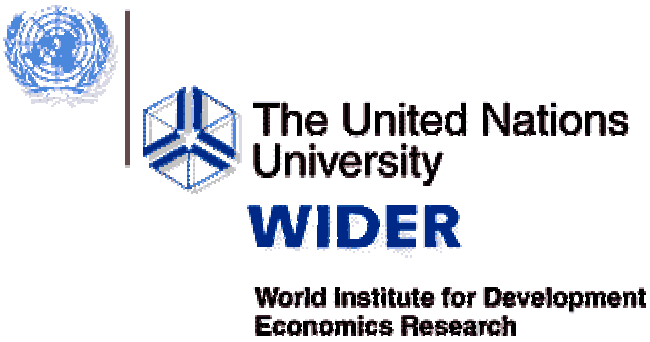

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Research for Action 46

Real Exchange Rate Policy and Non-Traditional Exports in Developing Countries

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This study has been prepared within the UNU/WIDER project on Growth, External Sector and Role of Non-Traditional Exports in Sub-Saharan Africa which is directed by Professor Gerald K. Helleiner (External Project Director), University of Toronto, Canada.

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FOREWORD

By comparing experience in other more successful areas with that in Africa and by comparing African country-level experiences, the UNU/WIDER project on 'Growth, External Sector and the Role of Non-Traditional Exports in Sub-Saharan Africa' hopes to provide guidance to policymakers as they seek to promote African development. In particular, the project seeks to shed light upon the reasons for the relative failure of African countries to diversify and expand their exports following structural adjustment in the 1980s and 1990s.

Among the most important determinants of export performance are believe to be: investment in the relevant production capacity, appropriate incentives and overcoming of a variety of non-price constraints upon performance. In an earlier WIDER paper, produced as part of this project, Sanjaya Lall drew upon East Asian experience to elucidate some of the key policy requirements for the encouragement of non-traditional exports, particularly industrial exports (Sanjaya Lall, [Selective Policies for Export Promotion: Lessons from the Asian Tiger]). His paper was particularly concerned with the analysis of the efficacy of selective encouragements to particular types of exporting activity. At the same time as the project asked Lall to assess the role of selective policy encouragements, it also invited Ibrahim Elbadawi to explore the role of more general incentives, particularly the role of the real exchange rate (RER), in the encouragement of non-traditional exporting.

In this paper, Elbadawi develops an innovative econometrically-based analysis of the role of the real exchange rate in non-traditional exporting in Africa and a select number of more successful non-African countries. Drawing upon data from 63 developing countries, he models the determination of the 'equilibrium' real exchange rate, incorporating not only the usual 'fundamentals' but also the role of official development assistance and the capital account in the process. This allows him to decompose RER changes as between changes in the equilibrium real exchange rate and changes in the degree of misalignment from equilibrium. In his subsequently analysis of the determinants of non-traditional exports, he discovers that not only is the degree of real exchange rate misalignment very important, but so also are investments in machinery, schooling and other influences. He also measures the variability/stability of the real exchange rate and is able to show that it too plays an important role in non-traditional export performance. Some of his results are frankly puzzling; he finds that once the effect of real exchange rate misalignment is considered, the actual level of the real exchange rate appears to add nothing further to non-traditional export performance. No doubt further explorations of these issues will be necessary.

Elbadawi's innovative empirical paper demonstrates that overall export growth and export diversification in Africa require both appropriate and stable real exchange rates; but they also require other supply-side elements or country characteristics that make it possible for these economies to respond to such incentives. The eight detailed studies of

individual African country experience, which are still forthcoming in the project, will shed greater light both on the specifics of existing incentive systems and on the constraints under which potential investors in non-traditional exporting operate in the African context; and they will offer concrete recommendations for government policy.

Gerald K. Helleiner
External Project Director
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ABSTRACT

In this paper I estimate a non-traditional export performance equation for a panel of 60 developing countries. As an input to the export model, I also estimate a panel regression model of the real exchange rate (RER) for the same countries. The RER estimation allows derivation of indexes of equilibrium RER (ERER) and RER misalignment (RERMIS), which were subsequently used in the export equation, as proxies for the profitability of the export sector. As determinants of export performance, the RER effects are accounted for by two channels: RER misalignment and RER variability. In addition to the RER-based variables, the export model also accounts for other non-incentive factors, such as human capital, imports of machinery (a proxy for investment in capital goods) and external demand. While the first two were found to be robustly associated with non-traditional exports, the latter was not. Moreover, the estimated effects of regional dummies suggest that, *ceteris paribus*, the ratios of non-traditional exports will tend to be higher in both of East Asia and Latin America compared to Sub-Saharan Africa. To the extent that these dummies reflect other supply constraints not explicitly accounted for by the model (such as market imperfection, technological capabilities, etc.), appropriate state interventions may be necessary for supporting sustained and diversified export expansion. Finally, our results also suggest that Dani Rodrik's interpretation of the phenomenal export expansions in Korea and Taiwan were only partially supported by the wider experiences of developing countries. Rodrik argues that the key factor behind the success of the export-oriented strategies of these two countries was a sustained rise in private returns to capital, and not increased export profitability; the former was engineered by the two governments through a range of strategic interventions to build capabilities and to resolve market failures in modern sector production. Our results corroborate the view that imports of (or investment in) capital goods, basic capabilities, and maybe some strategic interventions to resolve market failures, are important for successful export-orientation; but they also suggest that export promotion and export diversification require a supportive structure of incentives, especially appropriate and stable real exchange rates.

I INTRODUCTION

As a development strategy, export-orientation has been credited for the phenomenal economic transformations of the East Asian economies over the last thirty years or so, as well as for other more recent remarkable economic successes in other places – such as Chile. Successful and sustained export-orientation policies have usually led to significant export diversification, and therefore a much higher rate of growth of non-traditional exports than the overall growth rate of the economy or of aggregate exports. In particular, it is argued that export diversification through promotion of manufactured exports (considered non-traditional exports for many developing countries) could support sustained overall economic growth for at least three reasons: (i) compared to primary goods exports, manufactured exports are likely to grow faster when the global economy is expanding because their income elasticity of demand is higher; (ii) because of the relatively higher price elasticities of demand and supply for manufactured compared to primary goods exports the former are less susceptible to price variability; and (iii) the prospects for dynamic productivity gains are much higher in the manufacturing sector (Sekkat and Varoudakis, 1998).

Despite the differences between the orthodox and revisionist views about the relevant set of policies/interventions that are responsible for the success of export-orientation strategies, the two schools of thought, nevertheless, agree on the central role of some such strategy in the development process of recent 'success' stories (e.g. Rodrik, 1994a). Moreover, exchange rate policy-induced competitiveness is also broadly accepted as – at least – one of the key instruments of this 'winning' strategy. Indeed, despite considerable differences about the relevance of some of the sectoral and microeconomic components of the 'Washington Consensus'[1] economic reform measures (such as trade liberalization, privatization and deregulation of markets), there is a strong and unanimous acceptance of the centrality of macroeconomic stability, fiscal discipline and real exchange rate competitiveness for the success of any reform programme (Helleiner, 1994; Rodrik, 1992, 1996).[2] Specifically, the exchange rate policies of these successful

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1 A succinct list of policy measures normally prescribed in the context of SAPs as compiled by John Williamson, which he dubbed as the 'Washington Consensus'. Williamson describes the Washington Consensus as offering 'a description of what is agreed about as the set of measures that are typically called for in the first stage of the policy reform' (Williamson, 1994a:17). A summary of the list of the elements of the Washington Consensus includes: fiscal discipline; redirection of public expenditure priorities towards health, education and infrastructure; tax reform, including the broadening of the tax base and cutting marginal tax rates; unified and competitive exchange rates; secure property rights; deregulation; trade liberalization; privatization; elimination of barriers to direct foreign investment (DFI); and financial liberalization.

2 On the other hand, the experience of East Asia suggests that these countries did not all fare well in terms of implementation of the latter set of reforms (Rodrik, 1996: Table 3).

countries (most notably the high performing East Asian[3] countries and Chile), which made it possible for these countries to maintain very low real exchange rate risks, to minimize real exchange rate volatility and above all to avoid real currency overvaluation, have been among the major factors behind their economic success. The relevance of the real exchange rate (RER) (generically defined as the relative price of tradables to non-tradables)[4] to export promotion and generation of an optimal output and employment path can be shown in rigorous behavioural models based on optimization of welfare or expenditure functions (e.g. see Edwards, 1986a, 1987b, 1989; Edwards and van Wijnbergen, 1986a, 1987; and Mussa, 1974).[5]

The experiences of the above-mentioned successful countries contrast very sharply with the relatively weak export performance (especially in terms of diversification and growth of non-traditional exports) in many other developing countries, notably most Sub-Saharan African countries, even after many of them have embraced reforms for almost two decades. Against this background, it is not surprising that a lot of academic and policy interest in the region has been attached to the issue of what is the appropriate mix of policies and institutional designs that could jump-start the economies of Sub-Saharan Africa into self-sustaining export-led growth (e.g. World Bank, 1995).

This paper contributes to this debate by specifying and estimating an empirical model of non-traditional export performance for 60 developing countries over three periods (1980–85, 1986–89, 1990–95).[6] The empirical framework is based upon two different theoretical models of export determination. Motivated by the experiences of Korea and Taiwan, Dani Rodrik (1994a) developed a model to explain the phenomenal expansion of exports in the two countries as driven by a sustained boom in capital goods investment (or import) demand. Based on Latin American experiences, Paredes (1988) developed an alternative model that predicts a significant role for real exchange rate

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3 However, the current financial markets' crises and the subsequent weakening of currencies in several South East Asian countries – which are mainly attributed to an over-borrowed and under-regulated private sector and not to fundamental macroeconomic disequilibria – suggest that exchange rate management is still a major challenge, even for these successful countries.

4 One of the most frequently used empirical measures of the RER is the multilateral index defined as the ratio of the nominal effective exchange rate index multiplied by the ratio of the weighted average of the CPIs of the trading partners to the CPI of the country in question. This is the measure of the RER adopted in this paper, where a decline (increase) in the index implies an appreciation (depreciation) in the real value of the currency. The RER index used in this paper is the reciprocal of an index constructed by the IMF, which prefers defining the RER as the relative price of non-tradables to tradables; unfortunately no information about trade weights is provided.

5 Also the literature abounds in empirical evidence linking export performance to the RER. For example, Diaz-Alejandro (1984) drew from the experience of Latin America to argue that RER misalignment and especially real currency overvaluation (with respect to the equilibrium RER) can be detrimental to an export-oriented development strategy, Caballero and Corbo (1989) emphasized the importance of RER stability for export promotion, while Paredes (1988) found both RER variability and uncertainty to have significant negative effects on export performance in Latin America.

6 See data appendix for a description of the data. While 63 countries are considered in the real exchange rate analysis, only 60 are used in the estimation of the export equation, because of the exclusion of the Republic of Congo, Malta and Honduras for lack of data.

competitiveness (as a proxy for profitability of exporting) and for real exchange rate stability in the determination of export supply. The unifying empirical framework of this paper attempts to account for profitability of the export sector (measured by real exchange rate misalignment, relative to a notional RER equilibrium); macroeconomic stability relevant for export performance (stability of the RER); investment in or imports of capital goods; as well as a range of factors affecting technical capabilities and the effectiveness of strategic interventions.

As an input to the estimation of the non-traditional export model, a dynamic panel regression model of the RER is estimated and analyzed. The estimation results allow the derivation of three key indicators of real exchange rate policy for 63 developing countries: the equilibrium RER (ERER) index; the index of RER misalignment (RERMIS); and a measure of RER variability (a proxy for anticipated real exchange rate instability). The novelty of this approach is that it provides a systematic and model-consistent method for disentangling the channels through which the RER affects exports as well as estimating the relative orders of magnitude for the influences of each of the three channels.[7]

In section 2, I undertake a country-specific and regional analysis of the evolution of non-traditional exports and some of the key variables of relevance to export behaviour over the 1980s and 1990s. Section 3 contains an overview of the theoretical framework that underlies the empirical model for non-traditional exports. Section 4 contains the estimation results and analysis of the determinants of the RER (based on an empirical RER model contained in Appendix 1 to this paper), the RER indexes and the non-traditional export performance model. Section 5 concludes.

