hypothesis is rejected at the 90 percent significance level.

The estimation results for this ECM are reported in Table 2, columns 1 and 4.<sup>9</sup> Output growth in the North is significantly affected by its own lagged cyclical position, but not by the lagged cyclical position of the South. This does not mean, however, that there are no reverse linkages, but rather that the effect of growth in the South is only through the long-run relationship. Although our estimates for the reverse linkages may appear high--a 1 percentage point increase in growth in the South leads, in the following period, to about 1/3 of 1 percentage point increase in growth in the North--they nevertheless provide evidence in favor of the importance of these linkages.<sup>10</sup>

Output growth in the South appears to be determined mostly by its own cyclical position, and does not seem to be affected significantly by the North. This result appears to imply that growth in the South is independent of that in the North. As shown below, however, this result is due to a model mis-specification which arises because of a structural break in the system.

### 3. Structural breaks

To examine the robustness of the above results, and in view of the apparent changes that have taken place in North-South linkages, we explore the possibility of a structural break in the system during the period after 1985. Given the relatively small number of observations since the mid-1980s, it is not possible to test, with a reasonable degree of confidence, a change (break) in the long-run relationship, even if one has occurred. Therefore, we only test for a possible break in the short-run linkages between the North and the South. In other words we examine whether the  $\alpha$ 's in equations (1) and (2) have changed during the recent period. Log-likelihood ratio tests on the full North-South model suggest evidence of a structural break between any two periods divided by any year between 1985 and 1991, but the lowest marginal significance level is for 1988 (Table 3). We therefore re-estimate the ECM allowing for a break in that year and present the results in Table 2.<sup>11</sup> Columns 2 and 5 report

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<sup>9</sup>The estimation of the ECM for the North and the South follows Engle and Granger's two step procedure, although the estimates for the long-run relationship are obtained from the Johansen maximum likelihood method (Table 1) rather than OLS estimates. Monte Carlo simulations suggest that despite the super-consistency of OLS estimates of cointegrating vectors, in small samples, OLS estimates are dominated both in terms of small sample bias and mean square error by maximum likelihood estimates. See Stock and Watson (1991) and Phillips and Loretan (1989).

<sup>10</sup>The estimate is obtained as the product of the long-run effect of a 1 percent increase in the South (0.57, from Table 1) and the coefficient of the cointegrating relationship (0.53, from Table 2).

<sup>11</sup>All tests for breaks in the short-run coefficients are conditional on a stable cointegrating vector. We do not find any empirical evidence that the  $\rho$ 's or the constants have changed in the recent period.

Table 2. Short-Run Growth Linkages in the North-South Model, Annual Data 1967-93  
(Standard errors in parentheses)

	Dependent Variable <sup>1</sup>					
	North Growth			South Growth		
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Regressors Lagged One Period</u>						
Error correction term	-0.53** (0.20)	-0.86*** (0.28)	-0.50*** (0.12)	-0.02 (0.16)	-0.18 (0.19)	...
North growth	0.58*** (0.20)	0.72*** (0.24)	0.53*** (0.10)	0.14 (0.16)	0.47*** (0.16)	0.25** (0.12)
South growth	-0.01 (0.26)	0.04 (0.27)	...	0.53*** (0.20)	0.34* (0.18)	0.40** (0.18)
North growth x D1988 <sup>2</sup>	...	0.41 (0.55)	...	...	-0.90** (0.36)	-0.25** (0.12)
South growth x D1988 <sup>2</sup>	...	-0.14 (0.31)	...	...	0.52** (0.21)	... <sup>3</sup>
Constant	-0.00 (0.01)	-0.02 (0.02)	...	0.02* (0.01)	0.02 (0.01)	...
<u>Hypothesis Test</u>						
F statistic <sup>4</sup>		0.52			2.30	
R <sup>2</sup>	0.37	0.48	0.37	0.40	0.62	0.49
R <sup>2</sup>	0.29	0.35	0.35	0.32	0.53	0.45
Standard error of residuals	0.0140	0.0137	0.0135	0.0110	0.0091	0.0099
Durbin-Watson statistic	1.90	2.00	1.88	1.65	1.58	1.22

<sup>1</sup>Columns 1 and 4 refer to the model without structural breaks, columns 2 and 5 refer to the model with structural breaks, and columns 3 and 6 refer to the preferred model. \*, \*\*, and \*\*\* denote significance at the 10, 5, and 1 percent levels, respectively.

<sup>2</sup>D1988 is a dummy variable that is equal to zero before 1988 and equal to one thereafter.

<sup>3</sup>In the preferred specification for growth in the South, the variable "South growth x D1988" was insignificant after dropping the constant and the error correction term, and therefore excluded.

<sup>4</sup>The null hypothesis refers to the joint significance of variables excluded in the preferred model. For the South the null hypothesis also includes the decoupling from the North, i.e., the sum of the two coefficients of the impact of the North growth on the South (0.47) and the impact of the North growth multiplied by the dummy variable (-0.90) is zero.

the results for the general specifications, while columns 3 and 6 report those for the preferred specifications with insignificant terms dropped.

Table 3. Marginal Significance Levels for Log-Likelihood Ratio Tests for Structural Breaks Between 1985 and 1991<sup>1</sup>

Break	North-South Model	North-Asia-Other South Model
1985	0.05	6.17
1986	0.05	5.24
1987	0.02	2.03
1988	0.01	1.43
1989	0.12	6.97
1990	1.17	8.29
1991	1.00	14.08

<sup>1</sup>The test statistics (marginal significance levels) correspond to a Chi Squared distribution, with the number of degrees of freedom equal to the number of coefficients tested; for the North-South model, there are 4 degrees of freedom (2 for each equation). Similarly for the North-Asia-Other South model, there are 9 degrees of freedom (3 for each equation). The null hypothesis of the absence of a break in the year indicated in the first column is rejected at the 95 percent confidence level if the marginal significance level--which has been multiplied by 100--is less than 5.0.

The results suggest that while there has been a structural break in the equation for the South, the equation for the North has remained stable. More specifically, they suggest that the business cycle in the South has become more resilient to, or is less influenced by, cyclical movements in the North. In fact, the hypothesis that the short-run effect of growth in the North on that in the South has been negligible since around 1988 cannot be rejected.<sup>12</sup> Although the point estimate of the impact of the North on the South after 1988 is less than zero (-0.43), suggesting that lower growth in the North could be associated with higher growth in the South, this coefficient is not statistically different from zero. This result, however, should be treated with caution given the small number of observations following the break. Also it is unlikely to

<sup>12</sup>The F test, however, also cannot reject the hypothesis that business cycles in the two regions are positively related, but it does indicate that the impact of the North on the South has fallen.

be valid for all countries of the South, especially for countries whose exports comprise mainly primary commodities. Indeed, evidence from a three region model consisting of the North, Asia, and the rest of the South reported below suggests that the greater resilience is accounted for mainly by developing countries in Asia.

