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External Shocks and Fiscal Adjustment in Developing Countries: Experiences During 1962-82

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Abstract

This paper analyzes factors underlying fiscal developments in 18 developing countries during 1962-82 in relation to developments in their external sectors, which constitute one of their main revenue bases. The analysis focuses on how government expenditure was used as a policy instrument for fiscal adjustment in the face of external shocks and the consequent fiscal imbalances. The analysis indicates that fiscal policy responded to external shocks in a fairly large number of countries. In particular, fiscal policy responses to unexpected shocks were stronger than the responses to anticipated ones.

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I. Introduction

A major feature of the fiscal sector in many developing countries is the importance of government revenue deriving directly or indirectly from external trade. This feature results both from the dominance of trade in their economies and from a weak administrative capability that makes them rely heavily on the taxation of external trade because of the ease with which such taxation can be administered. 1/

Therefore, in highly open developing countries, external developments can have powerful and direct impacts on fiscal developments. The fluctuation of external trade in these countries can be transmitted directly to the fiscal sector. The large fluctuation of trade and the uncertainty surrounding such fluctuation pose serious problems for the formulation and execution of fiscal policy.

The international economic environment for developing countries has changed substantially since the early 1970s. The cyclical fluctuation of industrial economies has become more pronounced, and the price of internationally traded goods--particularly primary commodities--has become volatile. Against this background, the overall fiscal deficits of developing countries averaged higher and fluctuated more sharply during 1972-82 than during 1962-71. Furthermore, average fiscal balances and yearly fluctuations of fiscal balances were dispersed more widely across the sample countries during 1972-82 than during 1962-71.

A recent paper by the author (Chu, 1987), explored a number of channels through which the fiscal sector and the external sector could interact. A greater fluctuation of the target for government expenditure could result in a greater fluctuation of actual expenditure. A greater fluctuation of the target for expenditure could originate from a greater fluctuation of external trade if the targets were based on anticipated revenue, which in turn would depend on anticipated future trade.

An intensification in the fluctuation of the fiscal balance may be a direct consequence of an intensification in the fluctuation of external trade, an important revenue base. Furthermore, errors in anticipation, other constraints on policy instruments, lags, and possible asymmetry of government responses could not only aggravate fiscal instability, but also contribute to longer-term persistence, and worsening of fiscal imbalances.

This paper analyzes fiscal developments in a group of 18 developing countries during 1962-82 broadly on the basis of an analytical framework discussed in the previous paper. The paper examines empirically the

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1/ Trade is not the only external factor (though a major one) with important fiscal implications. Other factors include the availability of foreign credit, foreign grants, and foreign investments. See Tanzi (1986).

following several aspects of fiscal adjustment processes. How did fiscal balances behave during different phases of recent world trade cycles? How did revenue and expenditure contribute to the fluctuation of the deficit during these cycles? Were increases in fiscal deficits and the consequent fiscal crises following the two recent world recessions attributable to a reduction in revenue or to an expansion in expenditure? Given the institutional dependence of revenue on external developments, how did government expenditure behave during the trade and fiscal cycles? How did expenditure respond to anticipated and unanticipated external shocks? How did fiscal discipline in dealing with fiscal crises affect its long-run fiscal performance? Was the long-run deterioration in the fiscal balance in any way related to the amplitude of the fluctuation of the fiscal balance; i.e., was the long-run fiscal deterioration partly a consequence of the fiscal fluctuation? What were the policy implications of the intensified fiscal fluctuation?

The organization of this paper is as follows. Section II describes fiscal developments in the 18 sample developing countries during 1962-82. Section III analyzes sources of fiscal fluctuation in the sample countries, particularly the relationship between trade cycles and fiscal cycles. Section IV analyzes fiscal policy responses to external shocks and the consequent fiscal imbalances. Section V draws conclusions from this analysis.

II. Overview of Fiscal Developments in Eighteen Developing Countries

The 18 sample countries are the developing countries for which consistent fiscal and external trade data are readily available from 1962 through 1982. During the period, world trade fluctuated widely, particularly around the two world recessions in 1975 and 1981-82. The sample consists of 4 countries in Africa, 7 in Asia, 1 in the Middle East, and 6 in the Western Hemisphere (Table 1). Most are highly open, non-oil primary commodity exporters, relying heavily on the taxation of international transactions for their central government revenues. 1/ Such taxation in 1980 accounted on average for 20 percent of total government revenue and 25 percent of tax revenue; for several countries, it accounted for more than 30 percent of total revenue, suggesting the importance of the external sector as a source of government revenue. The importance of the external sector is much greater than suggested by these statistics because these countries rely indirectly on the external

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1/ The openness of an economy in this paper refers to the dependence on external trade, not necessarily a liberalized trade regime.

Table 1. Sample Countries

A. Location, Openness, and Major Exports 1/

Location	Openness: Trade value in percent of GDP (1980)	Major Exports 2/: Total	Primary commodities	Services	Manufactures
	(Percent)	(Number of countries)			
Total sample countries	75.1	18	12	4	2
Africa	60.6	4	4	0	0
Asia	96.5	7	3	2	2
Middle East	90.6	1	0	1	0
Western Hemisphere	57.2	6	5	1	0

B. Importance of Taxation on International Transactions 3/

	Percentage share (1980) in: Total revenue	Tax revenue
	(Average in percent) 4/	
Total sample countries	19.9	25.2
	(Number of countries)	
Percentage share: total Sample countries	18	18
40 or more	1	3
30-40	4	4
20-30	4	4
10-20	3	1
0-10	6	6

1/ Based on data from the International Financial Statistics, various issues.

