IMF Working Paper

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Monetary and Capital Markets Department

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Abstract

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This paper examines interest rate spreads in English-speaking African countries. Higher spreads were found to be associated with lower inflation, a greater number of banks, and greater public ownership of banks. Higher deposit interest rates were found to be associated with lower interest rate spreads, but higher net interest margins. A large increase in spreads in the late 1980s and 1990s may be explained by a strengthening of financial sector supervision. Limited data suggested that poor governance, weak regulatory frameworks and property rights, and higher required reserve ratios are associated with higher spreads.

I. INTRODUCTION

Deposit-lending rate spreads are closely related to the banking sector's ability to channel savings into productive uses. Several studies have looked at the causes and implications of high spreads, but in some regions, particularly Africa, spreads have received less attention. The purpose of this paper is to address part of this gap by examining interest rate spreads in a selected group of African countries. After discussions on this topic with the IMF Monetary and Financial Systems Department's technical assistance wing responsible for English-speaking African countries, it was decided to focus this analysis on English speaking African countries.

The structure of this paper is as follows. Section two provides background and theory on interest rate spreads and their determinants. Section three describes the data and the countries analyzed. Section four examines a list of factors that might affect interest rate spreads and examines simple relationships between these variables and spreads. Section five provides multivariate analysis of factors that determine interest rate spreads. Section six examines the impact interest rate spreads have on growth and investment. Section seven provides a summary and conclusions, including policy recommendations, and an appendix looks at the behavior of interest rate spreads.

II. BACKGROUND AND THEORY

Several studies of bank spreads have examined worldwide country sets or specific non-African regions. One of the more recent and broader studies of the determinants of spreads in the banking system is Demirgu, Kunt, and Huizinga (1999). They found several variables to be correlated with higher spreads, including higher inflation, higher real interest rates, and lack of banking sector competition. They also found that some variables—institutional features such as lack of creditor rights or corruption, and reserves—matter more in developing countries than in developed countries. In a related paper, Claessens, Demirgüç-Kunt, and Huizinga (1998) found that foreign banks had higher returns to capital than domestic banks, and that entry by foreign banks lowered the returns to capital of domestic banks. Demirgüç-Kunt, Laeven, and Levine (2003) found that inflation was associated with higher bank net interest margins, and that concentration and tighter regulations were too, but that these latter relationships broke down when indicators of economic freedom and property rights were controlled for.

Several regional studies have been conducted. Gelos (2006) found that Latin American banks had high spreads because of higher interest rates, less efficient banks, and larger reserve requirements than banks in other regions. Brock and Rojas-Suarez (2000) found that higher operating costs and higher nonperforming loans (NPLs) were related to higher spreads. Randall (1998) found that the share of loans going to the public sector in the Carribbean was negatively correlated with spreads (one possible explanation for this was that greater government involvement resulted in larger transactions that were more efficient to manage). Chirwa and Mlachila (2004) found that spreads in Malawi increased after financial liberalization because of increases in reserve requirements and provisioning. Barajas, Steiner, and Salazar found that in Columbia spreads widened in the 1990s as a result of high NPLs of

the public banks and private banks' greater responsiveness to credit quality and more careful approach to risks. Banco Central do Brasil (1999) identified credit risk, taxes, and overhead costs as the main determinants of the high ex-ante spreads in Brazil (more important even than the high level of required reserves, which are nevertheless significant).

Higher costs would logically require banks to charge higher spreads in order to remain profitable (Randall 1998, Gelos 2006). Most studies, including the regional ones cited above, have reached this conclusion. There are many sources of higher costs that have different implications for other aspects of bank management. These include personnel costs, required reserve ratios, poor governance, NPLs, and general inefficiency. Several measures of these variables are included in the analysis. Higher capital to asset ratios would also increase costs, though the direction of causation in this relationship could be uncertain. Berger (1995) noted that higher spreads allow banks to accumulate higher profits to set aside to increase their capital stocks.

Higher spreads may be a result of higher costs, or they could be a result of factors that allow banks to become more profitable, such as a reduction in competition. Some studies have indicated that higher concentration in the banking sector leads to higher spreads by reducing competition (Demirgu, Kunt, and Huizinga 1999). Berger and Hannon (1989) suggested that greater concentration could lead to higher profits, but possibly not to higher lending rates since higher concentration can be associated with greater efficiency. Claessens and Laeven (2004) suggested that concentration does not reduce competition. Several measures of competition are examined in this paper.

Competition could also be affected by the size of the banking sector or the size of the economy. In a smaller economy the concentration of the banking sector would be greater and the number of banks smaller. However, in some small countries a very few large local companies represent the only reputable borrowers and banks compete fiercely to lend to them. The effect of reducing the size of the economy or the size of the banking sector on spreads could be negative if the small size results in a greater reduction in the number of reputable borrowers than in the number of banks.

Uncertainty could be another source of higher spreads since banks would require a risk premium to compensate for the added volatility. Higher inflation or higher interest rates would be sources of uncertainty, and several studies have found this relationship (Demirguc-Kunt and Huizinga 1999 and Banco Central do Brasil 1999 for inflation, and Demirgu, Kunt, and Huizinga 1999 for interest rates). Changes in inflation or interest rates would seem more directly related to uncertainty. Ho and Saunders (1981) found that interest rate volatility leads to larger spreads. Variability of the exchange rate could also be a source of uncertainty.

III. Data and Countries Analyzed

This analysis focused mainly on two different measurements of interest rate differentials. First a raw spread was measured as the difference between a single lending rate—such as the prime rate or its equivalent, chosen to be uniform across countries—and a similarly uniform deposit rate.

Arriving at a uniform measurement of interest rate spreads can be problematic since most countries have multiple rates. The FSAP report for Kenya, for example, found a wide variety of lending and deposit rates which yielded spreads ranging from 7 to 20 percent depending on which rates were used. Some banks specialized in particular types of lending and might have charged rates that did not necessarily match overall market trends. Therefore the second measurement that was used was net interest income to assets. Unfortunately these data were only available for 1997-2004. The net interest margin captures the effects of variations in the types of lending that banks engage in. If banks' loan portfolios are more heavily oriented towards risky clients their net interest margins ought to be larger (to compensate for the risk and higher cost) relative to their interest rate spreads, which would be based on standardized rates and not affected by the composition of lending. Net interest margins are easier to measure uniformly since there is no need to decide which rates are comparable across countries.

Data were collected for the period 1975-2004. WEO and IFS data on interest rates and macroeconomic aggregates were used. Data on bank concentration and lending structure were collected from FSAP reports, central bank web pages, and the World Bank, including a Database on Financial Development and Structure.

Finally, various data for 1997-2004 were collected from BankScope[1], including net interest income to assets, concentration, public and foreign ownership shares, provisioning, NPLs, and costs. Bank by bank data allowed for the construction of Herfindahl indices—which was done on the basis of assets as well as on loans—and the construction of shares of the banking sector controlled by the public sector and by foreign sources.[2]

There were, of course, many gaps in the data. The analysis focused on unbalanced panel regressions. Additions and deletions of variables sometimes affected results more by changing the number of observations or time period than by changing the estimated model. Financial sector indicators were scarce and not always comparable across countries (particularly in the case of nonperforming loans and measurements of capital).

It was assumed that banks set spreads according to the real return that they earn, meaning that spreads must be adjusted for price increases. The raw interest rate spread and net interest

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[1] Data were collected for 18 countries: Botswana, Ethiopia, Gambia, Ghana, Kenya, Lesotho, Malawi, Mauritius, Mozambique (Portuguese speaking), Namibia, Nigeria, Rwanda (English and French speaking), Sierra Leone, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe. Liberia is excluded because it is in a post-conflict situation and data are limited. In Eritrea English is the language of higher education, though not an official language, but little useful data are available. South Africa is a larger and more developed economy than the others, and in Seychelles, as in Rwanda, some French is spoken. Adding these countries to the sample did not qualitatively change the results.

[2] In some cases assumptions needed to be made when share information was missing. If no information was available the bank was assumed to be a private domestic bank, unless the name strongly suggested otherwise. In some cases stockholders that appear to be private or domestic are in turn owned by public or foreign entities. When this could be determined adjustments were made to the shares. If a bank was majority public owned it was given a 100 percent public share.

margins were therefore adjusted using December-to-December monthly average inflation by applying the formulas: adjusted spread = spread / (1+inflation) and adjusted net interest margin = net interest margin / (1+inflation). When montly average inflation wasn't available to create a December to December index, annual average inflation was used instead.

IV. FACTORS AFFECTING SPREADS

A. Time

The increase of adjusted interest rate spreads over time, noted above, was confirmed by running a simple regression of the adjusted interest rate spread on the year. The trend during 1977-2003 was for an annual increase in inflation adjusted spreads of 0.29 percentage points; a substantial increase. Regressing the other measures of interest rate spreads from BankScope on a time trend did not yield significant results, but the data only went back to 1997 and the choice of time frame significantly affected the results. Regressing adjusted interest rate spreads only from 1997 yielded similar insignificance. In fact, the latest starting year for a regression in which the time variable was significant is 1992. Because of this observation, regressions covering a period starting before 1993 included a YEAR term, while other regressions did not.[3]

Regressions of adjusted interest rate spreads 1/

Sample Period	1977 - 2004	1997 - 2004	1977 - 1986	1986 - 2000
Constant	-581	-54	384	-914
	(-6.62)	(-0.28)	(2.52)	(-7.18)
Year	**0.30**	0.03	**-0.19**	**0.46**
	(6.70)	(0.33)	**(-2.49)**	**(7.24)**
AR (1)	0.66	0.30	0.10	0.49
	(17.73)	(3.61)	(0.96)	(8.79)
Adjusted R-Square	0.76	0.86	0.64	0.75
DW	2.22	2.03	2.12	2.11
Observations	399	133	114	234

1/ T-statistics are shown in parentheses.

