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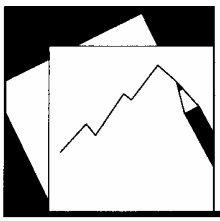

IMF Working Paper

Pace and Sequencing of Economic Policies

Juan Zalduendo

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Pace and Sequencing of Economic Policies

Prepared by Juan Zalduendo[1]

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Abstract

This paper examines the design of economic policies using factor analysis, which has several advantages; in particular, it limits the problems that typically arise from the high correlation of economic policy indicators, it helps in identifying clusters of economic policy, and it facilitates the derivation of policy design indicators that represent the pace and sequence of economic policies. Econometric results show that the introduction of sound economic policies has both level effects and growth effects, suggesting it is necessary to exercise caution when assessing a country's growth prospects immediately following the introduction of new policies. In addition, the results suggest that growth strengthens when a country implements policies that outpace either a notional measure of "world average policies" or a country's own policy trend, and highlight the critical role played by macroeconomic vis-à-vis microeconomic policies. The latter also reveals the existence of sequencing factors in policy implementation; for example, trade liberalization and financial liberalization positively affect growth, but more so if economic stability and fiscal sustainability have been secured.

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Author(s) E-Mail Address: jzalduendo@imf.org

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I. INTRODUCTION

There is broad agreement within the economics profession that sound macroeconomic management (primarily policies aimed at securing economic stability and fiscal sustainability) and structural reforms have a positive effect on economic performance. While policymakers have recognized the importance of the former for some time, the emphasis on structural reforms is more recent and can be traced back to the early 1980s when a number of developing countries were having difficulties in adjusting to the oil shocks of the preceding decade.[2] In fact, strong macroeconomic management and structural reforms are now recognized as complementary: on the one hand, the former is required to address economic imbalances and, on the other, the latter are needed to improve the transmission mechanism of fiscal and monetary policies and strengthen a country's supply response.

Indeed, the experience of many countries reveals the importance of both macroeconomic management and structural reforms.[3] This experience also suggests that policy design requires integrating into a coherent economic program the initial conditions of a country and a correct diagnosis of supply-side bottlenecks. The design must also pay close attention to political factors that may help strengthen the support for sound economic policies; for example, de Melo et al. (1995) identify a positive correlation between reforms and political liberalization. In this regard, focusing on a high-payoff reform agenda serves to enhance the credibility of government policy and provides early evidence of the benefits that can be derived from economic policy changes.

However, while a broad understanding of the macroeconomic and structural policies that strengthen economic performance exists, the identification of empirical regularities has been hampered by numerous factors. In particular, as noted by Staehr (2003), "one of the reasons why numerous studies have failed in pinpointing economic policies that matter for growth is the high correlation of policy indicators." In addition, the diversity of indicators (both in terms of scale and colinearity) complicates the identification of what we could refer to as

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[2] As noted by Allen (1994), structural reforms were not viewed at the time the IMF was established as a matter of legitimate international concern, but these views evolved over time as policymakers became aware of their critical importance in sustaining adjustment efforts.

[3] Many countries have complemented economic management and structural policies over the past few decades. Reform efforts in Latin America since the 1980s have been directed towards improving macroeconomic management and removing obstacles to investment. Trade liberalization, an enabling business environment, and fiscal reforms are the key policy instruments used for this purpose. Similarly, among countries in Africa, a key goal has been to address deficiencies that hampered the delivery of public services. This characterization of economic policies does not exhaust the list of country experiences. For example, among transition economies, creating the conditions for labor market mobility required the introduction of changes to existing housing policies (e.g., in Ukraine and Poland housing was linked to the enterprises in which people worked, and was enough of a disincentive for labor mobility). In fact, the improvement in resource allocation that arises from more open trade opportunities fails to materialize without changes to labor markets.

second best regularities. Specifically, while removing economic distortions is an aspiration, the pace and sequence of economic policies also needs to be tailored to the existing policy distortions, in particular if these cannot be removed or other factors suggest a more gradual reform process would be called for.

How can these regularities be revealed? This paper applies a statistical technique known as factor analysis (FA) to limit the effects of the high correlation of policy indicators and the diversity of factors that may mask second best regularities. The primary advantage of FA is that it enables the creation of new and fewer variables that represent independent sources of variation, which we refer to as "clusters of economic policy." In turn, FA also limits the instability of coefficient estimates by addressing the high correlation problem. But factor analysis has a number of additional advantages. For example, since the new variables are normalized indicators with mean equal to zero and variance equal to one, the derived factors can be easily transformed so as to represent alternative indicators of economic policy design. Specifically, we will look at the role played by the pace with which reforms are implemented (e.g., deviations from trend values of policy) and the existence of evidence suggesting optimal reform sequences that may affect the growth impact of economic policies.

The paper is organized as follows. Section II describes the factor analysis techniques used in the paper. Section III examines the design aspects of economic policies based on an econometric analysis of policy clusters—the focus is on speed and sequencing aspects of macroeconomic and structural reforms. Some concluding remarks follow.

