Who is Afraid of Political Instability?

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Executive Summary

The analysis of the consequences of socio-political instability has been a central theme in recent macroeconomic research, in general, and in the economic growth literature, in particular. There are two different views on the nature of the relationship between political instability and growth. Some authors submit that political instability disrupts productive activities and increases uncertainty. By doing so, it undermines the incentives for the accumulation of physical capital with detrimental consequences for the rate of economic growth. Other economists argue that economic growth leads to more political instability because growth entails substantial structural changes that undo political coalitions and induce painful read*justments in the balance of power among different interest groups.

Despite the negative relationship between political instability and economic growth having been elevated to "stylized fact" status, the empirical studies on which this assessment is based have been heavily criticized for ad hoc selection of explanatory variables, excessively narrow definitions of political instability, insufficient sensitivity analysis and failure to investigate the direction of causality. Although not fully sharing this criticism, we believe that this finding should not be elevated to "stylized fact" status without demonstrating that causality exists and runs from political instability to growth, rather than vice-versa.

The objective of this paper is to investigate the existence and direction of a causal relationship between political instability and economic growth. To do so, we construct two indexes of political instability (one for mild and the another for severe instability) for non-overlapping five-year periods, between 1960 and 1995, for 98 developing countries. We use the Granger causality framework and report Anderson-Hsiao-Arellano instrumental variable estimates.

We find no evidence of the hypothesized negative and causal relationship between political instability and economic growth. Our sensitivity analysis, however, suggests two possible explanations for the apparent disagreement between our findings and those of the rest of the literature. First, for the full sample, the negative relationship obtains only contemporaneously (and independently of whether we use 25- or 5-year averages). Second, in the long run and ignoring institutional factors, the Sub-Saharan Africa sample seems to be the driving force in arriving at the negative relation between growth and political instability.

WHO IS AFRAID OF POLITICAL INSTABILITY?*

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Abstract: An unstable macroeconomic environment is often regarded as detrimental to economic growth. Among the sources contributing to such instability, the literature has assigned most of the blame to political issues. This paper empirically tests for a causal and negative long-term relation between political instability and economic growth, but finds no evidence of such a relationship. Sensitivity analysis indicates that there is a contemporaneous negative relationship and that, in the long run and ignoring institutional factors, the Sub-Saharan Africa group plays the determining role in steering this relationship into causal and negative.

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1. Introduction

The analysis of the consequences of socio-political instability (hereafter, SPI) has been a central theme in recent macroeconomic research, in general, and in the economic growth literature, in particular.[1] There are two very different views on the relationship between SPI and growth. Some submit that SPI disrupts production and increases uncertainty in the economy. By doing so, it undermines the incentives for the accumulation of physical capital and reduces the rate of economic growth.[2] Others argue that economic growth leads to either higher SPI (because growth entails substantial structural changes that undo political coalitions and induce painful readjustments in the balance of power among different interest groups[3]) or lower SPI because it reduces social and political tensions. Despite the negative relationship between SPI and economic growth having been elevated to "stylized fact" status,[4] the empirical studies on which this is based have been heavily criticized for ad hoc selection of explanatory or control variables, excessively narrow definitions of SPI, insufficient sensitivity analysis and failure to investigate the direction of causality.[5] Although not fully sharing this criticism, we

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[1] Among the variables allegedly affected by SPI are the independence of central banks (see e.g. Cukierman, Webb and Neypati, 1992 and Cukierman and Webb, 1995), seigniorage (Cukierman, Edwards, and Tabellini, 1992), aggregate investment (Ozler and Rodrik, 1992), budget deficits (Roubini, 1991), external debt (Alesina and Tabellini, 1989, and Ozler and Tabellini, 1991), and exchange rate regime (Collins, 1996). Examples of the literature on SPI and growth are Barro (1991), Alesina, Ozler, Roubini and Swagel (1996), and Ades and Chua (1997).

[2] See Alesina, Ozler, Roubini and Swagel (1996), and references therein.

[3] See, e.g., Olson (1963) and North (1981).

[4] According to the review of the literature by Mankiw (1995, 302), a robust finding is that "political instability, as measured by the frequency of revolutions, coups, or wars, is negatively associated with growth". Similarly, Persson and Tabellini (1999) conclude in their chapter for the *Handbook of Macroeconomics* (1999): "Political instability, as measured by more frequent regime changes, or political unrest and violence, is significantly and negatively correlated with growth in cross-country data".

[5] Durlauf and Quah (1998) provide the most extensive review of this empirical literature and find that more than 80 different explanatory variables have been used thus far.

believe that this finding should not be elevated to "stylized fact" status without demonstrating that causality exists and runs from SPI to growth, rather than vice-versa.

The objective of this paper is to investigate the existence and direction of a causal relationship between SPI and economic growth. To do so, we construct two different indexes of SPI for non-overlapping five-year periods, between 1960 and 1995, for 98 developing countries. We use the Granger causality framework and report Anderson-Hsiao-Arellano instrumental variable estimates.

We find no evidence of the hypothesized negative and causal relationship between political instability and economic growth. Our sensitivity analysis, however, suggests two explanations for the apparent disagreement between our findings and those of the rest of the literature. First, for the full sample, the negative relationship obtains only contemporaneously (and independently of whether we use 25- or 5-year averages). Second, in the long run and ignoring institutional factors, the Sub-Saharan Africa sample seems to be the driving force in arriving at the negative relation between SPI and growth.