The significance of the error-correction term in the equations for the North (Table 2, columns (1)-(3)) provides additional evidence of cointegration of output levels in the two regions.<sup>13</sup> Moreover, the statistical significance of the error correction term suggests that the South Granger-causes the North. Although the error-correction term is not significant in the equations for the South, since lagged growth in the North is significant, the North also Granger-causes the South. These results suggest that Granger-causality is bi-directional and provide some evidence in favor of North-South interdependence as opposed to unidirectional dependence of the South on the North.<sup>14</sup>

The empirical results give rise to two important questions. First, what are the implications for the transmission of shocks of the apparent recent structural break in the dependence on the North of growth in the South? Second, how has the strong growth performance in the South in recent years affected the North?

Using the preferred specifications for the ECM (see Table 2, columns 3 and 6), we compare the effects of a negative shock originating in the North before and after the structural break in 1988. The impulse responses indicate that since 1988, the impact of the North on the South has declined (Chart 3, lower panel).<sup>15</sup> Prior to the break, a 1 percent fall in output in the North typically led to a 1 percent decline in output in the South in the long run. After the break, a 1 percent fall in output in the North leads to a less pronounced decline in the South, with a smaller long-run effect of about  $\frac{3}{4}$  of 1 percent. Moreover, the smaller decline in output in the South following the break also benefits the North. The feedback effect through the error correction term implies a smaller decline in the level of output in the North--around  $\frac{2}{5}$  of 1 percent compared with a decline of about  $\frac{1}{2}$  of 1 percent before the break (Chart 3, top panel).

Dynamic simulations of the model can help to illustrate the importance of the recent strong growth performance in the South for growth in the North (Chart 4). A baseline is obtained by simulating the error correction model from 1990 onward; the counter-factual is obtained by assuming that the South's growth rate remains at its 1990 level of  $3\frac{3}{4}$  percent a

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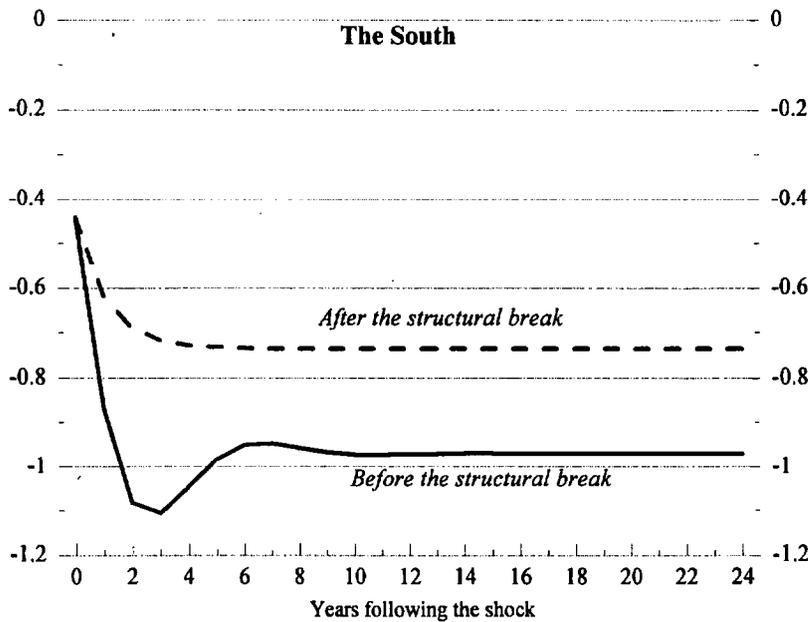
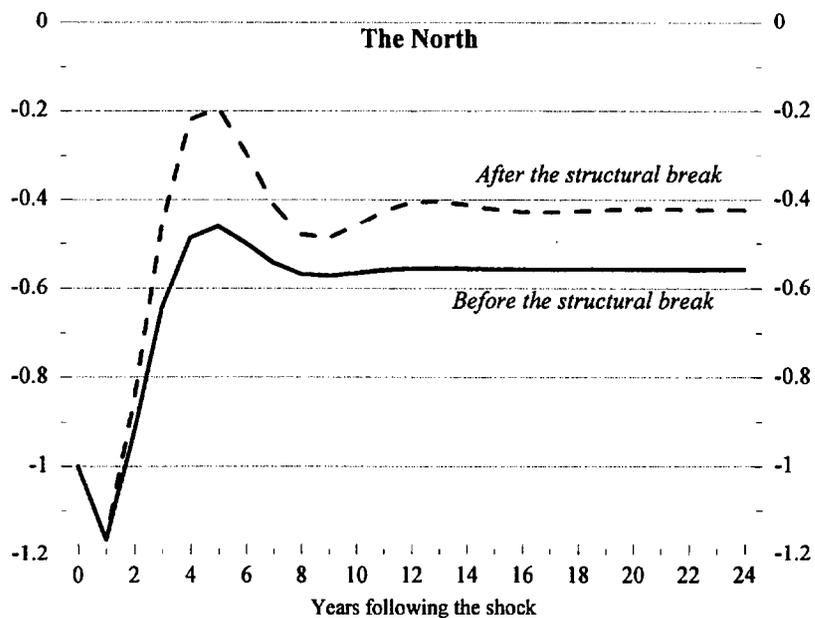
<sup>13</sup>See Engle and Granger (1987) and Kremers, Ericsson, and Dolado (1992).

<sup>14</sup>See Engle, Hendry, and Richard (1983) for a discussion of exogeneity and causality.

<sup>15</sup>The chart shows the generalized impulse responses of the model to a "composite" shock, conditional on the historical information. The main advantage of these generalized impulse responses is that they are independent of the contemporaneous ordering of the variables in the model, and thus are not subject to arbitrary ordering restrictions (see Pesaran, Potter, and Shin (1994)).