II. FACTOR ANALYSIS

The main objective of factor analysis is to detect the structure that exists among a set of different indicators. In doing so, factor analysis creates new variables that represent independent sources of variation and does so while minimizing the loss of information. The underlying assumption is that a number of unobserved latent variables account for the pattern of relationships that exists among the observed (and frequently correlated) variables. Many statistical methods are used to study the relation between independent and dependent variables. However, factor analysis is different in the sense that it is used to study the patterns of relationship among a set of variables with the goal of discovering something about the nature of the variables that affects them, even though these independent variables are not measured directly. The inferred independent variables are known as factors.[4, 5]

[4] Several rules exist to decide how many factors to retain. The *Kaiser criterion* recommends dropping all factors with eigenvalues less than (or close to) one. In essence, this rule drops all factors that do not extract as much information as one of the original variables. Another rule, known as the *scree test*, plots the factors in the *x* axis and the corresponding eigenvalues in the *y* axis. The factors are ordered so that the eigenvalues decline when moving to the right in the *x* axis (i.e., towards components with less information). The rule calls for dropping all factors that follow the cease in the plot's decline. Another rule is based on the *percentage of variation explained*; specifically, all factors are kept until, say, 90 percent of all the variation

(continued…)

Algebraically, the basic factor analysis model can be described by

$$z_j = a_{j1}F_1 + a_{j2}F_2 + \ldots + a_{jm}F_m + u_j Y_j \qquad \text{where} \qquad j=1, 2, ..., n$$

where each of the *n* observed variables is described linearly in terms of *m* common factors and one unique factor. The common factors (F) account for the correlations among the variables, while each unique factor (Y) accounts for the remaining variance (including the error). The coefficients of the factors are referred to as "loadings." [6] Equivalently, it can be said that *m* predictors are used to represent *n* original variables, with *n* larger than *m*. Also, if *m* were to be set equal to *n*, then there is no loss of information in the derived factors, though it is equally true that the interpretation of the data is not made simpler. It follows that the smaller are the unique components, the better is the data represented by the derived factors.

Although a close kin to another technique known as principal components, factor analysis is distinct in a number of ways. In particular, factor analysis extracts the proportion of variance that is due to common factors (i.e., shared among several variables) and generates new variables that represent independent sources of variation.[7] In contrast, principal components generate new variables that minimize the total residual variance.[8] In either case, the derived factors are uncorrelated and preserve much of the original variation in the data. However,

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is explained. Finally, the *interpretability criterion* examines several solutions and recommends keeping as many factors as required to interpret the underlying structure.

[5] It is important to note that the factors derived through factor analysis are necessarily more hypothetical than when the independent variables are observed directly. In fact, in the view of many, factor analysis is a heuristic approach to data representation; more precisely, a convenient albeit not unique representation. Indeed, the inherent tension of factor analysis is that many different combinations of factors can be posited to represent the original set of variables. The simpler the theory proposed, the greater is the discrepancy between the theory and the data it attempts to represent. Conversely, the more accurately the data is depicted, the less we can say as to the nature of the underlying theory represented by the data.

[6] The correlation coefficients between the variables and the factors are called factor loadings. The squared factor loading is the percent of variance explained by the factor. The eigenvalue for a given factor measures the variance in all the variables that are accounted by that factor.

[7] Factor analysis techniques, as is also the case with principal component techniques, scale the data into uncorrelated variables with mean 0 and standard deviation 1.

[8] Principal components analysis (PCA) derives new variables (principal components) that are a linear combination of the original variables. The first principal component extracts the maximum variance in the data. After this principal component is extracted, PCA seeks a second linear combination, which in turn explains the maximum proportion of the remaining variance (and so on for successive principal components). In this manner, since each consecutive principal component maximizes the variability that is not captured by the preceding ones, consecutive principal components are independent of each other.

factor analysis is the instrument of choice to detect the structure of the data while principal components are preferred as an instrument to reduce the data into a fewer set of variables.

III. Design of Economic Policies

To review the growth effects of macroeconomic and structural policies we focus on a panel dataset of 5-year period—i.e., four 5-year periods between 1981 and 2000. This medium-term focus has advantages and disadvantages. The medium-term horizon is appropriate for assessing the permanent effects of economic policies on growth, thus serving to identify the appropriate pace and sequence of economic policies. The disadvantage is that some transitional factors cannot be covered with data based on 5-year averages. As a result, the conclusions in this paper are in terms of what is critical for growth and the combinations of policies that help strengthen a country's growth prospects, but do not allow an assessment of policy interactions over shorter time periods. Few statistically significant policy sequences can be identified, in part because of this medium-term focus. Still, we will argue that those found are intuitively appealing and consistent with arguments put forward in the literature.