The paper is organized as follows. In Section II we present our two measures of SPI, describe how each index is constructed and map the relationship between them. In Section III we discuss the advantages and shortcomings of the Granger-causality framework. In Section IV we present our causality results, reporting Anderson-Hsiao-Arellano instrumental variable estimates. In Section V we subject these results to sensitivity analysis. Section 6 concludes.

2. The Measurement of Political Instability

There seem to be two rather different understandings of SPI in the literature. One stresses regular and irregular government transfers, the other much harsher aspects, such as revolutions, *coups* *d'Etat*, civil wars and political assassinations.[6] That these overlap (e.g., by including irregular government transfers) does little to diminish the different intensities that each attaches to "instability." While the former interpretation constrains it to relatively tame phenomena, the latter places it closer to social chaos. In order to recognize both views, we construct two measures of SPI, one capturing the more severe and the other the less severe forms of SPI. While many other variants could have been used, our justification is that these can be considered the bounds of the realistic range of such measures, together permitting a more complete depiction of the causality structure between SPI and growth.

Our measure of "severe" or "upper-bound" SPI follows existing literature in using three indicators: the numbers of political assassinations per million people, revolutions and successful *coups d'Etat*.[7] The first of these is especially important because it captures a magnitude dimension that is largely missing from the other (frequency) measures.

For the measure of the "moderate" or "lower-bound" SPI we follow Chen and Feng (1996) and others in the use of indicators from the *Polity III* data collection (Jaegger and Gurr, 1996). A crucial advantage of using this source is its relatively complete country and time coverage. From it, we select the following variables: competitiveness and regulation of political participation; regulation, competitiveness, and openness of executive recruitment; and the legal (*de jure*) and operational (*de facto*) independence of the chief executive.[8] Because political actors and processes are to be subject to systematic regulation, this set of indicators is capable of capturing the extent of even subtle changes in

[6] See footnote 4 above.
[7] The data source is Barro and Lee (1993).
[8] Although a more appropriate lower-bound measure of SPI might include strikes, demonstrations without violence or deaths, regional and internal conflicts, free press, etc., to our knowledge, data on such variables is largely lacking for our sample (98 developing countries, 1960-1995).

both legal and actual practice. The less regulated are such actors and processes, the greater is the potential for social and political change (and the higher the value of this SPI index).[9]

These two SPI indexes are constructed by the method of principal components. This method has the benefit that it addresses the latent variable problem and minimizes the inherent arbitrariness in the aggregation procedure. For the severe or upper bound SPI (UBSPI) indicator, the loadings resulting from this procedure are 0.3162 for assassinations, 0.6909 for revolutions, and 0.6502 for coups. In the case of lower bound SPI (LBSPI), the resulting loadings are 0.3923 and 0.1105 for the competitiveness and regulation of political participation (respectively); 0.4677, 0.4734 and 0.3535 for regulation, competitiveness, and openness of executive recruitment; and 0.2317 and 0.4608 for the legal (de jure) and operational (de facto) independence of the chief executive.

Since both indexes are measures of SPI but capturing quite different aspects of it, one would expect them to be positively but not highly correlated. In general, this expectation is fulfilled: with the exception of the Middle East and North Africa region, for all other regions the correlation between the respective pairs of SPI indexes is positive and statistically significant but less than 0.6 (as shown in column 1, Table 1). Since these correlation coefficients are only with respect to the linear relation between the two measures, to get at non-linearities, in the remaining columns of Table 1 we present some results from two alternative specifications. Column (2) contains the adjusted-R^2 of regressions where the dependent variable is LBSPI and the independent variables are UBSPI and its square and column (3) those where a cubic term is added. Note that the adjusted values of R^2 are universally higher when the cubic terms are included. In the remaining columns of the table are the regression coefficients

[9] Since in Polity III (Jaegger and Gurr, 1996) countries receive high scores when the extent of regulations is high (implying low SPI), for present purposes the coding has been reversed.

estimated from the model of column (3). Note that for the sample as a whole and for each region, the coefficients of the linear, quadratic and cubic terms have alternating signs – indicating non-linearity in the relationship - and are, with a single exception, significant at the 1-percent level. On this basis, we claim that our lower-bound SPI index is indeed systematically, though non-linearly, related to SPI of the more traditional "severe" or upper-bound variety.

INSERT TABLE 1 ABOUT HERE

Next we turn to the rate of real per capita GDP growth and the other variables used in the analysis to follow and to the time periods chosen. All such measures are collected for non-overlapping five-year periods, covering the period 1960-1995 in an unbalanced panel of 98 developing countries.[10] There are 14 countries from Asia, 21 from Latin America, 17 from the Middle East and North Africa and 46 from Sub-Sahara Africa. Table 2 shows basic statistics and correlation matrix. The negative correlation coefficients between both UBSPI and LBSPI and growth are both statistically significant for the full sample and for each of the regions. We also found that the same significant negative relationship holds for the pure cross section relating to growth over the whole period as to that reported in the table with the pooled data for five-year intervals. However, this negative relationship need not imply causality, the issue explored below.

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[10] Per capita GDP data are from Summers and Heston (1994). We chose an unbalanced panel in order to deviate as little as possible from the rest of the literature. The differences in country and time coverage between our sample and those used in other studies are marginal.