2/ Based on the classification for the World Economic Ourtook excercises. The sample countries consist of the following: Africa: Kenya, Malawi, South Africa, Zambia; Asia: India, Malaysia, Nepal, Pakistan, Singapore, Sri Lanka, Thailand; Middle East: Jordan; Western Hemisphere: Brazil, El Salvador, Honduras, Jamaica, Nicaragua and Panama.

3/ Based on data in Government Finance Statistics Yearbook, International Monetary Fund, Volume IX, 1985.

4/ Simple average.

sector--particularly the taxation of incomes or transactions deriving from international transactions. 1/

1. Long-term trend

One of the notable changes in the fiscal balances of the sample countries over the years is deterioration in overall deficits. Deficits on average more than doubled from 2.8 percent of gross domestic products (GDP) during 1962-71 to 5.9 percent during 1972-82 (Table 2, Part A). This increase in deficits resulted entirely from sharp increases in expenditure as a percent of GDP, as they, on average, exceeded smaller increases in revenues. 2/

Between the two periods, the external balances of the sample countries also deteriorated sharply as a result of increases in imports. The average trade balance deficit almost doubled from 5.8 percent to 10.5 percent of GDP; the average current account deficit also deteriorated.

Aggregate fiscal variables were dispersed across the sample countries more uniformly than trade variables. For example, fiscal balances were dispersed relatively uniformly across the sample countries in comparison with the values of external trade. For 1962-82, the standard deviation of deficits across the countries was 2.8; the similar standard deviation for trade values was 53.2 (Table 2, Part B). This relative uniformity of the dispersion of fiscal deficits across the countries is partly, but not entirely, accounted for by the tendency of fiscal variables to be much smaller than trade variables as a percent of GDP. Thus, the standard deviation of fiscal deficits across the countries, normalized by the average fiscal deficit across the countries, was still smaller than that for trade values, with similar statistics for revenues and expenditures also smaller than those for exports and imports.

The dispersion of both fiscal deficits and trade values across the countries became more pronounced during 1972-82 than during 1962-71. The standard deviation of deficits increased from 1.9 during 1962-71 to 4.0 during 1972-82, while similar statistics for trade values increased from 48.8 to 58.4. There is no evidence, however, that these increases exceeded the increases in their averages. The standard deviations of

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1/ For an analysis of the tax systems in a broader sample of developing countries, see Tanzi (1983). That paper shows that the importance of the taxation of international transactions is a fairly general characteristic of the tax systems in developing countries.

2/ Data cover only the central government. In some sample countries, the fiscal performance of the public sector could diverge substantially from that of the central government owing to the fiscal activities of the local government and public enterprises. All the time series data used in this study are based on calendar years; exceptions are fiscal data for India, Kenya, and Pakistan.

Table 2. Eighteen Developing Countries: Trends of Fiscal Balances and External Trade, 1962-82

(Average over time) 1/

	1962-80	1962-71	1972-82
A. Average across countries 2/			
		(Fiscal balances)	
In percent of GDP			
Deficit	4.5	2.8	5.9
Revenue 3/	17.5	16.0	18.9
Expenditure	22.0	18.8	24.8
		(External trade)	
Total trade	58.8	53.6	63.5
Exports	25.3	23.9	26.5
Imports	33.5	29.7	37.0
Trade balance deficit	8.2	5.8	10.5
Current account deficit	4.1	2.6	5.5
B. Dispersion across countries 4/			
		(Fiscal balances)	
Deficit	2.8	1.9	4.0
Revenue	7.5	6.9	8.4
Expenditure	9.2	7.9	10.8
		(External trade)	
Total trade	53.2	48.8	58.4
Exports	24.2	23.4	25.7
Imports	30.4	26.7	34.2

1/ Based on data from the International Financial Statistics, various issues.

2/ Simple average.

3/ Revenue in this study includes foreign grants whenever data are available in the International Financial Statistics, various issues.

4/ Measured by standard deviation.

deficits and trade values increased in the same proportion as the increases in their averages.

2. Fluctuation

The deterioration in fiscal balances of the 18 developing countries between 1962-71 and 1972-82 was accompanied by an intensification in the fluctuation of the fiscal balances around their trends. The indices of fluctuation of overall deficits almost doubled on average from 1.4 to 2.5; similar indices for both revenues and expenditures also increased between the two periods (Table 3, Part A). This intensification in the fluctuation of fiscal balances was accompanied by a similar intensification in the fluctuations of external trade. The indices of the fluctuation of trade values increased on average from 3.9 to 6.8 as a result of greater instability of both exports and imports.

The dispersion of the fluctuations of fiscal balances and external trade across the countries also widened between 1962-71 and 1972-82. The standard deviation of the indices of the fluctuations of fiscal deficits increased from 1.4 to 1.9; the similar standard deviation for trade values increased from 4.4 to 5.6 (Table 3, Part B).

The intensification in the fluctuations of fiscal balances and trade values did not exceed the increases in their averages. Similarly, there is no evidence that the dispersions of the fluctuations become more pronounced if they are normalized by their averages.

The large fluctuation of fiscal balances of the sample countries was particularly notable around the two recent world trade cycles during 1971-76 and 1977-82 (see Table 4). During the 1971-76 cycle, exports peaked at 27.4 percent of GDP in 1974 before declining to 24.9 percent in 1975. Fiscal deficits, showing an inverse movement, declined to 3.5 percent of GDP in 1974, but increased to 7.0 percent in 1976 following the 1975 world recession. During the 1977-82 cycle, exports expanded until 1979 to attain a level of 32.7 percent before declining to 26.1 percent in 1982. Fiscal deficits declined to 5.5 percent in 1977, but began to increase steadily to attain a peak of 9.5 percent in 1982 (see Section III for details).