None of the data that were included in regressions greatly diminished the significance of the time variable in regressions going back before the mid 1990s. This strongly suggests that a significant variable or variables was missing from the regressions. There is of course much data that was unavailable and there are several possible candidates for the missing variable(s). One possibility is that improvements in regulation and supervision have resulted in increased spreads. Such improvements are costly for banks and their customers.

[3] Because of serial correlation, all regressions include an AR(1) term. Higher order AR terms do not appear to be relevant since the addition of a single AR(1) term brought Durbin-Watson statistics close to 2, higher order AR(1) terms were not significant, and there was no obvious rationale for expecting higher order serial correlation.

Previously, under weaker supervisory and regulatory regimes, taxpayers would have born the cost of risk and uncertainty in the form of bank bailouts. Barajas, Steiner, and Salazar (1999) found that in Columbia spreads widened in the 1990s partly as a result of private banks' greater responsiveness to credit quality and more careful approach to risks. Chirwa and Mlachila (2004) concluded that spreads increased in Malawi as a result of financial liberalization, which led to increases in reserve requirements and provisioning.

Little of this liberalization took place during the period 1975-86, and indeed a regression on the time variable during this period yielded a negative coefficient. Meanwhile a regression on the period 1986-2000 yielded a strong positive coefficient.

B. Competition

In a free-market oriented financial system spreads might be expected to be negatively related to factors affecting competition, including concentration, the number of banks, and the size of the market, since reduced competition would allow banks to profit from higher spreads. But these factors were not found to influence interest rate spreads in this study.

Concentration of the banking sector would be expected to increase spreads by reducing competition. In fact, no evidence of such a relationship was found in this study. A simple regression of adjusted spreads on concentration—defined as the asset share of the three largest banks—yielded a relationship that was negative and significant, though it lost its significance if the YEAR term was added. Regressing on a Herfindahl index yielded insignificant results, and regressing on number of banks yielded a positive relationship almost significant at the 95 percent level; in other words having more banks was associated with higher spreads.

Effects of Measures of Concentration 1/

Dependent variable 2/					Interest income/
	Spread	Spread	Spread	Spread	Assets
Constant	13	-738	10	9	6
	(8.04)	(-3.48)	(15.72)	(20.76)	(18.60)
Share of 3 largest banks	**-6.11**	-1.25			
	(-2.56)	(-0.48)			
Hirfendahl index			0.67		
			(0.41)		
Number of banks				0.08	0.04
				(1.93)	(1.37)
Year		0.37			
		(3.54)			
AR (1)	0.20	0.17	0.26	0.24	0.11
	(2.58)	(2.28)	(3.07)	(2.82)	(1.21)
Adjusted R-Square	0.84	0.85	0.88	0.88	0.80
DW	2.62	2.40	1.78	1.81	2.31
Sample Period	1991 - 2000	1991 - 2001	1998 - 2004	1998 - 2004	1998 - 2004
Observations	96	112	117	116	129

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

Regressing the ratio of net interest income to assets (adjusted for inflation) instead of the inflation adjusted spread yielded similar results, but with less significance of the number of banks. Also substituting a Herfindahl index of loan concentration for an index of asset concentration made little difference.

The number of banks might capture the presence of smaller banks and diversification of lending more than an overall concentration index which focuses on the larger banks. Smaller and more diversified banks could be less efficient if they do not benefit from economies of scale or if they do more business with small clients, so they might have to charge higher spreads. Or more diversified banks might simply be able to charge higher spreads because their differentiation would give them more market power.

Another possible explanation for the finding of a negative relationship between concentration and spreads is that more diverse banking systems may be more common in countries with well supervised financial sectors since both may be associated with greater financial sector development. Supervision may also be seen as being in greater need in countries that have many banks, and in countries where there is a small number of powerful banks—perhaps state run—there may be more effective political pressure opposing stronger supervision. Oversight may increase costs by requiring better provisioning, higher levels of reserves, and limiting credit expansion. This could require banks to charge higher spreads to cover the increased costs. There is evidence that greater concentration is associated with a lower probability of a country facing a systemic banking crisis (Beck, Demirgüç-Kunt, and Levine 2005), so a more diverse banking sector might require better supervision.

In countries with a small number of powerful banks, the large banks could restrict competition by keeping spreads artificially low. In the case of a large public sector bank there would be less of a profit constraint because the bank could be recapitalized by the government, and even in the case of a large private bank there could be an expectation of assistance when needed.

Policy responses to this result are difficult to determine since there is more than one possible explanation. To the extent that better supervision is responsible for the higher spreads this cost should be noted when considering the overall cost of the supervision and efforts should be made to reduce these costs, particularly administrative costs, though it is likely that these costs would simply be necessary in order to ensure the stability of the banking sector. To the extent that increased spreads are a result of banks successfully differentiating their products or their markets in order to gain market power, the authorities would need to be aware of this development in order to take steps to maintain competition, if necessary. And authorities should be alert to the possibility that large banks could stifle competition by maintaining low spreads, particularly if they are able to rely on government support when they need it.

C. Size of the economy

A simple regression of adjusted spreads on **size of the economy** (real GDP in US dollars) yielded no significant results, nor did a regression on real broad money in US dollars or real credit to the private sector in US dollars. Regressing adjusted net interest income to assets, however, yielded strong positive significance on real GDP in US dollars, on real broad

money in US dollars, and on real credit to the private sector in US dollars. Using purchasing power parity GDP instead of real GDP lessened the significance in the interest rate spread regression and enhanced it in the adjusted net interest income to assets regression.

A larger economy might be expected to allow for economies of scale and greater competition (Randall 1998), so in that sense the results are unexpected. However, it is possible that a larger economy allows for greater specialization and deeper financial markets where riskier borrowers have better access to funds. This could result in a larger proportion of banks' loan portfolios being devoted to retail and specialized lending and thus net interest income being higher even without any individual lending rate changing. This should be seen as a positive rather than a negative development. Meanwhile smaller economies are more likely to be dominated by a large state-owned bank, which in many cases does not operate subject to a strict profit constraint and therefore is able to charge lower spreads.

Effects of the Size of the Economy and the Banking Sector 1/

Dependent variable 2/		Interest income/		Interest income/
	Spread	Assets	Spread	Assets
Constant	-592	5.11	-664	5.28
	(-6.52)	(17.45)	(-6.43)	(12.16)
Real GDP (in US$)	0.00	**0.07**		
	(0.48)	**(3.35)**		
Bank assets/GDP			1.80	1.43
			(0.99)	(1.23)
Year	0.30		0.34	
	(6.60)		(6.48)	
AR (1)	0.66	0.19	0.59	0.14
	(17.79)	(2.52)	(13.06)	(0.93)
Adjusted R-Square	0.76	0.82	0.69	0.86
DW	2.22	2.57	2.35	2.79
Sample Period	1977 - 2004	1998 - 2004	1977 - 2002	1998 - 2002
Observations	399	129	306	52

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

D. Size of the banking sector

A similar logic might apply to the size of the banking sector. Higher bank assets to GDP could indicate a more developed financial sector with more diversity of services and more profit-oriented banks which could lead to higher average interest income, or it could be associated with more competition or greater efficiency which could lead to lower spreads. The finding in this study is that the size of the banking sector is not significant in regressions with either spreads or average interest income.

E. Operating costs

High overhead costs in the banking sector might be expected to be associated with higher spreads since higher spreads would be required to cover the additional costs. However, the relationship is found to be weak in this study. Several variables measuring costs were examined: (a) two measures of the accounting value of a bank's overhead costs as a share of its total assets; one taken from the most recent BankScope data (operating expenses/assets), and another less recent BankScope dataset—not always consistent with the first in years when there is overlap—that was used because it had better coverage of the past (total costs); and (b) recent BankScope measures of salaries as a share of total assets (salaries/assets).

While all of the coefficients on these variables are positive in a regression using the adjusted interest rate spread as the independent variable, none of them is significant. However, regressing adjusted net interest income to assets instead of the adjusted interest rate spread yields significant coefficients for salaries to assets and for total operating expenses to assets.

