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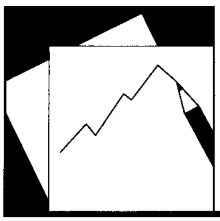

IMF Working Paper

Spillovers From the Rest of the World into Sub-Saharan African Countries

Paulo Drummond and Gustavo Ramirez

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African Department

Spillovers from the Rest of the World into Sub-Saharan African Countries [1]

Prepared by Paulo Drummond and Gustavo Ramirez

Authorized for distribution by Norbert Funke

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Abstract

This paper investigates the impact of a global slowdown on individual African countries using a series of dynamic panel regressions for countries in the region, relating real growth in domestic output to world growth in trade weighted by partner countries and several control variables: oil prices, non-oil prices, financial variables, and country fixed effects. Estimates are then applied to prepare country-specific simulations. The model, which is shown to estimate well out-of-sample spillover effects in the region, shows that countries in the region are significantly affected by lower external demand for their exports, declines in commodity prices and the terms of trade, and tighter financial conditions abroad. The last, proxied by the spread of three-month Libor to US treasury bills, is to our knowledge one of the first applications of such a measure of financial conditions for countries in the region.

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Author's E-Mail Address: pdrummond@imf.org gramirez@imf.org

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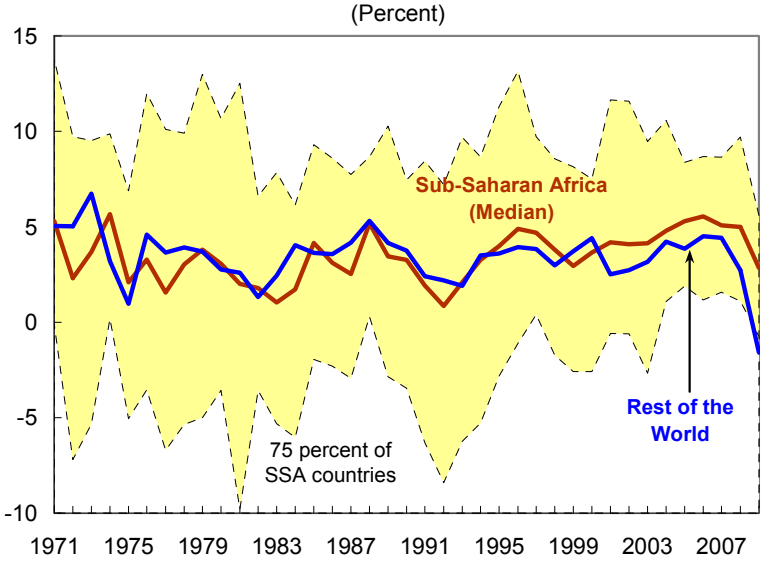
I. World Growth Spillovers

The world economy is facing a global recession and it is in the midst of a global financial crisis. This paper addresses three questions. What is the expected impact of the global slowdown on growth of sub-Saharan African countries? What is the expected impact of changes in commodity prices and the terms of trade? What is the role of global financial links in the region?

Historically, SSA growth has closely tracked global real GDP growth (Figure 1). As global growth slows, SSA is affected by less external demand for its exports, declines in commodity prices and the terms of trade, and tighter financial conditions abroad. The magnitude of the impact of past declines varied greatly, depending on the causes of the decline in world growth, idiosyncratic domestic developments in SSA, and country economic policy responses (Box 1).

Figure 1. Sub-Saharan Africa and the Rest of the World: Real GDP Growth
(Percent)



Source: IMF, *World Economic Outlook;* and authors' calculations.

To quantify the impact of a global slowdown on individual African countries, this paper uses a series of dynamic panel regressions for countries in the region, relating real growth in domestic output to world growth in trade weighted by partner countries and to several control variables: oil prices, non-oil prices, a measure of global financial stress, and country fixed effects. Estimates are then applied to prepare country specific simulations of the effects of changes in commodity prices and world growth. The paper does not attempt to embed these variables in a more complete growth model, such as the ones that have been identified in the literature (see for instance, Ndulu and O'Connell, 2007) and discussed in Regional Economic Outlook: Sub-Saharan Africa (October 2008, Chapter II).[2]

[2] This is appropriate because the goal is mainly to forecast, and the other variables may themselves depend partly on world growth and the terms of trade. Suppose, for example, that terms of trade shocks may cause declines in growth or consumption that raise the risk of conflict. Including conflict in a growth regression would then understate the impact of a terms of trade shock.

Four key results stand out:

- A 1 percentage point slowdown in the rest of the World has been found to lead to an estimated 0.4-0.5 percentage point slowdown in sub-Saharan African countries. The effect is partly felt contemporaneously (0.2 percentage points) and partly in the following year (0.2 percentage points).

- A nonfuel-commodity-prices-induced income reduction by 10 percent tends to reduce growth in sub-Saharan Africa by about 1.9 percentage points after two years.

- An oil price shock tends to be significant only above a certain threshold (5 percent increase in prices). The impact is calculated as the oil price change (above the threshold) times the share of net oil exports. An SSA country with oil imports of some 20 percent of GDP facing a decline in oil prices on the order of 50 percent, could expect a growth rate some 0.5 percentage points higher than otherwise. The impact is linear on price changes above the threshold and on the oil intensiveness of the economy. It appears symmetric for price increases and decreases in prices.

- A financial channel is significant when proxied by the spread of 3-month LIBOR vs. US Treasury bills: a 100 basis point increase in the spread reduces growth in SSA countries by an estimated 0.5 percentage points. To our knowledge, this is one of the first applications of such a measure of financial conditions for countries in the region.