This overview suggests that the intensification in the fluctuation of fiscal balances was restrained in the sense that it did not exceed the increase in deficits. The proportionality itself raises a serious question, however, about the proper relationship between deficits and their fluctuation because a simple extrapolation of this proportionality implies that the fiscal balance should not fluctuate when fiscal equilibrium is maintained over a number of years. The unrealistic nature of this implication is obvious because it should not be unusual for the fiscal balance to fluctuate even if the balance averages zero over a period of years. It is, therefore, realistic to expect the intensification in the fluctuation of fiscal deficits to be less than proportional to the increase in their levels. It is from this

Table 3. Eighteen Developing Countries: Fluctuations of Fiscal Balances and External Trade, 1962-82

Fluctuation Over Time 1/

	1962-82	1962-71	1972-82
A. Average across countries 2/			
		(Fiscal balances)	
In percent of GDP			
Deficit	2.4	1.4	2.5
Revenue	1.9	1.3	1.8
Expenditure	3.0	1.8	3.0
		(External trade) 3/	
Total trade	8.6	3.9	6.8
Exports	4.2	1.7	3.5
Imports	5.4	2.8	4.7
B. Dispersion across countries 4/			
		(Fiscal balances)	
Deficit	1.5	1.4	1.9
Revenue	1.5	1.6	1.5
Expenditure	1.9	1.6	2.3
		(External trade) 3/	
Total trade	9.6	4.4	5.6
Exports	5.1	1.8	3.0
Imports	4.6	2.6	3.0

1/ Measured by the standard error of the regression of the series on time trend; i.e., the standard deviation of the residuals of the regression. Based on data from the International Financial Statistics, various issues.

2/ Simple average.

3/ Excluding Zambia.

4/ Measured by the standard deviation.

Table 4. Eighteen Developing Countries: Fluctuations of Fiscal Balances and Exports During the Two Recent World Trade Cycles 1/

	1971-76 Cycle						1977-82 Cycle					
	Expansion					Contraction	Expansion					Contraction
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
	(In percent of GDP) 2/											
Fiscal deficit	5.1	4.3	4.8	3.5	5.9	7.0	5.5	6.8	7.4	8.6	8.3	9.5
Exports	21.1	21.8	24.3	27.4	24.9	27.3	28.5	29.1	32.7	32.5	29.4	26.1

1/ Based on data from the International Financial Statistics, various issues.
2/ Simple averages of fiscal deficits and exports in percent of GDP for individual countries.

perspective that the intensification in the fluctuation of fiscal deficits and the cyclical appearance of fiscal crises are disturbing.

III. Sources of Fiscal Fluctuation

1. Sources of the fluctuation of deficits

In Section II, it was shown that expenditures for the 18 sample countries fluctuated more than did revenues during the sample period. This result suggests that the fluctuation of expenditures, rather than that of revenues, was the immediate source of the unstable deficits. To test this hypothesis, the fluctuation of the deficit is regressed on the fluctuations of revenue and expenditure, all as a percentage of GDP, separately for each sample country as follows:

$$ed_{it} = -\alpha_{ri} er_{it} + \varepsilon_{it} \quad (1)$$

$$ed_{it} = \alpha_{gi} eg_{it} + \eta_{it} \quad (2)$$

where ed_{it}, er_{it}, and eg_{it} are deviations of the deficit (d_{it}), revenue (r_{it}), and expenditure (g_{it}) in percent of GDP for country i from their respective trends, derived by regressing d_{it}, r_{it}, and g_{it} on time trend. The estimated equations (1) and (2) would indicate not only whether revenue or expenditure was a dominant factor underlying the fluctuation of the deficit, but also the extent of the correlation between the fluctuations of revenue and expenditure. The relative dominance of revenue would yield a higher coefficient of determination for equation (1) than for equation (2); a positive correlation between revenue and expenditure fluctuation would yield the estimates $\hat{\alpha}_{ri}$ and $\hat{\alpha}_{gi}$ smaller than 1. 1/

1/ The estimate of α_{ri} is:

$$\hat{\alpha}_{ri} = -(\Sigma er_{it} ed_{it})/\Sigma er_{it}^2.$$

The deviations ed_{it}, er_{it}, and eg_{it} are related by the identity, $ed_{it} = -er_{it} + eg_{it}$. Therefore:

$$\hat{\alpha}_{ri} = 1 - (\Sigma er_{it} eg_{it})/\Sigma er_i^2.$$

The expected value of $\hat{\alpha}_{ri}$ will be 1 if er_{it} and eg_{it} are not correlated; it will be less than 1 if they are positively correlated, greater than 1 if negatively correlated. A similar proof can also be shown for $\hat{\alpha}_{gi}$.

The estimation results are summarized in Table 5. The results suggest expenditure fluctuations as the dominant source of the instability in the fiscal balances. The adjusted coefficients of determination average 0.13 for equation (1) and 0.60 for equation (2). The estimates of the coefficients $\alpha_{.i}$ are statistically significant in only 7 out of the 18 cases for equation (1), but 17 cases for equation (2) at the 5 percent level. The results also suggest a strong positive correlation between the fluctuations of revenues and of expenditures; the coefficients $\hat{\alpha}_{.i}$ average larger for expenditure (0.65) than for revenue (0.05), but substantially less than 1 in both equations (1) and (2). The correlations between deficits and revenues are estimated to be weak.

These results, however, do not necessarily refute the importance of the external circumstances as an ultimate source of fiscal instability. Whereas the fluctuations of expenditures may have originated from unstable fiscal targets not necessarily related to the external circumstances, it is not inconceivable that external circumstances were responsible for the fluctuations of expenditures either by affecting the target expenditure or by affecting the part of expenditure that was an instrument for fiscal adjustment.