A. Econometric Methodology

The econometric estimations presented in this section follow a reduced form growth equation that can be represented as

$$G = f(IC, PC, SH, POL),$$

where IC denotes a country's initial conditions, PC reflects country-specific choices, SH represents shocks (domestic or external), and POL is the policy environment. In turn, the latter is divided into three categories: macroeconomic policy (MP), structural reforms (SP), and institutional factors (IF). The dependent variable, G, is the growth rate of per capita output—alternative metrics exist, but G is viewed as a better choice given that it is necessary to sustain the public's support for economic policies being implemented by a government.[9]

The regressors not related (contemporaneously) to economic policies include initial conditions, private choices, and environmental variables. Initial income is a measure of endowments of physical capital, natural resources, and technology (i.e., initial conditions). The initial income is instrumented by lagged values of the Penn World data. Private choices are proxied by the fertility rates in each country—e.g., a proxy for policies that affect the size of the labor force. In the category of environmental variables, SH, both internal (e.g., weather-related shocks that affect agricultural production) as well as external (terms of trade)

[9] The paper uses national accounts to derive the information on country growth rates. This constitutes a departure from much of the empirical growth literature, which uses the PPP-based data available in the Penn World tables—also known as the Summers-Heston database. The use of national accounts data is not a limitation since, as noted by Pritchett (1998), the time series information in the Summers-Heston database is also derived from this data.

shocks are included. The definition of the variables broadly mirrors the paper by Batista and Zalduendo (2004), referred to in the rest of this paper as the BZ paper.[10]

The economic policies modeled cover numerous areas. Macroeconomic policies follow Fischer (1993); i.e., inflation (success in stabilizing the economy) and fiscal balance (likely sustainability of stabilization efforts) as complementary indicators of a government's ability to manage the economy. An inflation threshold effect is also added (see the BZ paper for a more thorough discussion). Several measures of structural policies are included—openness to external trade after controlling for country size, extent to which prices are market determined (an index based on exchange rate premiums), and banking sector's role in supporting private sector activity (share of credit to the private sector in total credit). A simple average of the political risk category in the ICRG index is used to represent institutional factors.

The econometric methodology parallels work in the BZ paper. Specifically, a structured methodology is followed to select the above regressors—an iterative selection process that retains all regressors with coefficient estimates that are statistically significant (10 percent level). The BZ paper also identifies the existence of structural breaks in growth determinants following the oil shocks, thus suggesting that the estimation be limited to 1981-2000.

The paper departs from the BZ paper in three respects. First, a slightly different index on black market exchange rate premium is constructed. Specifically, the index is defined over the interval (0, 1]—a number close to 1 implies a low premium. Second, human capital is excluded from the indicators of initial conditions, as it is not statistically significant after the 1970s oil shocks. Finally, factor analysis is applied to all economic policy indicators.

There are a number of methodological problems in most reduced form growth equations, of which two are particularly problematic. The lack of a theoretical foundation for these equations may result in misspecification problems—e.g., the omission of relevant variables. This risk is reduced by beginning, as in the BZ paper, with a fairly general model and establishing strict rules to reduce the final list of possible regressors. In addition, endogeneity is a potential source of problems. For example, fiscal performance could itself depend on growth.[11] This risk is reduced by using instrumental variables among many of the non-policy regressors and aggregating the economic data over the described 5-year periods.

B. Application of Factor Analysis to Policy Indicators

The paper advances the literature in a number of ways. In particular, while other papers have applied principal component techniques to growth issues, in part to reduce the correlation of policy indicators (Table 1), this paper uses factor analysis for this purpose. Papers that have

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[10] A full description of each of the variables can be found in the data appendix to the BZ paper (http://www.imf.org/external/pubs/ft/wp/2004/wp04203.pdf).

[11] Other problems are country-specific effects. These are captured through the indicators of exogenous shocks being used, which cover both external and domestic shocks, and through the indicators that reflect country-specific initial conditions.

used principal components have applied these techniques to construct uncorrelated and less numerous measures of initial conditions (de Melo et al., 1999) or of reform indicators (Havrylyshyn and van Rooden, 2000, and Staehr, 2003). However, the factor analysis used in this paper is applied to all proxies of economic policies and is better suited to identify individual policy clusters. Also, the use of factor analysis helps to derive new indicators that represent speed and sequencing issues, thus providing a richer understanding of economic policy design. Staehr also examines pace and sequencing issues, but derives his conclusions by interpreting individual factor loadings in the derived principal components. The goal of this paper is to focus on policy clusters, which is better accomplished through factor analysis.

Table 1. Correlations of Economic Policies

	CPI	ITE	FB	ERP	OPEN	PSC	ICRG
Inflation (CPI)	1.00						
Inflation threshold effect (ITE)	0.57	1.00					
Fiscal balance (FB)	-0.23	-0.07	1.00				
Exchange rate premium (ERP)	-0.40	-0.18	0.26	1.00			
Openness (OPEN)	-0.28	-0.16	0.17	0.27	1.00		
Share of private sector credit (PSC)	-0.05	-0.06	0.33	0.01	-0.01	1.00	
Institutional index (average; ICRG)	-0.44	-0.29	0.38	0.58	0.22	0.11	1.00

With the motivation for using factor analysis out of the way, it is necessary to decide how many factors to retain. This decision is largely arbitrary and is based on an assessment of variance explained by the new factors and the structure that is evinced by the corresponding factor loadings—i.e., correlations between the original variables in each derived factor. Although the factor loadings at first sight do not evince a clear underlying structure, this can be revealed by implementing a "varimax" rotation of the factor matrix.[12]

Hence, by iteratively assessing alternative numbers of factors to be retained, the decision is taken in this paper to keep five factors largely based on the interpretability of the data—the proposed heuristic. More precisely, Table 2 (first panel) shows that 3 to 4 factors have eigenvalues greater or close to one—i.e., they contain as much variance as one of the original variables. But more factors are needed to ease interpretation. Indeed, the retained factors represent a sensible structure of policies distributed between stabilization and sustainability (two factors; macro-related indicators) and structural reforms (three factors; micro-related indicators such as trade reforms, business environment, and financial sector development).