[7] This methodology was adopted in a country-specific time series context by Elbadawi (1997). Also Sekkat and Varoudakis (1998) adopt a similar approach.

II NON-TRADITIONAL EXPORTS IN DEVELOPING COUNTRIES

Table 1(a) shows recent export performance (1994/95 relative to 1984/85) in 14 countries, nine of which are African, drawn from three developing regions.[8] The experiences of these fourteen countries are analyzed as case studies in the UNU/WIDER project on 'Growth, External Sector and the Role of Non-Traditional Exports in Sub-Saharan Africa'. The five non-African countries represent highly successful experiences in terms of export growth and export diversification. The set of African countries is interesting because it reflects an important divide in Sub-Saharan Africa (SSA), between the fixed exchange rate economies that belong to the CFA monetary unions (Burkina Faso and Côte d'Ivoire) and the other seven 'flexible' exchange rate economies; the timing of the economic crisis that has impacted SSA since the 1980s and the policy response to it have differed quite considerably between the two groups. These countries also reflect considerable cross country variation in terms of the level of development and the patterns of economic adjustment.

The best performers among the African countries in terms of the growth rates of non-traditional exports (NTEX) relative to GDP are: Ghana (469 per cent), Tanzania (387 per cent) and Zimbabwe (209 per cent). (NTEX made up 2.4, 4.8 and 7.1 per cent of GDP, respectively, in these countries by 1994/95.) Some of the remaining African countries (Burkina Faso and Uganda) achieved high growth rates (181 and 251 per cent, respectively) but the share of NTEX in their economies was almost negligible (at 0.2 per cent). The remainder are those countries (Côte d'Ivoire, Kenya, Mauritius and South Africa) which have higher shares of NTEX (at 4.2, 2.8, 3.0 and 5.7 per cent, respectively) but rather modest growth performances (at 40, 61, 52 and 45 per cent, respectively). Except for Zimbabwe and South Africa, the shares of NTEX in the economies of these African countries are rather small relative to the five non-African countries. The real challenge for these countries is to sustain the growth of NTEX as its share grows to higher levels. This was achieved by the 'world class' performers in the international export market – such as Chile, Costa Rica, Indonesia, Malaysia and Thailand – which managed to increase NTEX ratios (to GDP) by, respectively, 68, 48, 261, 120 and 78 per cent, even though the share of NTEX in their national economies was already quite high. The degree of export diversification achieved in Costa Rica, Indonesia and especially Malaysia was particularly remarkable: the shares of NTEX in GDP for these three countries in 1994/95 were, respectively, 10 per cent, 9.8 per cent and 25 per cent.

NTEX growth has often been associated with considerable real currency depreciation, which reached more than 100 per cent for the cases of South Africa, Tanzania, Zimbabwe and Chile (Table 1 (b)). In terms of overall macroeconomic stability, South

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8 The nine African countries are: Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mauritius, South Africa, Tanzania, Uganda and Zimbabwe. The other five (non-African) countries are Chile, Costa Rica, Indonesia, Malaysia and Thailand. Non-traditional export performance in all 14 countries is analyzed as case studies in the UNU/WIDER project.

TABLE 1 (a)
NON-TRADITIONAL EXPORTS IN A SAMPLE OF DEVELOPING COUNTRIES

		Aggregate exports current US $m	Non-traditional exports current US $m	% share of total exports to GDP	% share of non-traditional exports to GDP
Burkina Faso	1994/1995 Average	93.07	4.89	4.45	0.23
	Growth Rate (%): 1994/95 relative to 1984/85	43.78	331.85	-6.33	181.34
Côte d'Ivoire	1994/1995 Average	3209.60	371.49	36.64	4.24
	Growth Rate (%): 1994/95 relative to 1984/85	24.94	77.54	-1.45	40.04
Ghana	1994/1995 Average	1386.51	153.50	21.55	2.39
	Growth Rate (%): 1994/95 relative to 1984/85	197.28	721.62	105.96	469.23
Kenya	1994/1995 Average	1305.0	227.64	15.82	2.76
	Growth Rate (%): 1994/95 relative to 1984/85	44.94	115.05	8.28	60.67
Mauritius	1994/1995 Average	1447.56	110.02	39.04	2.97
	Growth Rate (%): 1994/95 relative to 1984/85	225.21	343.50	11.35	51.86
South Africa	1994/1995 Average	17493.31	7294.59	13.56	5.66
	Growth Rate (%): 1994/95 relative to 1984/85	76.12	192.28	-12.66	44.94
Tanzania	1994/1995 Average	547.56	168.85	15.69	4.84
	Growth Rate (%): 1994/95 relative to 1984/85	37.71	192.03	129.89	387.49
Uganda	1994/1995 Average	513.66	11.54	10.66	0.24
	Growth Rate (%): 1994/95 relative to 1984/85	27.60	376.56	-5.92	251.37
Zimbabwe	1994/1995 Average	1321.11	437.19	21.46	7.10
	Growth Rate (%): 1994/95 relative to 1984/85	96.60	296.15	53.47	209.25
Chile	1994/1995 Average	14161.12	3662.31	23.71	6.13
	Growth Rate (%): 1994/95 relative to 1984/85	280.26	463.27	13.51	68.13
Costa Rica	1994/1995 Average	3605.11	873.82	41.08	9.96
	Growth Rate (%): 1994/95 relative to 1984/85	213.58	243.12	35.50	48.27
Malaysia	1994/1995 Average	73086.43	19716.02	93.66	25.27
	Growth Rate (%): 1994/95 relative to 1984/85	315.14	429.05	73.28	120.83
Thailand	1994/1995 Average	46180.11	11128.64	29.78	7.18
	Growth Rate (%): 1994/95 relative to 1984/85	610.82	585.14	84.98	78.30
Indonesia	1994/1995 Average	42599.13	18323.67	22.81	9.81
	Growth Rate (%): 1994/95 relative to 1984/85	114.52	673.35	0.31	261.62
SS Africa	1994/1995 Average	1976.24	382.52	19.47	3.77
	Growth Rate (%): 1994/95 relative to 1984/85	28.60	183.89	10.89	144.80
East Asia	1994/1995 Average	88979.56	23532.90	34.80	9.21
	Growth Rate (%): 1994/95 relative to 1984/85	397.73	494.72	78.87	113.72
Latin America	1994/1995 Average	9830.39	2462.38	14.44	3.62
	Growth Rate (%): 1994/95 relative to 1984/85	108.87	164.13	-4.58	20.66

Note: For various countries, due to the unavailability of data, the nearest available years have been used.

TABLE 1 (b)
STRUCTURE OF INCENTIVES IN A SAMPLE OF DEVELOPING COUNTRIES

		Terms of trade	Terms of trade variablility (%)	Real exchange rate	Real exchange rate variablity	Average tax rate of exports (% of exports)	Average tax rate of imports (% of imports)	Inflation
Burkina Faso	1994/1995 Average	104.30	1.53	230.59	5.80			16.34
	Growth Rate (%): 1994/95 relative to 1984/85	-2.25	-40.08	90.65	45.44			167.67
Côte d'Ivoire	1994/1995 Average	80.70	1.75	150.63	9.04	2.76	33.52	20.36
	Growth Rate (%): 1994/95 relative to 1984/85	80.00	1.52	161.03	7.73	3.44	35.19	571.41
Ghana	1994/1995 Average	64.70	0.51	672.43	1.56	4.95	12.73	42.21
	Growth Rate (%): 1994/95 relative to 1984/85	-36.16	-92.30	308.69	62.95	-80.60	-26.39	68.99
Kenya	1994/1995 Average	100.88	8.46	128.42	5.14	0.00	9.11	14.94
	Growth Rate (%): 1994/95 relative to 1984/85	-19.33	426.99	29.73	149.94	-99.82	-47.57	27.99
Mauritius	1994/1995 Average	103.13	5.52	120.85	2.40			6.64
	Growth Rate (%): 1994/95 relative to 1984/85	33.50	36.15	14.28	103.29			-5.53
South Africa	1994/1995 Average	106.62	3.18	134.23	0.15	0.00	1.06	8.65
	Growth Rate (%): 1994/95 relative to 1984/85	4.42	226.75	12.30	-82.20	-100.00	-68.57	-37.64
Tanzania	1994/1995 Average	83.95	2.50	253.67	24.16			30.97
	Growth Rate (%): 1994/95 relative to 1984/85	-34.69	9.18	381.25	276.38			-10.45
Uganda	1994/1995 Average	53.50	12.37	1036.16	2.17			9.24
	Growth Rate (%): 1994/95 relative to 1984/85	-64.44	134.83	52.97	-6.68			-90.80
Zimbabwe	1994/1995 Average	86.50	1.71	200.32	3.36			22.29
	Growth Rate (%): 1994/95 relative to 1984/85	-15.77	-57.84	98.08	-27.18			55.79
Chile	1994/1995 Average	99.05	2.25	173.11	1.80			9.97
	Growth Rate (%): 1994/95 relative to 1984/85	9.27	-19.46	31.86	7.89			-60.80
Costa Rica	1994/1995 Average	92.05	1.34	165.12	4.22	1.34	8.93	18.48
	Growth Rate (%): 1994/95 relative to 1984/85	-18.07	-55.34	14.92	647.61	-79.92	-11.91	37.18
Malaysia	1994/1995 Average	93.50	2.35	132.92	8.97	0.90	3.92	4.76
	Growth Rate (%): 1994/95 relative to 1984/85	-23.45	-59.17	50.44	267.49	-83.51	-54.59	120.44
Thailand	1994/1995 Average	102.70	1.47	126.05	3.21	0.12	9.43	5.13
	Growth Rate (%): 1994/95 relative to 1984/85	-4.24	-48.58	27.26	26.62	-92.57	-31.43	206.06
Indonesia	1994/1995 Average	84.00	2.76	215.97	4.04	0.15	5.86	8.91
	Growth Rate (%): 1994/95 relative to 1984/85	-43.55	-55.63	96.71	187.38	-55.36	51.41	16.79
SS Africa	1994/1995 Average	86.50	2.57	170.24	3.19	2.41	11.82	20.88
	Growth Rate (%): 1994/95 relative to 1984/85	-26.41	-25.24	61.08	12.00	-1.96	-42.05	99.60
East Asia	1994/1995 Average	98.10	1.64	129.49	4.29	0.15	4.92	2.64
	Growth Rate (%): 1994/95 relative to 1984/85	-11.26	-33.61	28.95	82.07	-91.00	-42.50	2.48
Latin America	1994/1995 Average	92.05	1.96	153.90	4.65	0.00	10.17	16.81
	Growth Rate (%): 1994/95 relative to 1984/85	-19.92	-48.25	48.13	218.76	-100.00	4.41	-34.41

Note: For various countries, due to the unavailability of data, the nearest available years have been used.

Africa, Mauritius and Chile managed to reduce inflation between the 1980s and 1990s as well as maintaining its level at single digits. On the other hand, inflation rose between the two periods, to reach 15 per cent or more in 1995, in Burkina Faso, Côte d'Ivoire, Kenya, Ghana, Zimbabwe and Costa Rica. Also inflation was high in Tanzania (more than 30 per cent in 1995) even though it declined by more than 10 per cent from its 1984/85 level. Despite substantial increases in their inflation rates between the two periods (including 120 per cent for Malaysia and 206 per cent for Thailand), the three Asian countries' inflation rates remained very low: at 4.8 per cent for Malaysia, 5.1 per cent for Thailand and 8.9 per cent for Indonesia.

Notwithstanding efficiency considerations, the share of gross investment to GDP is a useful broad indicator of an economy's potential to sustain high rates of export (as well as overall economic) growth.[9] On this score most of the African countries are badly lagging behind. Except for Mauritius and Tanzania – which have investment ratios comparable to those of Chile and Costa Rica, between 26 and 31 per cent – virtually all the remaining African countries have investment rates lower than 20 per cent (Table 1 (c)). The three Asian countries, on the other hand, managed to increase their investment shares by 30 per cent or more to register staggering rates of 40 per cent for Malaysia, 42 per cent for Thailand and 36 per cent for Indonesia in 1994/95. The three Asian countries have further distinguished themselves through their vastly superior capacity to support the export sector through telecommunications, transport and electric power generation (Table 1 (c)). Chile, South Africa, Mauritius and to some extent Zimbabwe also have fairly substantial capacity in these areas.