INSERT TABLE 2 ABOUT HERE

3. The Costs and Benefits of Granger Causality

This section discusses the conceptual and econometric advantages (as well as the limitations) of the Granger-causality framework. This framework has endured the test of time because of its elegance and strong intuitive appeal: the notion that an event in the future cannot cause one in the past.[11] Consider two time series, x_t and y_t. Series x_t is said to Granger-cause series y_t if, in a regression of y_t on lagged y's and lagged x's, the coefficients of the lagged x's are jointly significantly different from zero.

There are two critical issues to be addressed in conducting Granger causality tests.[12] The first concerns the length and frequency of the time lags. On their length, Granger warns that "using data measured over intervals much wider than actual causal lags can destroy causal interpretation" (Granger, 1987, p.49). We believe that five year periods are short enough to allow us to investigate the effects of lagged variables, and yet long enough to be meaningful for studying the long-run effects of SPI on economic growth, and vice-versa (Solow, 1997). As to their frequency, there are tests to determine the optimal number of lags. Yet, because ours is a short panel, we use the grid procedure identified below to evaluate the robustness of the results presented below.

The second issue to be dealt with lies in the information set. The Granger test depends on the assumption that the cause contains unique information about the effect, in the sense that it is exhaustive

[11] Granger remarks that "causation is a non-symmetric relationship, and there are various ways in which asymmetry can be introduced, the most important of which are controllability, a relevant theory, outside knowledge, and temporal priority" (1987, 49.) For discussion see, e.g., Hsiao (1979), and Zellner (1989).

[12] We do not know of other studies that use the Granger framework in this context. The closest paper to ours is Blomstrom, Lipsey and Zejan (1996).

and unavailable elsewhere. If the two variables in the Granger test are affected by a third one, unless the latter is accounted for, the test can be rendered useless. In what follows, we present Granger causality results that are unaffected by the inclusion of variables that could potentially play this disruptive role.

Finally, we must attend to the econometric issue that arises from the inclusion on the right-hand side of the (lagged) dependent variable, referred to in the econometric literature as the dynamic panel problem: unless the time dimension of the panel is very large, parameter estimates will be inconsistent and biased.[13] While the best solution to this problem is still an object of debate in the econometrics literature,[14] in one of the few studies focusing on "short and wide" panels (like ours), Kiviet (1995) finds that the instrumental variable approach pioneered by Anderson and Hsiao (1982) performs as well as any other alternative. Hence, we use this method. Specifically, we first-differenced all variables and followed Arellano's (1989) recommendation by using the twice-lagged levels instead of the twice-lagged first-differences as instruments.

4. Empirical Results

We begin our investigation of the causality patterns between SPI and economic growth in Tables 3 and 4. In Table 3 we ask whether (severe or moderate) SPI Granger-causes per capita GDP growth. In our complete sample of 98 developing countries, we find no evidence of a causal relationship: neither moderate nor severe SPI seems to Granger-cause economic growth. When we break down these results by region, at best we find a negative relationship between moderate SPI and

[13] For discussion see, e.g., Hsiao (1986), Sevestre and Trognon (1992), and Baltagi (1995).
[14] See, among others, Holtz-Eakin et al. (1988), Arellano and Bond (1991), Kiviet (1995), and Judson and Owen (1999).

growth that is significant at the .10 (but not .05) level and only for the Sub-Saharan Africa sample. Note also that the effect (i.e., the sign of the relevant coefficient) varies substantially not only by region, but also by the SPI index used. In particular, for the Middle East and North Africa region, the commonly used severe SPI index Granger-causes greater rather than lower rates of economic growth.[15] With respect to the relationship flowing from economic growth to SPI, the results presented in Table 4 fail to reveal any indication of causality.

INSERT TABLES 3 AND 4 ABOUT HERE

Summarizing, the evidence supporting the hypothesis that SPI causes a decrease in the growth rate of per capita income seems much weaker than generally believed. In addition, such a negative and causal relation seems to be largely confined to the Sub-Saharan Africa sample, the only sample for which the relevant coefficient is statistically significant. Finally, we find no evidence whatsoever of causality flowing the other way (i.e., from per capita GDP growth to SPI). Before discussing these results further, in the following section we subject them to various sensitivity analyses.

5. Sensitivity Analysis

The objective of this section is to test the sensitivity of the results to various modifications, which (in the interest of space) are only partially reported in the text.

[15] Campos, Nugent and Robinson (1999) find that in the Middle East and North Africa region, external political instability affect economic performance directly and indirectly (via policy distortions), conditional on the level of internal SPI. Controlling for external political instability renders the coefficient on internal political instability (as above) statistically insignificant.

The first sensitivity test reported here is with respect to the frequency of the time lags. Having in mind that ours is a short panel, we experimented with including two lags of the "causing variable *x*" (instead of the one lag results presented throughout this paper), and with the exclusion of one lag of the "caused variable *y*." Since none of these changes affects our conclusions, and our focus is on the relation between SPI and *long-term* growth, in subsequent sensitivity analyses we keep the length of the lag fixed at five years.[16]

The issue regarding the content of the information set refers to whether there are omitted variables that affect both growth and SPI. A particularly promising candidate for such a role is institutional development. Our measure of institutional development is the index of "legislative effectiveness" from Banks (1984). It is selected here because it is available for a large number of developing countries for a long period of time, and conceptually it captures an aspect of institutional development that is closely related to SPI.[17] The unattractive features are that the data are available only until 1984 (thereby forcing us to lose observations) and it is a categorical variable that assumes one of four values, from zero to 3.[18] We mitigate these drawbacks by lagging it one period and using 5-year

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[16] It would be important to investigate the effect of alternative lag lengths (such as one, two, three or four year periods) relative to the five year length use here. While Gupta (1990) constructed annual series for a similar SPI index, he did so only until 1982 and in personal communication has stated that the updating of these series (until 1995) has not yet been completed. We thus have to leave this important exercise for future work.