[12] The rotation is necessary to facilitate the interpretation of the derived factors. Specifically, the goal is to identify different patterns of factor loadings—for example, factors that are somehow clearly marked by high loadings for some variables and low loadings for others. The sum of eigenvalues is not affected by rotation, but the rotation will alter the factor loadings. Since multiple rotations explain the same variance (have the same eigenvalue) but have different factor loadings, and since factor loadings are used to interpret the derived factors, different meanings may be ascribed depending on the rotation methodology. The "varimax" rotation used in this paper has the effect of differentiating the original variables by extracted factor (i.e., it minimizes the number of variables which have high loadings on one factor). In sum, a varimax solution helps to identify each variable with a single factor.

However, this structure is not revealed from the outset (Table 2, second panel), as a varimax rotation needs to be undertaken (Table 2, last panel, outlined cells). It is worth noting that the unique variance of each original variable is small (0 to 27 percent; last column in Table 2), thus providing added support for representing stabilization and structural reform policies through the identified five policy clusters. The five policy clusters are described as follows:

- ***Lack of Economic Stability***. This policy cluster reflects the lack of success (positive factor loadings) in keeping low and stable inflation rates, and is linked to developments in consumer prices (CPI) and an inflation threshold effect—the ITE variable in the tables.

Table 2. Factor Analysis of Economic Policies

Panel 1: Eigenvalues of All Factors

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	2.70	1.54	0.39	0.39
2	1.17	0.21	0.17	0.55
3	0.95	0.09	0.14	0.69
4	0.86	0.31	0.12	0.81
5	0.55	0.11	0.08	0.89
6	0.44	0.12	0.06	0.95
7	0.32	-	0.05	1.00

Panel 2: Matrix of Factor Loadings

Variable	Factor Loadings					Uniqueness
	1	2	3	4	5	
CPI	-0.76	0.28	0.26	0.02	-0.08	0.27
ITE	-0.58	0.32	0.66	-0.03	0.12	0.11
FB	0.62	0.49	0.18	0.17	-0.53	0.03
BMP	0.71	0.00	0.41	-0.36	0.29	0.11
OPEN	0.45	-0.28	0.31	0.76	0.17	0.02
PSC	0.20	0.81	-0.36	0.19	0.36	0.01
ICRG	0.81	0.07	0.14	-0.29	-0.03	0.23

Panel 3: Matrix of Rotated Factor Loadings

Variable	Varimax Rotation					Uniqueness
	Business environment	Financial sector role	Economic stability	Trade liberalization	Economic sustainability	
CPI	-0.43	-0.02	**0.70**	-0.22	0.08	0.27
ITE	-0.04	-0.03	**0.94**	-0.05	0.07	0.11
FB	0.19	0.17	-0.07	0.12	**-0.94**	0.03
BMP	**0.93**	0.01	-0.05	0.12	-0.11	0.11
OPEN	0.10	-0.03	-0.10	**0.98**	-0.11	0.01
PSC	0.02	**0.99**	-0.03	-0.03	-0.14	0.00
ICRG	**0.72**	0.03	-0.31	0.02	-0.38	0.24

- ***Lack of Fiscal Sustainability***. Policies that decrease vulnerabilities are important for economic sustainability and, in part, reflect the strength of the fiscal position attained by a country. This cluster relates to the fiscal position (referenced as the FB variable) and represents the lack of sustainability given the negative factor loadings in the factor matrix.

- ***Enabling Business Environment***. This policy cluster includes the exchange rate risk premium (ERP) and the ICRG index on institutional factors. It also reflects the extent to which (i) prices are market determined and (ii) institutions support private sector activity,

though the factor loadings suggest a closer correlation with price liberalization than with the institutional factors contained in the average ICRG index—0.93 and 0.72, respectively.

- ***Trade Liberalization***. This policy cluster reflects policies that open up an economy to competitive pressures (i.e., OPEN, trade openness after controlling for country size).

- ***Financial Sector Development***. The PSC variable—credit to the private sector as a share of total credit—can be viewed as a representation of the extent to which the banking sector channels resources to the private sector. The implicit assumption is that a more mature financial sector focuses on the private sector and that, in turn, this requires introducing financial and institutional reforms (e.g., laws on collaterals and bankruptcy procedures).

How are these factors correlated to income per capita? The factor on business environment should be positively correlated with growth. This cluster has large and positive factor loadings with the ERP and ICRG indexes—i.e., high values imply few price distortions and an institutional environment that supports growth. Similarly, trade liberalization and the intermediation role of deposit money banks (the OPEN and PSC variable) have positive and large factor loadings, thus suggesting that these factors are positively correlated with growth. Slightly more complicated is the interpretation of the last two factors. The positive factor loadings of the economic stabilization cluster with the inflation variables suggest that this factor would be negatively correlated with growth. Similarly, the negative loading for the fiscal balance in the sustainability cluster suggests that this factor implies lack of fiscal consolidation—thus, an increase in this factor should reduce per capita growth.