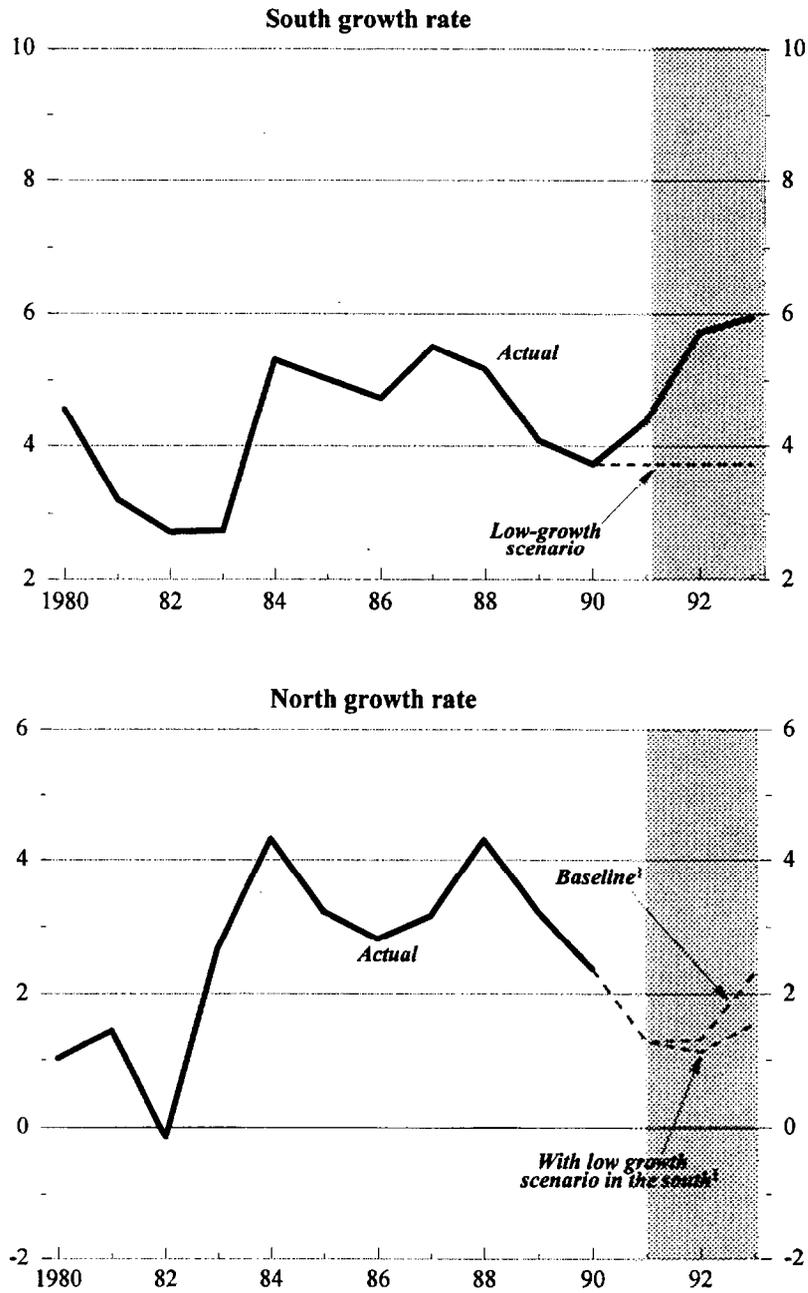
**Chart 3. Output Responses to a Negative Shock Originating in the North<sup>1</sup>**

*(Percent deviation from baseline)*



<sup>1</sup> The shock is a 1 percent decline in output in the North.

**Chart 4. Impact of Lower Growth in the South on the North**  
(in percent)



<sup>1</sup>Dynamic forecasts using estimates in column 3, Table 2 and the actual growth rate in the South in the top panel. Shaded areas indicate the simulation periods.

year for the period 1990-93 instead of the 5 percent average actual growth. Compared with the baseline scenario, output growth in the North would have been lower by about  $\frac{1}{4}$  of 1 percentage point in 1992, and by about  $\frac{3}{4}$  of 1 percentage point in 1993. These results suggest that the North has benefited significantly from the relatively strong growth experienced in the South in recent years. More specifically, the results suggest that robust growth in the South made a substantial contribution to containing the growth slowdown in the North, and to the subsequent recovery in the North.

#### 4. Regional differences

As noted before, the increased resilience of growth in the South is unlikely to have been uniform across different regions. Extending the model by dividing the South into the main geographical regions can, in principle, help determine whether particular regions in the South account for the structural break in North-South linkages. In view of the small number of observations, however, only a North, Asia and other South division is explored.<sup>16</sup> Many Asian countries have managed to diversify their export base, both in terms of the composition of exports--with a marked increase in manufactured exports--and also with regard to foreign markets. The growth in intra-regional trade among developing countries, which represents an important change in global trading patterns, is also particularly striking in Asia (Chart 5). The extended model can also help to identify the source of the reverse linkages to the North from the South.

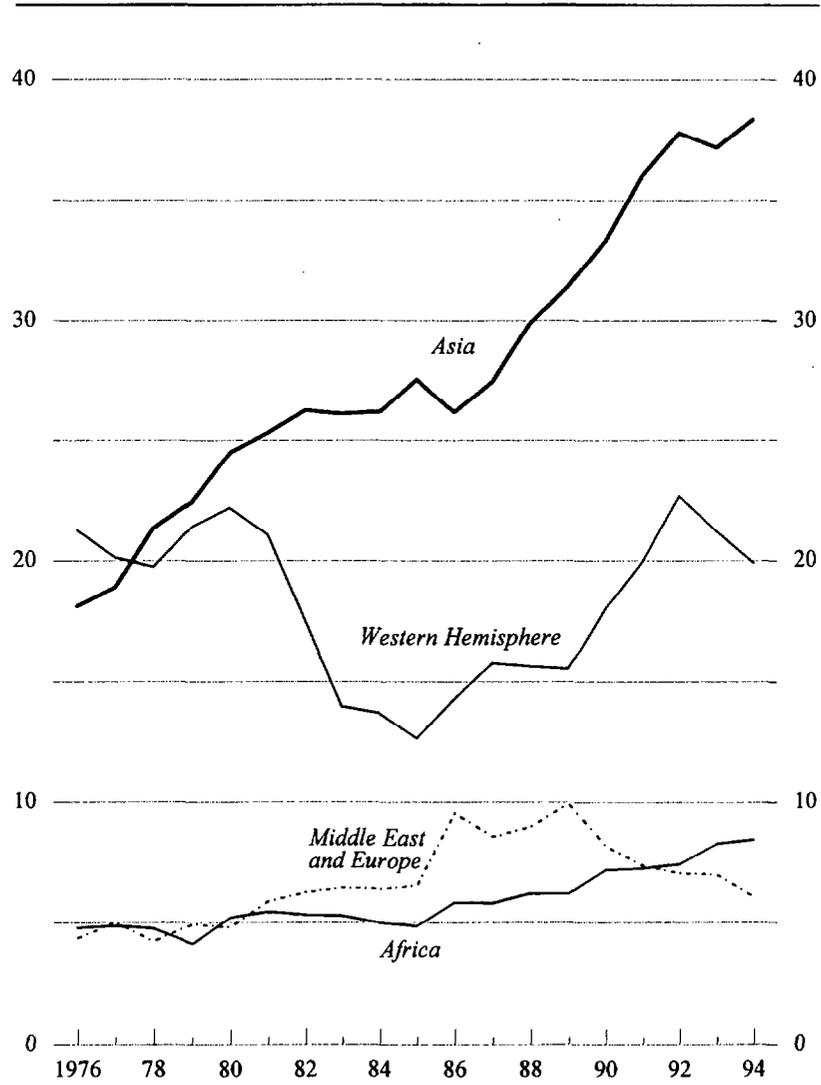
Estimating the extended three region model--North, Asia, and other South--following the same procedure as before, we find that there is a unique long-run relationship between output levels in the three regions (Table 1, Panel B). The estimates suggest that the North benefits more from growth in Asia--about 50 percent more--than from growth in the rest of the South. Based on this cointegrating relationship, we estimate the ECM's and test for breaks in the short-run linkages. The likelihood-ratio tests suggest evidence of a break in 1987 and 1988, although the significance level for 1988 is lower (see Table 3). Expanding the model does, however, increase the number of parameters in each equation, thereby reducing the precision of the estimates.

The results for the extended ECM are presented in Table 4. Columns 1, 4, and 7 show the results for the models without structural breaks; columns 2, 5, and 8 include the structural break; and columns 3, 6, and 9 are the preferred specifications for each of the three regions. The extended model suggests that the breaks are important only for Asia, which appears to be less affected by cyclical fluctuations in the North since the late 1980s, although it is still influenced by the North in the long run. Moreover, following the structural break, growth in the rest of the South is also a significant determinant of growth in Asia. The effect of past

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<sup>16</sup>Previous studies on the issue of resilience of developing countries have found Asia to be significantly different from other developing country regions. See, for example, Peterson and Srinivasan (1995).