2.1 Beyond 'getting the prices right'

The experiences of successful exporters have shown that responsiveness of exports to appropriate incentives depends crucially on the extent of weakness or market failure in key sectors such as financial markets, human capital formation, technology and market information. The notable experiences of East Asia make clear that successfully addressing problems of market failure can dramatically boost export expansion and especially export diversification (e.g. Rodrik, 1994a). Even Chile, one of the more recent world class success stories, which adopted a much less 'statist' development strategy than those of East Asia, pursued very pro-active policies in support of its export-orientation drive (e.g. Agosin, 1997). These experiences corroborate the policy recommendations of the literature on information asymmetries and market imperfection (e.g. Stiglitz and Weiss, 1981; Stiglitz, 1994).

Because of these non-price constraints even if macroeconomic stabilization, exchange rate adjustment and trade liberalization policies have successfully delivered the appropriate structure of incentives for exports, a timely and adequate supply response may still not be forthcoming. The most subtle forms of these constraints are those related to incomplete or absent information in such areas as appropriate technology for producing competitive goods and services for both international and domestic markets

9 According to robust evidence drawn from a vast set of developing countries, a 6 per cent real GDP growth rate would require about a 28 per cent rate of investment (Williamson, 1997a).

TABLE 1 (c)
OTHER DETERMINANTS IN A SAMPLE OF DEVELOPING COUNTRIES

		Ratio of gross domestic investment to GDP	Electric power production (million kwh)	Fax machines (per 1000 people)	Rail traffic (km per million US$ GDP)	Roads paved (%)	Telephone mainlines (per 1000 people)
Burkina Faso	1994/1995 Average	22.14					2.75
	Growth Rate (%):						
	1994/95 relative to 1984/85	9.92					27.34
Côte d'Ivoire	1994/1995 Average	12.60	2305.00		4.85	9.50	8.00
	Growth Rate (%):						
	1994/95 relative to 1984/85	2.47	30.52		-73.19	7.95	16.36
Ghana	1994/1995 Average	17.25	6115.00	0.27	7.57	24.65	3.23
	Growth Rate (%):				-14.63	15.73	8.54
	1994/95 relative to 1984/85	109.75	144.99				
Kenya	1994/1995 Average	18.92	3539.00	0.14	22.84	13.70	8.88
	Growth Rate (%):						
	1994/95 relative to 1984/85	-18.96	72.47	13.53	-44.34	4.98	5.24
Mauritius	1994/1995 Average	28.77		17.00		93.00	124.19
	Growth Rate (%):						
	1994/95 relative to 1984/85	26.43		111.10		0.00	44.83
South Africa	1994/1995 Average	18.01	189316.00	1.80	74.26	32.50	92.65
	Growth Rate (%):						
	1994/95 relative to 1984/85	-21.31	34.87	31.99	-57.00	7.97	4.71
Tanzania	1994/1995 Average	31.17	1913.00	0.07	10.67	4.20	3.05
	Growth Rate (%):						
	1994/95 relative to 1984/85	82.85	71.57		-76.90		1.32
Uganda	1994/1995 Average	15.56		0.13	6.10	7.60	2.08
	Growth Rate (%):						
	1994/95 relative to 1984/85	84.50			-27.55	8.57	45.20
Zimbabwe	1994/1995 Average		7334.00	0.91	83.61	18.50	13.15
	Growth Rate (%):						
	1994/95 relative to 1984/85		31.49	373.88	-44.05	27.59	9.05
Chile	1994/1995 Average	27.07	24451.00	1.09	4.82	13.80	110.00
	Growth Rate (%):						
	1994/95 relative to 1984/85	75.52	87.21		-71.43	0.00	16.49
Costa Rica	1994/1995 Average	25.79	4601.50	0.67		16.30	121.39
	Growth Rate (%):						
	1994/95 relative to 1984/85	6.15	55.01	-2.82		6.54	17.38
Malaysia	1994/1995 Average	39.62	32764.50	2.62	2.83	75.00	119.58
	Growth Rate (%):						
	1994/95 relative to 1984/85	29.60	167.55				
Thailand	1994/1995 Average	42.17	60251.50	0.65	14.84	91.25	34.74
	Growth Rate (%):						
	1994/95 relative to 1984/85	46.11	239.67		-52.19		
Indonesia	1994/1995 Average	36.04	46038.50	0.22	10.24	46.70	9.47
	Growth Rate (%):						
	1994/95 relative to 1984/85	36.70	264.83		29.09		
SS Africa	1994/1995 Average	15.56	2740.00	0.16	15.04	12.30	3.73
	Growth Rate (%):						
	1994/95 relative to 1984/85	-6.34	34.64	-85.67	-24.37	-15.17	-45.74
East Asia	1994/1995 Average	38.25	46038.50	2.62	14.47	88.00	119.58
	Growth Rate (%):						
	1994/95 relative to 1984/85	26.21	197.45		-59.73		
Latin America	1994/1995 Average	19.43	6536.50	0.99	9.69	14.05	69.07
	Growth Rate (%):						
	1994/95 relative to 1984/85		113.14	43.99	-30.49	-3.44	-30.18

Note: For various countries, due to the unavailability of data, the nearest available years have been used.

following trade liberalization; requirements for penetrating overseas markets and creating a niche in new and high-payoff markets; and market intelligence regarding consumer tastes and producers' needs in overseas markets. These market imperfections clearly suggest an important role for the state in the process of opening up the economy, by directly subsidizing activities aimed at 'internalizing' these externalities, or by supporting creative institutional designs (such as associations of exporters) to achieve the same goals. In addition, under-provision of development finance may require policies and regulation to deepen financial markets as well as competitive public financial institutions to complement the private financial system. The same also applies for the areas of human capital and infrastructure, especially in the most basic areas such as primary education and rural infrastructure where the leading role of the state is unavoidable.

III AN ANALYTICAL FRAMEWORK FOR EXPORT PERFORMANCE

To motivate the empirical model for analysing the performance of non-traditional exports by developing countries, I review two interesting, but quite different, theoretical models of export determination. Dani Rodrik (1994a) argues that, at least in the cases of the very successful development experiences of Korea and Taiwan, spectacular and sustained export growth was achieved with little increase in the profitability of exports – as measured by real currency depreciation. Rodrik developed a model to explain the phenomenal expansion of exports in the two countries as driven instead by a sustained boom in capital goods investment (and import) demand. On the other hand, Paredes (1988) developed a model that predicts a significant role for real exchange rate competitiveness (as a proxy for profitability of exporting) and for real exchange rate stability in the determination of export supply. He then uses the case of manufactured exports from several Latin American countries to corroborate his model.

3.1 Paredes' model

The breakdown of the Bretton Woods exchange rate regime in 1973, and the subsequent emergence of more flexible exchange rate arrangements, triggered a lot of concern about increased exchange rate risk and what it might do to exports. Most studies found fairly systematic evidence on the increased variability of real exchange rates in both developing and developed countries alike. However, while RER variability was found to be linked to export supply in developing countries, the evidence for developed countries is at best tenuous. The main explanation for the latter findings is that the presence of futures markets in the case of developed countries has effectively de-linked the export supply markets from RER risks in these countries, while in developing countries futures markets either don't exist or could only be accessed at very high cost.

Paredes (1988) develops a behavioural model of export supply under uncertainty that formally justifies the inclusion of expected RER and RER risk as a determinant of manufactured export supply in developing countries. According to this model, firms are assumed to maximize expected utility of profits under uncertainty, where the only source of this uncertainty is provided by exchange rate risk, which is proxied by various measures of RER variability. The firms are assumed to have some monopoly power in the domestic market but they are pure price takers in the international market. The technology for producing exports is such that maximization of profits equates marginal and average costs. The model assumes a two-period contract where firms get orders and are required to purchase the required inputs, which are assumed to be denominated in the importer's currency, in the first period; and these produce output for delivery in the second period. This contract design, which is very plausible in the developing world's environment, strongly emphasizes the role of exchange rate risk as a determinant of export supply.

3.2 Rodrik's model

In a very persuasive paper Rodrik (1994a) argues that the emphasis on export-orientation as the explanation for the 'miracle' growth performance of Korea and Taiwan, in both orthodox and revisionist approaches, is both incomplete and quite misleading. He shows that the increase in export profitability in both countries around the mid-1960s was too modest to fully account for the initial jump of the export/GDP ratio or for its steady rise thereafter. According to Rodrik, a more plausible explanation is that the economic take-off of the two countries was caused by a sharp increase in investment after the 1960s. This, argues Rodrik, was made possible by a sustained increase in private returns to capital engineered by the two governments through a range of strategic interventions, not only to enhance capability but also to resolve coordination failures that usually characterize modern sector production. Moreover, Rodrik argues that the effectiveness of these rather extensive interventions – which included investment subsidies, administrative guidance, and the use of public enterprise – very much depended on the initial conditions of favourable human capital endowment and relatively equal income and wealth distribution in the two countries.

Dani Rodrik's model thus assumes an exogenous increase in the profitability of investment, followed by an increase in the share of investment in GDP. Also the model assumes that the country in question has a comparative *dis*advantage in producing capital goods and that international borrowing is not unlimited. The working of a simple (graphical) version of Rodrik's model, with two goods (exportables and importables) can be described as follows. At the initial period the economy's levels of consumption and production are set at (C0, Q0). The increase in investment demand is represented as a shift in preferences towards more capital-intensive importables and a proportionate decrease in *domestic* demand for exportables, leading to a net rise in aggregate consumption to C1. Since in the short-run, with the external terms of trade fixed and the transformation frontier unchanged, aggregate production remains at Q0, exports increase simply as a result of reduced domestic demand for exportables. This model, therefore, suggests that the impact effect of an increase in investment is to render the economy more open to trade, even though the relative price of exportables remains unchanged. This result of the basic Rodrik model applies in the short-run only, where the transformation frontier is assumed to remain unchanged. However, Rodrik demonstrates that the qualitative prediction of this basic model remains basically intact in the longer-run when the transformation frontier moves outward in response to the expansion in the economy's capital stock. Moreover, in a more recent paper (Rodrik, 1995), it is shown that the above predictions are plausible even in a context of a more general model of exportables, importable and non-tradables.

3.3 An empirical framework for analysing non-traditional exports

A unifying empirical framework based on the above two models should account for: profitability of the export sector (measured by the evolution of the RER and RER misalignment); macroeconomic stability relevant for export performance (stability of the RER); investment and imports of capital goods; as well as a range of factors affecting technical capabilities and the effectiveness of strategic interventions. The latter group of variables should include the initial stock of human capital, income distribution

profile, index of institutional quality and the capacity of infrastructure (such as power generation, telecommunication, road and port facilities).

In addition to controlling for the above non-price factors, this paper's empirical analysis of non-traditional exports will particularly emphasize the role of RER-based profitability and stability variables. In this connection, the empirical model will extend Paredes' work by explicitly linking export supply both to equilibrium RER and to the degree of RER disequilibrium. The relevance of RER misalignment relative to its equilibrium as a determinant of export supply is straightforward, given the tradability of exports. In addition, the level of equilibrium RER also matters for exports. It has been argued that even though a country may manage to avoid massive overvaluation, it could nevertheless trap itself in a sub-optimal export growth path by maintaining a 'low' equilibrium RER, due for example to adopting a less open trade regime (e.g. Valdés, 1985; Edwards, 1992). However, it is important to distinguish between overvaluation due to less openness (as in many high performing East Asian economies during their IS phases) and currency overvaluation caused by unsustainable macroeconomic policy (as in Chile before the reform). This distinction is emphasized by Helleiner (1992) who argues that while the latter is harmful, the former amounts to a choice of a development strategy or a response to a practical necessity (for example foreign trade taxes in Sub-Saharan Africa).