C. Benchmark Econometric Results

The estimation procedure builds on the BZ paper: a two-stage least square estimation method with GLS correction for heteroscedasticity. The estimation combines both the time and cross-section variation in the data: 253 observations for 81 countries in the four 5-year periods between 1981 and 2000. Non-policy regressors are instrumented by their lagged values.

The regression results on the left side of Table 3 mirror the results in the BZ paper.[13] Most coefficient estimates on initial conditions, shocks, and private choices have the expected sign and are statistically (and economically) significant. Low inflation and strong fiscal positions support growth and the results highlight the existence of a non-linear relationship between inflation and growth. In addition, growth is supported by reforms that liberalize trade, improve the financial intermediation role of banks, and liberalize prices. The departures from the BZ paper relate to the coefficient estimate on the ICRG index and on the terms of trade regressor—both of these have the expected sign, but are not statistically significant.

The estimation results obtained using the clusters of economic policy derived through factor analysis are equivalent to those using the original dataset of economic indicators and the

[13] Although the coefficient estimates are not exactly the same than in the BZ paper owing to differences in country coverage and in the definition of exchange rate premiums, the conclusions reached remain broadly in line with those discussed in the BZ paper.

deterioration in fit is largely marginal. As shown in Table 3 (right column), an enabling business environment (F1), the intermediation role of banks (F2), and trade liberalization (F4) serve to support growth in per capita incomes. In contrast, lack of economic stability (high inflation; F3) and lack of economic sustainability (F5) hurt growth prospects. In all cases, the coefficient estimates are statistically significant (1 percent level). The information loss of regressions using variables derived by factor analysis is small—the standard error of the regression increases from 0.0212 using the original dataset to 0.0220 using the derived factors, which is equivalent to less than a one-tenth of one percent in annual growth rates.

Table 3. Regressions Without and With Factor Analysis
(GDP per capita as dependent variable) 1/

Regressions WITHOUT Factor Analysis			Regressions WITH Factor Analysis		
Non-policy regressors			Non-policy regressors		
Constant	0.0572	***	Constant	0.1315	***
	3.21			8.14	
Initial conditions (IC); initial	-0.0097	***	Initial conditions (IC); initial	-0.0109	***
income level	-5.93		income level	-6.76	
Private sector choices (PC); fertility	-0.0083	***	Private sector choices (PC); fertility	-0.0074	***
rates	-8.12		rates	-7.05	
Shocks (SH)			Shocks (SH)		
Internal	-0.0216	***	Internal	-0.0252	***
	-4.82			-5.60	
External	0.0157		External	0.0215	**
	1.37			2.55	
Policy regressors			Policy regressors		
Macroeconomic policies (MP)			Factors on economic policies		
Inflation (CPI)	-0.0065	***	Good business environment (F1)	0.0088	***
	-8.19			7.38	
Inflation threshold effect (ITE)	0.0082	***	Financial sector role (F2)	0.0028	***
	4.09			3.60	
Fiscal balance (FB)	0.1150	***	Lack of economic stability (F3)	-0.0046	***
	11.01			-6.48	
Structural policies (SP)			Trade liberalization (F4)	0.0074	***
Exchange rate premium (ERP)	0.0063	***		8.95	
	1.11		Lack of economic sustainability (F5)	-0.0063	***
Openness (OPEN)	0.0689	***		-6.33	
	7.04				
Private sector share in total credit (PSC)	0.0187	***			
	4.02				
Institutional factors (IF)					
ICRG index (ICRG)	0.0043				
	0.50				
Wald statistic	6855.17		Wald statistic	471.6	
Standard error of regression	0.0212		Standard error of regression	0.0220	
R-squared	0.47		R-squared	0.43	
Number of observations	253		Number of observations	253	
Number of different countries	81		Number of different countries	81	

*** Indicates significance at 1 percent.

** Indicates significance at 5 percent.

1/ Coefficient estimates (above) and t-statistics (below) are presented for each regressor.

Incidentally, had the estimation been based on all seven possible factors, then the regression results in Table 3 would have been identical to the regression in the table that does not use the factors derived through factor analysis (same coefficient estimates for all regressors that are not part of the factor analysis exercise and same regression fit, the sole difference being on the coefficient estimates of the regressors now being represented by factors).[14]

D. Policy Design

Three aspects of policy design are examined: the possible co-existence of growth effects and level effects as a result of policy changes, the role played by the speed (or pace) with which policies are implemented, and evidence on the appropriate sequencing of economic policies. The agenda is rather ambitious and the conclusions should be viewed only as departure points for policy design. Still, they provide a framework for the design of economic policies.

Table 4. New Mapping for Factors 1/
(253 observations)

	Mean	Standard deviation	Minimum	Maximum
GDP per capita (growth rate)	1.17	1.81	-3.92	7.02
F1	0.00	1.00	-3.44	1.56
F2	0.00	1.00	-3.19	1.51
F3	0.00	1.00	-8.36	2.36
F4	0.00	1.00	-1.63	6.64
F5	0.00	1.00	-3.71	5.66
NEW F1	0.50	0.15	0.00	0.73
NEW F2	0.50	0.16	0.00	0.74
NEW F3	0.50	0.06	0.00	0.64
NEW F4	0.50	0.08	0.38	1.00
NEW F5	0.50	0.09	0.17	1.00

1/ F3 and F5 converted so as to be postively correlated with growth.