2. Trade cycles and fiscal cycles

At this stage of analysis, it is instructive to survey the developments of the fiscal and external sectors of the 18 sample countries over the two recent world trade cycles during 1972-82 (Table 6). The fluctuations of both fiscal and external balances followed cyclical patterns during these periods. In the trade cycles, a lag of about one year between the peaks in exports and imports is noted. 1/ During the 1971-76 cycle, a downturn in exports took place in 1975, whereas a significant downturn in imports took place in 1976. During the 1977-82 cycle, a significant downturn in exports took place in 1981-82, and a major decrease in imports in 1982, although this observation is tentative because the 1977-82 cycle should be extended beyond 1982.

Fiscal cycles lagged trade cycles by about a year; revenue cycles lagged export cycles, possibly as a result of the usual lags in collection of taxes, and expenditure cycles showed a tendency to lag the revenue cycles. Thus, during the 1971-76 cycle, revenues continued to expand in 1975 and experienced a significant downturn only in 1976, whereas exports declined in 1975. Expenditures expanded at an

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1/ See Rangarajan and Sundararajan (1976), Hemphill (1974), and Chu, Hwa, and Krishnamurty (1981) for the role of exports in the determination of imports in developing countries where the level of imports is constrained by the availability of foreign exchange.

Table 5. Eighteen Developing Countries: Relative Importance of Fluctuation of Revenues and Expenditures in Fluctuation of Deficits, 1962-82

	Regression of Deficit on 1/	
	Revenue	Expenditure
Average statistics 2/		
Adjusted R^2	0.13	0.60
Coefficient ($\alpha_{.1}$)	0.05	0.65
Statistical significance of coefficient ($\hat{\alpha}_{.1}$)		
Significant at		
1 percent	4	14
5 percent	7	17
10 percent	7	17
20 percent	10	17
Not significant at		
20 percent	8	1

1/ The regressions are conducted on the deviations of deficits, revenues, and expenditures in percent of GDP from their respective trend for individual countries. The trends are estimated by regressing the deficits, revenues, and expenditures in percent of GDP on time trends. Based on data from the International Financial Statistics, various issues.

2/ Simple average for all the 18 sample countries.

Table 6. Eighteen Developing Countries: Fluctuations of Fiscal and External Balances During the Two Recent World Trade Cycles 1/

(In percent of GDP) 2/

	1971-76						1977-82					
	Expansion					Con-traction	Expansion					Con-traction
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Fiscal balance												
Deficit	5.1	4.3	4.8	3.5	5.9	7.0	5.5	6.8	7.4	8.6	8.3	9.5
Revenue	18.0	18.1	18.1	19.4	19.9	18.6	19.7	20.2	21.2	21.5	22.0	21.7
Expenditure	23.1	22.4	22.9	22.9	25.8	25.6	25.2	27.0	28.6	30.1	30.3	31.2
External balance												
Trade deficit	9.0	7.5	6.4	11.9	13.9	8.5	8.1	9.7	9.0	14.5	16.3	15.2
Exports	21.1	21.8	24.3	27.4	24.9	27.3	28.5	29.1	32.7	32.5	29.4	26.1
Imports	30.1	29.3	30.7	39.3	38.8	35.8	36.6	38.8	41.7	47.0	45.7	41.3
Total trade	51.2	51.1	55.0	66.7	63.7	63.1	65.1	67.9	74.4	79.5	75.1	67.4

1/ Based on data from the International Financial Statistics, various issues.
2/ Simple average across the sample countries.

accelerated pace in 1975, and declined only slightly in 1976. During the 1977-82 cycle, a downturn in revenues took place in 1982, whereas exports began to decline in 1981. Expenditures continued to expand in that year. Reflecting these cyclical movements of revenues and expenditures, fiscal deficits peaked in 1976 and again in 1982. During the 1971-76 fiscal cycle, the increase in deficits in 1975 was the result of a decline in revenues not sufficiently offset by a small downward adjustment in expenditures. During the 1977-82 cycle, the increase in deficits in 1982 was the result of a decline in revenues reinforced by a continued increase in expenditures. During both the 1971-76 and the 1977-82 fiscal cycles, the adjustment of expenditures was slow and limited compared with the decline in revenues.

A more pronounced cyclical picture of fiscal balances is obtained by normalizing the timing of the cycles, i.e., by averaging the fiscal balances across the sample countries after adjusting for the slight difference in the timing of the cycles among the sample countries. As shown in Table 7, the fluctuation becomes more pronounced, but same broad conclusions emerge. Revenue cycles lagged export cycles for a number of reasons, including administrative lags in tax collection. The movements of revenues and deficits indicate that the adjustments in expenditures following the downturns in revenues were not sufficient to contain deteriorations in fiscal balances.

One notable phenomenon is a sharply larger dispersion of changes in revenues, deficits, and exports, across the countries in the recession phase of the fiscal and trade cycles than in the expansion phase during the 1972-76 cycle. Apparently the extent of the declines in exports and revenues was more heterogeneous than the increase among the countries. This phenomenon is not observed during the 1978-82 cycle, but then the data do not cover the complete phases of the latter cycle which was extended beyond 1982.