IV EMPIRICAL ANALYSIS OF RER AND NON-TRADITIONAL EXPORTS

This section contains three main empirical exercises. First, I discuss the estimation results of a real exchange rate model, using panel data from 63 countries covering three periods (1980–85, 1986–89, 1990–95). Second, the estimation of the long-run model will subsequently be combined with 'sustainable' values of the long-run fundamentals to generate indexes of the equilibrium real exchange rates, real exchange rate misalignment and real exchange rate instability for these countries. Third, the derived RER indexes will be combined with other non-price variables – as suggested by the analytical framework of section 3 – to estimate a model of non-traditional export performance for the 60 countries.[10]

4.1 The RER econometric analysis

The empirical analysis of RER in this paper is motivated by a theoretical model that emphasizes the interplay of the long-run (flow) fundamentals of current account balance and the determinants of the longer term propensity for accumulation (or de-accumulation) of net foreign assets (NFA). Following Faruqee (1995), this model extends the LDCs' version of the empirical real exchange rate model (e.g. Edwards, 1989; Elbadawi, 1994; Elbadawi and Soto, 1997a, b) to incorporate, in addition to the traditional current account fundamentals of the RER, three stock variables relevant for the determination of the capital account equilibrium. Moreover, this model also accounts for the effect of official development assistance (ODA), which constitutes an important current account variable for the determination of RER in many low income developing countries.

A fuller discussion of the model is contained in Appendix 1. In this section we estimate a simple dynamic version of the model using panel data. The following equation is estimated:

$$\text{Log } q_t = \alpha + \beta' F_1 - \gamma_1 oda_t - \gamma_2 nfi_t + \gamma_3(\Delta resv_t - nki_t) + \delta \log q_{t-1} - \theta_1 MACRO_t + \theta_2 DEVAL_t \quad (1)$$

where q is the RER (defined as the ratio of the price of tradables to non-tradables).

F is a vector of four trade balance fundamentals {terms of trade (Log TOT), government consumption ratio (Log GCON/GDP), trade openness (Log OPEN), productivity (PROD)}. Theoretically, the terms of trade influence on the RER cannot be signed *a priori*, depending on whether income or substitution effects dominate, with the former leading to real currency appreciation (decrease in RER) and the latter to real currency

[10] As indicated earlier, the Republic of Congo, Malta, and Honduras are not included in the export analysis because of lack of data.

depreciation (increase in RER). However, most empirical evidence suggests that the income effect tends to dominate the substitution effect. Government consumption is expected to carry a negative sign, openness a positive sign and productivity a negative sign. The measure of openness (OPEN) is the residual of a panel regression of log (X + M/GDP) on GNP and GNP squared; this measure adjusts the trade ratio for the size of the economy. Productivity is proxied by the log of the ratio of real GNP per worker to that of the G-7. The fifth current account fundamental is oda = ODA/GNP, which is predicted by the model to be negatively associated with RER. One capital account variable, Δresv (ratio of change in international reserves to GNP), is expected to have a positive long-term effect on RER (i.e. accumulation of reserves requires a real currency depreciation). The other two capital account variables, nki (ratio of net foreign capital inflows to GNP) and nfi (ratio of net foreign income to GNP), are expected to have negative long-run effects on the RER.[11]

The inclusion of capital account variables, in addition to the standard trade balance fundamentals, in the above equation permits interesting interpretations of the effects of ODA and other capital account stock determinants of the RER in the long run:

- Should a country successfully achieve a higher sustainable level of net foreign income in the very long run, the real currency value in this country will eventually converge to a more *appreciated* equilibrium level (lower RER);

- However, in the medium-to-long runs (when the stock of net foreign assets, NFA, is less than the desired level), this country may have to depreciate its real currency value (increase RER) (i.e. run a current account surplus – which is the counterpart of accumulating reserves) to allow the building of assets to desired levels;

- The required magnitude of the real currency depreciation may be ameliorated by the extent of 'sustainable' levels of private capital flows or foreign aid, both of which support a more appreciated long-run path for the real currency value (lower RER) *if* they could be sustained in the future.

The above equation also incorporates two short-run determinants of RER. DEVAL refers to the rate of nominal exchange rate devaluation (where the exchange rate is defined in terms of domestic currency per unit of the foreign currency). The second variable, MACRO, the ratio of the change in domestic credit to initial stock of broad money, is an indicator of macroeconomic (monetary) policy. The short-run impact effect of nominal devaluation is expected to be real currency depreciation, and monetary expansion is expected to lead to real currency appreciation. As pointed out by Edwards (1989) a nominal devaluation will help the adjustment process only to the extent that the initial situation is one of overvaluation, and if the nominal exchange rate adjustment is accompanied by supporting macroeconomic policy. Finally, the partial adjustment term (given by the coefficient of log q_{t-1}) reflects the self-correcting mechanism that calls for future depreciation in real currency value, given initial overvaluation. The speed by which this automatic adjustment operates depends on the parameter δ, which falls in the

[11] Note that the model also predicts the long-run effects of Δresv and nki on RER to have equal, though opposing, coefficients.

interval (0,1). A value of δ equal to one signifies prompt adjustment over just one period, while the smaller the value of δ, the slower the adjustment will be.

The estimation results of equation 1 are reported in Table 2. Two sets of results are reported; each set contains two regressions of the same equation, one based on a fixed-effects model and the other on a random-effects model. The first set includes, in addition to the long-run fundamentals, the effects of macroeconomic policy (MACRO) as well as the devaluation effect (DEVAL). The second set excludes DEVAL. The Hausman test suggests that the random effects model is uniformally superior to the fixed effects model. In addition, perhaps due to the relatively long time horizon of the estimation the DEVAL effect was not found to be significant. Therefore, further analysis will be confined to the results of the random effects model of set #2 (i.e. regression #4).

The results of the regressions strongly corroborate the theoretical predictions of the model. Starting with the five long-term current account fundamentals, our results show that they are robustly and significantly associated with RER in all of the four regressions. The terms of trade has a negative and significant effect, with an elasticity of about -0.54. The degree of openness of the economy (appropriately adjusted for economic size) has a positive long-run elasticity of about 0.48. This result suggests that a more liberalized and open trade regime requires a more depreciated equilibrium real currency value (higher RER). The implication of this finding is that trade liberalization is not sustainable without commensurate real currency depreciation. The third current account fundamental, the government consumption/GDP ratio, was also found to be significantly associated with RER with a negative elasticity of about -0.30. Given the dominance of non-tradable goods in government consumption, an increase in the latter will lead to real currency appreciation. The fourth current account fundamental, productivity, is found to have a negative and significant effect at -0.55. This result is consistent with the theoretical prediction of the model that 'sustained' productivity enhancement should lead to a more appreciated equilibrium real currency value (lower RER). Finally, foreign aid (given by the ratio of ODA to GNP), which is associated with real currency appreciation, had an estimated effect of -0.91.

The model suggests that the capital account position influences the long run behaviour of the RER through three channels: the very long-run effect of the income from net foreign asset position (expressed as a ratio to GNP), which together with the net capital inflows/GNP ratio should lead to a more appreciated equilibrium real currency value (lower RER) in the long run; and the ratio of the change in reserves to GNP, which should force a real currency depreciation. In the restricted version of the model – estimated in this paper – the last two variables are replaced by the difference between the change in reserve ratio and the net capital inflows ratio (DRNK). As predicted by the model, net foreign income was found to be negatively associated with RER with an estimated coefficient of -0.77. The effect of the composite variable (the change in reserves minus net capital inflows) is appreciable (at 3.19) and significant in all of the

TABLE 2
AN EMPIRICAL MODEL OF THE REAL EXCHANGE RATE IN DEVELOPING COUNTRIES

Dependent variable log RER	Equation 1 Fixed		Equation 2 Random		Equation 3 Fixed		Equation 4 Random	
	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
Log (TOT)	-0.549	-3.654	-0.54	-3.911	-0.561	-3.658	-0.541	-3.91
Log (OEN)	0.452	1.796	0.486	2.19	0.443	1.693	0.481	2.174
Log (GCON/GNP)	-0.551	-2.651	-0.294	-1.935	-0.388	-1.844	-0.304	-2.102
PRODUCTIVITY	-0.774	-2.203	-0.55	-2.042	-0.599	-1.994	-0.554	-2.059
NFI/GNP	-0.465	-0.657	-0.772	-1.58	-0.623	-0.887	-0.771	-1.572
ODA/GNP	-0.366	-0.750	-0.920	-2.475	-0.452	-0.930	-0.908	-2.470
DRNK/GNP	3.786	2.393	3.223	2.86	3.56	2.208	3.191	2.84
MACRO	-0.021	-0.319	-0.08	-1.687	-0.038	-0.653	-0.081	-1.713
DEVAL	0.7E-03	1.049	-0.9E-04	-0.238				
Log RER(-1)	0.096	1.069	0.274	2.958	0.144	1.566	0.27	3.005
CONSTANT			-0.327	-0.863			-0.346	-0.935
Adjusted R Squared	0.6485		0.4372		0.6457		0.4397	
R Squared	0.7831		0.6527		0.7795		0.6513	
P Value	0.01831				0.0003			
Number of observations	189							
Number of countries	63							
Period of Estimation	1970-75,	1976-79,	1980-85,	1986-89,	1990-95			

Notes:

TOT	Terms of Trade
OPEN	(Real Exports + Real Imports)/Real GNP
GCON	Government Consumption
PRODUCTIVITY	Ratio of the country's GNP per worker to OECD average GNP per worker
GNP	Gross National Product at market prices
NFI	Net Foreign Income
ODA	Overseas Development Assistance
DRNK	(Change in Reserves/GNP)-(Net Capital Inflows)
MACRO	(Change in domestic credit)/(lagged broad money supply)
DEVAL	Nominal Devaluation
RER	Real Exchange Rate
Pvalue	refers to the Hausman test for Fixed vs. Random Effects Model

four regressions.[12] This result suggests that accumulation of reserves could be an effective instrument for minimizing undesirable effects of temporary capital flows on the real exchange rate.

The coefficient of the lagged dependent variable (Log q_{t-1}) has a highly significant estimated elasticity of 0.27, which indicates the importance of inertia in RER evolution over time. The model's estimate of automatic adjustment is much larger than the 0.19 obtained by Edwards (1989) for a different group of developing countries in an earlier period using a similar partial adjustment model. Finally, the short-run effect due to macroeconomic policy was found to be significant, though with a small impact coefficient at -0.08.

4.2 Real exchange rate equilibrium, RER misalignment and RER instability

Now we proceed to compute the indexes for ERER using the derived long-run elasticities based on the estimates of Table 2 (regression #4),[13] for given 'sustainable' or 'permanent' values of the fundamentals. Williamson (1994b:187) recommends an *ex ante* approach for estimating, 'the set of real effective exchange rates (or paths) needed to achieve simultaneous internal and external balance by some date in the medium-run future, and to maintain balance thereafter'. The so-called 'fundamental equilibrium exchange rate' (FEER) concept, therefore, calls for assuming behavioural specifications for the fundamentals and using the real exchange rate equations in the context of a bigger model to derive a path (paths) for the equilibrium real exchange rate, given the assumed path(s) for the fundamentals. By and large, our approach for estimating 'sustainable' fundamentals resembles the FEER approach.[14] In particular, the capital account fundamentals are obtained using a model that links sustainable net capital flows and net foreign income to sustainable current account balance (Edwards, 1997) and sustainable change in reserves to long-term import requirements. In addition, sustainable foreign aid ratios are linked to levels that are judged to be consistent with avoiding excessive aid dependency. The statement of the current account model and the methods used for computing the sustainable values are reported in Appendix 2.

Three pivotal series are derived for all of the 63 countries considered: the equilibrium RER (ERER) indexes; RER misalignment indexes (computed as (RER-ERER)/ERER)*100 per cent); RER variability (RERVAR) computed as a three-year moving standard deviation of the change in the log of the RER index. Table 3 contains

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12 Comparison of estimation results of the unrestricted model (not reported here) – which allows the size of the effect of the change in reserves to differ from that of net capital inflows – and that of the restricted model reveals that the latter is superior.

13 The derived long-run effects are obtained by setting the coefficient of MACRO to zero, setting Log q_t = Log q_{t-1} and solving for the long-run equation of Log q as a function of the seven current and capital account fundamentals.