The estimation begins by mapping all factors (F1 to F5) into the interval [0, 1] and transforming these so that they now have a positive correlation with growth (see Table 4 for a summary of descriptive statistics; the new variables are referenced by the word NEW). These changes help ease the interpretation of the econometric estimations. The regressions using the new factors are presented in Table 5; equation 1 is based on the old factors and equations 2 through 4 are based on the new factors. The number of observations is smaller than in Table 3, as the estimations are based on the observations that remain after generating lagged indicators—172 observations in Table 5 compared to 253 observations in Table 3.

[14] As noted before, if *n* regressors are replaced by *n* linear functions of these regressors, then there is neither a gain nor a loss of information. In fact, the derived factor loadings and the corresponding linear functions can be used to reconstruct the original variables.

Growth and Level Effects

The results in Table 5 suggest that there is a level effect component reflected in the initial gains in growth. This conclusion is derived from equations 2, 3, and 4. Equation 2 (includes only contemporaneous effects) and equation 3 (includes only lagged effects) suggest that improvements in the policy environment strengthen growth prospects. Combining these effects into one equation (equation 4), however, shows that the contemporaneous coefficient estimates are positive (and statistically significant) while the lagged indicators of policies have a negative sign. Still, the sum of the coefficients on contemporaneous and lagged variables is positive. These results provide evidence that stabilization and policy reforms produce a spurt on growth, but this spurt weakens over time even after controlling for convergence factors as represented in a number of indicators that represent differences in initial conditions. In sum, sound economic policies have both a level and a growth effect.

It is also worth noting that the coefficient estimates for the policy clusters are economically significant. Indeed, the potential growth effects from improvements in economic policies are presented in Table 6. This table shows that improving each policy cluster by one standard deviation leads to improvements in growth that range from 0.3 to 0.6 percent per year.[15]

What can explain these results and what are their implications for policy design? The results suggest that growth opportunities might be triggered when sound macroeconomic and reform policies are introduced, in all likelihood owing to investment opportunities that await an improvement in the policy environment. However, while these "project-specific effects" exist, they do not fully result in permanent gains in growth rates. As a result, caution should be exercised when assessing a country's growth potential. More precisely, growth projections embedded in policy design should take into account the existence of level effects.

Pace of Economic Policies

The next step in the econometric estimation is to assess the role played by the pace with which economic policies are implemented. Two different pace measures are examined: a country's deviation from the "world average policies" and the deviation from its own trend path (the difference between actual and trend policies). The first measure of pace—world average policies—represents the importance of having a better policy environment. As such, this measure reflects level more than change effects and is an imperfect proxy for reform speed. The second measurement is more useful in that it relates the pace benchmark to the country's own trend path. Still, it is a measure of speed only in a roundabout way: early reformers tend to perform better. Irrespective of these limitations, these measures serve to assess the importance of proceeding rapidly in the implementation of sound policies.

As to the econometric estimations, Table 7 shows that countries more often than not benefit from a rapid implementation of reforms and sound macroeconomic policies. Specifically, the measure of speed defined as the deviation of a country's policy cluster from a notional

[15] The standard deviation of the 172 observations in the regression is used, which are only marginally different to those presented in Table 4 for all 253 observations in the dataset.

measure of "world average policies" suggests that the greater this deviation (for the better), the greater is a country's growth rate (equation 5). Equation 6 presents estimations based on policy deviations relative to a country's own trend path (the regressors referred to as speed in Table 7). The path is defined by the initial and final period of available data for each country. If the reform path of any one country is—at any point in time—above its trend, then the country can be viewed as an early reformer. The opposite is the case if the reform path of a country lies below its trend (i.e., a late reformer). The estimation results show that all coefficients have the expected sign, though the coefficient for F1 is not significant.

Table 5. Growth and Level Effects of Macroeconomic and Structural Reform Policies (GDP per capita as dependent variable) 1/

Regression		(1)	(2)	(3)	(4)
Non-policy regressors					
Constant		0.1611 ***	0.0337	0.0611 ***	0.0299
		8.74	1.39	2.68	1.49
Initial conditions (IC)	Initial income level	-0.0133 ***	-0.0133 ***	-0.0095 ***	-0.0127 ***
		-7.06	-7.06	-5.41	-6.96
Private sector choices (PC)	Fertility rates	-0.0100 ***	-0.0100 ***	-0.0108 ***	-0.0105 ***
		-7.88	-7.88	-8.40	-8.74
Shocks (SH)	Internal	-0.0262 ***	-0.0262 ***	-0.0359 ***	-0.0255 ***
		-4.30	-4.30	-5.92	-4.09
	External	0.0151	0.0151	0.0139	0.0073
		1.25	1.25	0.99	0.63
Policy regressors 2/					
NEW F1		0.0052 ***	0.0359 ***		0.0717 ***
		3.40	3.40		4.44
NEW F2		0.0028 ***	0.0177 ***		0.0248 ***
		2.91	2.91		3.47
NEW F3		-0.0038 ***	0.0639 ***		0.0920 ***
		-4.17	4.17		4.34
NEW F4		0.0049 ***	0.0652 ***		0.1552 ***
		3.67	3.67		4.19
NEW F5		-0.0064 ***	0.0720 ***		0.1108 ***
		-4.33	4.33		6.03
Lag F1				0.0097	-0.0442 ***
				0.99	-2.96
Lag F2				0.0067	-0.0050
				1.55	-0.60
Lag F3				0.0680 **	-0.0004
				2.54	-0.01
Lag F4				0.0525 ***	-0.0998 ***
				5.10	-2.73
Lag F5				0.0125	-0.0527 ***
				0.94	-3.11
Wald statistic		191.57	191.57	204.55	271.63
Standard error of regression		0.0213	0.0213	0.0230	0.0208
R-squared		0.43	0.43	0.32	0.45
Number of observations		172	172	172	172
Number of different countries		61	61	61	61