IV. Anticipation, Fiscal Discipline, and Fiscal Fluctuation

1. Government revenue and fiscal cycles

The fairly synchronized cycles of fiscal balances and trade originate from the institutional setting in which the government relies heavily on the external sector for its revenue in most of the sample countries. The external factors often encompass not only exports, but also the availability of credit, cost of credit, foreign grants, and import prices. 1/ The following tests are based only on merchandise trade. For the time series test summarized in Table 8, revenues are regressed on current or lagged exports and total trade values, with or without a time trend. The estimated coefficients are statistically

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1/ This institutional setting is emphasized in Tanzi (1982, 1986) for developing countries in general, particularly Tanzi (1986, p.89), and in Morgan (1979) for oil exporting countries in particular.

Table 7. Eighteen Developing Countries: Fiscal Developments During the Two World Recessions

(In percent of GDP)

	1975 Recession		1981-82 Recession	
	Preceding expansion 1972-74	Recession 1975	Preceding expansion 1978-80	Recession 1981-82
	(Average and dispersion of annual changes)			
Revenues 1/				
Average	1.7	-2.1	2.8	-0.7
Standard deviation	1.6	3.9	3.6	1.3
Deficits 1/				
Average	-0.3	2.2	0.6	--
Standard deviation	2.6	4.4	4.6	2.6
Export developments				
Exports				
Average	2.1	-2.6	1.2	-3.9
Standard deviation	2.5	5.3	2.8	5.0

1/ Changes during the expansionary and the contractionary phases, not necessarily identical in terms of their timing and duration, are aggregated. The fiscal cycles lagged the trade cycles by about a year.

Table 8. Eighteen Developing Countries: External Trade and Government Revenue: Time-Series Results, 1964-82

	Results for Total Sample	Regression of Revenue on 1/		
		Exports	Total trade	Cases with time trend included
Number of countries	18	6	12	5
Coefficients				
Average of estimates		0.24	0.24	0.07 2/
Statistical significance				
Significant at				
1 percent	7	3	4	4
5 percent	14	5	9	5
10 percent	14	5	9	5
20 percent	15	5	10	5
Not significant at				
20 percent	3	1	2	0
Adjusted R^2	0.44	0.50	0.32	

1/ Revenues, exports, and total trade values are all expressed in percent of GDP. Revenues are regressed on either exports or total trade values (current or lagged by one year) with or without a time trend as an additional variable for individual countries.

2/ Average for the 18 sample countries with the coefficients of the time trend for the countries for which such trend is not included in the regression assumed to be zero.

significant at the 5 percent level for 14 of 18 sample countries and for 15 countries at the 20 percent level. For the cross section test summarized in Table 9, the index of fluctuation of revenue is regressed on the index of the fluctuation of trade value. The result indicates a positive correlation between the fluctuations of revenue and trade across the sample countries. Against the institutional setting described above, together with the time series evidence, this correlation should be interpreted as an indication of the impact of trade instability on revenue instability. In the regression for the period 1962-82, the coefficient of the variable representing the fluctuation of trade value is statistically significant at the 5 percent level; for the sub-period, 1972-82, when the fluctuation of trade values became more volatile, the coefficient becomes even more significant.

Is it possible that the trade cycles were a consequence, rather than a cause, of the fiscal cycles? It is conceivable that expansionary fiscal policies caused a deterioration in the external competitiveness, erosion of the revenue basis, and ultimately fiscal crises. Alternatively, expansionary fiscal policy itself might have originated from the trade cycles. For example, the world recession might have necessitated increases in government expenditure for the alleviation of the adverse impacts of the recession on the economy, in general, and on the poor segment of the population, in particular. These two channels are plausible but obviously different from the channel running from external developments, through changes in revenue, to fiscal fluctuation focused on in this paper. It should be noted, however, that even in the first of these alternative channels the role of the government's anticipation of external developments in the formulation of fiscal policy cannot be overemphasized. Furthermore, the synchronization of the fiscal cycles among the sample countries in relation to the world trade cycles indicates the importance of external developments in fiscal cycles and fiscal crises. For the second of the two possible channels mentioned above to be dominant, the correlation between the fluctuations of revenue and expenditure should be negative, as a world recession induces a revenue shortfall (resulting from a low tax base) and an excess in expenditure (resulting from anti-cyclical fiscal policy). The positive correlation between revenue and expenditure for most sample countries suggests that expenditure has been, at least to a certain extent, an important policy instrument for fiscal adjustment rather than for anticyclical economic stabilization.

2. Fiscal and external imbalances and government expenditure

In this section, the process in which government expenditure was determined in the 18 sample countries is examined against the background of the broad analytical framework discussed in an earlier paper. 1/ In that paper, on the basis of an optimizing policy rule, the change in expenditure was shown to be a function of the anticipated fiscal and external imbalances, the change in the target component of expenditure,

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1/ Chu (1987).

Table 9. Eighteen Developing Countries: External Trade and Government Revenue: Cross-Section Results, 1962-82

Sample Periods	Regression of Fluctuation of Revenue on Fluctuation of Trade Values				
	Coefficients				
	Constant	Fluctuation of Trade value	Dummy 1/	SEE 2/	Adjusted R^2
1962-82	0.61	0.18*	-7.02*	1.37	0.23
	(1.02)	(2.67)	(-2.43)		
1962-71	0.90	0.09	-1.46	1.58	0.02
	(1.90)	(1.52)	(-7.99)		
1972-82	-0.22	0.37**	-7.42	1.18	0.41
	(-0.35)	(3.69)	(-3.13)		

1/ Representing Singapore, which has a relationship between the revenue and the trade fluctuations radically different from those of the other sample countries.
2/ Standard error of estimate.