These estimates reflect the average effects for the average country and shock. While they are robust to different specifications, two caveats are in order: (1) While the cross-country regression estimates seem to be in line with previous structural cross-country regressions in the literature (Ndulu and O'Connell, 2007), they explain only part of the growth variation experienced by SSA countries. A broad range of factors—for instance, the level of reserves, the policy response, and the expected persistence—may plausibly interact with the shock to produce the effects: for example. (2) The estimates reflect short-term effects of changes in the external environment on SSA growth.

The paper is organized as follows. Section II summarizes relevant findings in previous studies. Section III briefly reviews transmission channels. Section IV provides quantitative estimates of spillovers using dynamic cross-country regressions. Section V applies the growth estimates to decompose growth projections into spillovers and other effects and tests the spillover model in- and out-of-sample. Section VI contains concluding remarks.

II. PREVIOUS STUDIES

The questions addressed here have been studied previously, with mixed results. However, a common message from different studies is that the impact on growth from a global slowdown

and changes in commodity prices would depend on the strength of trade and financial linkages. [3]

- An IMF study (*World Economic Outlook*, April 2007, Chapter 4) shows that on average a 1 percentage point decline in GDP growth in the Euro area is associated with a slowing in GDP growth of about 0.25 percentage point in sub-Saharan Africa as a whole. The spillovers from a slowing in U.S. growth (0.1 percentage point) are less pronounced. However, these results abstract from output co-movements between regions, ignore lags, and fail to control for the effects of growth on the terms of trade. If disturbances in the United States led to disturbances elsewhere, the impact on SSA growth would be larger.

- Several studies have attempted to analyze growth factors (including exogenous shocks) using variants of structural cross-country growth regressions. Ndulu and O'Connell (2007) estimated the impact of exogenous shocks like the ones considered in this paper (income effects of terms of trade and growth in trading partners) on the growth rate of African economies using a global regression setting, for the period 1960 through 1997. They found that:

  > A rise in trading partner growth rates is a positive shock to the economy. A 1 percent rise in the growth rate of a country's trading partner appears to raise a country's growth rate by 0.4 percent. [4]

  > Similarly, income effects of terms of trade changes likewise have the expected positive effect on growth, though with a small coefficient (0.04).[5]

- Studies that focused on commodity prices and terms of trade such as Deaton and Miller (1996) for Africa and Raddatz (2007) for low income countries find that a surge in commodity prices significantly raises growth. Deaton finds that a decline in non-fuel commodity prices of 10 percent could reduce SSA GDP by about 1.5 percent (cumulative effect on thrice-lagged growth of commodity prices).

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[3] This paper does not look into regional spillovers from neighbors within the continent which have been addressed elsewhere (see, for example, Arora and Vamvakidis, 2005).

[4] Trading partner growth is defined as the half-decadal average weighted growth rate of real GDP per capita for the country's trading partners, with weights defined by the partner's share in total imports plus exports.

[5] The income effect is measured as the five-year average effect of the change in the terms of trade using the final year of the previous five-year period as base. The variable is defined as the product of the share of exports in GDP in the initial year of the five-year period and the cumulative effect of the changes in terms of trade, which is then averaged over the five-year period.

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- Collier and Goderis (2007) however, find that while positive terms of trade shocks may have positive short-term effects on output they have adverse ones in the longer term in countries that do not have good institutions.

III. Channels of Transmission

A global slowdown affects sub-Saharan Africa through two primary channels. The first is trade. As growth in trading partners slows, sub-Saharan Africa is affected by lower real external demand and declines in commodity prices and the terms of trade. The second channel is financial links, namely a reduction or reversal in capital flows to the region, including foreign direct investment (FDI).

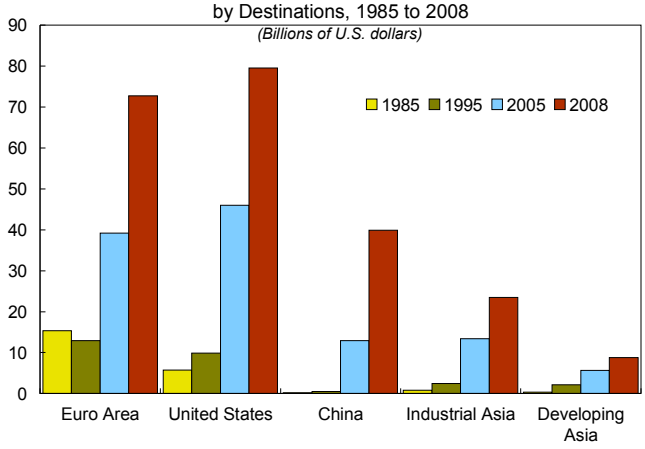
Trade channel

- Export exposure of SSA countries to advanced economies—the share of exports to these economies as a percent of GDP—has generally increased in recent years. Exports from sub-Saharan Africa to the US (as a percent of GDP) doubled from 3 percent in the early 1980s to 6 percent in the 2000s, while exports to the euro area remained stable at about 6 percent in the same period.

- Advanced economies account for three-quarters of all exports from SSA.

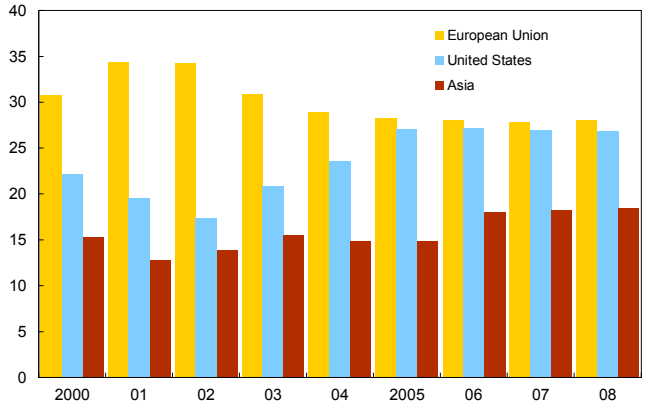
- But export destinations have become more diversified in recent years, with more exports now going to other emerging and developing economies (Figures 2 and 3).