[17] For example, the quality of the bureaucracy is another aspect of institutional development, but its relation to SPI is not as direct or clear.

[18] "Legislative effectiveness" (LEGEF) is coded zero if no legislature exists, '1' if legislative activity is of a "rubber stamp" character, its implementation is faulty or it is completely subordinate to the executive, '2' if the executive's power substantially outweighs, but does not completely dominate, that of the legislature, and '3' for an "effective legislature" distinguished by significant governmental autonomy, including its ability to override vetoes by the executive.

averages. Our working hypothesis is that, in a given country, the level of SPI is contemporaneously negatively correlated with the level of institutional development.[19]

The initial level of per capita income is another natural candidate for having an influence on both SPI and economic growth. The convergence property of the neoclassical growth model suggests that growth should be negatively related to the initial level of income per capita. We conjecture also that lower levels of per capita income may increase the potential for political instability.

In what follows, we present results obtained by adding the levels of both initial income and institutional development to the specifications for the Granger-causality tests reported in the previous section. In Table 5 we investigate whether or not SPI Granger-causes GDP growth, once we control for the levels of institutional development and initial income. There are two important differences in results from those in Table 3. First, a rise in lower bound SPI ceases to Granger-cause (a decrease in) economic growth in Sub-Saharan Africa and, second, a rise in severe SPI ceases to Granger-cause (an increase in) GDP growth in the Middle East and North Africa. It is worth noting that it is the inclusion of the institutional variable that makes the coefficient for Sub-Saharan Africa statistically insignificant but it is the inclusion of initial income per capita that does so for the Middle East and North Africa. In other words, the result for Sub-Saharan Africa from Table 3 holds with initial income in the specification (provided the institutional development variable is not included) and the result for the MENA region holds with the institutional development in the specification (provided initial income is not included).

[19] We find support for the hypothesis that high levels of SPI are associated with low levels of institutional development. The contemporaneous correlation between "legislative effectiveness" and each of our SPI indexes are negative and statistically significant, at the 5 percent level, for our whole sample and each of the four regions individually.

INSERT TABLES 5 AND 6 ABOUT HERE

In Table 6 we ask whether economic growth Granger-causes SPI after controlling for the levels of institutional development and initial income. Recall that from Table 4 there was no indication of causality flowing in this direction, irrespective of the SPI index used or of the regional breakdown. These same results hold in Table 6 with one exception. The coefficient on economic growth for Latin America turns out to be statistically significant after we enlarge the information set. Moreover, the result indicates that a rise in the rate of per capita economic growth in this region seems to Granger-cause a rise in the level of our moderate index of SPI. Further investigation revealed that it is the inclusion of the institutional development variable that is responsible for this change.[20] The identification of the precise mechanism for this destabilizing effect of economic growth in Latin America is left for future work.

Further sensitivity tests were performed for alternative control variables with the following results (available on request from the authors). In particular, the results are not affected by using (instead of level of per capita income or institutional development) the rate of population growth or the growth rate of the country's main trade partners as alternative controls. The use of a "terms of trade" index as an alternative control does have some effect, but this is to make the coefficient on LBSPI for the Africa region statistically insignificant, thereby further strengthening the case against a causal relation.

Finally, some tests with respect to estimation procedure were also performed. Yet, our conclusions remain the same even if instead of the Anderson-Hsiao-Arellano estimator, we should use

[20] Notice that including only initial income in the relevant specifications also makes the coefficient on economic growth become statistically significant, although only marginally at the 10 percent level. It is on this basis that we claim that the institutional variable is responsible for the change.

any of the following procedures: OLS (with levels), OLS (with first-differences), the Anderson-Hsiao estimator, the one-step GMM estimator proposed by Arellano and Bond (1991), the two-step GMM estimator proposed by Arellano and Bond (1991), or the GMM estimator proposed by Ahn and Schmidt (1995).

6. Conclusions

The objective of this paper was to investigate the existence (and direction) of a causal relationship between SPI and economic growth. We find that the evidence supporting the hypothesis that high levels of SPI cause lower rates of economic growth is much weaker than generally believed, as we find no traces of a long-run causal relationship. How can this be reconciled with the results from other studies? Our sensitivity analysis shows that the Sub-Sahara Africa sample constitutes a large part of the explanation. Not only is the Sub-Saharan African sample much larger than those for other regions, but also its SPI seems to be of a more structural nature. This explanation is supported by our finding that, once one controls for institutional development or alternatively the terms of trade, the causality results vanish. Hence, we suspect that of other studies were to exclude African countries from their samples, the existing results of a negative relation between SPI and growth would disappear.

Given the prominence attached to SPI in recent macroeconomic research in general (and in political economy in particular), there are a number of suggestions for further research that should be put forward. First, in light of the inconsistency between existing results (of a negative contemporaneous relation between SPI and economic growth) and our own findings of the lack of a causal negative relationship between SPI and growth, one should ask at what frequencies and lag lengths does the relationship change from non-causal to causal?[21] As noted above, this is an important question answerable only when higher frequency data should become available.