14 Using the case of Chile, Elbadawi (1994) and Elbadawi and Soto (1997a) compare the FEER method to an *ex-post* approach for computing ERER indexes, where the ERER paths are based on the 'permanent' historical time series components of the fundamentals. No significant differences between the two approaches was found. However, the FEER approach is more amenable to policy simulations.

TABLE 3
EQUILIBRIUM RER (ERER), RER MISALIGNMENT (RERMIS) AND RER VARIABILITY (RERVAR) IN DEVELOPING COUNTRIES

COUNTRY	YEAR	ERER	RERMIS %	RERVAR %
Burkina Faso	1978-79	147.21	-17.19	4.23
	1980-85	137.53	-8.33	3.63
	1986-89	133.51	-2.16	2.22
	1990-95	133.01	9.48	3.34
Côte d'Ivoire	1978-79	84.76	6.08	5.69
	1980-85	155.11	-7.16	11.86
	1986-89	181.59	-22.62	4.79
	1990-95	219.08	-24.96	6.49
Ghana	1978-79	169.09	-8.40	0.73
	1980-85	249.57	-50.02	2.95
	1986-89	338.36	9.29	2.30
	1990-95	406.30	13.84	1.23
Kenya	1978-79	89.40	4.63	4.11
	1980-85	101.83	-0.28	1.97
	1986-89	125.19	-0.31	0.97
	1990-95	130.13	3.38	2.71
Mauritius	1978-79	93.69	2.98	3.25
	1980-85	103.06	-0.62	1.15
	1986-89	112.07	3.27	2.90
	1990-95	88.75	14.11	2.92
South Africa	1978-79	88.75	8.49	2.43
	1980-85	96.94	2.78	0.92
	1986-89	98.24	14.82	0.26
	1990-95	99.51	11.70	0.27
Tanzania	1978-79	113.29	1.05	162.29
	1980-85	81.90	-9.12	5.89
	1986-89	77.02	27.57	6.18
	1990-95	226.29	8.59	14.71
Uganda	1978-79	1017.68	-76.14	6.27
	1980-85	716.76	-33.37	4.00
	1986-89	723.63	-15.15	2.36
	1990-95	1050.66	3.27	2.74

Table 3 continues...

Table 3 (continued)

COUNTRY	YEAR	ERER	RERMIS %	RERVAR %
Zimbabwe	1978-79	93.58	0.86	3.75
	1980-85	104.33	-2.72	2.99
	1986-89	105.42	7.77	2.01
	1990-95	122.35	19.01	3.10
Sub-Saharan Africa	1978-79	94.27	0.86	4.11
	1980-85	106.10	-2.59	3.44
	1986-89	120.53	-0.98	2.30
	1990-95	131.75	3.38	2.92
Chile	1978-79	94.61	8.76	5.51
	1980-85	126.80	-7.08	3.29
	1986-89	112.68	21.94	1.51
	1990-95	124.70	16.90	4.34
Costa Rica	1978-79	117.51	-4.26	2.66
	1980-85	125.53	6.95	2.58
	1986-89	148.68	3.67	1.47
	1990-95	165.76	0.07	3.91
Latin America	1978-79	92.85	8.04	2.66
	1980-85	111.82	-4.84	1.82
	1986-89	113.87	5.84	1.51
	1990-95	163.33	-4.11	3.57
Indonesia	1978-79	187.18	-17.16	5.12
	1980-85	166.02	-21.96	2.54
	1986-89	196.21	-2.73	1.45
	1990-95	220.12	-1.45	3.05
Malaysia	1978-79	88.49	4.24	1.18
	1980-85	99.41	-2.61	2.09
	1986-89	125.63	-2.53	1.71
	1990-95	302.65	-32.93	5.73
Thailand	1978-79	82.82	12.23	2.38
	1980-85	99.20	-1.01	2.16
	1986-89	80.13	19.04	1.19
	1990-95	93.08	13.24	2.39
East Asia	1978-79	102.66	-6.46	2.71
	1980-85	109.76	-5.51	2.22
	1986-89	160.92	-2.63	2.29
	1990-95	174.93	3.15	2.72

estimates of ERER, RERMIS and RERVAR for the 14 countries and the three developing regions analyzed in Table 1. The ERER indexes – which do vary over time – suggest that at least part of the observed RER variability is related to changing equilibria, and that analyzes of real exchange rate misalignment based on historical comparisons of observed RER levels (i.e. the PPP approach) may lead to erroneous conclusions. In addition, the indexes of RERMIS are fairly successful in reproducing overvaluation (and undervaluation) 'episodes' that are consistent with other aspects of the recent macroeconomic history of these countries.

The evolution of the real exchange rate in Ghana is consistent with major shifts in policy regimes and in the TOT (mainly the price of cocoa) over the period. For example, the period up to 1977 was not characterized by any substantial macroeconomic disequilibria. Then a modest reversal took place during 1978–79, when the currency became overvalued by about 8 per cent per annum during these two years. This episode of real currency overvaluation reached its peak during the first half of the 1980s (the annual rate of overvaluation exceeded 50 per cent during 1980–85),[15] before the results of an aggressive macroeconomic stabilization programme supported with large maxi devaluations began to take hold. For the second half of the 1980s the economy achieved substantial competitiveness, which was further consolidated in the 1990s (the currency was actually undervalued in real terms at annual rates of 9 per cent in 1986–89 and 14 per cent in 1990–95). A very similar, if less dramatic, pattern of adjustment was provided by the experience of Tanzania. Tanzania started the 1980s with an overvaluation crisis, when the currency was estimated to have been overvalued by about 9 per cent during 1980–85. Again similar to Ghana, for the following two periods real currency overvaluation was substantially reversed, with the currency undervalued at an annual rate of 28 per cent in 1986–89 and 9 per cent in 1990–95. The above analysis suggests that exchange rate policy in Ghana (in the first half of the 1980s) and in Tanzania (in the second half of the 1980s) may have constituted a sort of an 'overkill' from the RER perspective, because the main objective of the policy was to achieve unification of the official and parallel market exchange rates. The rather low credibility attached to government policy at the beginning of the reform and the possible negative budgetary implications of the loss of the implicit tax (on exporters) as overvaluation was reduced could have dictated a much deeper fiscal/monetary retrenchment (and supporting exchange rate policy) than would have been required in the absence of the parallel market.[16]

Another comparable reform experience is that of Uganda. The recovery of this country from its large overvaluation crisis in the late 1970s (the RER was overvalued by more than 76 per cent for each of 1978 and 1979) was much slower, however, mainly because reforms started much later. The overvaluation episodes continued throughout the 1980s, before the RER reached virtual equilibrium during the 1990s. (The currency was undervalued at an annual rate of 3 per cent.)

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15 The 1981–83 period also witnessed the collapse of cocoa prices and the reversal of earlier policy reforms.

16 For a review and analysis of economic reforms in Ghana during the 1980s see Pinto (1987, 1988a, 1988b), and for Tanzania see Ndulu and Kimie (1997).

Like Ghana, Tanzania and Uganda the RERMIS indexes for Burkina Faso and Côte d'Ivoire were remarkably successful in reproducing overvaluation (and undervaluation) patterns consistent with well known episodes in the recent macroeconomic history of the CFA zone.[17] For example, in Côte d'Ivoire the currency became overvalued during the first half of the 1980s (at an annual rate of 7 per cent) because of the inconsistency of fiscal policy and other structural factors with the fixed exchange rate regime under the monetary union. However, overvaluation was by and large moderated by the steady depreciation of the French franc against the US dollar and other major currencies during this period (e.g. Elbadawi and Majd, 1996). However, when the French franc moved in the reverse direction following 1986, the situations of fiscal laxity and structural rigidities that had all along characterized the Ivoirian economy were fully exposed. Our calculation shows that during 1986–89 and 1990–95 the currency was overvalued at annual average rates of about 23 and 25 per cent, respectively. Using a similar method Baffes, Elbadawi and O'Connell (1997) estimate that the currency in Côte d'Ivoire was overvalued by 29 per cent in 1993.[18] However, by 1994 a set of corrective measures, including a zone-wide 50 per cent devaluation, was effected. For this year our estimates suggest that the overvaluation was reduced to just 8 per cent (from 31 per cent in 1993) and in 1995 the RER was in equilibrium. Again the estimates for 1994 and 1995 appear consistent with the significant export and output recovery that was enjoyed by this country after 1994.

The above pattern of adjustment contrasts sharply to that of Ghana, Tanzania and Uganda reflecting the fundamental CFA/non-CFA divide that characterizes macroeconomic policies in SSA. However, the pattern of RER adjustment in Côte d'Ivoire (as well as the other big countries of the franc zone) is also different from that experienced by the smaller CFA countries. According to our estimates, Burkina Faso (a small CFA member country) has experienced only a mild overvaluation episode (the currency was overvalued at an annual rate of 8 per cent) during the first half of 1980s. Moreover, in the second half of the 1980s the RER was virtually in equilibrium (the annual rate of overvaluation was about 2 per cent). This is remarkable because the economy of this small country appears to have adjusted quite well to the post-1986 adverse shocks that impacted the entire zone, especially the larger countries which suffered from severe recession and loss of competitiveness (Devarajan and Hinkle, 1994). Therefore, it should not be surprising that in this country the currency became undervalued by more than 9 per cent during the 1990s, since it became undervalued by more than 26 per cent in 1994 (the year of the devaluation) and remained substantially undervalued (by about 15 per cent) in 1995.

Kenya, Mauritius, South Africa and Zimbabwe are non-CFA countries, which by and large, have managed to avoid the crisis-proportions type of overvaluation episodes that

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[17] The CFA zone is made up of two separate monetary unions: the West African Monetary Union (UMOA) and the countries which have formed the Bank of Central African States (BEAC). The former includes: Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Togo and the latter consists of Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon.

[18] Even a very different approach suggests comparable orders of magnitude. Using a CGE approach, Devarajan (1997), for example, estimates the degree of overvaluation in Côte d'Ivoire for 1993 at 36 per cent.

impacted Ghana, Tanzania and Uganda. For example, our estimates suggest that following an episode of mild currency undervaluation in 1978–79 (at an annual rate of 5 per cent), the RER in Kenya was in equilibrium throughout the 1980s, before slight undervaluation emerged in the first half of the 1990s (at a 3 per cent annual rate). These initial conditions allowed rapid RER adjustment, with less draconian measures than the ones required in Ghana, Tanzania and Uganda. However, our estimates show mild overvaluations in 1994 for Kenya, as well as for Tanzania and Uganda, possibly reflecting a new cycle of real overvaluation due to the large and possibly unsustainable capital inflows.

Very similar patterns of RER adjustment were experienced by Mauritius, South Africa and Zimbabwe. The currencies in the three countries have either been undervalued or in virtual real equilibrium during 1978–79 and the first half of the 1980s. In Mauritius the RER remained close to equilibrium in the second half of the 1980s, before the currency became substantially undervalued in the 1990s (at an annual rate of about 14 per cent). In South Africa and Zimbabwe the cycle of currency undervaluation started even earlier. The average annual rates of real undervaluation during 1986–89 and 1990–95 were, respectively, 15 and 12 per cent for South Africa, and 8 and 19 per cent for Zimbabwe.

The experiences with RER adjustment of five high performing non-African countries provide interesting lessons for reforming African countries. First, Chile and Thailand both maintained highly undervalued currencies from the second half of the 1980s onward. In Chile the currency was undervalued by 22 per cent per annum in 1986–89 and by 17 per cent in 1990–95, while the annual rate of undervaluation in Thailand was equally dramatic at 19 and 13 per cent, respectively, for the two periods. Second, the experiences of Costa Rica and Indonesia, and especially Malaysia, suggest that countries that were able to keep RER close to its equilibrium for an extended period could also achieve substantial export growth, especially in the case of Malaysia, where RER policy was supported by other effective export-promoting measures. Following a small undervaluation of about 7 per cent per annum during the first half of the 1980s, the currency in Costa Rica remained in equilibrium thereafter. In Indonesia, following very large real overvaluation (by more than 19 per cent per annum) prior to 1986, the RER remained in equilibrium for the subsequent periods. For Malaysia the adjustment was somewhat different, where the RER remained in equilibrium throughout the 1980s following a small degree of currency undervaluation (of about 4 per cent per annum) for the late 1970s.