* Significant at the 5 percent level.
** Significant at the 1 percent level.

and the unanticipated part of the shock. Ideally, the key hypotheses underlying the model should be tested by designing more country-specific structural models. This paper focuses on analyzing the fluctuation of fiscal balances in a fairly large number of sample countries. Therefore, the analytical framework is made simple and uniform for all the sample countries. This simplified relationship may be written as:

$$\Delta g_t = \theta_o + \theta_1 t + \theta_2 fb_t^e + \theta_3 eb_t^e + \theta_4 ds_t \qquad (3)$$

where

Δg_t = change in <u>total</u> government expenditure,

fb_t^e = anticipated fiscal imbalance, defined as the difference between the anticipated fiscal balance and the target balance,

eb_t^e = anticipated external imbalance, defined analogously as in the fiscal imbalance,

ds_t = unanticipated component of an external shock, and

t = time.

Total expenditure includes the target component: in equation (3), the change in this target component is captured by the constant (θ_o), and any acceleration or deceleration in its change is captured by the time trend with a constant coefficient (θ_1). It should also be recalled that the anticipated imbalances, fb_t^e and eb_t^e, are assessed at the optimal levels of the policy instruments (g_t and e_t) based on the anticipated external shock. 1/

Equation (3) postulates that government expenditure is determined partly as a result of a systematic drift in its target component and partly as a result of the optimization process. The first two terms reflect the change in the target component, the next two terms the fiscal response to the anticipated shock, and the last term a fiscal response to the unanticipated shock.

In testing the model empirically, a number of further simplifying assumptions have to be made.

First, the government is assumed to regard a certain level of fiscal and external (current account) deficits as sustainable and regards any deviations of fiscal and external balances from these sustainable deficits as imbalances. The anticipated imbalances are the

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1/ A positive imbalance indicates either a surplus or a deficit smaller than the target deficit; a negative imbalance indicates a deficit larger than the target deficit.

deviations of anticipated fiscal and external balances from these sustainable levels. The unanticipated shock is defined as the deviation of revenue from anticipated revenue. Therefore, the fiscal and the external imbalances and the unanticipated shock in equation (3) may be written as:

$$fb_t^e = b_t^e - \bar{b}_t \tag{4}$$

$$eb_t^e = cab_t^e - \overline{cab}_t \tag{5}$$

$$s_t = r_t - r_t^e \tag{6}$$

where b_t, cab_t, and r_t are, respectively, the fiscal balance, external balance, and revenue as a percentage of GDP with superscript e indicating an anticipated value and the bar (-) indicating a sustainable level.

Second, the government is assumed to form anticipation by looking backward. Specifically, the government is assumed to anticipate the fiscal and the external current account balances and revenue on the basis of the following autoregressive equations: 1/

$$b_t^e = \phi_{11} b_{t-1} + \phi_{12} b_{t-2} + \phi_{13} b_{t-3} \tag{7}$$

$$cab_t^e = \phi_{21} cab_{t-1} + \phi_{22} cab_{t-2} + \phi_{23} cab_{t-3} \tag{8}$$

$$r_t^e = \phi_{31} r_{t-1} + \phi_{32} r_{t-2} + \phi_{33} r_{t-3} \tag{9}$$

Therefore, equation (3) may be written as:

$$\Delta g_t = \theta_o - \theta_2 \bar{b}_t - \theta_3 \overline{cab}_t + \theta_1 t + \theta_2 b_t^e + \theta_e cab_t^e + \theta_4 s_t \tag{10}$$

On the assumption that the targets for fiscal and external deficits are constant, the model may be estimated by regressing the change in expenditure on time, anticipated fiscal and external balances, and unanticipated revenue shock. In addition, possible asymmetric responses

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1/ These specifications deviate from the original specifications discussed in the earlier paper. In that paper, the anticipated fiscal and external imbalances were functions of the optimal values of the real government expenditure, real exchange rate, and anticipated external shock. The equation for the change in government expenditure as a function of the anticipated fiscal and external imbalances, therefore, may not be estimated without taking into account the simultaneity between the real government expenditure and the real exchange rate. The relationships as specified in equations (3)-(10) may be regarded as a simpler version of that equation and may be estimated by the ordinary least squares method.

of expenditure may be tested by introducing dummy variables in equation (3). For example, possible asymmetric responses of expenditure to an improvement and a deterioration in the anticipated fiscal balance may be tested by replacing $\theta_2 b_t^e$ by $\theta_2 b_t^e + \theta_2' b_t^e d_{1t}$ where d_{1t} assumes 1 for the period of an anticipated fiscal improvement and -1 for the period of a deterioration. Similarly, possible asymmetric responses to the unanticipated revenue shock may be tested by replacing $\theta_4 s_t$ by $\theta_4 s_t + \theta_4' s_t d_{2t}$, where d_{2t} assumes 1 for the period of a revenue excess and -1 for the period of a revenue shortfall.

The constant term and the coefficient of the time trend in equation (3) cannot be straightforwardly interpreted because they reflect not only the trend component of expenditure but also the target levels of fiscal and external deficits. The coefficients θ_2 and θ_3 of b_t^e and cab_t^e would reflect the responses of expenditure to the anticipated fiscal and external imbalances. Other things being equal, a large weight attached to the anticipated fiscal imbalance term in the objective function of the first-step optimization should yield a large θ_2, and a large weight attached to the anticipated external imbalance term in the equation should yield a large θ_3. A large weight attached to the fiscal imbalance term in the objective function of the second-step optimization would yield a large θ_4.

Note that, in estimating equation (3) for each of the 18 sample countries, not all the coefficients are necessarily expected to be statistically significant for all the sample countries. On the several key assumptions maintained in the specification of the model, statistical significance of the coefficients θ_2 and θ_4 would suggest the presence of fiscal discipline for the particular sample country. Given the statistically significant coefficients θ_2 and θ_4, the magnitude of the coefficients would suggest the extent of fiscal adjustment for a given magnitude of fiscal imbalance. The explanatory power of the equation may not necessarily be high for all countries, since many variables other than those considered in the framework of the optimization may also be important determinants of government expenditure. The regression would indicate correctly the extent to which government expenditure is determined by the variables included in the equation as long as the omitted variables are not correlated with the variables included in the equation.