*** Indicates significance at 1 percent; ** indicates significance at 5 percent.

1/ Coefficient estimates (above) and t-statistics (below) are presented for each regressor.

2/ Except for equation 1, where all regressors are defined as in table 3, the rest of the equations are based on the factors mapped into the interval [0, 1] and transformed as discussed in the text.

Table 6. Effects on Growth Rates 1/

	Coefficient	Standard deviation	Annual growth effect
Business environment	0.04	0.14	0.51
Financial sector development	0.02	0.16	0.28
Economic stabilization	0.06	0.07	0.42
Trade liberalization	0.07	0.07	0.49
Fiscal sustainability	0.07	0.08	0.58

1/ Based on Equation 2 in Table 5.

Although the above results are undoubtedly interesting, it should be noted that they also reflect transitional factors; indeed, a better policy environment should have a higher steady state. Still, they provide empirical support for the views of policymakers that argue for rapid implementation of sound macroeconomic policies and reforms. This does not mean, however, that sound macroeconomic and reform policies need to be introduced concurrently. In fact, as noted below, the sequence of reforms is critical for policy design.

Sequencing of Economic Policies

Examining the appropriate sequence of macroeconomic and reform policies is more complicated. The analysis presented in Table 8, as is the case in the rest of this paper, is restricted to medium-term aspects of reform, thus identifying only sequencing issues that are critical for growth, but disregarding transitional factors. Specifically, the assessment of sequencing issues is based on an analysis of interactive terms; namely, the multiplicative effect of lagged values of economic policies on contemporaneous policy indicators. These interaction terms represent the sensitivity of growth to contemporaneous factors if other policies are in place. These results should not be interpreted as absolute sequences, but as the importance of certain policy pre-conditions. The three sequencing links identified are:

- **Both economic stabilization and fiscal sustainability are important for growth, but the former plays a more critical role**. Specifically, equation 7 in Table 8 suggests a negative relationship between controlling lagged inflation and contemporaneous fiscal sustainability (interaction term between F3 lagged and F5), but the coefficient estimate is not significant. In contrast, equation 8 shows that the interaction term between lagged fiscal sustainability and the contemporaneous measure of stabilization negatively affects growth. The coefficient estimate is statistically significant and large, suggesting that the first priority of governments should be to stabilize the economy. Many authors link the importance of stabilization to the informational content of prices. Hence, even though lack of fiscal sustainability can be detrimental for growth, controlling inflation plays an even greater role.

- **Stabilization should precede efforts to liberalize trade**. Equation 9 shows that the interactive term between the lagged effect of economic stabilization and trade liberalization positively affects growth. The coefficient estimate is large and statistically significant. In particular, trade policies frequently entail opening up trade barriers and giving up on revenue generating sources and many authors stress these need to be introduced only if stabilization is secured (Funke, 1993). Michaely et al. (1990) also argue that macroeconomic instabilities are frequently related to fiscal imbalances that induce a real exchange rate appreciation, which in

turn lead to undesired shifts in the allocation of resources between tradable and non-tradable sector. In sum, it is better to secure stabilization prior to embarking in trade reforms.

Table 7. Pace of Macroeconomic and Structural Reform Policies
(GDP per capita as dependent variable) 1/

Regression		(5)	(6)
Non-policy regressors			
Constant		0.1658 ***	0.1104 ***
		9.27	8.33
Initial conditions (IC)	Initial income level	-0.0137 ***	-0.0067 ***
		-7.64	-5.43
Private sector choices (PC)	Fertility rates	-0.0100 ***	-0.0105 ***
		-8.03	-9.78
Shocks (SH)	Internal	-0.0308 ***	-0.0282 ***
		-7.34	-4.52
	External	0.0178	0.0117
		1.72 *	0.93
Policy regressors			
Cross-country deviation of F1		0.0580 ***	
		7.09	
Cross-country deviation of F2		0.0206 ***	
		3.78	
Cross-country deviation of F3		0.0803 ***	
		7.84	
Cross-country deviation of F4		0.0868 ***	
		4.87	
Cross-country deviation of F5		0.0808 ***	
		5.18	
Speed F1			0.0264
			1.15
Speed F2			0.0313 ***
			2.93
Speed F3			0.0692 *
			1.86
Speed F4			0.2242 ***
			3.27
Speed F5			0.0890 ***
			4.01
Wald statistic		347.64	244.70
Standard error of regression		0.0206	0.0232
R-squared		0.46	0.31
Number of observations		172	172
Number of different countries		61	61

*** Indicates significance at 1 percent; * indicates significance at 10 percent.
1/ Coefficient estimates (above) and t-statistics (below) are presented for each regressor.