Effects of Costs 1/

Dependent variable 2/		Interest income/		Interest income/		Interest income/
	Spread	Assets	Spread	Assets	Spread	Assets
Constant	-584	5.019	9.705	5.134	8.850	4.682
	(-3.10)	(3.86)	(16.30)	(12.53)	(10.14)	(9.84)
Total costs	10.37	16.80				
	(0.62)	(0.86)				
Operating expenses/Assets			2.97	**12.75**		
			(0.35)	**(2.23)**		
Salaries/Assets					28.91	**45.60**
					(0.85)	**(2.53)**
Year	0.30					
	(3.15)					
AR (1)	0.09	0.05	0.26	0.18	0.21	0.14
	(0.90)	(0.37)	(2.98)	(2.08)	(2.19)	(1.36)
Adjusted R-Square	0.88	0.80	0.88	0.81	0.89	0.82
DW	2.51	2.49	1.78	2.36	1.74	2.25
Sample Period	1992 - 2001	1998 - 2001	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004
Observations	94	66	114	129	96	111

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

One might expect a slightly stronger effect of higher costs in a regression with adjusted net interest income to assets as the dependent variable since that variable would more directly relate to banks' abilities to cover their costs, though the difference in this case is more dramatic than one would expect. An explanation of why the relationship might be so much stronger with net interest income to assets than with spreads could be that in countries where banks are more involved in retail and SME lending as opposed to making large loans to enterprises or SOEs banks will have higher operating costs and at the same time will earn more net interest income because spreads are higher in retail banking than in enterprise banking in order to cover the higher costs. The deposit-lending spreads, which only takes into

account the difference between a uniform lending rate (the prime rate or its equivalent) and a uniform deposit rate, would not capture the effect of a shift from enterprise and SOE lending to retail and SME lending. The profile of lending rates might not change, but the average lending rate might change because of a change in the composition of lending. A similar story could be told regarding the move away from large-state-owned banks.

The coefficient and significance are stronger for salaries than for all costs. This is partly because total costs include interest costs, thus diluting the results. Increases in operating costs and salaries would be more closely related to a move towards retail lending. Also a high level of salaries may be more associated with other factors such as political pressure and nepotism than overall operating costs.

This suggests that in some circumstances higher costs should be welcomed, as in cases where this is due to a movement of the banking sector into retail or SME services. Higher salary and operating costs should be seen as a negative sign of reduced efficiency in the case of large banks that do not have higher personnel needs because of smaller-scale lending.

F. Loan quality

Data on **NPLs** were limited to the recent BankScope data for 1997-2004. NPLs were not significant in a regression using the adjusted interest rate spread as the dependent variable, but had a significant positive coefficient in a regression using adjusted net interest income to assets. The higher significance of NPLs in the adjusted net interest income to assets regression could simply reflect, again, the effect of shifting to retail and SME banking since such a shift could be associated with higher NPLs and higher net interest income, without being associated with an overall profile of higher spreads.

Loan Quality and Capialization 1/

Dependent variable 2/		Interest income/		Interest income/		
	Spread	Assets	Spread	Assets	Spread	Spread
Constant	9.085	5.471	9.307	6.448	7.133	8.649
	(23.61)	(22.58)	(17.10)	(26.93)	(6.18)	(14.53)
NPLs	0.03	**0.05**				
	(0.68)	**(2.03)**				
Provisioning			0.00	**-0.003**		
			(0.11)	**(-1.99)**		
CAR ratio					0.11	
					(1.72)	
Capital/assets						**0.12**
						(2.28)
AR (1)	0.45	0.21	0.46	0.26	0.26	0.25
	(4.35)	(2.03)	(4.19)	(2.41)	(1.59)	(2.95)
Adjusted R-Square	0.90	0.85	0.90	0.83	0.92	0.89
DW	1.67	2.55	1.67	2.51	2.66	1.88
Sample Period	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004
Observations	82	89	76	83	26	116

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

Provisioning levels, also from BankScope for 1997-2004, were also not significant in regressions using adjusted interest rate spreads, but were significant in regressions with adjusted net interest income to assets. Low provisioning could require banks to increase net income assets in order to address the excess provisioning. Retail banking could be more strongly associated with lower levels of provisioning if a large share of the retail lending were mortgage lending since these loans could be viewed by regulators as well-secured and requiring less provisioning. (Unfortunately there weren't sufficient data to test this hypothesis.)

G. Capitalization

Data on **capitalization** were limited to 26 observations from 1998 to 2003. The results are that higher capital to total assets ratios are associated with higher spreads, as would be expected since higher spreads would be needed to offset the higher costs of greater capitalization. A simpler measure of capital to asset ratios was available from BankScope for a wider range of countries, and similar results were obtained.

The causality of the relationship is ambiguous and could run in two directions. Low levels of capitalization could require banks to raise spreads in order to meet capital requirements. At the same time, higher spreads would help banks to increase their capital levels. Furthermore, inefficient state-owned banks often charge low spreads and have problems with capitalization (particularly since they can usually rely on liquidity injections from the government if necessary).

H. Inflation

Higher **inflation** might be expected to lead to higher inflation adjusted spreads if it causes banks to charge a risk premium, but the data in this study indicated that higher inflation was strongly associated with lower inflation-adjusted spreads in English speaking African countries. Regressing adjusted spreads on inflation yielded the result that an additional 12 points of inflation was associated with about a half point decline in the inflation-adjusted spread with high significance. Similar results were obtained by regressing adjusted net interest income to assets on inflation. End of period inflation was more significant than year average inflation.

Inflation 1/

Dependent variable		Interest income/		Interest income/		
	Spread 2/	Assets 2/	Spread	Assets	Spread 2/
Constant	-513	6.693	-614	7.051	-592
	(-5.50)	(39.53)	(-5.24)	(36.43)	(-6.37)
Inflation (end of period)	**-0.04**	**-0.06**	0.00	**-0.03**	
	(-7.87)	**(-5.88)**	(0.19)	**(-2.61)**	
Change in inflation					0.00
					(0.03)
Year	0.26		0.31		0.30
	(5.59)		(5.31)		(6.44)
AR (1)	0.67	0.19	0.69	0.24	0.63
	(17.06)	(2.31)	(17.31)	(3.06)	(15.30)
Adjusted R-Square	0.80	0.86	0.79	0.88	0.77
DW	2.15	2.27	2.10	2.33	2.19
Sample Period	1977 - 2004	1998 - 2004	1977 - 2004	1998 - 2004	1978 - 2004
Observations	363	121	363	121	353

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

A possible explanation for this relationship would be found in the link to monetary policy. Lending rates typically vary more than deposit rates, so looser monetary policy—which would lead to higher inflation—would be associated with lower lending rates and therefore lower spreads. Similarly, if banks charge lower spreads this would be associated with lower lending rates, faster credit expansion, and higher inflation.

Inflation would also be associated with the presence of large dominant banks that lend irresponsibly, and which have low spreads because they are not fully responsible to their shareholders. Large state-owned banks and dominant banks that are not state-owned but which can be pressured by the government would also fit this pattern. The relationship could even be affected simply by government interference in the banking sector, by a willingness of the authorities to subjugate sound economic management to political considerations, including by pressuring banks to lend at low rates to support the economy.

It should be noted that this paper examines spreads adjusted for inflation. In regressions of unadjusted spreads inflation was not found to be significant. This could suggest that banks do not take the erosion of their profits into account when determining how to adjust interest rates to compensate for inflation. However, in regressions of unadjusted net interest income to assets inflation remains significant with a negative coefficient.

I. Changes in inflation

Changes in inflation could lead to higher spreads by increasing the risk premia that banks need to charge. But the results do not indicate that changes in inflation have much effect in English speaking Africa. Annual changes in inflation (percent and absolute changes) and

three year variances are insignificant in regressions of the adjusted spread or the adjusted net interest income to assets.

J. Broad money growth

Higher spreads are associated with lower nominal **broad money growth**, but the significance disappears when inflation is added to the regression. The rate of growth of broad money is significant in regressions of adjusted interest rate spreads and adjusted net interest income to assets. However when broad money growth and inflation are included in the same regression, inflation remains significant, while broad money does not. This suggests that monetary policy does not fully explain the relationship between inflation and spreads; some linkage to bank behavior is likely. Similar results are obtained when deposit growth is used instead of broad money growth. Growth of credit to the private sector also yields a negative coefficient, but it is not significant.

Broad Money Growth 1/

Dependent variable 2/	Interest income/		Interest income/	
	Spread	Assets	Spread	Assets
Constant	-596.148	6.384	-517.672	6.819
	(-7.21)	(33.18)	(-5.74)	(34.28)
Broad money growth	**-1.71**	**-1.58**	-0.28	-0.99
	(-2.73)	**(-2.39)**	(-0.41)	(-1.04)
Inflation (end of period)			-0.04	-0.05
			(-7.52)	(-3.97)
Year	0.30		0.26	
	(7.30)		(5.83)	
AR (1)	0.64	0.18	0.66	0.21
	(16.58)	(2.05)	(16.37)	(2.58)
Adjusted R-Square	0.77	0.82	0.81	0.86
DW	2.21	2.34	2.18	2.28
Sample Period	1977 - 2004	1998 - 2004	1977 - 2004	1998 - 2004
Observations	388	127	353	119

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

K. Interest rates

In a regression of adjusted spreads lending rates have a significant positive coefficient and deposit rates have a significant negative coefficient. This comes as no surprise since spreads are calculated as lending rates minus deposit rates. What is surprising, however, is that in regressions of adjusted net interest income to assets all interest rates that were tested—including deposit rates—had positive coefficients, most of which were significant. Most of these coefficients have higher significance when inflation is added to the regression, so the interest rate is not simply capturing the effect of inflation.