Tables 10 and 11 summarize the results of the tests conducted on the basis of the data for the sample countries. In Table 10, the results for equation (3), without the asymmetry dummies, are summarized (Part A). The adjusted coefficients of determination average 0.39 for the sample countries, suggesting that a substantial, although not overwhelming, part of the fluctuation of expenditure is accounted for by the variables included in the equation. 1/ It is not surprising that large variations in government expenditures are left unexplained. Fiscal responses to external shocks were diverse, as suggested by the large dispersion of fiscal deficits and expenditures across the sample countries discussed in an earlier section. 2/

At the 20 percent level, the coefficient of the time trend is significant for 8 of the sample countries. The coefficient of the anticipated fiscal imbalance is significant also for 7 countries, and that of the unanticipated revenue shock for 11 countries. The coefficient of the anticipated external imbalance is significant only for two countries. At the 5 percent level, the number of countries for which the coefficients of the time trend, anticipated fiscal imbalance, and unanticipated revenue shock is reduced, respectively, to 3, 5, and 9.

The estimated coefficients of the anticipated fiscal imbalance and the unanticipated revenue shock average, respectively, 0.43 and 0.85. These estimates suggest that, on average, the adjustments of the government expenditure were only 0.43 percent of the anticipated fiscal imbalances and 0.85 percent of the unexpected revenue excesses or shortfalls.

In part B of the table, the estimation results of the same equation with the coefficient (θ_3) of the external imbalance term constrained to be equal to zero are shown; the results are broadly the same as in Part A.

Possible asymmetric responses of government expenditure are tested as follows. First, equation (3) is re-estimated, without the external imbalance term, but only with an asymmetry dummy variable for the unexpected revenue shock variable. The results do not support the hypothesis that expenditure responded asymmetrically to the unexpected revenue shock. Second, the asymmetry dummy variable is replaced by an asymmetry dummy variable for the anticipated fiscal imbalance. Table 11 summarizes the results of this test. The results confirm the dominant role of the unanticipated revenue shock in the fluctuation of expenditure. Evidence is weak on the role of the anticipated fiscal

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1/ The adjusted coefficients of determination average 0.41 for 12 countries for which the anticipated fiscal imbalance or the unanticipated revenue shock is found to be significant at the 20 percent level.

2/ See Tanzi (1986) for discussion of the patterns of fiscal responses to external shocks in developing countries.

Table 10. Factors Underlying Changes in Expenditure (A), 1967-82 1/

	Test of Statistical Significance with Significant Level (in percent) of				Estimated 2/ Coefficient
	20	10	5	1	
	(Number of Countries)				Average
Part A. Maintained Hypothesis: Expenditure Responds to Both Fiscal and External Imbalances					
Systematic drift					
Time trend	8	4	3	2	0.20
Responses to shocks					
Anticipated					
Fiscal imbalance	7	6	5	1	0.43
External imbalance	2	1	1	1	-0.01
Unanticipated revenue shock	11	10	9	7	0.85
Adjusted R^2					0.39
DW 3/					2.05
Part B. Maintained Hypothesis: Expenditure Responds to only Fiscal Imbalance					
Systematic drift					
Time trend	6	5	3	2	0.14
Responses to shock					
Anticipated					
Fiscal imbalance	7	5	3	1	0.26
Unanticipated revenue shock	11	10	10	7	0.92
Adjusted R^2					0.35
DW 3/					2.09

1/ Excluding Zambia.
2/ Simple average of the estimated coefficients for the sample countries.
3/ Durbin-Watson statistics; in two cases of the regressions reported in both parts A and B, the DW statistics are in inconclusive regions, whereas in the rest of the cases, they indicated the absence of serial correlation of the errors.

Table 11. Factors Underlying Changes in Expenditure (B), 1967-82 1/

	Maintained Hypothesis: Expenditure Responds to Fiscal Imbalance, but not to External Imbalance				
	Test of Statistical Significance with Significant Level in percent of				Estimated Coefficient
	20	10	5	1	
	Number of Countries				Average 2/
Systematic drift					
Time trend	8	6	3	2	0.22
Responses to shocks					
Anticipated fiscal imbalance	8	7	4	2	0.53
Of which: the countries for which the asymmetry dummy is significant	(3)	(3)	(1)	(0)	
Asymmetry dummy	4	4	2	0	-0.04
Unanticipated revenue shock	10	10	10	6	0.88
Adjusted R^2					0.40
DW 3/					2.07

1/ Excluding Zambia.
2/ Simple average of the stimated coefficients for all the sample countries.
3/ Durbin-Watson statistics; in one of the regressions, the DW statistic is in an inconclusive region, whereas in the rest of the cases, the DW statistics suggest the absence of serial correlations.

imbalance in the fluctuation of expenditure and possible asymmetric responses of expenditure to changes in such imbalance.

Thus, at the 20 percent level, the coefficient of the anticipated fiscal imbalance is statistically significant for 8 of the sample countries; for 4 of these 8 countries, the asymmetry dummy variable is significant; the coefficient of the unanticipated revenue shock is significant for 10 countries. At the 5 percent level, the coefficient of the anticipated fiscal imbalance is significant for 4 countries, and the coefficient of the unanticipated revenue shock is significant for 10 countries. The coefficients of the anticipated fiscal imbalance average substantially less than one (0.53), whereas those of the unanticipated revenue shock average closer to, but still less than, one (0.88).