**Chart 5. Shares of Intraregional Trade in Total Trade<sup>1</sup>**



<sup>1</sup> Exports to other countries within the region as a percent of total exports.

Table 4. Short-Run Growth Linkages in the North-Asia-Other South Model, Annual Data 1967-93  
(Standard errors in parenthesis)

	Dependent Variable <sup>1</sup>								
	North Growth			Asia Growth			Other South Growth		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Regressors Lagged</b>									
<b>One Period</b>									
Error correction term	-0.45*** (0.16)	-0.47** (0.18)	-0.52*** (0.13)	-0.50* (0.26)	-0.39 (0.27)	-0.45* (0.23)	-0.26 (0.19)	-0.22 (0.21)	...
North growth	0.44** (0.20)	0.34 (0.23)	0.63** (0.09)	0.42* (0.25)	0.62** (0.27)	0.39** (0.20)	0.25 (0.23)	0.30 (0.27)	0.36* (0.20)
Asia growth	-0.15 (0.18)	-0.11 (0.19)	...	-0.30 (0.23)	-0.37 (0.23)	...	0.03 (0.21)	-0.01 (0.23)	...
Other south growth	0.07 (0.15)	0.09 (0.18)	...	-0.15 (0.17)	-0.26 (0.19)	...	0.69*** (0.18)	0.66*** (0.21)	0.69*** (0.14)
North growth x D1988 <sup>2</sup>	...	0.45 (0.72)	...	...	-1.27* (0.75)	-0.39** (0.20)	...	-0.50 (0.87)	...
Asia growth x D1988 <sup>2</sup>	...	-0.13 (0.52)	...	...	0.43 (0.54)	...	...	0.37 (0.63)	...
Other south growth x D1988 <sup>3</sup>	...	-0.34 (1.01)	...	...	0.24 (1.65)	0.64* (0.39)	...	-0.54 (1.23)	...
Constant	0.01 (0.01)	0.02 (0.02)	...	0.07*** (0.02)	0.07*** (0.02)	0.05*** (0.01)	-0.01 (0.02)	0.00 (0.02)	...
<b>Hypothesis Test</b>									
F statistic <sup>3</sup>		0.67			0.98			0.47	
R <sup>2</sup>	0.41	0.45	0.34	0.21	0.37	0.22	0.58	0.59	0.53
R <sup>2</sup>	0.31	0.25	0.31	0.05	0.11	0.11	0.51	0.44	0.51
Standard error of residuals	0.0138	0.0144	0.0138	0.0156	0.0151	0.0150	0.0164	0.0174	0.0163
Durbin-Watson statistic	1.86	1.93	1.89	2.32	2.60	2.60	2.51	2.49	2.51

<sup>1</sup>Columns 1, 4, and 7 refer to the model without structural breaks, columns 2, 5, and 8 refer to the model with structural breaks, and columns 3, 6, and 9 refer to the preferred model. \*, \*\*, and \*\*\* denote significance at the 10, 5, and 1 percent levels, respectively.

<sup>2</sup>D1988 is a dummy variable that is equal to zero before 1988 and equal to one thereafter.

<sup>3</sup>The null hypothesis refers to the joint significance of the variables excluded in the preferred model. For Asia the null hypothesis also includes the decoupling from the North, i.e., the sum of the two coefficients of the impact of the North growth on the Asia (0.62) and the impact of the North growth multiplied by the dummy variable (-1.27) is zero.

performance of Asia on its growth rate is primarily through the error-correction term which is significant at the 10 percent level. For the rest of the South, the only significant determinants of growth are the previous year's growth in the region and growth in the North. Moreover, there is no evidence of a structural break in the other South's growth linkages with the North and Asia. For the North, the results of the extended model suggest, as before, that the reverse linkages operate mainly through the long-run relationship with the South. Since the cointegrating relationship suggests that the impact of Asia on the North is larger than that of the rest of the South, the interaction of the North and South can be characterized as one of differential reverse linkages.

Dynamic simulations of the extended model can help illustrate these differential reverse linkages. As before, a baseline projection is obtained by simulating the error correction model from 1990 onward. The counter-factual projection is obtained by assuming that growth in Asia remains at its 1990 level of about 5½ percent (Chart 6), and growth in the Other South remains at its 1990 level of about 1¾ percent (Chart 7). Compared with the baseline, output growth in the North in 1993 would have been lower by about ½ of 1 percentage point if growth in Asia had remained constant in the early 1990s, and ¼ of 1 percentage point lower if growth had stagnated in the Other South region.

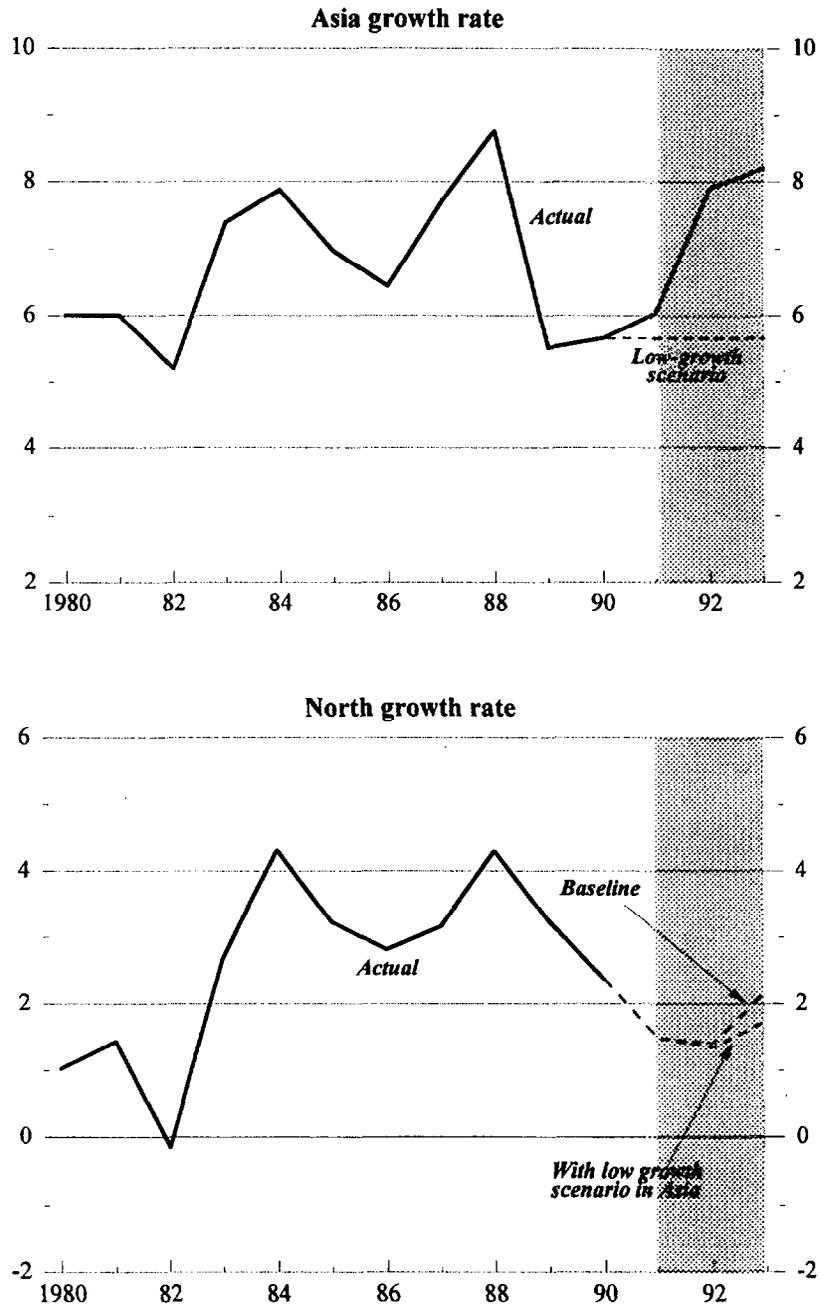
#### **IV. Possible Explanations for the Changing North-South Relationship**