Again, this could be explained by the effects of diversification of and competition in the banking sector. A country with a small number of large banks, perhaps state-owned or state-influenced, may have low deposit rates and low spreads. A similar country that also has a number of smaller banks that make riskier or more diversified loans could have more competition for deposits, raising deposit rates and narrowing deposit-lending spreads. The adjusted interest rate spread would therefore decline. However the smaller banks could lend to smaller borrowers, riskier borrowers, or more diversified borrowers at higher interest rates. Spreads—measured with respect to a base lending rate such as the prime rate—would not change, but net interest income could increase because of the change in the composition of lending.

Similarly, a country that has a less-developed banking system that suffers from public ownership, public influence, or lack of competition could offer low deposit rates, have high base lending rates, and meanwhile do enough lending on preferred terms to special clients not captured in the data on spreads that net interest income is lower even though reported spreads are higher.

Interest and Exchange Rates 1/

Dependent variable 2/		Interest income/		Interest income/		Interest income/
	Spread	Assets	Spread	Assets	Spread	Assets
Constant	-494	5.794	-579	4.948	-704.122	5.999
	(-5.06)	(16.45)	(-6.64)	(15.92)	(-7.57)	(50.62)
Deposit rate	**-0.08**	**0.07**	**-0.08**	**0.09**		
	(-3.43)	**(2.85)**	**(-2.95)**	**(3.65)**		
Inflation (end of period)	-0.04	-0.05				
	(-8.15)	(-4.96)				
Exchange rate variance (3 yr.)					0.00	0.00
					(-0.04)	(-0.03)
Year	0.25		0.29		0.36	
	(5.15)		(6.73)		(7.65)	
AR (1)	0.69	0.23	0.66	0.20	0.62	0.12
	(17.97)	(2.48)	(17.41)	(2.09)	(14.92)	(1.37)
Adjusted R-Square	0.81	0.87	0.77	0.83	0.76	0.80
DW	2.18	2.29	2.24	2.27	2.19	2.30
Sample Period	1977 - 2004	1998 - 2004	1977 - 2004	1998 - 2004	1980 - 2004	1998 - 2004
Observations	363	120	399	128	348	129

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

L. Exchange rates and external sector

The **variability of the exchange rate** is not associated with higher or lower interest rate spreads. Exchange rate variability was measured as the variance of the nominal exchange rate versus the US dollar over the previous 3 years and over the previous 5 years. Neither of these variables was significant in a regression of adjusted interest rate spreads, net interest rate margins, or adjusted net interest income to assets.

This result is somewhat surprising, since increased exchange rate variability should lead to greater uncertainty and higher risk premiums. Even if banks in English-speaking Africa do little international lending and are exposed to little direct exchange rate risk, they would surely have clients in the tradables sector whose ability to repay would be affected.

No relationship was found between spreads and foreign reserves, foreign liabilities, or foreign direct investment (in contrast with Gischer and Juttner 2002).

M. Public sector involvement

Public sector involvement is widely viewed as being associated with higher spreads, and indeed this is the case in Africa. Regressing adjusted interest rate spreads on the **publicly controlled share of banking sector assets** yields a significant positive coefficient. Regressing adjusted net interest income to assets instead of spreads also yields a positive relationship, but it is not significant.

Public Sector Involvement 1/

Dependent variable 2/		Interest income/		Interest income/
	Spread	Assets	Spread	Assets
Constant	8.653	5.476	-651.136	3.907
	(16.57)	(14.44)	(-6.83)	(3.93)
Public ownership share of banks	**5.58**	2.31		
	(2.57)	(1.46)		
Fiscal expenditure/GDP				**6.99**
				(2.11)
Fiscal primary balance/GDP			**-0.09**	
			(-2.26)	
Year			0.33	
			(6.91)	
AR (1)	0.27	0.16	0.64	0.08
	(3.35)	(1.81)	(16.24)	(0.87)
Adjusted R-Square	0.89	0.81	0.76	0.81
DW	1.95	2.36	2.15	2.24
Sample Period	1998 - 2004	1998 - 2004	1981 - 2004	1998 - 2004
Observations	117	129	370	129

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

The common explanations for high interest rate spreads in publicly owned banks are that the banks are mismanaged and have to charge high spreads to remain profitable, and that public involvement in the banking sector stifles competition. The difference in results depending on whether spreads or net interest incomes are used in the regression suggests that part of the explanation may be that publicly owned banks provide credit to industries that the government wants to promote on favorable terms and have to make up for these losses by charging higher rates on other loans. This would result in higher reported lending rates, while interest income would rise by less because of the losses from issuing credits at preferential

rates. Claims on state owned enterprises were not found to be significant in any regression of adjusted interest rate spreads or adjusted net interest income to assets, so public sector involvement would appear to affect all lending including private sector lending.

There could also be indirect relationships between government ownership of banks and spreads. La Porta, de-Silvanes, and Schleifer (2002) found rates of government bank ownership to be higher in poorer countries with backward financial systems, interventionist governments, and poor property rights. These third factors could also contribute to higher spreads.

A relationship was found between spreads and the **size of government**, but it is not robust. No evidence of crowding out was found. There is a significant positive coefficient on the GDP share of **government expenditures** in a regression of adjusted net interest income to assets (which remains significant if the share of publicly controlled assets of the banking system is added to the regression), but the coefficient is not significant in a regression of adjusted interest rate spreads. There is a significant negative coefficient on the GDP share of the **primary fiscal balance** in a regression of adjusted interest rate spreads, but the coefficient is tiny and there is no significance in a regression of adjusted net interest income to assets. (The difference in this case seems to be caused by the change in time period when the dependent variables are changed since the significance also disappears in the regression using adjusted interest rate spreads if the time period is simply shortened.) No robust relationship was found between adjusted interest rate spreads or adjusted net interest income to assets and credit to government or gross debt of the government. Other variables that were looked at and were not significant were fiscal debt to GDP and growth of fiscal debt, fiscal expenditures, and the primary fiscal balance.

N. Foreign involvement

Foreign banks are generally considered to be managed more efficiently than domestic banks in less developed countries. They are often based in industrialized countries, and suffer less interference from the public sector. It is therefore surprising that the share of banking sector assets that is controlled by foreign entities is not significant in any regression of adjusted interest rate spreads or adjusted net interest income to assets.

Foreign Involvement 1/

Dependent variable 2/	Interest income/		Interest income/	
	Spread	Assets	Spread	Assets
Constant	10.155	5.942	6.864	4.656
	(14.01)	(11.56)	(5.23)	(5.24)
Foreign ownership share of banks	-0.53	0.12	2.60	1.25
	(-0.37)	(0.11)	(1.48)	(1.02)
Public ownership share of banks			**8.01**	3.31
			(2.96)	(1.78)
AR (1)	0.26	0.12	0.27	0.16
	(3.11)	(1.37)	(3.35)	(1.82)
Adjusted R-Square	0.88	0.80	0.89	0.81
DW	1.79	2.30	1.96	2.35
Sample Period	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004
Observations	117	129	117	129

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

In many countries foreign banks are able to compete for the more desirable lenders. It may be that foreign banks are able to charge lower spreads because they cream skim the better borrowers, leaving the riskier clients to the domestic banks and not affecting average spreads in the banking sector as a whole. Furthermore, it seems logical that if foreign banks are more efficient they would not pass this benefit on to the consumer, but would rather capture it for themselves in the form of higher profits.

In fact, foreign involvement may even be associated with higher spreads. In a regression of adjusted interest rate spreads or adjusted net interest margins on both public sector involvement and foreign involvement, both coefficients are positive, though neither is significant. Detragiache, Tressel, and Gupta (2006) suggested that foreign entry could increase spreads if foreign banks cream skim the best borrowers in a country and reduce competition by making the remaining pool of borrowers less profitable. Or the causality could run in the reverse direction. Foreign involvement may be determined by spreads, rather than the other way around. High spreads provide an opportunity for entry by foreign banks. Public sector involvement and foreign involvement are of course negatively correlated, since if a bank is foreign owned it cannot be publicly owned, so a regression with foreign involvement may capture crowding out of public sector involvement.

O. Governance

Several studies have highlighted the importance of legal frameworks, governance, and property rights (Demirgüç-Kunt, Laeven, and Levine 2003). Several variables regarding governance were available only for a small number of years. These included the quality of the legal framework, the quality of the regulatory framework, and an index of corruption. All of these variables unsurprisingly had negative coefficients (better governance meant lower spreads), though only the coefficient on the quality of the regulatory framework was

significant when interest earnings to assets were regressed on it. (Note that no AR term was used because there weren't enough data points.)

Regulatory Framework and Required Reserves 1/

Dependent variable 2/		Interest income/
	Spread	Assets
Constant	5.551	4.948
	(28.88)	(0.77)
Quality of the regulatory framework	**-1.41**	
	(-2.69)	
Required reserve ratio		0.65
		(1.00)
Adjusted R-Square	0.80	0.92
Sample Period	1998 - 2004	1998 - 2004
Observations	74	12

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

P. Required reserves

Higher required reserve ratios could be expected to result in higher spreads, particularly if the required reserves are unremunerated, as banks would have to cover the increased costs of holding reserves (Gelos 2006). Required reserve data in time series are scarce, but a simple regression with very few data points yields a positive coefficient, as expected, though without significance. None of the series related to governance or required reserve ratios included enough data to be used in multivariate regressions, and even the univariate regressions benefited from only a few data points.