Figure 2. Sub-Saharan Africa: Total Merchandise Exports by Destinations, 1985 to 2008
(Billions of U.S. dollars)



Source: IMF, *Direction of Trade Statistics*.

Figure 3. Sub-Saharan Africa: Destination of Exports
(Percent of total exports)



Source: IMF, *Direction of Trade Statistics*.

Financial links

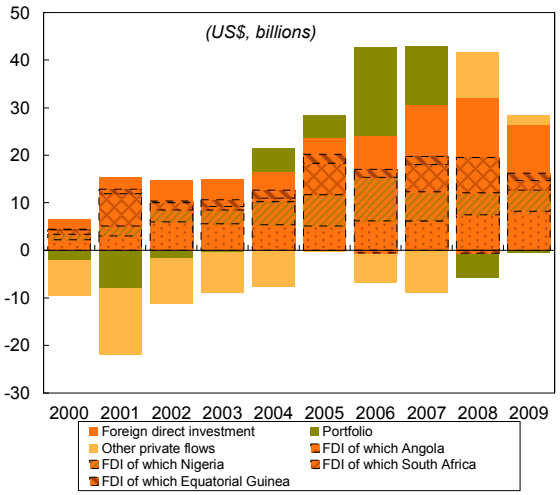
- Flows of private capital to SSA reached close to 5 percent of GDP (US$50 billion) in 2007, led by strong FDI and portfolio inflows. However (see IMF 2008), most of the flows

focused on just a few countries, and were targeted mainly at extractive industries, particularly the petroleum sector (Figure 4).

- As for aid and remittances, in 2007 SSA received grants of 0.8 percent of GDP, and remittances inflows of about 1.3 percent of GDP.

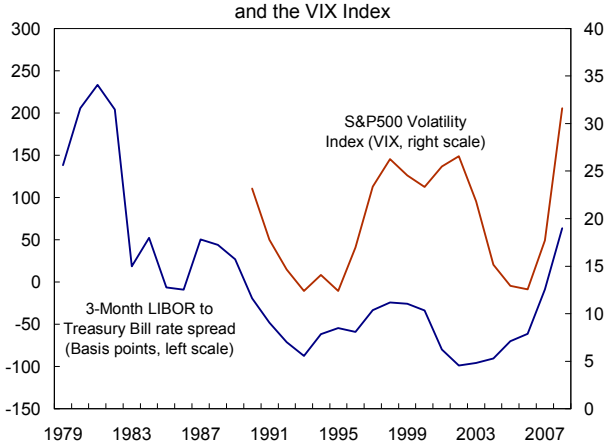
- Global financial conditions have recently deteriorated to levels not seen in more than two decades (Figure 5).

Figure 4. Capital Inflows in Sub-Saharan Africa



Source: IMF, *World Economic Outlook*.

Figure 5. 3-month Libor to Treasury Bill Rate Spreads and the VIX Index



Source: IMF, Research Department; and Bloomberg.

IV. Quantitative Estimates of Spillovers

To estimate the impact of a global slowdown on individual African countries, a series of dynamic panel growth regressions were estimated for all countries, relating real growth in domestic output to growth in the rest of the world, weighted by exports to partner countries, and with several control variables: oil prices, non-oil prices, the global financial conditions, and country income effects. The sample covers 40 countries and uses annual data for 1980–2008 (see the appendix for a description of data and sources).

The analysis that follows has two differences from previous approaches in the literature. First, rather than attempting to isolate each of the channels by which world growth might be expected to influence growth in SSA countries, the paper focuses squarely on quantifying the impact of variations in both world growth and commodity prices/terms of trade. The coefficients on the world growth variables provide a measure of the magnitude of the impact, both controlling and not controlling for commodity or terms of trade changes. Second, the analysis is carried out using annual data, rather than five-year averages, to better capture shorter-run business cycle spillovers.

The empirical framework is a dynamic panel growth regression with the following specification:

$$g_i = c_i + \beta X_i + \varepsilon_i \text{ for country i-1,...n} \quad (1)$$

Where the dependent variable g is average real GDP growth rate; the constant term c is different for each country, β is the matrix of parameters to be estimated, and ϵ is the error term. X is the matrix of explanatory variables that includes variables that capture some of the effects on growth of international spillovers, including prices of non-fuel commodities and oil prices, as described in the appendix. All estimates are based on the Arellano-Bond GMM estimator.[6]

Table 1, column 1 suggests the following results of the cross country regressions:

- World growth has a positive and statistically significant impact on growth of African countries. On average, a 1 percentage point decline in world growth is associated with a 0.4 to 0.5 percentage point drop in growth in the following two years across the sample of SSA countries.

- Income effects from changes in non-fuel commodity prices have a positive and statistically significant impact on growth in the region. Assuming exports of about 40 percent of GDP (equivalent to the weighted average for SSA countries), a 25 percent drop in nonfuel commodity prices would lower the growth rate by about 1.9 percentage points within two years.