A second direction for future research would be to investigate whether a causal negative relationship emerges between growth and other important sources of instability, for instance, policy variability. Hopenhayn and Muniagurria (1996) have formalized its macroeconomic role, and Brunetti (1998) presents relevant empirical evidence.

Third, there should be considerable scope to identify additional omitted variables, especially those of an institutional nature, which might be related to both SPI and growth. Numerous institutional variables may be relevant, like the fairness and effectiveness of the judicial system and the stability of property rights. Indeed, in a cross-sectional framework Keefer and Knack (1995) find that, once these are taken into account, the negative effect of SPI on growth vanishes. Another important candidate for such an omitted variable role, following Persson and Tabellini (1992, 1994) and Alesina and Perotti (1996), might be the level of income inequality. Unfortunately, the data (on income distribution and institutions) needed for these "enlargements" of our Granger tests are not presently available.

Fourth, given the difficulties in constructing a lower-bound measure of socio-political instability, exploratory research of this sort with other SPI measures should be encouraged.

Finally, in the light of the wide variety of other consequences that have been alleged to SPI, and referred to in our introduction, serious consideration should also be given to the examination of causal

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[21] For example, might it not be that there is a very short period of an initial negative impact of SPI on growth, say six months or a year, followed by several years of catch-up, reflected in a positive relation between five year lagged SPI and growth?

relationships between SPI and these other variables. In particular, it would be interesting to see whether the Sub-Saharan Africa sample would again play such a determinant role.

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Table 1.
The Relationship between the Lower-Bound and Upper-Bound Indexes of SPI

	Simple Correlation	Adj. R^2	Adj. R^2	UBSPI	$UBSPI^2$	$UBSPI^3$
	(1)	(2)	(3)	(4)	(5)	(6)
All LDCs	0.319 [0.0001]	0.2577	0.5616	-1.93816*** (-10.043)	2.89843*** (22.225)	-0.40813*** (-16.989)
Asia	0.284 [0.0001]	0.3840	0.6776	-0.73461 (-1.632)	4.03200*** (10.714)	-0.94505*** (-7.459)
Latin America	0.535 [0.0001]	0.3198	0.6555	-1.08082*** (-3.085)	3.61378*** (13.113)	-0.65841*** (-10.019)
Middle East & North Africa	-0.027 [0.8169]	0.1590	0.5978	-2.91247*** (-6.236)	3.44408*** (10.163)	-0.42997*** (-8.859)
Sub-Saharan Africa	0.319 [0.0001]	0.3419	0.6119	-1.45044*** (-4.925)	3.74465*** (15.281)	-0.72011*** (-11.110)

Notes: Column (1) contains the simple correlation coefficients between the two indexes of socio-political instability (LBSPI and UBSPI). Numbers in brackets are p-values.
Column (2) shows the adjusted R^2 of a regression where the dependent variable is LBSPI and the independent variables are UBSPI and $UBSPI^2$. In all regressions, both coefficients are significant at the 1 percent level, and have negative and positive signs respectively.
Column (3) shows the adjusted R^2 of a regression where the dependent variable is LBSPI and the independent variables are UBSPI, $UBSPI^2$ and $UBSPI^3$.
Columns (4), (5) and (6) contain the coefficients on UBSPI, $UBSPI^2$ and $UBSPI^3$ for the regression which adjusted R^2 is shown in column (3). Numbers in parenthesis are t-statistics. A * denotes that the coefficient is statistically significant at the 10 percent level, ** that it is statistically significant at the 5 percent level, and *** that it is statistically significant at the 1 percent level.

Table 2.
Basic Statistics and Correlation Matrix

Variable	Mean	Std.Dev.	Min	Max
Growth	1.5713	4.1372	-15.8808	10.6604
UBSPI	-.0472	1.2155	-.9076	4.8948
LBSPI	5.1137	1.5630	.4046	10.3362
Institutional Development	1.2979	.9106	0	3
Per capita income	2013.7	1563.4	322	7777
Population growth	2.532	.7744	.1490	6.9542
Trading partners' Growth	2.5198	1.2869	-2.2389	6.4387
Terms of Trade	.00088	.02485	-.0805	.1493

Correlation Matrix

Variable	Growth	UBSPI	LBSPI	Institutional Dev.	Per capita income	Pop. growth	Trading partners' Growth
UBSPI	-0.1168						
LBSPI	-0.0610	0.3658					
Institutional Development	0.0027	-0.3899	-0.6902				
Per capita income	-0.0954	-0.1080	-0.2435	0.2245			
Population growth	-0.0992	-0.0665	0.1705	-0.1404	-0.0511		
Trading partners' Growth	0.4006	-0.0149	-0.0902	0.0176	-0.1583	0.0297	
Terms of Trade	0.0980	0.0252	0.0265	-0.0645	0.0333	0.0795	0.0596

Note: See text for details.