V. MULTIVARIATE RESULTS

A. Short term results

Of the variables tested, the most robust ones were found to be inflation, the number of banks, the deposit interest rate, and public sector involvement. These variables were significant in any regression of adjusted interest rate spreads when just about any other variable was included. (Some variables, notably the capital adequacy ratio, caused some of the robust variables to lose significance by reducing the time period—the same decline in significance occurred if the time period was shortened without adding the variables.)

Interest Rate Spreads 1/

Dependent variable 2/					
	Spread	Spread	Spread	Spread	Spread
Constant	10.746	9.851	10.875	10.627	10.313
	(15.48)	(8.78)	(13.67)	(14.25)	(12.67)
Inflation (end of period)	**-0.11**	**-0.11**	**-0.12**	**-0.11**	**-0.11**
	(-8.65)	**(-8.53)**	**(-8.71)**	**(-8.51)**	**(-5.42)**
Deposit rate	**-0.13**	**-0.13**	**-0.13**	**-0.13**	**-0.15**
	(-4.25)	**(-4.29)**	**(-4.11)**	**(-4.23)**	**(-3.69)**
Number of banks	**0.09**	**0.08**	**0.09**	**0.09**	**0.08**
	(2.75)	**(2.44)**	**(2.80)**	**(2.71)**	**(2.28)**
Public ownership share of banks	**4.06**	**5.45**	**4.21**	3.77	5.97
	(2.28)	**(2.41)**	**(2.33)**	(1.97)	(1.69)
Foreign ownership share of banks		1.45			
		(1.01)			
Operating expenses/Assets			-3.37		
			(-0.56)		
Capital/assets				0.02	
				(0.42)	
NPLs					0.03
					(0.82)
AR (1)	0.48	0.48	0.49	0.48	0.44
	(6.29)	(6.24)	(6.00)	(6.17)	(4.87)
Adjusted R-Square	0.94	0.94	0.94	0.94	0.94
DW	2.03	2.02	2.08	2.03	2.04
Sample Period	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004
Observations	108	108	106	108	81

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

Similar, but less strong results were obtained by regressing the adjusted net interest income to asset ratio instead of the adjusted spread. In these regressions the number of banks and the ownership by the public sector still had positive coefficients, but they became tiny and no longer significant. Also the sign on the coefficient on the deposit rate changed. Meanwhile, some other variables became significant in regressions. Operating expenses and the size of the economy became significant, and NPLs become almost significant. These results were consistent with those from the single variable regressions for these series described above.

Net Interest Income 1/

Dependent variable 2/	Interest income/ Assets	Interest income/ Assets	Interest income/ Assets	Interest income/ Assets	Interest income/ Assets
Constant	5.186	4.535	4.771	5.248	5.523
	(9.70)	(7.48)	(9.22)	(12.35)	(6.20)
Inflation (end of period)	**-0.05**	**-0.05**	**-0.05**	**-0.06**	**-0.06**
	(-4.99)	**(-4.93)**	**(-5.04)**	**(-6.46)**	**(-5.00)**
Deposit rate	**0.07**	**0.06**	**0.07**	**0.05**	**0.07**
	(2.73)	**(2.45)**	**(3.20)**	**(2.33)**	**(2.74)**
Number of banks	0.03	0.03	0.03	0.02	0.03
	(1.25)	(1.07)	(1.37)	(1.06)	(1.32)
Public ownership share of banks	1.40	1.62	-0.08	3.02	0.91
	(0.98)	(1.14)	(-0.06)	(1.46)	(0.51)
Operating expenses/Assets		**10.65**			
		(2.17)			
Real GDP (in US$)			**0.15**		
			(3.91)		
NPLs				0.03	
				(1.57)	
Foreign ownership share of banks					-0.55
					(-0.47)
AR (1)	0.22	0.24	0.25	0.36	0.22
	(2.43)	(2.79)	(3.10)	(3.53)	(2.41)
Adjusted R-Square	0.87	0.88	0.89	0.93	0.87
DW	2.31	2.30	2.58	2.31	2.31
Sample Period	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004	1998 - 2004
Observations	120	120	120	87	120

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

B. Long term results

The multivariate regressions above are limited to periods starting in the 1990s, however many of the data series are available back to the 1970s. Regressions using only those series provide a longer timeframe.

The longer term regressions confirm that the significance of the inflation rate and the deposit rate are robust. The size of the economy, which was significant in the shorter-term regression of adjusted net interest income to assets but not in the shorter-term regression of adjusted spreads is not significant in the longer-term regression of adjusted spreads. Government expenditures are not significant either, though the primary balance of the government is. The size of the banking sector is not significant.

Long Term Results 1/

Dependent variable 2/					
	Spread	Spread	Spread	Spread	Spread
Constant	-494.381	-527.661	-508.953	-496.086	-582.880
	(-5.06)	(-4.61)	(-5.03)	(-4.82)	(-5.37)
Inflation (end of period)	**-0.04**	**-0.04**	**-0.04**	**-0.04**	**-0.04**
	(-8.15)	**(-7.77)**	**(-8.08)**	**(-8.09)**	**(-6.83)**
Deposit rate	**-0.08**	**-0.08**	**-0.08**	**-0.08**	**-0.08**
	(-3.43)	**(-3.09)**	**(-3.35)**	**(-3.48)**	**(-2.65)**
Fiscal primary balance/GDP		**-0.10**			
		(-2.75)			
Real GDP (in US$)			0.01		
			(0.46)		
Fiscal expenditure/GDP				2.62	
				(1.02)	
Bank assets/GDP					2.16
					(1.27)
Year	**0.25**	**0.27**	**0.26**	**0.25**	**0.30**
	(5.15)	**(4.69)**	**(5.13)**	**(4.90)**	**(5.44)**
AR (1)	0.69	0.70	0.69	0.70	0.62
	(17.97)	(17.56)	(17.61)	(18.11)	(13.15)
Adjusted R-Square	0.81	0.81	0.81	0.81	0.76
DW	2.18	2.11	2.17	2.17	2.31
Sample Period	1977 - 2004	1981 - 2004	1977 - 2004	1977 - 2004	1977 - 2002
Observations	363	339	363	358	280

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

VI. EFFECTS OF INTEREST RATE SPREADS

A. Growth

Higher spreads appear to negatively impact growth. In a simple regression of **purchasing power parity growth over the subsequent 5 years** on the adjusted interest rate spread the coefficient is negative and significant.[4] If the starting level of per capita purchasing power parity GDP is included in the regression the coefficient remains significant, and it remains significant even if the investment to GDP ratio is included, which is interesting since it indicates that there may be mechanisms other than through investment by which interest rate spreads affect GDP. The coefficient also remains significant if the lending rate is added to the regression. Replacing purchasing power parity GDP with real GDP does not affect the results significantly.

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[4] Note that a second AR term was added because it is significant and the DW statistic is close to 1 without it. It does not change the significance of the interest rate spread variable.

Regressions using GDP over the subsequent n<>5 years yield similar results, but with less significance. Periods of less than 5 years may not allow time for the effects of the interest rate spreads to work their way through the economy fully, while longer periods may allow the effects to dissipate and also reduce the number of data points. Regressions using adjusted net interest income to assets yield insignificant coefficients, most likely because of the greatly reduced time period available with the data.

The negative relationship between spreads and GDP growth might not be considered surprising because of the effect spreads could have on investment. But the investment coefficient has an insignificant coefficient in a growth regression, suggesting that there is another factor besides investment that hinders growth when spreads are high. Many of the variables tested above cannot be tested in this regression because they are available for such a short time frame. Some of these variables are associated with higher spreads and are ones that are considered desirable (more competition in the banking sector, better regulation and governance) so it is frustrating not to be able to rule them out as contributing to lower growth.

In growth regressions lending rates alone have negative coefficients and deposit rates alone have positive coefficients, but neither is significant. When both rates are in a regression together their coefficients are both significant, but neither is as significant as that of the adjusted spread alone.

The negative relationship between growth and spreads should not lead to the conclusion that higher spreads are always bad. The relationship could have a reverse causality. Kahn and Senhadji (2000) found that high growth may cause low spreads. Furthermore, as suggested above, higher spreads could be associated with financial sector development, in which case any negative effect they have on growth would perhaps diminish but not reverse the growth benefits of financial sector development that have been well established (Levine 1997, King and Levine 1993).

Impact of Spreads on Growth and Investment 1/

Dependent variable	5-year Real Growth	5-year Real Growth	Investment Rate	Investment Rate
Constant	0.366	0.367	20.548	20.963
	(9.54)	(7.88)	(21.34)	(23.53)
Spread 2/	**-0.01**	**-0.01**	-0.02	
	(-3.04)	**(-3.18)**	(-0.16)	
Spread, lagged 3 years 2/				-0.08
				(-0.86)
Investment rate		0.00		
		(0.56)		
AR (1)	1.15	1.18	0.64	0.63
	(20.19)	(19.15)	(15.83)	(15.96)
AR (2)	-0.31	-0.34		
	(-5.80)	(-5.32)		
Adjusted R-Square	0.85	0.85	0.80	0.83
DW	2.01	2.00	2.04	2.01
Sample Period	1978 - 1999	1982 - 1999	1981 - 2004	1981 - 2004
Observations	291	263	371	347

1/ T-statistics are shown in parentheses.
2/ Adjusted for inflation

B. Investment

Further supporting the hypothesis that spreads affect growth through pathways other than investment is the result that investment rate levels do not seem to move in line with adjusted interest rate spreads. Regressions of the investment rate on adjusted interest rate spreads with lags from zero to five years all yield insignificant relationships.