- Income effects from changes in oil prices have a positive and statistically significant impact on growth. The impact for oil exporters and oil importers is differentiated by interacting the world oil price index with net oil exports so that a positive coefficient implies a positive impact for oil exporters and a negative impact for importers. We find that the impact is statistically significant above a certain income-effect threshold (set at 5 percent). An oil-importing SSA country, importing about 20 percent of GDP, and seeing a decline in oil prices of, say, 50 percent, could expect a growth rate some 0.5 percentage point higher within two years.

- The financial channel is significant when proxied by the spread of 3-month LIBOR vs. US Treasury bills: a 100 basis point increase in the spread reduces growth in SSA countries by an estimated 0.5 percentage point.

We next investigate the **robustness of the results** in various ways:

[6] The use of instruments in the Arellano-Bond GMM estimator circumvents problems from the correlation of the lagged endogenous and the disturbance term.

Table 1.

GMM Regression Output for SSA Real GDP Growth (Y)

(44 countries, 1982 - 2008, z values in italics)

	Panel, GMM based on the Arellano Bond estimators					
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.961	1.0877	-0.0104	0.9928	0.9368	0.1256
	1.27	*1.44*	*-0.02*	*1.02*	*1.29*	*0.24*
Y_{t-1}	0.2062 ***	0.2182 ***	0.2406 ***	0.1880 ***	0.2214 ***	0.2466 ***
	2.57	*2.62*	*3.31*	*2.36*	*2.82*	*3.03*
Y_{t-2}	0.0098	0.0151	0.0656 **	-0.0187		0.0724 **
	0.3	*0.44*	*1.95*	*-0.57*		*1.94*
W	0.2225 **	0.1899 *	0.5559 ***	0.3249 **	0.3165 **	0.5097 ***
	1.49	*1.31*	*4.22*	*1.85*	*2.06*	*3.59*
W_{t-1}	0.2215 **	0.2648 **	0.1176	0.1453	0.1735 *	0.1235
	1.42	*1.85*	*1.05*	*0.92*	*1.27*	*1.05*
W_{t-2}	-0.0487	-0.0706	0.0501	0.0283	-0.0340	0.0309
	-0.30	*-0.47*	*0.41*	*0.18*	*-0.22*	*0.27*
PNF*X/GDP	0.0017	-0.0003			0.0140	
	0.05	*-0.01*			*0.57*	
$(PNF*X/GDP)_{t-1}$	0.0803 ***	0.0603 ***			0.0549 ***	
	3.98	*4.12*			*3.64*	
$(PNF*X/GDP)_{t-2}$	0.1113 ***	0.0864 ***			0.0753 **	
	2.89	*2.31*			*2.13*	
POIL*(Xoil - Moil)/GDP > 5	-0.0057	-0.0040				
	-0.58	*-0.38*				
$(POIL*(Xoil - Moil)/GDP)_{t-1} > 5$	0.0273 **	0.0161 **				
	1.78	*1.69*				
$(POIL*(Xoil - Moil)/GDP)_{t-2} > 5$	0.0286 *	0.0179 *				
	1.31	*1.38*				
STR_USA_TED	-0.5119 **					
	-1.75					
ToT						-0.0065
						-0.25
ToT_{t-1}						0.0172 ***
						2.93
ToT_{t-2}						0.0046
						0.32
PNF				-0.0094		
				-0.73		
PNF_{t-1}				0.0312 ***		
				2.72		
PNF_{t-2}				0.0285 *		
				1.27		
Arellano-Bond test for AR(1)	-3.83 ***	-3.83 ***	-2.74 ***	-3.91 ***	-4.09 ***	-2.63 ***
Sargan test (Overid. Restrictions)	454.26 ***	467.6 ***	631.15 ***	423.59 ***	441.19 ***	777.42 ***
Hansen test (Overid. Restriccions)	24.81	24.41	39.89	30.88	34.11	29.77

Source: Autors' calculations.

*** Statistically significant at 99 percent confidence (one tail).

** Statistically significant at 95 percent confidence (one tail).

* Statistically significant at 90 percent confidence (one tail).

Table 1 provides alternative estimates of spillover effects (i) abstracting from terms of trade or commodity price changes; (ii) using simple oil and non-fuel commodity export prices, without interacting with level of exports, (iii) using terms-of-trade measures instead of commodity prices; and, (iv) allowing for asymmetric effects of price changes as well as different thresholds for the income effect.

We find that:

- The effect of growth alone is larger when terms of trade is excluded (Table 1, columns 2 and 3). A natural implication is that some of the effect of world growth works through its effects on the terms of trade. Presumably, the fact that growth matters even controlling for the terms of trade implies some combination of (i) SSA countries that are not price-takers in world markets, so demand matters even controlling for price; (ii) mismeasurement of terms of trade, picked up by partner growth; and, (iii) effects of growth through FDI, tourism, or other non-trade channels. Abstracting from terms-of-trade or commodity price changes the estimated effect of world growth is 0.67, with a coefficient of about 0.5 contemporaneously.

- Using simple non-fuel and oil export prices, without interacting with level of exports, yields weaker results (column 4). This tends to confirm that the best way to measure the effects of export prices is through their impact on income, that is, weighted by the amount of trade.

- Abstracting from oil price changes or using terms of trade measures instead of export commodity prices has less clear effects (Table 1, columns 5 and 6).

- We find no evidence of asymmetric effects (not reported).

Non-linear specifications were evaluated, in particular in terms of the interaction of the oil variables. Different thresholds for the magnitude of the shock on oil income were tested in a recursive manner; the result was that 5 and 10 percent offered the maximum value and significance for the coefficients (Figure 6). Both levels provided the expected sign for the coefficients for the first and second lags, and 5 percent is associated with more non-zeros in the sample (about 15 percent, see figure 7) and a somewhat better model.