Table 3.
Does SPI Granger-cause per capita GDP Growth?
(Endogenous variable is Δ GDP$_t$)

	Δ GDP$_{t-1}$	Δ LBSPI$_{t-1}$
All LDCs	.1020 (1.48)	-.1603 (-.73)
Asia	.310948 (1.46)	.3553 (.83)
Latin America	-.1744 (-1.28)	.098049 (.34)
Middle East & North Africa	.1701 (1.32)	-.2473 (-.35)
Sub-Saharan Africa	.1192 (1.02)	-.8550 * (-1.96)

(Endogenous variable is Δ GDP$_t$)

	Δ GDP$_{t-1}$	Δ UBSPI$_{t-1}$
All LDCs	.0880 (.90)	.3629 (1.56)
Asia	.3595 (1.25)	-.3424 (-.8288)
Latin America	-.0560 (-.31)	.5528 (1.21)
Middle East & North Africa	.1687 (.75)	1.6020 * (1.83)
Sub-Saharan Africa	.1082 (.77)	.0494 (.15)

Notes: All variables are in first-differences (Δ), five-year averages, between 1960-1995, and t-statistics are in parenthesis. Instrumental variables estimates shown (Anderson-Hsiao-Arellano). *LBSPI* is lower-bound SPI, *UBSPI* is upper bound SPI, *and GDP* is the OLS per capita GDP Growth Rate.

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table 4.
Does per capita GDP Growth Granger-cause SPI?
(Endogenous variable is lower-bound Δ $LBSPI_t$)

	Δ $LBSPI_{t-1}$	Δ GDP_{t-1}
All LDCs	.5434 *** (4.48)	-.0036 (-.33)
Asia	.8702 ** (2.55)	-.0153 (-.35)
Latin America	.5818 *** (2.99)	.0513 (1.61)
Middle East & North Africa	.0159 (.10)	-.0014 (-.13)
Sub-Saharan Africa	.6208 *** (2.78)	-.0276 (-1.54)

(Endogenous variable is upper-bound Δ $UBSPI_t$)

	Δ $UBSPI_{t-1}$	Δ GDP_{t-1}
All LDCs	.1773 (1.59)	-.0021 (-.11)
Asia	.3255 (.87)	-.0736 (-.88)
Latin America	.0776 (.34)	.0673 (1.56)
Middle East & North Africa	.1854 (1.29)	.0057 (.19)
Sub-Saharan Africa	.2195 (1.07)	-.0331 (-1.08)

Notes: All variables are in first-differences (Δ), five-year averages, between 1960-1995, and t-statistics are in parenthesis. Instrumental variables estimates shown (Anderson-Hsiao-Arellano). *LBSPI* is lower-bound SPI, *UBSPI* is upper bound SPI, *and GDP* is the OLS per capita GDP Growth Rate.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table 5.
Controlling for institutions and initial income,
does SPI Granger-cause per capita GDP growth?
(Endogenous variable is Δ GDP$_t$)

	Δ GDP$_{t-1}$	Δ LBSPI$_{t-1}$	Δ LEGEF$_{t-1}$	Δ GDP0$_{t-1}$
All LDCs	-.099901 (-.793022)	-.127939 (-.579914)	-.310724 (-.657877)	-.000694 (-.843915)
Asia	.217832 (1.23315)	.025806 (.060398)	.308899 (.390275)	-.001467 (-1.477620
Latin America	-.411040* (-1.93362)	-.040021 (-.128262)	-.575221 (-.888192)	-.002343* (-1.67330)
Middle East & North Africa	.260669 (.624948)	-.285469 (-.334162)	1.63488 (.756562)	.001697 (.654005)
Sub-Saharan Africa	-.049150 (-.236183)	-.460715 (-.973416)	-1.23415 (-1.34210)	-.000452 (-.245089)

(Endogenous variable is Δ GDP$_t$)

	Δ GDP$_{t-1}$	Δ UBSPI$_{t-1}$	Δ LEGEF$_{t-1}$	Δ GDP0$_{t-1}$
All LDCs	-.272948* (-1.84204)	.219158 (.932017)	.-.524852 (-.886105)	-.001768* (-1.89236)
Asia	.243242 (.977085)	.018053 (.044311)	-.654817 (-.620857)	-.001444 (-1.42580)
Latin America	-.848040*** (-2.68874)	-.256357 (-.502485)	-1.02379 (-1.14927)	-.006313*** (-3.14233)
Middle East & North Africa	.341391 (.593774)	1.82170 (1.33377)	2.28172 (.867335)	.002853 (.814455)
Sub-Saharan Africa	-.215917 (-1.05915)	.075596 (.229527)	-1.19105 (-1.14784)	-.001621 (-.924678)

Notes: All variables are in first-differences (Δ), five-year averages, between 1960-1995, and t-statistics are in parenthesis. Instrumental variables estimates shown (Anderson-Hsiao-Arellano). *LBSPI* is lower-bound SPI, *UBSPI* is upper-bound SPI, *GDP* is the OLS per capita GDP Growth Rate, *LEGEF* is an index of legislative effectiveness (institutional development), and *GDP0* is level of initial per capita income.