The econometric evidence presented in the previous section suggests that the break in the North-South growth relationship is primarily a manifestation of relatively robust growth in the South since the late 1980s. Prior to this period, business cycles in the two regions were relatively well synchronized, and recessions in the North typically lowered growth in the South. Any explanation of the structural break, therefore, must focus on factors that have contributed to the improved performance and sustained growth in many countries of the South.

Because the postulated break is relatively recent, there is insufficient data to undertake a formal econometric analysis of its causes. Instead, this section presents some illustrative evidence that suggests that growth and resilience in the South have been assisted by three related developments in the South: i) structural reform and trade liberalization, ii) increased diversification of export base and export markets, and iii), increased capital inflows. These developments have also been affected by higher growth and resilience in the South; this two-way nature of the relationship between growth and structural changes also makes it difficult to formally evaluate the causes of the break, especially in reduced form equations such as those used in previous sections.

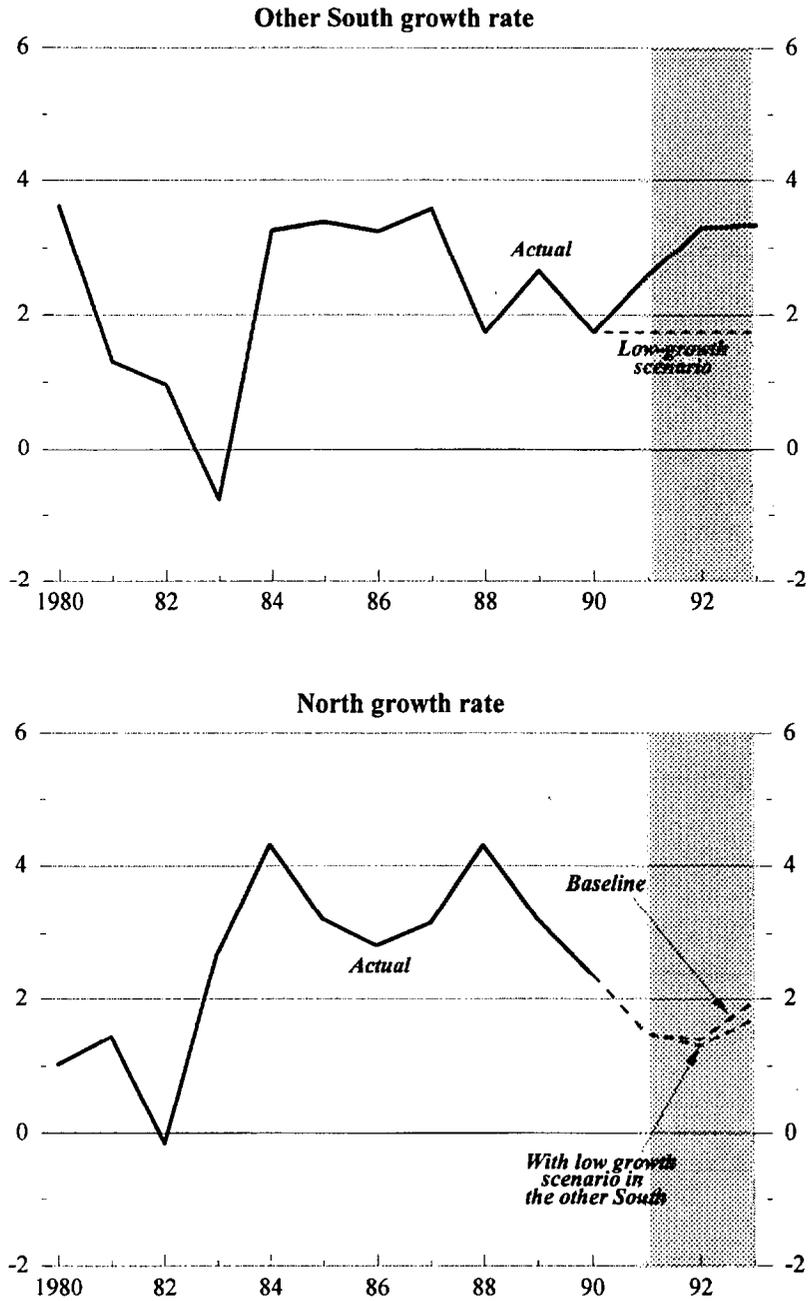
Structural reforms and the greater financial openness of many countries in the South, in conjunction with the increasing integration of world financial markets, have strengthened the financial links between industrial and developing countries. With more open capital markets, weak activity and low interest rates in the North have tended more strongly to lead to larger capital inflows and investment in the South. At the same time, there has been an increase in

**Chart 6. Impact of Lower Growth in Asia on the North<sup>1</sup>**  
(In percent)



<sup>1</sup>Dynamic forecasts using estimates in columns 3 and 9, Table 3 and the growth rate in Asia in the top panel. Shaded areas indicate the simulation periods.

**Chart 7. Impact of Lower Growth in the Other South on the North<sup>1</sup>**  
(In percent)



<sup>1</sup>Dynamic forecasts using estimates in columns 3 and 6, Table 3 and the growth rate in the Other South in the top panel. Shaded areas indicate the simulation periods.

intraregional trade and export diversification in the South, in particular a shift toward manufacturing from primary commodity exports. Both sets of factors have helped to offset the effects of cyclically low growth in exports to the North. Thus, despite a much closer relationship between developments in the two regions, the recent changes appear to have broken the predominantly unidirectional link between growth rates in the two regions that had resulted from the dominance of trade linkages with the North. As a result, activity and growth in many countries of the South were sustained despite the slowdown in the North during 1991-93.

Whilst it would be premature to suggest that these improvements have permanently reduced the dependence of developing country growth on growth in the industrial countries, the recent resilience of the more successful developing countries to weak external conditions is indicative of the improved ability of these countries to withstand cyclical downturns in the industrial countries.