VII. SUMMARY AND CONCLUSIONS

Interest rate spreads exhibit a wide variety of behaviors across countries in English speaking Africa. In spite of data weaknesses and limitations, a wide variety of factors was examined and several were found to have a robust effect on inflation adjusted interest rate spreads.

Inflation was found, contrary to previous studies in other parts of the world, to have a negative effect on inflation adjusted spreads and inflation adjusted net interest incomes. It was not found to have a measurable effect on unadjusted spreads, but was found to have a negative effect on unadjusted net interest incomes. Inflation could be associated with lower inflation adjusted spreads if lower lending rates result in inflation by expanding credit, or if high inflation results from governments putting pressure on banks to keep lending rates down. Spreads and net interest margins were adjusted for an entire year of inflation. Regressions of unadjusted spreads indicate no relationship with inflation, while regressions of unadjusted net interest margins still yield a significant negative relationship.

Deposit rates curiously have a robust negative effect on interest rate spreads, but a robust positive effect on net interest income. The negative effect on spreads is intuitive, since higher deposit rates without higher lending rates decrease spreads. The positive effect on net interest income could be caused by diversification of the financial system, where competition for deposits would lower spreads while a more risk-oriented composition of lending could raise net interest income. Similarly, a decline in large controlling banks that offer high spreads but then make preferential loans to certain clients could produce a similar relationship.

Measures of **concentration** in the banking sector when significant were found to be associated with lower spreads. The number of banks was found to have the greatest significance, possibly because it best captures diversification or deepening of the financial sector, which would bring many benefits. Concentration could also result in higher spreads if banks gained more market power through diversification, if the composition of lending changed towards riskier lending, or if it resulted in better financial sector oversight.

Public sector involvement is generally found to be associated with higher spreads, though the relationship was not always significant. Public sector involvement could cause inefficiencies that would need to be covered with higher spreads, or it could be associated with other disadvantages of an interventionist public sector, and the relationship could be weaker with net interest margins if public sector involvement could be associated with loans made on favorable terms to insiders and not captured in broad measures of lending rates.

In all of the regressions spanning periods back to the early 1990s or earlier, a **time variable** was found to be significant, and it is particularly significant during the period 1986-2000. This suggests a change during that time that is not captured in the data. One possibility for this unidentified variable is the improvement in supervisory regimes that took place.

A few other variables were sometimes significant, but the significance was not robust:

Measures of **costs** all had positive coefficients, though the significance was often weak. Curiously, the significance was stronger in regressions using adjusted net interest margins, perhaps not because of the direct causal relationship, but rather because costs are higher in countries with more retail-oriented banking and these countries have higher spreads. The significance is also stronger with salaries than with total operating costs, perhaps because salaries may be more closely related to other inefficiencies, such as political interference.

The results were unclear as to whether **loan quality** had a significant direct effect on spreads. In a regression of adjusted interest rate spreads loan quality was insignificant. In a regression of adjusted net interest margins it was significant. It was not significant in any multivariate regression.

Provisioning, curiously, was found to have no effect on adjusted interest rate spreads, but a nearly significant negative effect on net interest rate margins. This could reflect that higher provisioning is associated with greater efficiency, but the result is contrary to findings in other work.

Capital adequacy was usually associated with higher spreads and higher net interest margins. This result is intuitive either in that banks have to earn higher net interest margins in order to maintain higher capitalization ratios, or in that higher net interest margins result in higher capitalization ratios.

The **size of the economy** was found to be significant with a positive coefficient in regressions using the adjusted net interest margins. This could be because a larger economy will have a deeper and more diversified, as well as better regulated, financial sector.

Regressions using various measures of **government expenditures and deficits** yielded conflicting results. In long-term regressions the GDP share of the fiscal primary balance was found to be significant. This could indicate that when the government is trying to stimulate the economy with deficits it pressures banks not to dampen that stimulus by raising lending rates. A simple regression of adjusted net interest margins on the government expenditure share of GDP had a significant positive coefficient, suggesting a conflicting story that that an environment of loose spending allows banks to raise lending rates or perhaps is associated with inefficiencies that require higher spreads.

Nonperforming loans were found to have a positive coefficient, as would be expected, but they were not found to be significant in multiple variable regressions or in simple regressions of adjusted spreads. They were found to be significant in regressions of adjusted net interest margins.

A wide variety of other variables were not found to be significant:

The **size of the banking sector** had a positive coefficient, in line with the results for number of banks or size of the economy, but it was never found to be significant. **Broad money growth** was found to be significant, but only indirectly through its effect on inflation. The **variability of inflation and the exchange rate** was not found to have any significance, a surprising result since such variability would seem likely to lead to higher risk premiums. Several other external variables were found to have no significance. The **foreign share of bank ownership** curiously was found to have a positive coefficient, though it was not significant.

The **quality of the regulatory regime** was found to have a significant effect on lowering spreads in univariate regressions. Not enough data were available to run multivariate regressions. The required reserves ratio had a positive coefficient but, unsurprisingly given the small amount of available data, it was not significant.

Higher interest rate spreads were found to be associated with **lower growth** (Bernanke 1990), and the coefficient was found to be significant even when investment was included in the regression. Interestingly, higher interest rate spreads were not found to be associated with lower investment, so there could be some other mechanism through which interest rate spreads might hinder growth. There could also be a third factor which causes both high spreads and low growth, such as the quality of the legal framework (Beck 2000) or the regulatory framework, governance, or the effectiveness of government.

VIII. POLICY RECOMMENDATIONS

Many of the findings of this paper suggest that higher spreads should not always be viewed negatively. In many cases they may simply reflect a shifting of costs to banks from depositors or governments. A large inefficient bank that dominates a financial sector (as is the case in Ethiopia, the country that currently has the lowest spreads in English-speaking Africa) might charge low spreads and then require periodic bailouts. In a better functioning banking sector with proper oversight there may be fewer bailouts partly because spreads are adequate to cover costs and risks to the banking sector.

Higher net interest income may reflect deepening of the financial sector into retail and SME lending or lending to riskier clients. It could reflect more diversified lending, which would have the positive benefit of increased specialization and deepening of knowledge of certain markets, but could also have a downside in that it could give banks more market power. Higher spreads were found to be associated with lower inflation, though this result contrasts with other studies, and were found to be associated with greater competition in the banking sector.

Targeting lower spreads may therefore in many cases be undesirable. Higher spreads may result from steps that are widely agreed to be beneficial, such as financial sector deepening, breaking up of dominant banks, and better oversight. At the same time, higher spreads can result from undesirable factors, such as public sector ownership of banks. Before making a negative judgment about high spreads in the banking sector, it would be important to explore the reasons for these high spreads.

Some of the conclusions in this paper are difficult to verify. No comprehensive data were available to measure the extent to which banks were engaged in retail or SME lending. Measurements of public influence on banks was limited to measurements of public ownership of banks. Time series measurements of the effectiveness of regulation and supervision in these countries would be very difficult to construct. Only a few data points on required reserve ratios were available. Further investigation of the issues raised in this paper would require collection of these data.

APPENDIX

A. Behavior of Interest Rate Spreads

The average adjusted spread in all countries over the period 1975-2004 was about 7 percent and these values fluctuated with a standard deviation of about 3.5. There were wide variations across countries, with averages ranging from 3.5 in Botswana to 11 in Zambia. There were also large differences in the variability of spreads, with standard deviations over the period ranging from 0.4 in Seychelles to 6.0 in Malawi. Spreads varied from lows of 1 or 2 percent—even briefly significantly negative in Zimbabwe—to the high teens and briefly over 20 percent in Malawi (Table 1).