Figure 6. Selection of the Optimal Size for the Shock for the Absolute Value of Variable POIL*(Xoil-Moil)/GDP > i

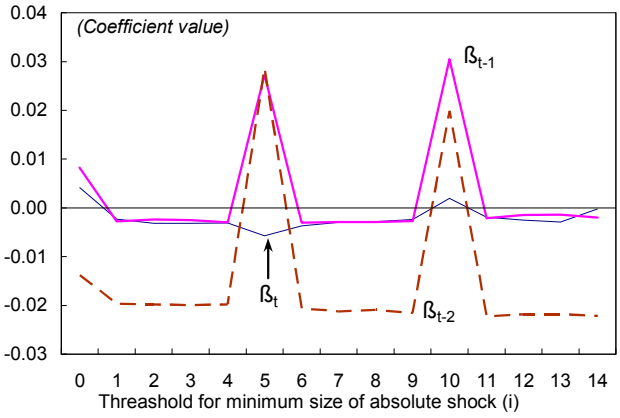
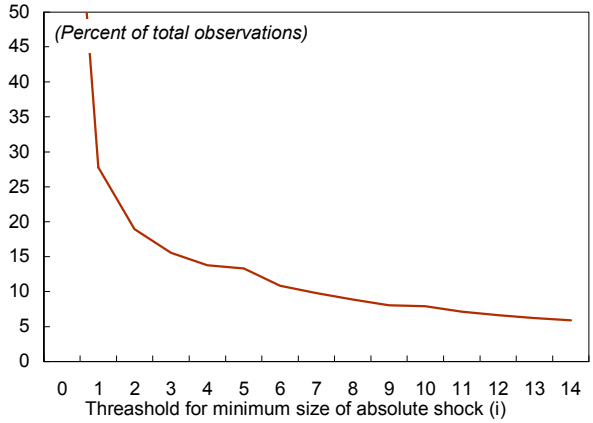
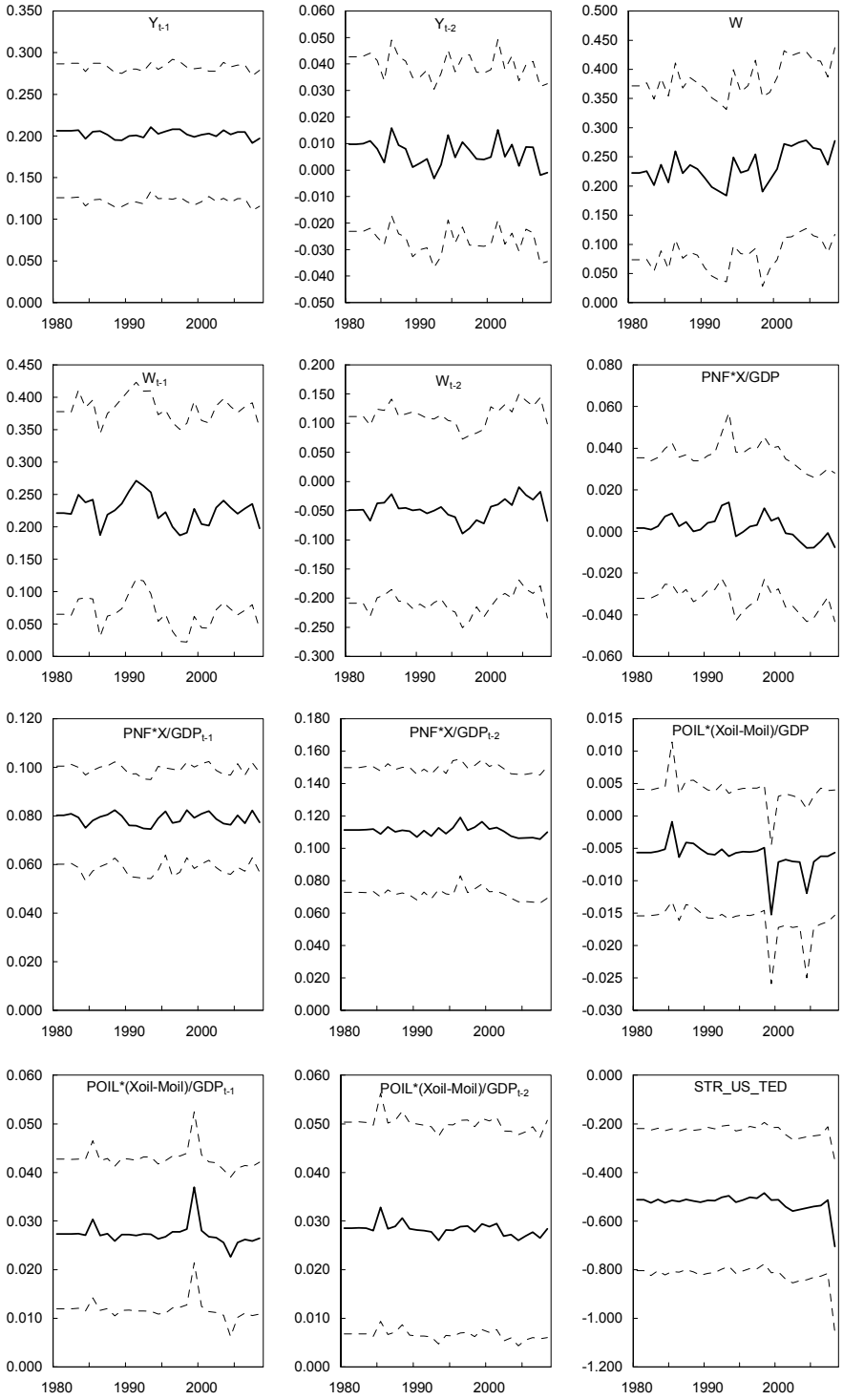