## 1. Trade liberalization

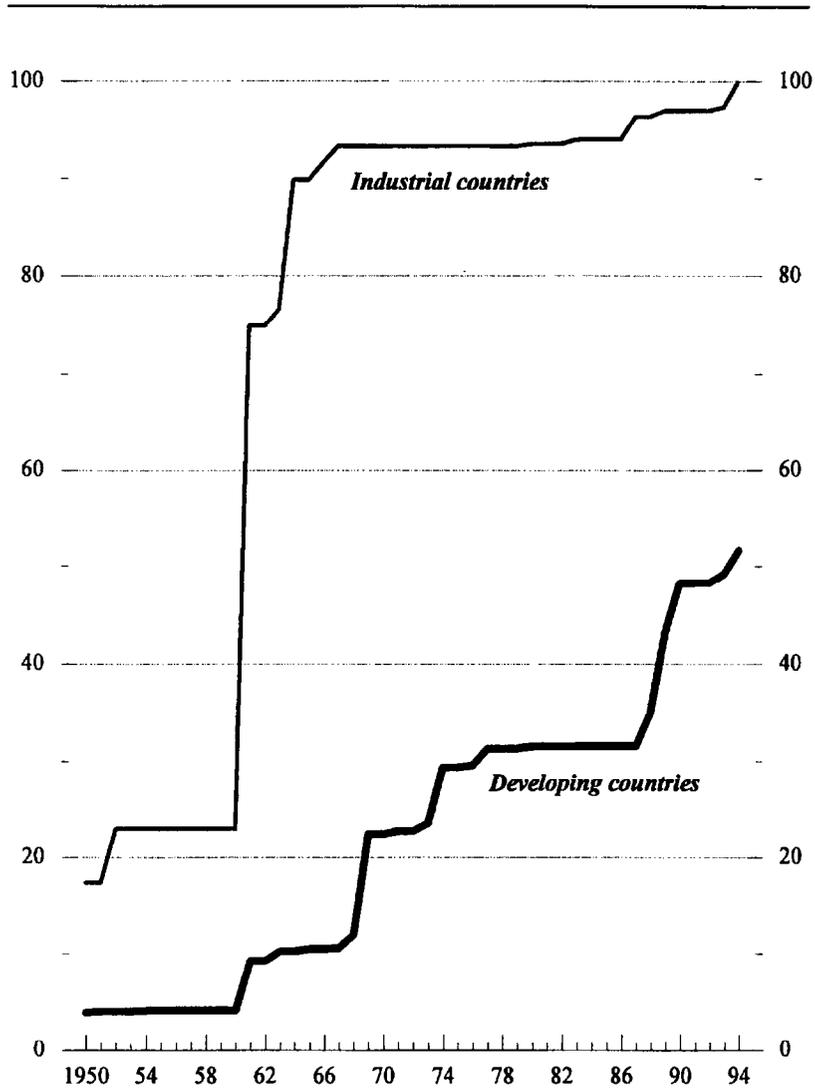
Over the past decade, many developing countries have implemented far-reaching structural reforms, especially trade liberalization and the removal of distortions in domestic product and financial markets, not only have helped improve the allocation of resources and productivity, but also have attracted large inflows of foreign capital. The shift in the orientation of trade policies has been particularly striking in many Asian and Latin American countries (Edwards (1993)). Although it is difficult to construct a single index to measure the extent of trade liberalization in the South as a whole, some indication of the increasing trend toward more open trade regimes accompanied by the liberalization of exchange arrangements can be gauged by the proportion of countries that have eliminated exchange restrictions for current international transactions (Chart 8).<sup>17</sup>

The adoption of more liberal exchange and trade regimes, in large part due to the failure of protectionist policies that were associated with import-substitution development strategies of the 1960s and 1970s, have enabled many developing countries to substantially expand both intraregional trade and trade with industrial countries. The share of world exports going to developing countries has been rising rapidly in recent years (Chart 9). Although, the relation between growth and trade, causation can go both ways--growth may foster or inhibit trade depending on the sources of growth (Cooper (1995))--empirical evidence suggests that output and productivity growth are positively associated with growth in exports, the degree of outward

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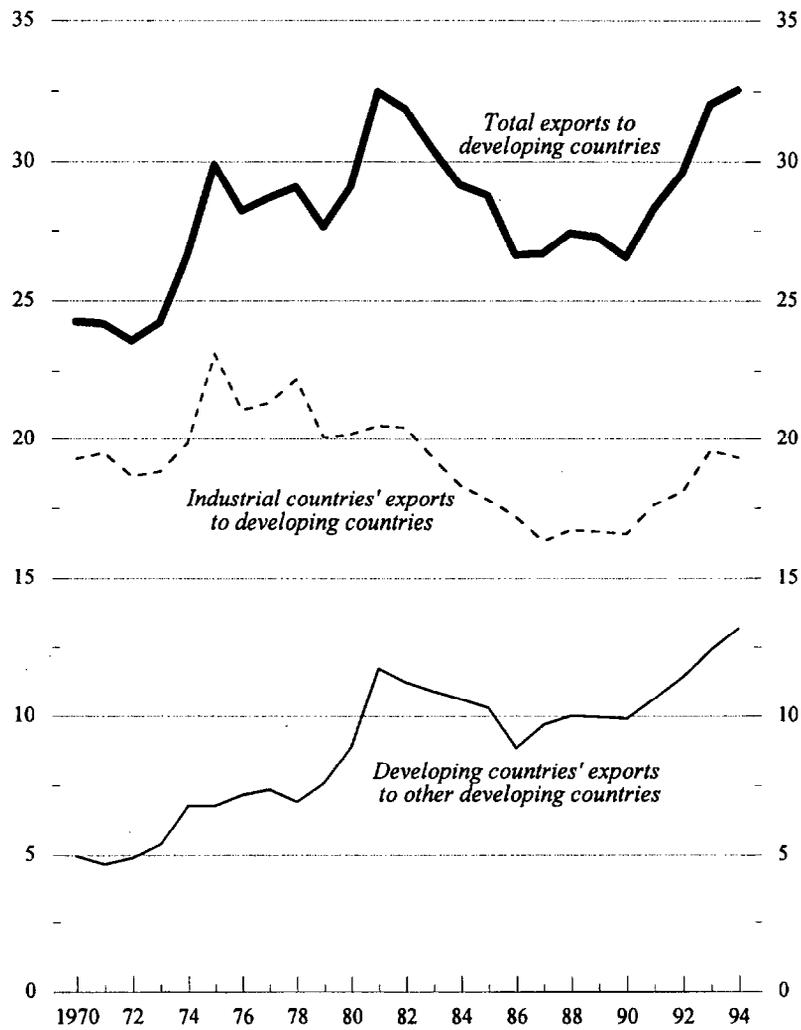
<sup>17</sup>See Leamer (1988) for a discussion of alternative measures of openness and also the study on globalization by Sachs and Warner (1995) which uses a measure of openness similar to that used here.

**Chart 8. Current Account Convertibility in Developing and Industrial Countries<sup>1</sup>**  
(In percent)



<sup>1</sup> Percent of developing and industrial countries that have accepted Article VIII of the IMF's Articles of Agreement; countries are weighted by their share of aggregate exports of either all developing or all industrial countries.