Third, contrasting the experiences of Chile to those of Indonesia and especially Malaysia might help shed some light on the challenge of stemming the adverse effects of capital flows on RER competitiveness. Chile was able to recover from the highly publicized overvaluation episodes of the early 1980s, which were mainly caused by excessive capital inflows,[19] by instituting explicit rules requiring the Central Bank of Chile to seek to prevent the current account deficit from exceeding 4 per cent of GDP on average (Williamson, 1997b). To execute this rule – which basically committed Chile to a policy of sustained export-orientation based on RER competitiveness – the

[19] See Elbadawi and Soto (1997a) for a detailed discussion of the debate on the real exchange rate appreciation in Chile during the early 1980s.

Central Bank of Chile has aggressively and apparently successfully discouraged the inflow of unsustainable and speculative capital inflows. On the other hand, and as revealed by the recent Asian financial sector crisis, both Indonesia and Malaysia failed to exercise adequate prudential and regulatory measures in the face of massive capital inflows in the 1990s. This is manifested in the substantial real currency overvaluation in Malaysia throughout the 1990s (at an average annual rate of about 33 per cent), and the smaller but steady real overvaluation in Indonesia since 1992, which reached almost 8 per cent in 1995.

Finally, RER instability does not lend itself to easily discernible patterns across the 14 countries considered. However, it appears that for all countries (except Côte d'Ivoire, Ghana, Mauritius and Tanzania) the first half of the 1980s was the most stable period. Also, for a few countries (e.g. Burkina Faso, Côte d'Ivoire, Kenya, Mauritius and Malaysia) there appears to be a long-term trend of rising instability over time. However, for most countries there was no clear association between RER instability and RERMIS. In particular, there is no systematic evidence that countries which managed to keep RER close to equilibrium have also succeeded in reducing RER instability.

4.3 The determinants of non-traditional exports in developing countries

Table 4 provides estimates of a non-traditional export performance equation for the panel of the 60 developing countries over 1989/90 and 1994/95.[20] The estimated equation, the rationale for which was discussed above (in section 3), is:

$$\text{Log XNTY}_t = \propto + \beta_1 \text{RERMIS}_t + \beta_2 \text{RERVAR}_t + \beta_3 \text{Log MM}_t/\text{GNP}_t + \beta_4 \text{Log TOT}_t$$
$$+ \beta_5 \text{TOTVAR} + \beta_6 \log \text{SCH}_t + \beta_7 \text{OECYB}_t + \gamma_1 \text{DSSA} + \gamma_2 \text{DEA} + \gamma_3 \text{DLAC} \qquad (2)$$

where XNTY is the ratio of non-traditional exports to GDP (both in current dollars); RERMIS and RERVAR are as described above (section 4.2);[21] MM is machinery imports; TOTVAR is variability in the terms of trade (standard deviation of the change in Log TOT); SCH is an index of schooling (the average of the primary and secondary enrolment ratios); OECYB is OECD countries' GDP per worker (in constant dollars); and DSSA, DEA and DLAC are dummies for Sub-Saharan Africa, East Asia and Latin America (proxying for differing supply conditions). To avoid picking up spurious effects, the dependent variable is given by the log of the ratio of non-traditional exports to GDP and all right hand side variables (other than relative prices) are expressed relative to appropriate scale variables (see the notes to Table 4).

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[20] Consistent data on non-traditional exports, obtained from the World Bank and employing its definition thereof, are available only for 1984/85, 1989/90 and 1994/95, where one lag was used as instrument.

[21] Estimation was also undertaken using RER and ERER instead of, and in addition to, RERMIS; these results are not shown in Table 4 but are discussed in the text.

TABLE 4
AN EMPIRICAL MODEL OF NON-TRADITIONAL EXPORTS IN DEVELOPING COUNTRIES

Dependent variable log (XNTY)	Equation 1 Random		Equation 2 Random		Equation 3 Random	
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
RERMIS	0.546	2.674	0.649	3.22	-	-
RERVAR	-4.401	-3.844	-5.921	-5.798	-3.547	-3.186
Log (MM/GNP)	0.175	3.007	-	-	0.2	3.436
Log (TOT)	-1.611	-4.243	-1.702	-4.496	-1.093	-3.27
TOTVAR	-2.462	-3.48	-2..578	-3.646	-2.232	-3.112
Log (SCH)	1.191	5.771	1.217	5.859	1.17	5.606
OECYB	0.1E-04	0.856	0.9E-05	0.6	0.3E-04	1.977
DSSA	-0.202	-2.216	-0.121	-1.378	-0.206	-2.234
DEA	0.301	2.449	0.395	3.297	0.284	2.289
DLAC	0.195	2.159	0.268	3.059	0.147	1.641
CONSTANT	-0.43	-0.363	-0.41	-0.346	-1.943	-1.828
Adjusted R Squared	0.828		0.821		0.819	
R Squared	0.928		0.923		0.922	
P Value	0.033		0.045		0.85	
Number of Observations	120					
Number of Countries	60					
Period of Estimation	1984/85, 1989/90, 1994/95					

Notes:

XNTY	Ratio of Non-Traditional Exports to GDP (current $/current $)
RERMIS	Real Exchange Rate Misalignment: Log (RER) - Log (Equilibrium RER)
RERVAR	Real Exchange Rate Variability: Standard Deviation of Δ Log (RER)
MM	Imports of Machinery
TOT	Terms of Trade
TOTVAR	Terms of Trade Variability: Standard Deviation of Δ Log (TOT)
SCH	Index of Schooling: Average of Primary and Secondary Enrolment ratios
OECYB	OECD Countries GDP per worker (Constant 1987$)
DSSA	Dummy Variable for Sub-Saharan Africa
DEA	Dummy Variable for East Asia
DLAC	Dummy Variable for Latin American Countries
Pvalue	refers to the Hausman test for Fixed vs. Random Effects Model

The Table contains results for three random effects regressions. (The full set of results, including both random and fixed effects, are contained in Appendix Table 1. The random effects results are stronger and more consistent with theoretical predictions. Moreover, in two of the regressions (#1 and 2), a formal Hausman specification test suggests that random effects results are superior to the results based on the fixed effects regressions.) All of the three regressions appear to fit the data very well, with more than 80 per cent of the variation in the non-traditional export/GDP ratio explained by the model. Regression 1 incorporates the full set of variables, while regression 2 excludes imports of machines, and regression 3 excludes RERMIS (the measure of export profitability).

In regression 1, two of the RER-based variables (RERMIS, RERVAR), terms of trade variability, the schooling variable and imports of machinery are all very significantly and robustly associated with export performance, and their effects are consistent with theoretical predictions. However, GDP per worker in the OECD countries (a proxy for external demand) is only marginally significant. Interestingly, neither the level of RER nor the equilibrium RER were significantly related to exports, when RERMIS is included; if anything, the results improve considerably when *only* the RERMIS is employed as a proxy for profitability of exporting. This suggests that what matters for exports is that the currency should not be allowed to become overvalued in real terms and that real currency depreciation relative to its equilibrium (i.e. undervaluation) will enhance export performance; whereas the absolute level of RER (or its equilibrium level) is irrelevant to export performance.

RERMIS (measured as undervaluation) has an elasticity of 0.55, while RER variability (the indicator of relevant macroeconomic instability) has a negative effect at -4.4. As expected, terms of trade variability has a deleterious effect on non-traditional exports at -2.5. A less clear effect, from a theoretical perspective, is the negative elasticity of the level of terms of trade at -1.6. However, since the terms of trade variable refers to aggregate exports, this effect may reflect the influence of the secularly declining terms of trade for traditional (rather than non-traditional) exports. Human capital (measured by the schooling ratio) has an elasticity of 1.2. Imports of machines (a proxy for capital goods imports or investment in capital goods) has an elasticity of 0.2.

Finally, and not surprisingly, other regional characteristics (proxied by dummies) matter. The results suggest that, *ceteris paribus*, the ratios of non-traditional exports to GDP tend to be higher in both of East Asia (EA) and Latin America (LAC) than in SSA. The derived elasticities of the estimated coefficients of these dummies[22] suggest that, relative to average performance of the sample of 60 developing countries, other non-accounted-for region-specific characteristics expand the non-traditional exports/GDP ratio by 57 and 100 per cent in LAC and East Asia, respectively, while these factors reduce non-traditional exports by 40 per cent in SSA. To the extent that these dummies reflect supply constraints related to market imperfections, technological capabilities, etc., this finding can be taken as providing strong support for the analysis of section 2.1 of this paper, which argues that beyond 'getting the prices right' the leading role of the

[22] The elasticities are derived by subtracting one from the exponential of the estimated coefficients of the regional dummies of Table 4.

state in addressing the endemic problems of market imperfection is indispensable for generating sustained and adequate export supply response to appropriate incentives.

Regressions 2 and 3 are designed indirectly to test the Rodrik model. First, the results of regression 2, which excludes imports of machinery, is marginally inferior to that of regression 1 in terms of the degree of fit and the strength of the Hausman specification tests (of the fixed versus the random effects model). This suggests that imports of machinery contribute significantly to explaining non-traditional export performance in developing countries. Second, regression 3, which excludes RERMIS (the measure of export profitability) does not pass the Hausman specification test (i.e. the fixed effects model is superior to the random effects model of regression 2). Comparing regression 1 of Table 4 with the fixed effects version of regression 3 (see Appendix Table 1) suggests that regression 1 is vastly superior. This suggests that export profitability (as reflected by an appropriate real exchange rate) is indispensable for sustained expansion of non-traditional exports. Therefore, the comparison of the results of regression 1 to each of regressions 2 and 3 strengthens the finding about the existence of robust association between non-traditional exports and imports of machinery, on the one hand, and real exchange rate-based indicators on the other. These findings suggest very important policy implications. First, they lend support to the argument that basic capabilities, investment, and maybe some strategic interventions to resolve market failures are important for successful export-orientation. Second, however, the results also suggest that export promotion and export diversification require a supportive structure of incentives, especially appropriate and stable real exchange rates.

V CONCLUSIONS

This paper has analyzed the impact of exchange rate competitiveness and exchange rate stability on non-traditional export performance for 60 developing countries. In particular, the paper focussed on fourteen countries, of which nine are Sub-Saharan African.

The empirical framework used for the analysis of non-traditional export performance is a unification of two theoretical approaches. One model (motivated by the experiences of Korea and Taiwan) explains export expansion as driven by a sustained boom in investment (and import) demand (Rodrik, 1994a). The other model, influenced by the Latin American experience, predicts a significant role for real exchange rate competitiveness (as a proxy for profitability of exporting) and real exchange rate stability in the determination of export supply (Paredes, 1988). The unifying empirical framework of this paper attempts to account for: the profitability of the export sector (measured by the evolution of the RER and RER misalignment); macroeconomic stability relevant for export performance (RER variability); investment in capital goods; as well as the school enrolment ratio (as a proxy for human capital).

To generate the required exchange rate measures for the estimation of the export equation, this paper estimates a real exchange rate model that accounts for both current account and capital account fundamentals for a panel of 63 developing countries over three periods (1980–85, 1986–89, 1990–95). The estimation results allow the derivation of two key indicators of real exchange rate policy for all of the 63 countries. These are the equilibrium RER index (ERER) and the index of RER misalignment (RERMIS). In addition, an index of RER instability (RERVAR) was constructed. The novelty of this approach is that it provides a systematic and model-consistent method for disentangling the channels through which the RER affects exports. The estimation results of the RER model strongly corroborate the predictions of the theoretical model, in which current account and capital account fundamentals are found to be associated with the RER in the long run. In addition, the estimated equilibrium RER and RER misalignment indexes appear very plausible from the point of view of other stylized facts about macroeconomic adjustment in the fourteen countries.

The non-traditional export supply function was estimated using panel regressions of 60 countries (the same set used in the RER estimation except for three countries, excluded for lack of data) over two periods (1989/90 and 1994/95). The results strongly corroborate most of the main predictions of this paper's theoretical framework. Two of the RER-based variables (RERMIS, RERVAR), terms of trade variability, the schooling variable, and imports of machinery are all very significantly and robustly associated with non-traditional export performance, and their effects are consistent with theoretical predictions. However, the levels of RER (as well as the equilibrium RER) were not significantly related to non-traditional export performance, when RERMIS was included in the same equation. The former result suggests that as long as real overvaluation is

avoided, the level of the RER (or its equilibrium level) is irrelevant to export performance.