Figure 7.
Percent of Non-Zeros in POIL*(Xoil-Moil)/GDP > i



Next, we run recursive estimates to check for the **stability of parameters** (Figure 8). We find that parameter estimates are remarkably stable. Contemporaneous world growth varies within a relatively narrow band of 0.2 to 0.3 for the whole estimation period (about 30 years). World growth lagged once also varies within a similar range. Thus, it appears that the long-

Figure 8. Recursive Estimators of the GMM Model



Source: Authors' calculations, based on a one-step recursive GMM model.
Note: The dotted lines are plus and minus one standard deviation of the recursive estimator.

sample estimates neither understate nor overstate spillovers. However, given continuing increases in trade and financial integration over the period, spillovers can be expected to rise over time. This is particularly true for countries that underwent rapid structural change in the 80s and the 90s, and it would be consistent with previous studies finding that closer trade linkages lead to increased synchronization of trade partner business cycles.

We then explore the role of an explicit **financial channel** in greater detail**,** because this is likely growing for several SSA countries. We experiment with various measures of financial stress in addition to the short term U.S. dollar-Libor spread. We use high-yield corporate and bank spreads in advanced economies, EMBI spreads, and other measures of financial stress in advanced and emerging market economies (see for instance, Lall, Cardarelli, and Selim Elekdag, 2008 and IMF, *World Economic Outlook*, 2009). We find that the financial channel is significant only for the initial measure of global financial stress. We also explore whether the channel is stronger for a sub-group of more financially developed countries in sub-Saharan Africa. We find that yes, the financial channel, as measured by the LIBOR-to-T-bill rate spread, would seem to have a larger impact in more financially advanced countries in the region, though the significance levels are less clear-cut (not reported).

V. Applications to Sub-Saharan African Countries

Spillovers and forecasting: Testing out-of-sample.

This section applies the growth estimates to decompose growth projections into spillovers and other effects (Table 2, Figure 9). The median estimates for the region as a whole suggest that spillover effects account for about 90 percent of the projected decline in growth in 2009. Estimates vary by country; three broad groups can be distinguished:

- In one group, (Benin, Burkina Faso, Cameroon, Comoros, Côte d'Ivoire, Kenya, Mali, Nigeria, and Senegal) the projected decline in growth is mostly consistent with spillover effects from the global slowdown and lower commodity prices. If there are idiosyncratic factors not captured by the model, they would seem to broadly cancel out.

Figure 9. Out-of-Sample Forecast: Changes in Growth as Forecasted by WEO and by the Spillover Model for 2008 to 09

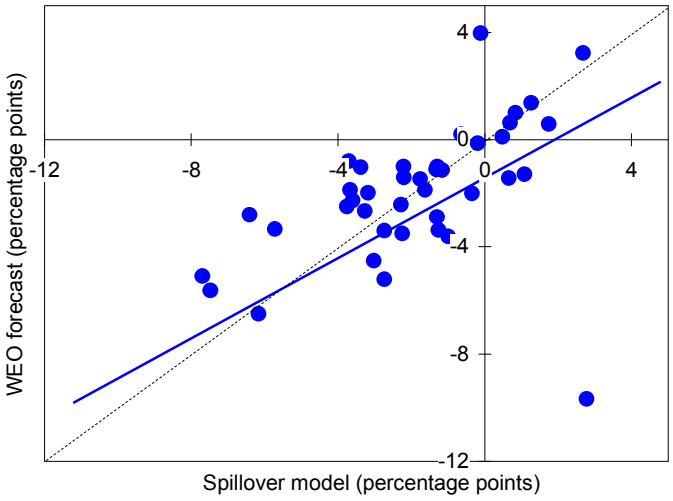


Table 2. Sub-Saharan Africa: Out-of-Sample Real GDP Growth as Forecasted in the WEO and the GMM Model

(In percentage points)

	Actual 2008	WEO/REO 2009	WEO/REO Δ 09/08	Spillover Effects[1]
Angola	14.8	-3.6	-18.4	-5.6
Benin	5.0	3.8	-1.1	-1.2
Botswana	2.9	-10.4	-13.4	-0.9
Burkina Faso	5.0	3.5	-1.5	-1.8
Burundi	4.5	3.5	-1.0	-2.2
Cameroon	3.4	2.4	-1.0	-1.3
Cape Verde	5.9	2.5	-3.4	-2.7
Central African Rep.	2.2	2.4	0.2	-0.7
Chad	-0.4	2.8	3.2	2.7
Comoros	1.0	0.8	-0.1	-0.2
Congo, Dem. Rep. of	6.2	2.7	-3.5	-2.2
Congo, Republic of	5.6	9.5	4.0	-0.1
Côte d'Ivoire	2.3	3.7	1.4	1.3
Equatorial Guinea	11.3	-5.4	-16.7	-4.9
Eritrea	1.0	1.1	0.1	0.5
Ethiopia	11.6	6.5	-5.1	-7.7
Gabon	2.0	0.7	-1.3	1.1
Gambia, The	5.9	4.0	-1.9	-1.6
Ghana	7.2	4.5	-2.7	-3.3
Guinea	4.0	2.6	-1.4	-2.2
Guinea-Bissau	3.3	1.9	-1.4	0.7
Kenya	2.0	3.0	1.0	0.8
Lesotho	3.5	0.6	-2.9	-1.3
Liberia	7.1	4.9	-2.3	-3.6
Madagascar	5.0	-0.2	-5.2	-2.7
Malawi	9.7	6.9	-2.8	-6.4
Mali	5.0	3.9	-1.1	-1.3
Mauritius	6.6	2.1	-4.5	-3.0
Mozambique	6.2	4.3	-1.9	-3.7
Namibia	2.9	-0.7	-3.6	-1.0
Niger	9.5	3.0	-6.5	-6.2
Nigeria	5.3	2.9	-2.4	-2.3
Rwanda	11.2	5.6	-5.6	-7.5
São Tomé & Príncipe	5.8	5.0	-0.8	-3.7
Senegal	2.5	3.1	0.6	0.7
Seychelles	0.1	-9.6	-9.7	2.8
Sierra Leone	5.5	4.5	-1.0	-3.4
South Africa	3.1	-0.3	-3.4	-1.3
Swaziland	2.5	0.5	-2.0	-0.3
Tanzania	7.5	5.0	-2.5	-3.8
Togo	1.1	1.7	0.6	1.7
Uganda	9.5	6.2	-3.3	-5.7
Zambia	6.0	4.0	-2.0	-3.2
Zimbabwe				
SSA Median	5.0	2.9	-2.0	-1.8