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table 6.
Controlling for institutions and initial income,
does GDP per capita growth Granger-cause SPI?
(Endogenous variable is $\Delta\, LBSPI_t$)

	$\Delta\, LBSPI_{t-1}$	$\Delta\, GDP_{t-1}$	$\Delta\, LEGEF_{t-1}$	$\Delta\, GDP0_{t-1}$
All LDCs	.241667** (2.51915)	.001460 (.106914)	-1.21630*** (-12.6326)	-.000082 (-.604501)
Asia	.212834 (.948019)	.006572 (.210992)	-1.23008*** (-6.44086)	-.000027 (-.114898)
Latin America	.197626 (1.27543)	.070435** (2.14353)	-1.51822*** (-8.82059)	.000166 (.541064)
Middle East & North Africa	-.012567 (-.066910)	-.036122 (-1.19802)	-.542633** (-2.19795)	-.000476 * (-1.89664)
Sub-Saharan Africa	.490306*** (2.73276)	-.029438 (-1.38838)	-1.07150*** (-6.23833)	-.000153 (-.601373)

(Endogenous variable is $\Delta\, UBSPI_t$)

	$\Delta\, UBSPI_{t-1}$	$\Delta\, GDP_{t-1}$	$\Delta\, LEGEF_{t-1}$	$\Delta\, GDP0_{t-1}$
All LDCs	.023900 (.238744)	-.005830 (-.284849)	-.796847*** (-4.98379)	-.000130 (-.659980)
Asia	.170841 (.536400)	-.065159 (-.858917)	-1.05159** (-2.32080)	-.000046 (-.104656)
Latin America	-.034635 (-.162371)	.068619 (1.45854)	-.727868*** (-2.91017)	-.000053 (-.123021)
Middle East & North Africa	.047810 (.280701)	-.019980 (-.477918)	-.471677 (-1.48426)	-.000257 (-.774756)
Sub-Saharan Africa	.003319 (.019613)	-.029328 (-.894690)	-1.07179*** (-3.39197)	-.000064 (-.158291)

Notes: All variables are in first-differences (Δ), five-year averages, between 1960-1995, and t-statistics are in parenthesis. Instrumental variables estimates shown (Anderson-Hsiao-Arellano). *LBSPI* is lower-bound SPI, *UBSPI* is upper-bound SPI, *GDP* is the OLS per capita GDP Growth Rate, *LEGEF* is an index of legislative effectiveness (institutional development), and *GDP0* is level of initial per capita income.
* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

APPENDIX TABLES

Table A1. Controlling for POPULATION GROWTH, does SPI Granger cause Growth? (Endogenous variable is Δ GDP$_t$)			
	Δ GDP $_{t-1}$	Δ UBSPI$_{t-1}$	Δ POP $_{t-1}$
All LDCs	.063713 (.673218)	.333251 (1.45867)	-.996263** (-2.55773)
Asia	.347481 (1.21911)	-.320292 (-.764315)	.364514 (.253842)
Latin America	-.048101 (-.263422)	.558470 (1.21246)	-.096387 (-.060595)
Middle East & North Africa	.120133 (.573351)	1.38320 (1.62525)	-1.13134 (-1.46858)
Sub-Saharan Africa	.071367 (.525525)	.064364 (.199753)	-.928208 (-1.56678)
(Endogenous variable is Δ GDP$_t$)			
	Δ GDP$_{t-1}$	Δ LBSPI$_{t-1}$	Δ POP $_{t-1}$
All LDCs	.1077099 (1.33395)	-.154811 (-.516021)	-.977435** (-2.47625)
Asia	.290755 (1.08038)	-.115740 (-.211145)	.877745 (.606567)
Latin America	-.070321 (-.392847)	.336406 (.763578)	.002995 (.001888)
Middle East & North Africa	.171345 (1.12078)	-.018353 (-.012682)	-1.34555* (-1.70763)
Sub-Saharan Africa	.104306 (.807724)	-.800627* (-1.66537)	-.743341 (-1.25646)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

Table A2.
Controlling for POPULATION GROWTH ,
does growth Granger cause SPI?
(Endogenous variable is Δ UBSPI$_t$)

	Δ UBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ POP$_{t-1}$
All LDCs	.177096 (1.58257)	-.002293 (-.119629)	-.019691 (-.125354)
Asia	.357684 (.877997)	-.050176 (-.546921)	.492166 (.674980)
Latin America	.070654 (.313628)	.064832 (1.50734)	-.501138 (-1.04395)
Middle East & North Africa	.227904 (1.44434)	.010491 (.340054)	.313509 (1.128160
Sub-Saharan Africa	.235191 (1.12014)	-.034555 (-1.10513)	-.128745 (-.563433)

(Endogenous variable is Δ LBSPI$_t$)

	Δ LBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ POP$_{t-1}$
All LDCs	.727157*** (4.48790)	-.005373 (-.460717)	-.040605 (-.451696)
Asia	1.15754** (2.42053)	-.034005 (-.624177)	-.436315 (-.796154)
Latin America	.747953*** (3.12212)	.060699* (1.75235)	.781040* (1.68018)
Middle East & North Africa	.987216** (2.00831)	-.007426 (-.555842)	-.077700 (-.889653)
Sub-Saharan Africa	.502235** (2.22661)	-.026458 (-1.47059)	-.093244 (-.743186)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table A3.
Controlling for GROWTH OF TRADE PARTNERS,
does UBSPI Granger cause Growth?
(Endogenous variable is Δ GDP_t)

	Δ GDP_{t-1}	Δ $UBSPI_{t-1}$	Δ GTR_{t-1}
All LDCs	.027706 (.260707)	.319729 (1.38067)	-.277978 (-1.08602)
Asia	.514409 (1.44240)	-.433201 (-1.00014)	-.902744** (-2.13731)
Latin America	-.181755 (-1.01994)	.469721 (1.07862)	-.361112 (-.627208)
Middle East & North Africa	.103222 (.443000)	1.52685* (1.69143)	.786441 (1.10039)
Sub-Saharan Africa	.037149 (.241965)	.033208 (.103939)	-.537624 (-1.37845)