Moreover, the estimated effects of other regional characteristics (proxied by dummies) suggests that, *ceteris paribus*, the ratio of non-traditional exports to GDP will tend to be higher in both East Asia and Latin America relative to SSA. To the extent that these dummies reflect supply constraints related to market imperfection, technological capabilities, etc., this finding corroborates the argument that beyond 'getting the prices right', there may be an important role for the state in addressing the endemic problems of market imperfections in order to generate sustained and adequate export supply response to appropriate incentives. Finally, our results lend partial support to the Rodrik model in that basic capabilities including schooling, investment in machinery, and maybe governmental interventions to resolve market failures, are important for successful export-orientation. However, our results also suggest that export promotion and export diversification require a supportive structure of incentives, especially appropriate and stable real exchange rates.

APPENDIX 1
AN EMPIRICAL MODEL FOR THE REAL EXCHANGE RATE

The model of this paper emphasizes the interplay of the long-run (flow) fundamentals of current account balance and the determinants of the longer term propensity for accumulation (or de-accumulation) of net foreign assets (NFA). Following Faruqee (1995), this model extends the LDCs' version of the empirical real exchange rate model (e.g. Edwards, 1989; Elbadawi, 1994; Elbadawi and Soto, 1997a, b) to incorporate stock variables relevant for the determination of capital account equilibrium. However, this model (which is a discrete version of Faruqee's) incorporates two desirable characteristics for models applicable to LDCs:

(1) a more encompassing set of trade balance fundamentals;

(2) a theoretical approach that is directly linked to cointegration and equilibrium-correction empirical models (under the assumption of no-unit root of the cointegration residual).

1. Trade balance

We start with the classical three sector (exportables, importables, home goods) model,[23] which solves the equilibrium conditions in the home goods market for given prices of exports and imports. An empirical version of this model specifies the RER (defined as the rate of the price of tradables to non-tradables) as a function of the terms of trade (TOT), the degree of trade regime openness (X+M/GNP), rate of productivity, proxied by the log of the ratio of (GNP/worker) to that of the G-7,[24] the level and structure of government expenditure (Government Consumption/GDP),[25] and a measure of domestic absorption given by the trade balance ratio tbr = (X-M/GNP). The model predicts that the RER is positively associated with trade balance and trade openness, and negatively associated with productivity. However, the RER relationship with the terms of trade and with government consumption cannot be signed *a priori*. If income effects dominate the substitution effects of TOT change, RER and TOT will be negatively associated; if consumption of non-tradables dominates government consumption, the latter will also be negatively associated with RER. However, most of the empirical evidence shows that improved TOT and higher government expenditure tend to lead to real currency appreciation (lower RER).

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23 See for example Dornbusch (1974). The empirical strand of this literature includes Edwards (1989); Elbadawi (1992 a, b); Mundlak, Cavallo and Domenech (1987); and Sjastaad (1980), to mention a few.

24 An alternative proxy also used in the empirical estimation of this model is simply log (GNP/WORKER).

25 The level and composition of Government expenditure is given by two indicators: Government expenditure/GDP and current government expenditure/aggregate government expenditure. However, given data limitations in most countries, Government consumption/GDP is used.

By linearizing and inverting the equation with the trade balance ratio as a dependent variable, we have:

$$tbr = \gamma q - F'\beta \quad (1)$$

where q = log RER and the vector of the trade balance fundamentals is given by F = {log TOT, Log GCON/GDP, Log OPEN, PROD}', which affect tbr according to the vector of coefficient

$$\beta = (?\beta_1, -\beta_2, +\beta_3, -\beta_4)'$$

2. The current account

The current account balance (cab), expressed as a ratio to GNP, is given by the trade balance ratio (tbr) plus interest income received (or paid) on net foreign asset (or debt) held by government and nationals (tbr+r*.f) plus the share of official development assistance oda = ODA/GNP that contributes to the external balance, where f = NFA/GNP is net foreign assets to GNP and r* is the international interest rate. cab is also equal to the rate of accumulation of net foreign assets held domestically. Expressed in discrete rational expectation form, the cab equation is therefore given by:

$$\cdot_t f_{t+1} - f_t = \gamma q_t - F_t'\beta + r^* f_t + \theta oda_t \quad (2)$$

As argued by Faruqee, determining the path of the equilibrium RER over the medium term revolves around the issue of sustainability of the cab that could be financed by a 'desirable' (or sustainable) rate of capital flows, which in turn depends on the underlying determinants of NFA (savings-investment balance). We follow Faruqee and posit the following behavioural equation for the desired rate of foreign asset accumulation:

$$\cdot_t f^d_{t+1} - f^d_t = \delta (r - \rho) + \phi (f^d_t - f_t); \delta, \phi \succ 0 \quad (3)$$

by setting $\rho = r^*$ and imposing the uncovered interest parity condition, we get

$$r = r^* + \alpha (\,_t q_{t+1} - q_t) \quad (4)$$

where $\alpha \succ o$ is the expenditure share of domestic goods in home consumption.

Moreover, a sustainable balance of payments position associated with flow account equilibrium in the medium term requires that the following equation holds:

$$\cdot_t f_{t+1} - f_t = \,_t f^d_{t+1} - f^d_t \quad (5)$$

3. Model solution

Using equations (2) - (4) on (5) leads to the following expression:

$$\gamma q - F_t'\beta + \theta oda_t + r^* f_t = \alpha\delta({}_t q_{t+1} - q_t) + \phi\,(f_t^d - f_t), \text{ which can be rewritten as}$$

$$q_t(\gamma + \alpha\delta) - \alpha\delta_t q_{t+1} = F_t'\beta - \theta oda_t - r^* f_t + \phi(f_t^d - f_t), \text{ by defining } \lambda = \frac{\alpha\delta}{\gamma + \alpha\delta}$$

The above equation can be compactly written as a martingale in q (a conditional stochastic difference equation in q):

$$q_t - \lambda_t\, q_{t+1} = \left(\frac{1}{\gamma + \alpha\delta}\right) F_t'\beta - \left(\frac{\theta}{\gamma + \alpha\delta}\right) oda_t - \frac{r^*}{\gamma + \alpha\delta} f_t + \frac{\phi}{\gamma + \alpha\delta}\left(f_t^d - f_t\right) \qquad (6)$$

Equation (6) is a forward looking stochastic difference equation that determines the time path of the equilibrium RER. Solving (6) by recursive substitution allows us to write the following expression for the equilibrium RER:

$$q_t = \sum_{i=0}\lambda^i\left[\frac{1}{\gamma+\alpha\delta}F_{t+i}'\beta - \frac{\theta}{\gamma+\alpha\delta}oda_t - \frac{r^*}{\gamma+\alpha\delta}\, f_{t+i} + \frac{\phi}{\gamma+\alpha\delta}\,(f_{t+i}^d - f_{t+i})\right] \qquad (7)$$

Under the assumption that the vector (q, F′, oda, r^*f, f^d-f) is composed of unit root variables, equation (7) collapses to a simple cointegration equation:[26]

$$q_t = \frac{1}{1-\lambda}\left(\frac{1}{\gamma + \alpha\delta}\right) F_t'\beta - \frac{1}{1-\lambda}\left(\frac{\theta}{\gamma + \alpha\delta}\right)\, oda_t - \frac{1}{1-\lambda}\left(\frac{r^*}{\gamma + \alpha\delta}\right)\, f_t$$

$$+ \frac{1}{1-\lambda}\,\left(\frac{\phi}{\gamma + \alpha\delta}\right)\,(f_t^d - f_t) + \varepsilon \qquad (8)$$

where

$$\varepsilon_t = \sum_{i=1}\left(\frac{\lambda^i}{1-\lambda}\right)\left[\frac{1}{\gamma+\alpha\delta}\Delta_t F_{t+i}'\beta - \frac{\theta}{\gamma+\alpha\delta}\,\Delta oda_{t+i} - \frac{r^*}{\lambda+\alpha\delta}\Delta_t f_{t+i}\right.$$

$$\left. + \frac{\phi}{\lambda+\alpha\delta}\Delta({}_t f_{t+1}^d - {}_t f_{t+1})\right]$$

which is a stationary disturbance term.

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26 See for example Kaminsky (1988).

Now since

$$\frac{1}{1-\lambda}\left(\frac{1}{\gamma+\alpha\delta}\right)=\frac{1}{\gamma},\ \text{equation (8) could be compactly written as}$$

$$q_t=\frac{1}{\gamma}F_t'\beta-\frac{\theta}{\gamma}oda_t-\frac{r^*}{\gamma}f_t+\frac{\phi}{\gamma}\left(f_t^d-f_t\right)+\varepsilon_t \qquad (9)$$

Equation (9) provides a rich long run structural cointegration model for the determination of the RER, where the parameters γ, r^*, θ and ϕ play a pivotal role. In addition to the standard trade balance fundamentals (which enters through the vector of coefficients $1/\gamma\ \beta$), this equation lends itself to interesting interpretation of the capital account stock determinants of the RER in the long run:

- Should a country successfully achieve a higher sustainable level of net foreign assets (f_t) (or equivalently a higher level of income earned from NFA (rf_t)) in the very long run, the real value of the currency in this country will eventually converge to an equilibrium at a more *appreciated* level.
- However, in the medium-to-long runs if the stock of NFA is less than the desired level (i.e. $f_d - f \rangle 0$), this country may have to depreciate its RER (i.e. run a current account surplus) to allow building of assets to desired levels.

4. Empirical issues

To facilitate subsequent empirical estimation, I make two simplifying adjustments to the model of equation 9. First, set $r^* = r_t^*$ and define the ratio of net foreign income to GNP (nfi) as $nfi = r_t^* . f_t^*$. This expression gives the readily available time series data on the interest income (or payment) from foreign assets (or debt) held by the domestic economy. Second, approximate $f_t^d - f_t$ by $\Delta NFA/GNP = \Delta RES/GNP - NKI/GNP$. This approximation allows us to write $f_t^d - f_t = \Delta resv_t - nki_t$, where $\Delta resv$ is the ratio of the change in reserves to GNP, and Δnki is the ratio of net capital inflows to GNP. Equation 9 can, therefore, be written as:

$$q_t=\frac{1}{\gamma}F_t'\beta-\frac{\theta}{\gamma}oda_t-\frac{1}{\gamma}nfi_t+\frac{\phi}{\gamma}(\Delta resv_t-nki_t)+\varepsilon_t \qquad (9')$$

The parametric restrictions imposed by the models of equations 9 and 9' could be tested against a more general reduced form models, such as:

$$q_t=F_t'\Omega+\lambda_1 oda_t+\lambda_2 nfi_t+\lambda_3\Delta resv_t+\lambda_4 nki_t+\varepsilon_t \qquad (9'')$$

where Ω, λ_1, λ_2, λ_3 and λ_4 are unrestricted parameters.

5. An equilibrium-correction model

If the cointegration relationship in equations 9 (9' or 9") above are valid, then the equation could not only be interpreted as a long-run equilibrium, but they are also consistent with dynamic equilibrium-correction specification (Engle and Granger, 1987). For example, the equilibrium-correction equation consistent with the unrestricted cointegration equation 9" is given in 10 below:

$$\begin{aligned}\Delta logq_{t+1} &= b_o(\Omega' F_t + \lambda_1 oda_t + \lambda_2 nfi_t + \lambda_3 \Delta resv_t + \lambda_4 nki_t - \log q_t) \\ &+ b_1 \Delta oda_{t+1} + b_2' \Delta F_{t+1} + b_3 \Delta resv_{t+1} + b_4 \Delta nki_t - b_5 DEVAL_{t+1} \\ &+ b_6 MACRO_{t+1} + \eta_{t+1}\end{aligned} \tag{10}$$

where DEVAL refers to the rate of nominal exchange rate devaluation (where the exchange rate is defined in terms of domestic currency per unit of the foreign currency), MACRO is an indicator of expansive (or restrictive) macroeconomic policy, and the disturbance η_{t+1} is a stationary random variable composed of the one-step-ahead forecast error in the RER (i.e. $\Delta\log q_{t+1} - {}_t\Delta\log q_{t+1}$).