**Chart 9. Exports To Developing Countries**  
(In percent of total world exports)



orientation, and the elimination of impediments to trade (Edwards (1993) and Dornbush (1992)).<sup>18</sup>

## 2. Diversification of export base and export markets

For many developing countries, diversification of the export base, especially an expanded manufacturing sector, has reduced their vulnerability to external shocks. Compared with primary commodities, the demand for manufactures has been less cyclical and has risen more rapidly. As a result, manufactured commodities have been subject to relatively smaller price swings and their prices have been secularly stronger. Exporters of manufactures and countries with diversified export bases have experienced stronger export growth and smaller terms of trade losses, which have contributed to increased resilience, higher investment, and more rapid growth in recent years (Table 5). Higher growth and investment have in turn facilitated export diversification, creating a virtuous circle. For example, in Asia where growth has been especially strong, the share of manufactured exports relative to primary commodities has increased substantially since 1970 and was over 70 percent of total exports of goods in 1990 (Table 6). Although the share of manufactures has also increased markedly in the Western Hemisphere and the Middle East, it remains relatively low at about 30 percent and 20 percent, respectively. In Africa, by contrast, the export share of manufactured goods declined from 28 percent in 1980 to 21 percent in 1990.

Table 5. Trade and Economic Performance in Developing Countries, 1988-94  
(Annual percent change, unless otherwise indicated)

	Real GDP	Terms of Trade	Terms of Trade Volatility <sup>1</sup>	Export Volumes	Investment <sup>2</sup>
Exporters of nonfuel primary products	2.8	-1.5	8.9	6.8	18.3
Exporters of fuels (mainly oil)	2.2	-3.5	9.9	6.6	22.6
Exporters of services	2.5	0.1	6.5	8.9	20.4
Exporters of manufactures	8.7	0.3	0.6	8.6	35.6
Diversified exporters	4.3	0.7	3.0	8.4	24.5

<sup>1</sup>The standard deviation as a percent of the mean.

<sup>2</sup>In percent of GDP.

<sup>18</sup>Levine and Renelt (1992) suggest that the relationship between exports and growth depends also on other determinants of growth. In particular, adding investment as a regressor in growth equations weakens the relationship with exports, suggesting that the positive association between exports and growth may reflect enhanced capital accumulation rather than increases in efficiency.

Table 6. Diversification of Developing Country Exports<sup>1</sup>  
(Percent of merchandise exports)

	Africa			Asia			Middle East and Europe			Western Hemisphere		
	1970	1980	1990	1970	1980	1990	1970	1980	1990	1970	1980	1990
Non-fuel primary products	62.8	17.0	31.2	49.4	30.7	16.0	10.7	1.8	5.7	64.5	42.1	39.9
Fuel	22.8	56.0	47.2	8.8	21.4	10.2	80.1	93.0	73.6	23.7	39.9	26.6
Manufactures	14.5	27.0	21.6	41.8	47.9	73.8	9.2	5.1	20.7	11.8	18.1	33.5

Source: United Nations Conference on Trade and Development data base.

<sup>1</sup>Based on 65 developing countries for which data are available.

The changing composition of developing country exports, while having been aided by the removal of distortions in domestic markets and reductions in trade barriers, also reflects an underlying shift in the comparative advantage of many developing countries toward manufacturing. Relatively low wage costs coupled with rising investment have made some developing countries highly competitive in the production of many manufactured goods, especially in countries where this process has been accompanied by improvements in the necessary supporting infrastructure. In some Asian countries, the composition of manufactured exports now includes a significant proportion of advanced, high technology manufactured goods. At the same time, the comparative advantage of many industrial countries has shifted toward services, many of which are now tradable owing to changes in technology, especially improvements in communications and information technology.

The diversification of export markets and a marked rise in intraregional trade have also contributed to (and have been stimulated by) the increased resilience of developing countries, especially in Asia where almost 40 percent of the region's exports are now destined for other Asian countries (Table 7). The expansion of markets in Asia has also benefitted other regions--all industrial and developing country regions have increased the share of their exports going to Asia.<sup>19</sup> Intraregional trade has also risen markedly among Latin American countries, although diversification of export markets has been limited, with almost 50 percent of the regions exports destined for North America. Export markets have remained relatively undiversified among African countries, and the rise in intraregional trade has been modest. Almost 50 percent of African exports are shipped to Europe, in part because of historical links and preferential or concessionary trade access, as well as geographical proximity.

<sup>19</sup>Hickok (1993) reports estimates indicating that trade liberalization in developing countries since 1985 may increase demand for industrial countries' exports by approximately 20 percent over the medium term.

Table 7. Diversification of Export Markets

(Percent of total exports)

	<b>Exports to Developing Countries</b>									
	<u>Africa</u>		<u>Asia</u>		<u>Middle East and Europe</u>		<u>Western Hemisphere</u>		<u>Total<sup>1</sup></u>	
	1984	1994	1984	1994	1984	1994	1984	1994	1984	1994
<b>Exports from</b>										
<b>Developing countries</b>										
Africa	5.0	9.7	3.0	6.8	1.9	2.4	2.6	2.6	12.5	21.5
Asia	1.8	1.3	26.2	38.6	5.8	2.9	2.0	2.4	35.8	45.1
Middle East and Europe	1.9	2.0	13.8	19.9	10.9	8.9	3.9	2.1	30.4	32.9
Western Hemisphere	2.2	1.0	3.2	5.6	2.8	1.5	13.7	19.8	21.9	27.9
<b>Industrial countries</b>										
North America	2.2	1.0	10.8	14.6	5.4	3.4	10.3	14.2	28.7	33.2
Pacific <sup>2</sup>	2.2	1.4	25.9	39.6	8.4	3.0	4.0	4.1	40.5	48.1
Europe	4.4	2.5	3.9	6.8	7.5	4.2	2.3	2.6	18.0	16.2
<b>Exports to Industrial Countries</b>										
	<u>North America</u>		<u>Pacific<sup>2</sup></u>		<u>Europe</u>		<u>Total<sup>1</sup></u>			
	1984	1994	1984	1994	1984	1994	1984	1994		
<b>Exports from</b>										
<b>Developing countries</b>										
Africa	15.9	15.8	3.6	3.5	52.4	46.7	71.8	66.0		
Asia	27.9	22.6	19.8	14.4	13.0	15.4	60.7	52.4		
Middle East and Europe	7.9	11.2	20.8	16.6	30.6	28.0	59.3	55.8		
Western Hemisphere	43.1	46.1	5.4	4.8	22.5	19.3	71.0	70.2		
<b>Industrial countries</b>										
North America	36.6	36.7	11.1	10.7	20.3	18.4	68.0	65.9		
Pacific <sup>2</sup>	34.4	28.6	7.8	6.5	14.2	15.8	56.4	51.0		
Europe	10.3	8.5	2.2	3.0	64.2	66.4	76.7	77.9		

Source: IMF, *Direction of Trade Statistics*.

<sup>1</sup>Export shares of each region to all developing and industrial countries do not add to 100 percent because trade with the countries in transition is excluded and because of some underreporting of trade.

<sup>2</sup>Australia, Japan, and New Zealand.