For a large proportion of the sample countries, government expenditure is found to have increased in a systematic fashion as a function of time. In the regression reported in Table 10, the coefficient for the time trend is significant for 8 countries at the 20 percent level and for 3 countries at the 5 percent level. The coefficients average 0.20, indicating a significant tendency of upward drifts in government expenditures not accounted for by the imbalance variables or the unanticipated revenue shock.

3. Policy rule and fiscal performance

The extent to which the fiscal imbalance affects the formulation and execution of fiscal policy is an important determinant of the fiscal performance. The policy parameters associated with the fiscal imbalance terms in the objective functions in the first-step and the second-step optimizations reflect the fiscal discipline of a country. Larger parameters should imply the greater fiscal discipline and the greater chance to maintain the fiscal equilibrium in the face of external shocks.

Table 12 compares the long-run fiscal performances of the sample countries with the results obtained in the preceding subsection on the policy rule. For the 12 countries for which the coefficient of the anticipated fiscal imbalance or the unanticipated revenue shock is fairly significant (i.e., at the 10 percent level), the deficits increased on average by 2.1 percent of GDP between 1962-71 and 1972-82. For the rest of the sample countries, for which the coefficient is not significant, the deficits increased on average by 4.9 percent of GDP. Thus, the countries that could be described as having been more fiscally disciplined are found to have experienced on average a smaller deterioration in the fiscal balance than the rest of the sample countries.

A similar result is also obtained for the increase in the expenditure. Thus, government expenditures for the first group of countries increased by 5.5 percent of GDP, those for the second group by 6.8 percent of GDP.

Table 12. Policy Rule and Fiscal Performance

Policy Rules	Number of Countries	Fiscal Performance Between 1962-71 and 1972-86	
		Increase in	
		Deficit	Expenditure
		(In percentage points of GDP)	
1. Countries whose government expenditure significantly responded to the anticipated fiscal deficit or the unanticipated revenue shock	12	2.1	5.5
2. Countries whose government expenditure did not respond to the anticipated fiscal deficit or unanticipated revenue shock	6	4.9	6.8

V. Summary and Conclusions

In this paper, an attempt was made to explain growing fiscal deficits in developing countries and the intensification in their fluctuations. The paper surveyed fiscal developments in 18 sample countries during 1962-82 and, broadly on the basis of the analytical framework discussed in an earlier paper by the author (Chu, 1987), analyzed possible factors underlying the fiscal developments and their relative importance.

In the earlier paper, it was noted that the importance of the direct and indirect taxation of international trade in many developing countries makes it inevitable for external shocks to affect the fiscal sector directly and immediately. Trade instability affects revenue instability directly. In this institutional setting, fiscal policy was viewed as a result of an optimization process in which not only fiscal policy objectives and fiscal discipline, but also a number of constraints, could play critical roles. The constraints originate from the government's imperfect foresight, technical features of public investment projects, and difficulties to reach political consensus. It was particularly noted that with weak fiscal discipline, wrong anticipations concerning future revenue developments could have important implications for both the long-term developments in fiscal imbalances and the fluctuations of the fiscal balances.

In this paper, data for the 18 sample countries indicated a substantial deterioration in fiscal balances and the intensification in their fluctuations during 1962-82. It was also shown that the fiscal cycles followed closely the trade cycles, particularly around the two recent world recessions (1975 and 1981-82). Thus, in each of the two fiscal cycles around the two world recessions, an increase in revenue followed the expansion in trade, and a decrease followed a contraction. It was shown that an increase in expenditure followed the increase in revenue; downward adjustment in expenditure following the contraction of revenue was too slow and small to prevent major deterioration in the fiscal balance.

Empirical tests indicated that a substantial, though not overwhelming, part of changes in government expenditure can be explained by variables intended to reflect the government's efforts to balance the need to contain the size of the fiscal imbalance and the need to maintain the level of expenditure at a certain level. The results indicate that expenditure responded to anticipated fiscal imbalances and unanticipated revenue shocks in a manner that contained the fiscal imbalance in a fairly large number of countries. The evidence of such responses was stronger for the unanticipated revenue shock than for anticipated fiscal imbalance. The use of expenditure as an instrument to contain external imbalance was not evident; the test did not support

the hypothesis that expenditure responses to fiscal imbalances could be asymmetric.

The negative results on the asymmetry hypothesis contradict the observation on the time series of aggregate trade, revenue, and fiscal deficit. The time series suggest that during the recent two major world trade cycles, downward adjustments in expenditure was slow and small compared with upward movements during the rising trade and revenue; this observation of aggregate time series suggests that the downward rigidity in expenditure contributed to the persistent fiscal imbalances and fiscal crises. Therefore, in contrast to the results obtained from regressions, the behavior of the aggregate time series suggests that the long-run deterioration of fiscal balances may not be unrelated to the fluctuation of revenues and imbalances.

The larger fluctuation of expenditure than of revenue and the dominance of expenditure fluctuation as the source of deficit fluctuation are noteworthy. The empirical analysis, however, indicated that the ultimate source of deficit fluctuation and recurrent fiscal crises was, in no small way, the unstable external environment surrounding developing countries.

On the basis of the particular anticipation scheme assumed in this paper, anticipated fiscal imbalances triggered less strong fiscal adjustment than unanticipated revenue shocks for a large number of countries. This phenomenon indicates that the adjustment was short-term and perhaps unduly costly. Although the results should be viewed as highly tentative, it may not be a coincidence that the long-run deterioration in the fiscal balance was significantly larger for those sample countries that did not respond to shocks than for those countries that did.

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