[1] Calculated using coefficients from Equation 1 in Table 1, and WEO data.

In some countries (Angola, Botswana, Equatorial Guinea, and Seychelles) estimates of spillover explain only a small fraction of the projected weakening in growth. For them, domestic factors would seem to be making a difficult situation worse.

- In all other countries, while the variation in growth is broadly explained by spillover effects, some offsetting domestic factors or shocks (positive or negative) seem to be at play.

Spillovers and forecasting: Testing in-sample.

To measure the magnitude of the spillovers compared to actual figures and the WEO forecast, we used the model to forecast the 2008 growth rate for each country based on the global assumptions provided by the WEO in Spring 2008 for world growth and commodity prices. The same assumptions were used to produce the 2008 country growth figures, making the comparison with the model "fair."

We found that

- Allowing for a forecast deviation of 0.5 percentage point either way, 58 percent of the WEO forecasts were above the actual growth rate, but with projections relatively optimistic for rates below 8 percent, and generally pessimistic for higher rates. Only 20 percent of the countries were more than 0.5 percentage points below the actual rate (Figure 10).

- For the spillover model, the percent of forecasts above the actual growth rate is somewhat lower, 37 percent. Forecasts are again generally more optimistic at low rates and pessimistic at high rates, but with low/high thresholds somewhat lower at about 4 percent.

- The distribution of errors for the spillover model is wider than for the WEO forecasts (Figure 11), probably because the spillover model does not

Figure 10. Spillovers Model and WEO Forecasts Vs. Actual 2008 Real Growth

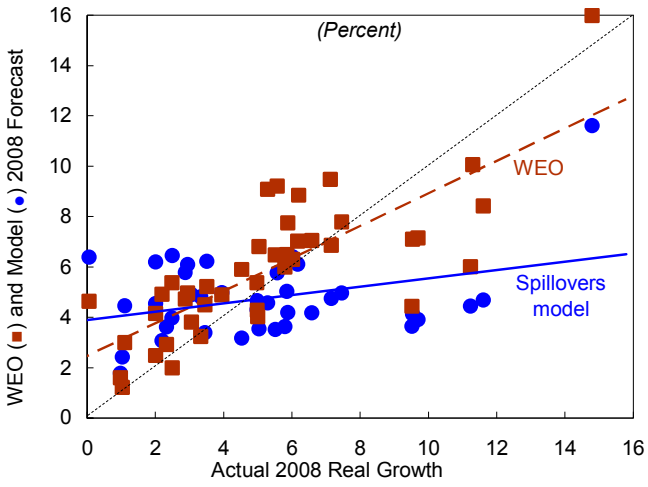
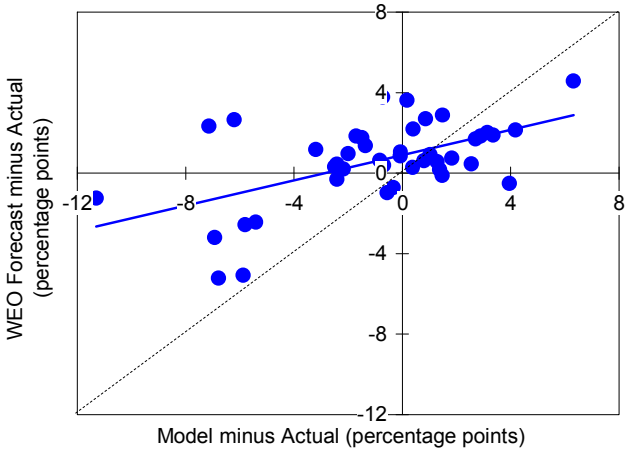


Figure 11. Forecasting Errors in WEO and Spillover Model for 2008



account for domestic factors, including policy responses, or for idiosyncratic shocks other than spillovers.

VI. CONCLUSIONS

This paper has investigated the impact of a global slowdown on individual African countries using a series of dynamic panel regressions for countries in the region, relating real growth in domestic output to world growth in trade weighted by partner countries and to several control variables: oil prices, non-oil prices, financial variables, and country fixed effects. The model, which is shown to estimate well out-of-sample spillover effects in the region, shows that countries in the region are significantly affected by lower external demand for their exports, declines in commodity prices and the terms of trade, and tighter financial conditions abroad. The last, proxied by the spread of 3-month LIBOR to US treasury bills, is to our knowledge one of the first applications of such a measure of financial conditions to countries in the region.