(Endogenous variable is Δ GDP_t)

	Δ GDP_{t-1}	Δ $LBSPI_{t-1}$	Δ GTR_{t-1}
All LDCs	.090733 (1.01752)	-.139800 (-.458321)	-.317800 (-1.25765)
Asia	.339162 (1.14546)	-.126568 (-.238707)	-.789257** (-2.04404)
Latin America	-.222673 (-1.29501)	.354821 (.845274)	-.361688 (-.627232)
Middle East & North Africa	.146200 (.871692)	-.350853 (-.235615)	.690579 (.927054)
Sub-Saharan Africa	.077057 (.528958)	-.879801* (-1.80158)	-.628217* (-1.73434)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table A4.
Controlling for GROWTH OF TRADE PARTNERS ,
does growth Granger cause UBSPI?
(Endogenous variable is Δ UBSPI$_t$)

	Δ UBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ GTR$_{t-1}$
All LDCs	.168124 (1.42441	.002781 (.129847)	-.098260 (-1.01434)
Asia	.342873 (.830166)	-.076887 (-.763641)	.048993 (.228379)
Latin America	.059153 (.259548)	.062023 (1.38413)	-.141492 (-.502934)
Middle East & North Africa	.172882 (1.10923)	.007879 (.238707)	.101710 (.590362)
Sub-Saharan Africa	.244716 (1.01520)	-.029368 (.768695)	-.237864 (-1.21281)

(Endogenous variable is Δ LBSPI$_t$)

	Δ LBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ GTR$_{t-1}$
All LDCs	.730082*** (4.54081)	-.004363 (-.336497)	.062273 (1.25365)
Asia	1.12818** (2.50427)	-.037148 (-.653014)	.111635 (.881780)
Latin America	.765661*** (3.16806)	.054805 (1.46851)	.094215 (.572528)
Middle East & North Africa	.968833** (1.99367)	-.007356 (-.525418)	-.006187 (-.087783)
Sub-Saharan Africa	.538116** (2.20668)	-.029093 (-1.29039)	.069778 (1.01961)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table A5.
Controlling for TERMS OF TRADE,
does SPI Granger cause Growth?
(Endogenous variable is Δ GDP$_t$)

	$\Delta\ \Delta$ GDP$_{t-1}$	Δ UBSPI$_{t-1}$	Δ TRADE $_{t-1}$
All LDCs	-.018488 (-.179112)	.157844 (.565360)	-13.8265* (-1.66314)
Asia	.559613 (1.13233)	-1.03075* (-1.90834)	-46.1092 (-1.60947)
Latin America	.001457 (.006833)	.865198 (1.55346)	-90.9842** (-2.55452)
Middle East & North Africa	-.060317 (-.258443)	1.03243 (.769931)	8.66788 (.337650)
Sub-Saharan Africa	.120246 (.734215)	-.088595 (-.202830)	-12.9814 (-1.19894)

(Endogenous variable is Δ GDP$_t$)

	Δ GDP$_{t-1}$	Δ LBSPI$_{t-1}$	Δ TRADE $_{t-1}$
All LDCs	.058502 (.676804)	.018173 (.049225)	-16.1476* (-1.86851)
Asia	.394451 (.985616)	.790993 (.942705)	-45.4362 (-1.47553)
Latin America	-.065674 (-.331421)	.548343 (1.06997)	-81.8608** (-2.40753)
Middle East & North Africa	.107492 (.698454)	-1.64159 (-.560102)	15.0812 (.541614)
Sub-Saharan Africa	.158013 (.956214)	-.950590 (-1.36600)	-16.5602 (-1.50938)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

Table A6.
Controlling for TERMS OF TRADE ,
does growth Granger cause UBSPI?
(Endogenous variable is Δ UBSPI$_t$)

	Δ UBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ TRADE $_{t-1}$
All LDCs	.080099 (.558266)	-.008692 (-.398951)	-.935119 (-.364147)
Asia	.265709 (.646096)	-.001380 (-.013287)	17.0913* (1.95409)
Latin America	.180841 (.629474)	.090800 (1.51321)	-12.1262 (-1.17756)
Middle East & North Africa	.236310 (1.12685)	.007069 (.217414)	-1.11948 (-.329785)
Sub-Saharan Africa	-.031384 (-.139568)	-.044168 (-1.37238)	-.917071 (-.257331)

(Endogenous variable is Δ LBSPI$_t$)

	Δ LBSPI$_{t-1}$	Δ GDP$_{t-1}$	Δ TRADE $_{t-1}$
All LDCs	.698154*** (3.78818)	-.005652 (-.418939)	2.60659 (1.43548)
Asia	1.13936** (1.98261)	.027353 (.409489)	-24.9810** (-2.01537)
Latin America	.693441*** (2.74535)	.053226 (1.38417)	2.36615 (.347874)
Middle East & North Africa	.273076 (.562626)	-.000573 (-.048486)	-1.92029 (-.741188)
Sub-Saharan Africa	.525919* (1.91550)	-.038697* (-1.66179)	4.95784** (2.51766)

Notes: All variables are in first-differences (Δ); five-year averages, between 1960-1995, and t-statistics are in parentheses. Instrumental variables estimates shown (Anderson-Hsiao-Arellano).

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

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