Table 1

|	BOT	ETH	GAM	GHA	KEN	LES	MAL	MAS	MOZ	NAM	NIG	RWA	SAF	SEY	SLE	SWA	TAN	UGA	ZAM	ZIM	ALL
Mean	3.53	4.53	10.72	4.81	6.98	6.36	10.41	6.92	10.32	6.85	4.18	7.34	3.89	6.29	8.62	5.35	10.02	7.63	11.01	7.51	**7.03**
Median	3.03	4.41	11.48	4.53	4.46	5.67	7.50	6.94	11.02	7.10	4.17	7.08	4.07	6.27	6.69	5.36	9.41	7.31	10.47	7.80	**6.05**
Maximum	11.93	7.86	13.73	7.18	14.64	12.97	21.66	12.17	16.29	8.62	9.64	9.95	5.63	7.16	18.52	7.19	17.65	14.67	19.23	13.31	**21.66**
Minimum	0.38	2.42	3.77	2.25	2.02	2.78	3.62	2.09	6.33	4.75	0.31	5.41	1.48	5.59	1.16	2.29	2.23	1.54	2.16	-6.05	**-6.05**
Std. Dev.	2.46	1.26	2.28	1.60	4.51	2.78	6.02	3.17	3.23	1.04	2.42	1.39	1.11	0.42	5.70	1.44	4.07	4.01	5.85	4.72	**4.17**
Observations	25	19	27	11	25	20	24	24	7	14	29	16	28	16	28	28	22	20	17	25	**425**

A graph of spreads for all countries reveals interesting characteristics:

Figure 1
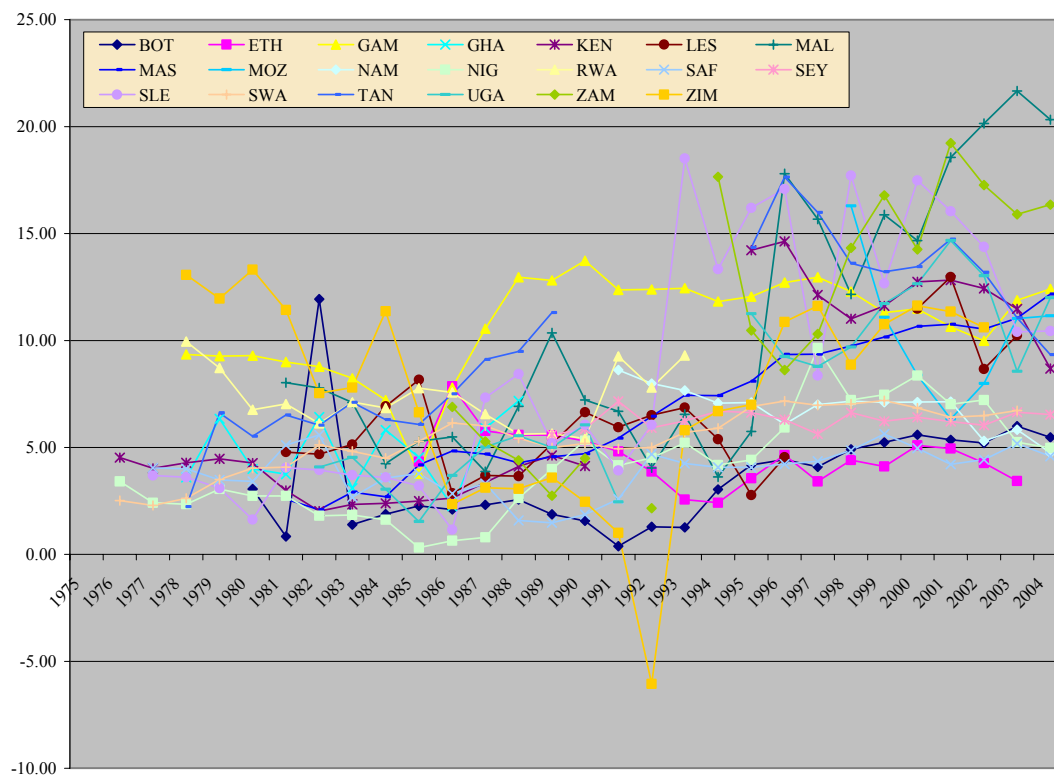
Two important patterns are evident in Figure 1. First, interest rate spreads vary considerably over time, with dramatic year-to-year jumps. Second, interest rate spreads increased during the 1990s.

Figure 2
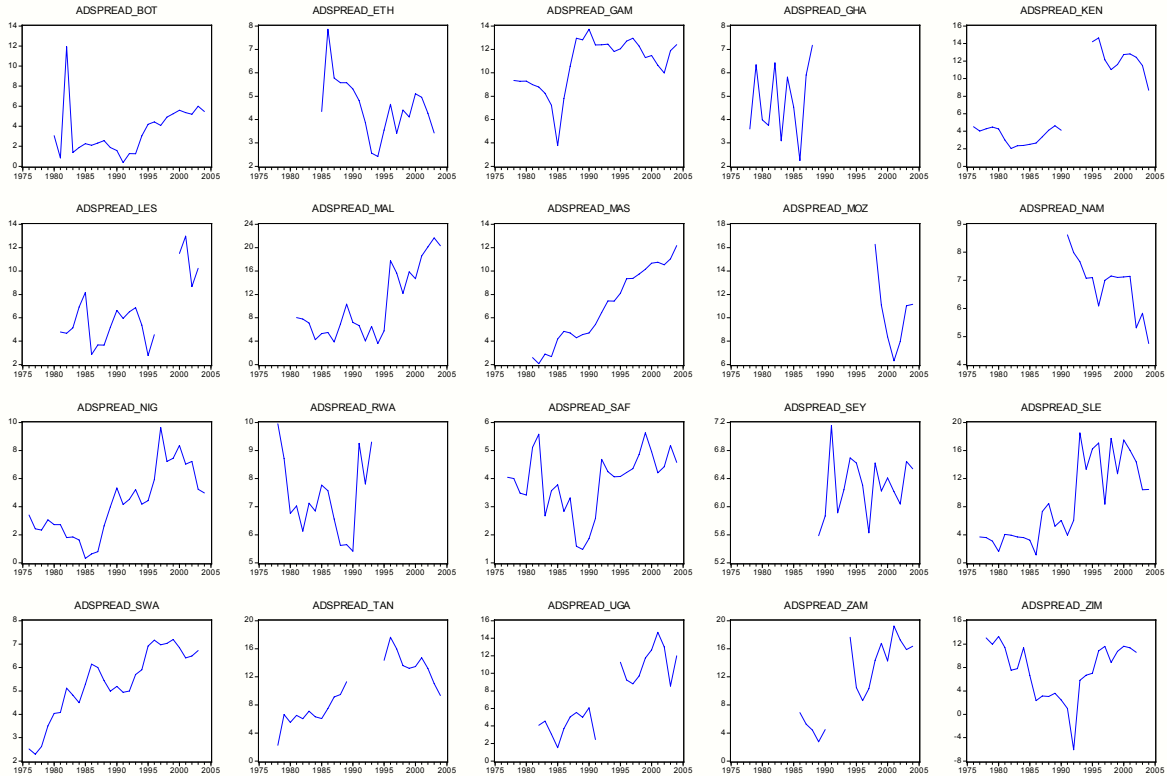
Separate graphs show that there is a wide variety of behaviors, with some countries fairly stable while others vary from being stable, stable with one or two unusual spikes, or constantly fluctuating. Madagascar has the smoothest relationship with a steadily increasing spread.

Figure 3
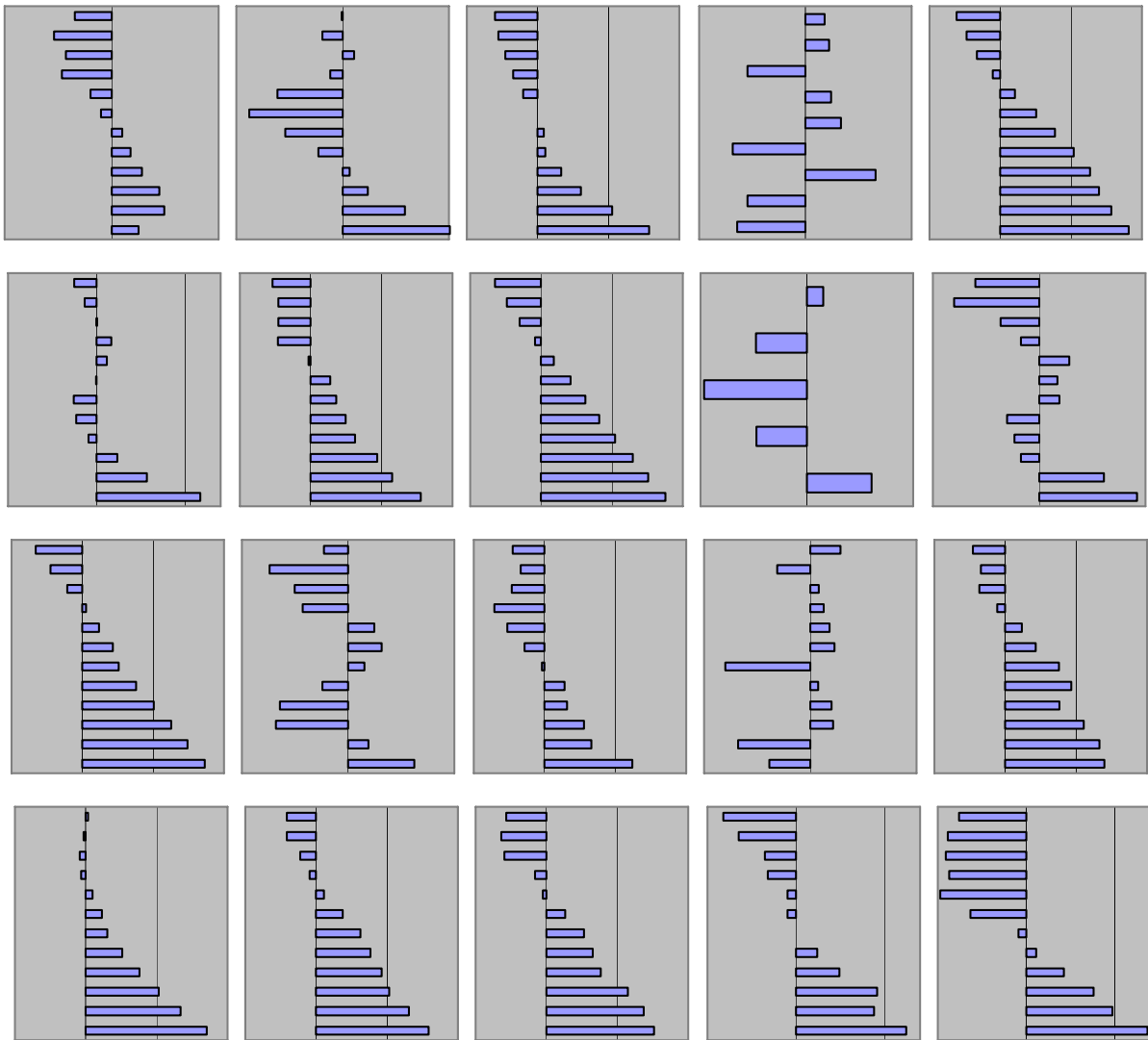
1) Correlograms indicate, as might have been expected, that with many adjusted spread series there was short-term positive autocorrelation (the charts read from the bottom up).