The equilibrium-correction term $(\Omega' F_t + \lambda_1 oda_t + \lambda_2 nfi_t + \lambda_3 \Delta resv_t + \lambda_4 nki_t - \log q_t)$ in equation 10 clearly incorporates the forward-looking sources of RER dynamics. Suppose, for example, that we start from an initial condition of real overvaluation, i.e. the error-correction term is negative; now the self-correcting mechanism that calls for future depreciation will be set in motion. This effect is captured by the negative error-correction term and its positive coefficient in the $\Delta\log q_{t+1}$ specification. The speed by which this automatic adjustment operates depends on the parameter b_0, which falls in the interval (0,1). A value of b_0 equal to one signifies prompt adjustment over just one period, while the smaller the value of b_0, the slower the adjustment will be.

In addition to the equilibrium long-run impact of the fundamentals, which is captured by the cointegration vector Ω, temporary changes in the fundamentals may also have short-run effects which are captured by the vector $(b_1, b_2', b_3, b_4)'$. Short-run effects due to expansive or contractionary macroeconomic policy is given by the coefficient of MACRO. Finally, the short-run impact effects of nominal devaluation (given by the coefficient $-b_5$) is expected to lead to real currency depreciation. As pointed out by Edwards (1989) a nominal devaluation will help the adjustment process only to the extent that the initial situation is one of overvaluation, and only if the nominal exchange rate adjustment is accompanied by supporting macroeconomic policy; i.e. in terms of our equation, the equilibrium-correction term is negative and MACRO is not positive.

APPENDIX 2
SUSTAINABLE FUNDAMENTALS AND THE ERER INDEX: AN EX-ANTE FEER APPROACH

1. The capital account fundamentals

To be sure, there are no ready-to-use rules for determining the volume of private capital that can be sustained in the long-run. However, one could assume that there is, 'an "equilibrium" level of a country's liabilities that foreigners will be willing to hold in their portfolios' (Edwards, 1997:44). The analysis of this equilibrium – which naturally should vary over time according to the evolution of variables such as interest rates differentials, the perceived degree of country and exchange risk, the degree of openness, etc. – could provide some useful guidelines for broadly determining the level of sustainable capital flows. Using this framework, Edwards (1997) posits a model for analysis of the sustainable current account deficit, which permits the derivation of 'sustainable' levels of net capital flows and a desired rate of accumulation of reserves. The computations require assumptions about the demand for the country's bonds, real GNP growth, and the required level of imports consistent with target long-term growth. The sustainable current account deficit to GNP is given by:

$$C/y = g.k^* - m\,(R/y)^*\,\gamma \qquad (1.1),$$

where sustainable net capital inflow to GNP (nki) is equal to the first right hand side term:

$$nki = g.k^* \qquad (1.2),$$

and the desired change in the stock of reserves to GNP (dresv) is equal to the second right hand side term:

$$dresv = m\,(R/y)^*\gamma \qquad (1.3),$$

and where,

- g = long-run real GNP growth (or GDP growth),
- k^* = ratio of desirable stock of liabilities to GNP that foreigners are willing to hold,
- m = forward-looking equilibrium rate of growth of imports,
- $(R/y)^*$ = ratio of the level of reserves (equivalent to '9' months of imports) to 'long-run' level of GNP,
- γ = long-run ratio of imports to GNP.

Using the above solution of his model, Edwards (see below) provides estimates of sustainable nki for various combination of g and k* (which if zero change in reserves is assumed is the same as the sustainable current account deficit):

TABLE 3 (Edwards, 1997)

g L/Y=k*	2%	4%	5%	6%	7%
0.25	0.02	0.10	0.0125	0.015	0.0175
0.40	0.008	0.016	0.020	0.024	0.028
0.50	0.010	0.020	0.025	0.030	0.035
0.75	0.015	0.030	0.0375	0.045	0.0525
1.00	0.020	0.040	0.050	0.060	0.070

Using the above model I compute sustainable nki and dresv as follows:

1.1 nki = five years moving average of (g.k), where g = max (real GNP growth rate, 0.06), and k = 0.50 if g = 0.06 and 0.75 if g is larger than 0.06.

1.2 dresv = five years moving average of (m (R/y)*γ), where m = a period average rate of growth of imports (the periods are: 1978–79, 1980–85, 1986–89, 1990–95), (R/y)* is the ratio of 75 per cent of the annual level of imports to the period average level of GNP, and γ is the period average of the ratio of imports to GNP.

1.3 nfi (net foreign income to GNP ratio) = five years moving average {max (nfi, -0.04)}. This measure is not directly drawn from the model; however, it ensures that interest payments do not exceed 4 per cent of GNP. This, as explained by Baffes, Elbadawi and O'Connell (1997:50), 'represents a kind of a compromise between a normative scenario in which interest payments are capped at 2.5% of GDP and a positive scenario (essentially a feasibility calculation) that caps them at 5%.'

2. The current account fundamentals

2.1 oda (ratio of ODA to GNP) = five years moving average of {median of aid for each group of developing countries: low, low middle, high middle and high income}. This measure assumes that, for a given level of development, higher than the group median levels of foreign aid are not likely to be sustainable.

2.2 Terms of trade = five years moving average of (TOT). This measure simply assumes that the TOT are exogenous.

2.3 OPEN (ratio of trade to GNP) = five years moving average of {the residual of the regression of Log OPEN on logs of GNP and GNP squared}. This measure adjusts the crude measure of trade openness for differences in the size of the economy in a cross-section of countries.

2.4 PROD (ratio of GNP per capita relative to the average for OECD countries) = five years moving average of {the residual of the regression of PROD on log TOT, log TOT(-1), log aid (-1), log aid (-2)}. This measure purges shocks due to terms of trade and aid flows from the crude index of productivity.

2.5 GCON (ratio of government consumption to GDP) = five years moving average of {median of GCON for each group of developing countries: low, low middle, high middle and high income}. This measure assumes that, for a given level of development, higher than the group median levels of government consumption are not likely to be sustainable.

3. Scaling of the equilibrium RER index

Furthermore, it should be noted that the computed ERER index does not represent a unique equilibrium in terms of the intercept – the position of the ERER in a given year.[27] As such, we have to normalize the ERER index to equal the actual RER series in a base period according to some systematic criteria. A given year is included in the base period if the absolute sum of the differences between the actual and permanent fundamentals in the year belongs to the lowest quartile range of the differences across all the years in the period.

[27] This is because the rational expectation solution for the ERER is not unique. In addition, if we assume the unknown ERER function to be given by $g^*(x)$ and the corresponding rational expectation solution to be given by a general Taylor approximation $g(x/\Theta)$ – which is assumed to approximate $g^*(x)$ fairly closely; then using the regression (on the observed RER): $y = g(x/\Theta) + \varepsilon$ to estimate $g(x/\Theta)$ by $\hat{g}(x/\theta) = g(x/\theta)$ does not guarantee that $g(x/\theta)$ and $g(x/\Theta)$ are equal for each point x in the space of the fundamentals (e.g. see Elbadawi (1983), on the validity of the Taylor series interpretation of the regression estimator).

INSERT APPENDIX TABLE 1

DATA APPENDIX

COUNTRIES

Sub-Saharan African countries include Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Côte d'Ivoire, Gabon, Gambia, Ghana, Kenya, Madagascar, Malawi, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

North African countries includes Algeria, Egypt, Morocco and Tunisia.

East Asian countries includes China, Indonesia, Korea (Rep.), Malaysia, Singapore, Thailand.

Latin American countries includes Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Trinidad & Tobago, Uruguay, Venezuela.

Others include India, Iran, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Syrian Arab Republic, Turkey.

SOURCES

All national accounts figures (including GDP, GNP, government consumption, public investment, capital inflows, international reserves, infrastructure) were obtained from the World Development Indicators database (World Bank; 1997).

All balances of payments and monetary figures (including nominal and real exchange rates, terms of trade) were obtained from the IMF database IFS in CDROM.

DEFINITIONS

Net private capital inflows

Net capital inflows consist of private debt and non-debt flows. Private debt flows include commercial bank lending, bonds, and other private credits; non-debt private flows are foreign direct investment and portfolio equity investment.

Government consumption

General government consumption includes all current expenditures for purchases of goods and services by all levels of government, excluding most government enterprises. It also includes capital expenditure on national defense and security.

Net factor income from abroad

Net factor income includes the net labour income and net property and entrepreneurial income components of the SNA. Labour income covers compensation of employees paid to non-resident workers. Property and entrepreneurial income covers investment income from the ownership of foreign financial claims (interest, dividends, rent, etc.) and non-financial property income (patents, copyrights, etc.). Data are in current US dollars.

Gross international reserves

Gross international reserves comprise holdings of monetary gold, special drawing rights, the reserve position of members in the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year end (December 31) London prices.

Gross domestic investment

Gross domestic investment consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets cover land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential buildings.

Official development assistance and official aid

Official development assistance (ODA) consists of net disbursements of loans and grants made on concessional terms by official agencies of the members of DAC and certain Arab countries to promote economic development and welfare in recipient economies listed as developing by DAC. Loans with a grant element of more than 25 per cent are included in ODA. ODA also includes technical cooperation and assistance. Official aid refers to aid flows from official donors to the transition economies of Eastern Europe and the former Soviet Union and to certain advanced developing countries and territories as determined by DAC. Official aid is provided under terms and conditions similar to those for ODA.

Labour force

Total labour force comprises people who meet the ILO definition of the economically active population: all people who supply labour for the production of goods and services during a specified period. It includes both the employed and unemployed. While national practices vary in the treatment of such groups as the armed forces and seasonal or part-time workers, in general the labour force includes the other unpaid caregivers and workers in the information sector.

Inflation

Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a fixed basket of goods and services. In general, a Laspeyres index formula is used.

Electric power production (million kwh)

Electric power production refers to gross production in kilowatt-hours by private companies, cooperative organizations, local or regional authorities, government organizations, and self-producers. It includes consumption by station auxiliaries, any losses in the transformers that are considered integral parts of the station, and electric energy produced by pumping installations. It covers electricity generated from all primary sources of energy – coal, oil, gas, nuclear, hydro, geothermal, wind, tide and wave, and combustible renewables – where data are available.

Fax machines

Fax machines is the estimated number of facsimile machines connected to the public switched telephone network, per 1,000 people.

Rail traffic

Rail traffic is the number of rail traffic units (the sum of passenger-kilometers and ton-kilometers) per million US dollars of GDP.

Roads

Paved roads that have been sealed with asphalt or similar road-building materials.

Telephone mainlines

Telephone mainlines refer to telephone lines connecting a customer's equipment (such as a telephone or facsimile machine) to the public switched telephone network. A mainline is normally identified by a unique number that is the one billed. Data are presented here as mainlines per 1,000 people; this is a measure of telephone density or penetration.

Export duties

Export duties include all levies collected on goods at the point of export from the country. Rebates on exported goods comprising repayments of previously paid general consumption taxes, excises, or import duties should be deducted from the gross receipts of the appropriate taxes, not from export duty receipts.

Import duties

Import duties comprise all levies collected on goods at the point of entry into the country. They include levies for revenue purposes or import protection, whether on a specific or ad valorem basis, as long as they are restricted by law to imported products.

Terms of trade

A ratio of the export to import price indexes (1987=100).

Real exchange rate

A multilateral index defined as a ratio of the nominal effective exchange rate index multiplied by the CPIs of major trading partners to the CPI of the country in question. This is the reciprocal of an index constructed by the IMF, normalised to equal 100 in 1980. No information about trade weights, however, is provided.

Imports of machinery goods

The total machinery exports by developed countries to the country in question. This is a proxy for imports of capital goods.

Non-traditional exports

Defined as all exports that are not classified as 'traditional', where the latter is defined as: the ten largest three-digit commodity groups in the country's exports in the base year (1983–84), unless these ten do not account for at least 75 per cent of those exports, in which case more three digit groups are added until at least 75 per cent is reached (World Bank, 1997).

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