### **3. Increased capital flows to developing countries**

Since the early 1990s, there has been a substantial increase in gross capital flows, particularly portfolio investment, to many developing countries (Chart 10). The increase in the value of gross capital flows far outweighs the increase in the value of trade during the same period, suggesting the increasing importance of North-South financial linkages.<sup>20</sup> The recent pattern of capital flows to developing countries reflects, to a large extent, greater international diversification of industrial country investments, especially in periods when growth and interest rates are low in the industrial countries (Calvo, Leiderman, and Reinhart (1993)). It also reflects the growth of trade and successful adjustment and stabilization efforts, and domestic financial liberalization--including fewer restrictions on acquisition of assets by foreigners--in a number of developing countries.

In contrast to earlier periods of large capital flows to developing countries, an increasing proportion now comprises private capital flows, especially in the form of foreign direct investment and portfolio investments in bond and equity markets. Although in some cases capital inflows, especially portfolio flows, have been attracted by high short-term interest rates, for many developing countries capital flows in the form of foreign direct investment, particularly to Asian countries, have helped to boost investment further. Higher foreign direct investment has enabled many developing countries to gain greater access to industrial country production technologies and increased the scope for rapid growth of exports (Graham (1995)). In most of the recipient countries, foreign direct investment has also contributed strongly to their growth performance. Borensztein, De Gregorio, and Lee (1994) report estimates from panel regressions for a sample of 69 countries that suggest foreign direct investment is an important channel for technology transfers from industrial to developing countries, and that foreign direct investment flows lead to a more than proportionate increase in domestic investment.<sup>21</sup>

## **V. Conclusions**

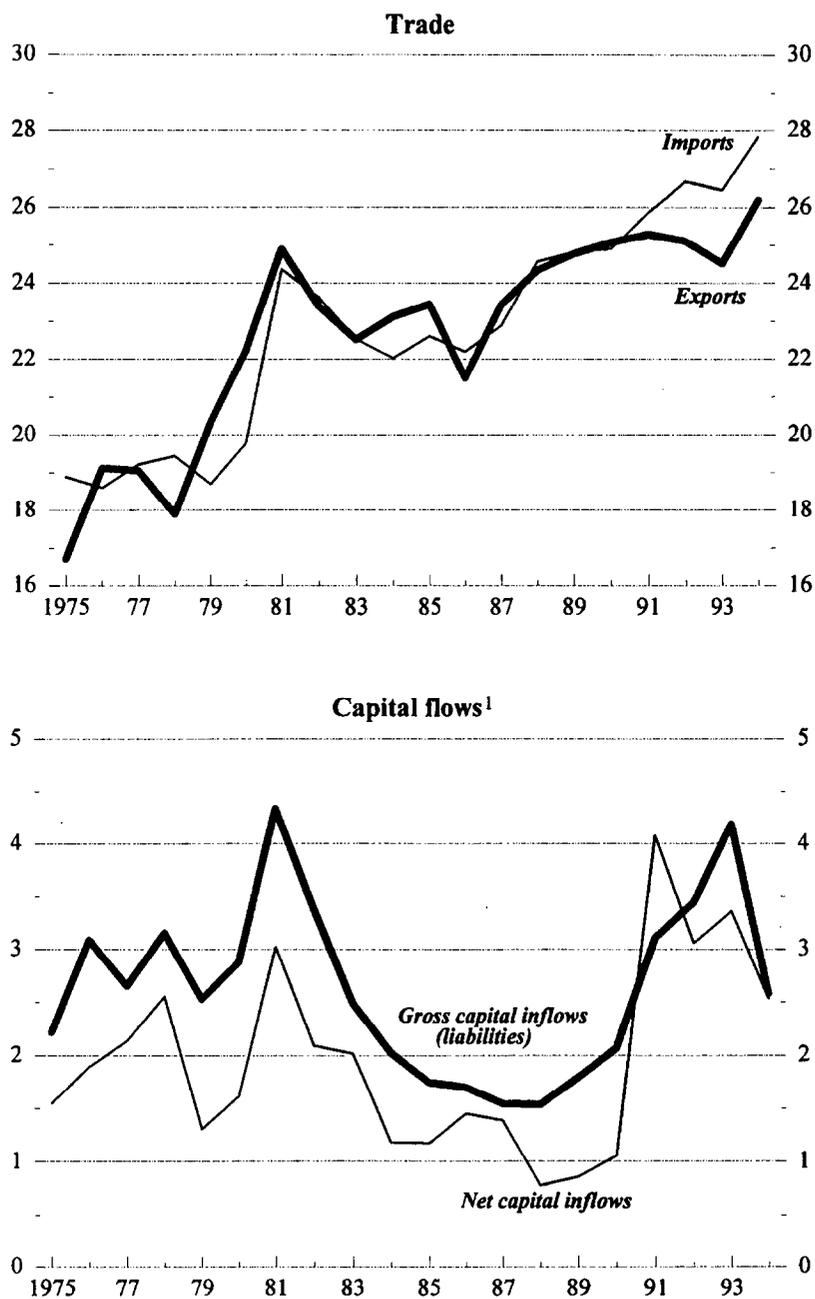
The evidence provided in this paper suggests that North-South linkages have undergone a transformation in recent years. It appears that, contrary to the prediction of earlier analyses of North-South interactions, countries in the South can to some extent sustain high growth even when activity is weak in the North.

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<sup>20</sup>Gross capital flows are often a better indicator of the extent of financial market integration since net capital flows largely mirror current account positions.

<sup>21</sup>Developing countries have also benefitted from research and development (R&D) spillovers via trade with the North. Coe, Helpman, and Hoffmaister (1996) find evidence that R&D spillovers are an important determinant of productivity growth in the South.

**Chart 10. Developing Countries: Trade and Capital Flows**  
(In percent of GDP)



<sup>1</sup>Net capital flows comprise net direct investment, net portfolio investment, and other long- and short-term net investment flows, including official and private borrowing.

The econometric results support the common wisdom that economic conditions in the North greatly influence the South. But they also show that the North is importantly affected by the South, and, in recent years the South has become more resilient to cyclical fluctuations in output in the North. The improved resilience of the South not only allowed growth to continue at high levels during 1991-93 despite the downturn in the North, but it also helped to limit the severity of that downturn. Finally, the results also illustrate that although the ability of the South to withstand adverse developments in the North has increased, this is not a generalized phenomenon. The increased resilience and the boost to the North stem mainly from the improved performance of the developing countries in Asia.

Because of the small number of available observations, a formal econometric examination of factors that have contributed to the apparent break in North-South linkages, and the extent to which these changes are permanent, has not been attempted. The conclusions are also qualified by the fact that higher resilience and growth in turn influence the hypothesized factors. With these caveats, the paper provides some informal evidence to suggest that improvements in economic policies, increased financial linkages, the expansion of intra-regional trade, and greater diversification in the composition of developing country exports have contributed to the higher growth and increased resilience in the South. It argues that the increased openness of developing countries and their greater integration into the world economy do not necessarily mean greater vulnerability to external conditions. Paradoxically, increased openness may have reduced vulnerability both because of the countercyclical effects of movements in capital inflows and because of the greater export diversification that increased openness has tended to foster.

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