2) There was also long term negative autocorrelation, or mean reversion. The crossovers generally occurred around the sixth to eighth years.

3) Several countries exhibited little serial correlation or puzzling correlations, such as negative serial correlation in the first year (Ghana). This could be indicative of less market oriented systems.

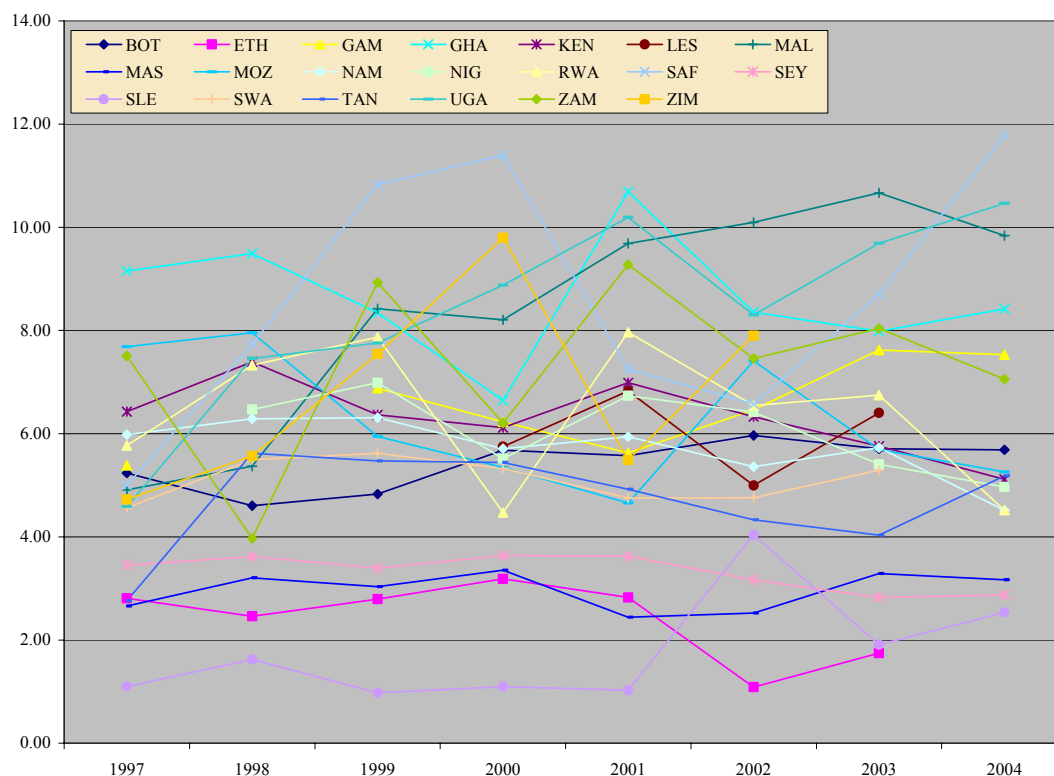## B. Behavior of Net Interest Income to Assets

The average adjusted net interest income to assets in all countries over the period 1997-2004 was about 6 percent and these values fluctuated with a standard deviation of about 2.4. There were variations across countries, with values ranging from under 1 percent in Ethiopia to nearly 12 percent in Uganda. While this represents a wide variation, the variation is significantly less than for adjusted interest rate spreads.

Table 2

|	BOT	ETH	GAM	GHA	KEN	LES	MAL	MAS	MOZ	NAM	NIG	RWA	SAF	SEY	SLE	SWA	TAN	UGA	ZAM	ZIM	ALL
Mean	5.41	2.42	6.53	8.63	6.31	5.99	8.40	2.96	6.24	5.73	6.07	6.40	8.66	3.32	1.79	5.11	4.72	8.42	7.31	6.84	**5.87**
Median	5.63	2.79	6.46	8.39	6.35	6.08	9.05	3.10	5.82	5.84	6.42	6.65	8.22	3.42	1.36	5.29	5.05	8.59	7.48	6.55	**5.70**
Maximum	5.96	3.19	7.62	10.69	7.39	6.83	10.67	3.35	7.96	6.31	6.99	7.97	11.78	3.64	4.04	5.62	5.62	10.47	9.28	9.80	**11.78**
Minimum	4.60	1.09	5.38	6.64	5.11	5.00	4.91	2.44	4.66	4.51	4.97	4.47	5.01	2.83	0.98	4.56	2.76	4.59	3.97	4.73	**0.98**
Std. Dev.	0.48	0.74	0.87	1.18	0.70	0.80	2.18	0.36	1.26	0.58	0.77	1.38	2.46	0.33	1.06	0.42	0.97	1.90	1.67	1.91	**2.35**
Observations	8	7	7	8	8	4	8	8	8	8	7	8	8	8	8	8	7	8	8	6	**150**

A graph of net interest incomes to assets shows the variability of interest income to assets and that fact that countries that have high values in one period may have low values in another.

Figure 4

The variability of behavior of interest income to assets can be seen in separate graphs. A comparison of these graphs to those for adjusted interest rate spreads shows that there is a rough correlation, but also some significant deviations in some cases.

Figure 5
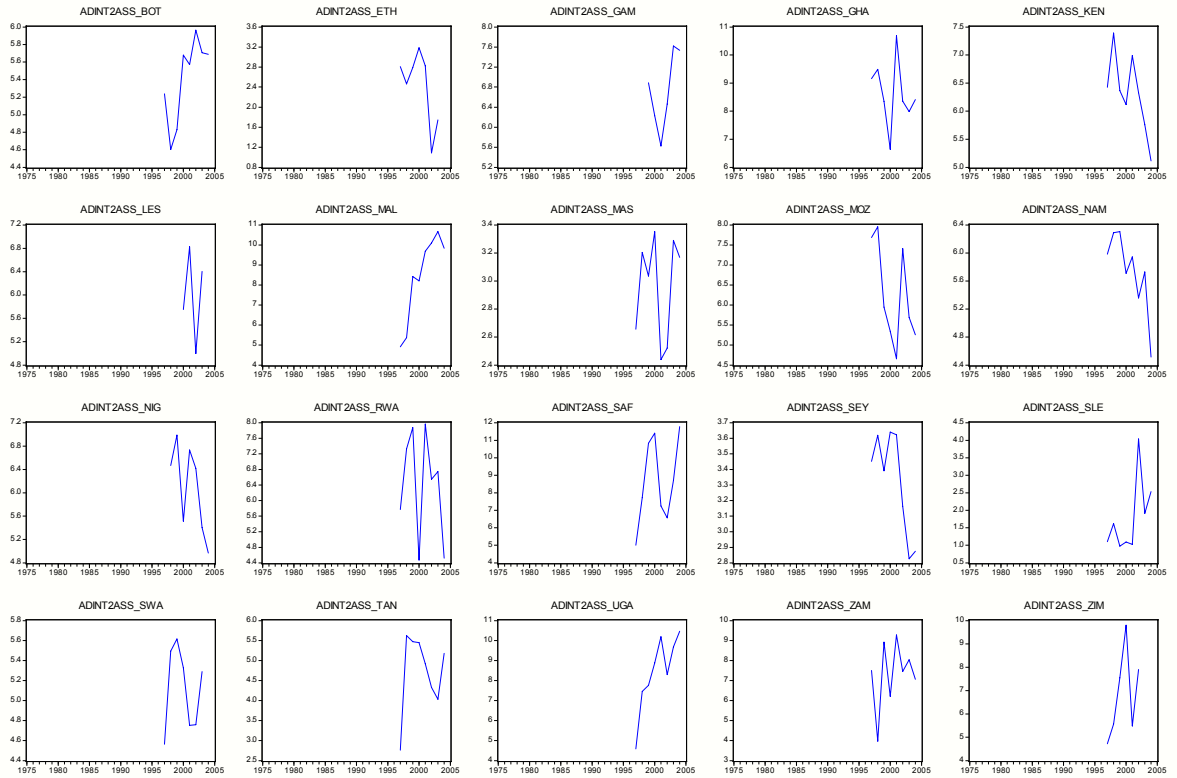
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