Four results stand-out:

(i) A slowdown in the rest of the World can be expected to drive a slowdown in sub-Saharan African countries, and part of the effect is contemporaneous. On average, over the last almost 30 years, a 1 percentage point slowdown in the rest of the World has led to an estimated 0.4 percentage point slowdown in SSA countries, with results robust across various alternative specifications;

(ii) A non-fuel commodity-price-induced income reduction has a quantifiable impact on growth. The results for simple price indices and terms of trade effects are less clear, and the interaction with the level of exports seems to be important;

(iii) An oil price shock tends to be significant, with no evidence of asymmetric effects, and there seems to be non-linear effects;

(iv) A financial channel is significant when proxied by the spread of 3-month LIBOR vs. US Treasury bills. To our knowledge, this is a first attempt to use such measure of global financial conditions for explaining spillovers into SSA countries.

This paper is intended to complement the body of research assessing growth effects in Sub-Saharan Africa (see for instance, Ndulu and O'Connell, 2007; and Osterholm and Zettelmeyer, 2007) by focusing on spillover effects into the region. The paper does not look into other growth-related issues such as long-term growth performance (see for instance Berg, Ostry, and Zettelmeyer, 2008). Some caveats are in order. First, although the cross-country regression estimates seem to be in line with structural cross-country regressions in the literature (Ndulu and O'Connell, 2007), they explain only part of the growth variation experienced by SSA countries. This is because a broad range of domestic factors may be at play. Second, the estimates reflect short-term effects of changes in the external environment on SSA growth. Some authors (Collier

and Goderis, 2007) have differentiated between the short- and the long-run impact of changes in commodity prices and terms of trade. Third, we do not explore the role of policies. Arguably, fiscal and monetary policies, as well as the exchange rate regime or level of reserves can mitigate the effect of shocks. Further research applying the methodology of this paper can yield useful insights on whether policy variables, such as the level of foreign reserves, for instance, can help mitigate the effect of such shocks.

Box 1. Previous Global Slowdowns and Growth in SSA Countries

Past declines in world growth have affected SSA countries (Table). However, the magnitude of the impact varied greatly, depending on the underlying cause of the decline in world growth, idiosyncratic domestic developments in SSA, and economic policy responses.

Global slowdowns and SSA Growth

	Recessions 1/					Slowdowns 2/	
	1974-75	1980	1982	1991	2001	1986	1995
	Change in GDP growth (median for region; unless otherwise indicated)						
World 3/	-4.5	-1.6	-1.1	-1.3	-2.3	-0.1	-0.1
United States	-6.1	-3.4	-4.5	-2.1	-2.9	-0.7	-1.5
Other Industrial countries	-5.4	-1.5	0.4	-1.3	-2	-0.1	-0.3
Emerging Asia	-3.5	-0.3	-1.5	-0.1	-1.1	0.9	0.3
SSA	-1.6	-0.7	0.2	-1.1	0.9	-1.1	0.6
SSA 3/	-1.0	1.5	-2.3	-2.5	1.0		
	Change in percent						
Non-fuel commodity prices	47.8	7.1	-13.8	-9.1	-8.5	6.3	11.5
Oil prices	250.8	133	-7.3	-15.7	-13.8	-48.2	7.9

Source: World Economic Outlook, April 2007; and IMF staff calculations.
1/ Year during which most of the impact on U.S. growth was recorded.
2/ Periods in which U.S. output was below potential and not considered recessions by the NBER.
3/ Weighted average

As world growth declined in 1974-75 and 1991, so did growth in SSA. In 1974-75, world growth suffered from a U.S. recession and large growth declines in other industrial countries. Due to not only the global nature of the crisis but also the associated large oil price shock, growth in SSA countries also suffered. But the decline in the SSA growth rates was more moderate than experienced elsewhere. In 1991 the decline in world growth was driven by the U.S. recession. The associated Savings and Loan crisis in the U.S. and the resulting credit crunch affected growth in other industrial countries, so the SSA region suffered.

By contrast, in 2001 despite declines in world growth, growth in SSA actually increased. The global slowdown was driven by a U.S. recession associated with the burst of the information technology bubble and the resulting plunge in most major stock market indices and in business investment around the world. The US recession was accompanied by growth declines in most industrial economies, and nonfuel commodity prices declined, but in SSA growth was resilient.

The patterns from the declines in world growth in 1980 and 1982 are less clear-cut.

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APPENDIX

VARIABLES USED IN THE PANEL REGRESSION

(All variables are annual and cover maximum 44 countries and the period 1971 to 2008)

Y = Real GDP growth (local constant currency), in percent. Provided by AFR desks and available in the WETA/WEO database.

W = Real GDP growth of the trading partners (Local constant currency, weighted by exports), in percent. Provided by WEO and available in the WEO/GEE database.

X/GDP = Exports of goods and services in percent of GDP. Data provided by WEO.

(Xoil-Moil)/GDP = Net exports of oil products in percent of GDP. Data provided by WEO.

ToT = Growth rate of terms of trade of goods and services. Provided by AFR desks to the WETA/WEO. Calculated as the price of exports divided by the price of imports.

PNF = Annual percent change in the price of country specific non-fuel commodities "Data on non-fuel commodity prices, maintained by the Research Department's, Commodities Unit, are used in the GEE tables to provide, for each country, an average of non-fuel commodity prices, weighted by its export as well as import composition of average 2004-2006 non-fuel commodity trade."

POil > 5 = Threshold dummy variable for oil price with income effects associated with absolute price changes greater than 5 percent.

FIN = Dummy that takes the value of 1 for financially developed and frontier markets, 0 for other countries (See IMF, 2009 for an explanation of the criteria).

STR_USA_TED = Measure of global financial conditions. Spread between 3-month Libor rate and short term treasury bills rate in the United States.