- **Economic sustainability should precede financial liberalization**. Equation 9 suggests that fiscal sustainability should be secured prior to liberalizing financial sector activities—the interaction terms between lagged fiscal sustainability and contemporaneous financial liberalization is positive and statistically significant. The usual argument is that financial liberalization exacerbates fiscal imbalances through its effects on how interest rates are determined and its implications on government interest payments. For example, Collier and Gunning (1999) argue that premature financial liberalization in Zimbabwe was one of

Table 8. Sequence of Macroeconomic and Structural Reform Policies
(GDP per capita as dependent variable) 1/

Regression		(7)	(8)	(9)
Non-policy regressors				
Constant		0.0137	-0.1161 *	0.0766
		0.13	-1.70	0.41
Initial conditions (IC)	Initial income level	-0.0141 ***	-0.0131 ***	-0.0124 ***
		-6.97	-7.09	-6.84
Private sector choices (PC)	Fertility rates	-0.0102 ***	-0.0101 ***	-0.0096 ***
		-7.88	-8.23	-7.64
Shocks (SH)	Internal	-0.0268 ***	-0.0240 ***	-0.0264 ***
		-4.04	-3.69	-4.24
	External	0.0132	0.0099	0.0113
		1.07	0.84	1.02
Policy regressors				
NEW F1		0.0379 ***	0.0354 ***	0.2255
		3.44	3.74	1.50
NEW F2		0.0141 **	0.0177 ***	-0.1815
		3.25	2.80	-1.37
NEW F3		0.0549 ***	0.3626 ***	0.4827 ***
		2.60	2.89	3.60
NEW F4		0.0638 ***	0.0725 ***	-0.2190
		3.27	5.04	-1.42
NEW F5		0.1041	0.0863 ***	-0.1153
		0.54	3.97	-0.52
Lag F3		0.0644		-0.4471
		0.32		-1.34
Lag F5			0.2601	0.2997 **
			2.20	2.03
Economic stabilization and sustainability				
Lag F3 * NEW F5		-0.0579		0.3874
		-0.15		0.91
Lag F5 * NEW F3			-0.5626	-0.7610 ***
			-2.40	-3.06
From economic stabilization to structural reforms				
Lag F3 * NEW F1				-0.3371
				-1.27
Lag F3 * NEW F2				0.1586
				0.66
Lag F3 * NEW F4				0.6278 **
				2.25
From economic sustainability to structural reforms				
Lag F5 * NEW F1				-0.0471
				-0.52
Lag F5 * NEW F2				0.2559 ***
				3.27
Lag F5 * NEW F4				-0.0761
				-0.59
Wald statistic		187.90	240.90	460.70
Standard error of regression		0.0213	0.0208	0.0203
R-squared		0.43	0.46	0.47
Number of observations		172	172	172
Number of different countries		61	61	61

*** Indicates significance at 1 percent; ** at 5 percent; and * at 1 percent.
1/ Coefficient estimates (above) and t-statistics (below) are presented for each regressor.

the reasons why fiscal accounts came under pressure—government domestic debt had accumulated by 1991 to 21 percent of GDP when interest rates were liberalized, which in turn increased the fiscal burden of domestic debt. In their words, if "financial liberalization

had been postponed, fiscal adjustment would not have had to deal with the additional burden of a sharp increase in interest rates." In sum, repressed financial markets were used to maintain high fiscal deficits and, even though these policies should be reversed, what begun as a flow problem (debt accumulation) has become in effect a balance sheet vulnerability.

IV. CONCLUSIONS

This paper adds to the existing literature on economic policies and growth by using factor analysis (FA) techniques. The advantages of FA include: (i) limiting the problems that arise from the high correlation of economic policy indicators, (ii) helping to identify clusters of economic policy, and (iii) facilitating the derivation of policy design indicators to represent the pace and sequence of economic policy.

The econometric results obtained are appealing. We find that the improvement in growth following the implementation of sound policies (after controlling for the usual convergence effects) might be attributed in part to level effects. Perhaps one-time investment opportunities and threshold effects in the policy environment are at play. Irrespective of their source, this result cautions against over-optimistic assessments of a country's growth prospects that are predicated on the immediate improvement in performance following the introduction of better economic policies.

Also, the results provide support for the "big bang" approach to the implementation of economic policies. Undoubtedly, the earlier sound policies are introduced, the higher is a country's growth rate. This conclusion is derived both in terms of deviation of policies relative to some "world average" benchmark or, more usefully, relative to a country's own trend path. These results reflect in part transitional factors—the shift to a higher growth steady state.

However, in spite of the evidence supporting a swift removal of economic distortions, the paper identifies that the sequencing aspects of policy design also play a crucial role. Specifically, economic stabilization enhances growth and plays a more important role than fiscal sustainability, perhaps highlighting the importance of price signals. In addition, the econometric results suggest that trade liberalization and financial intermediation are important for growth. However, these should preferably follow, respectively, the achievement of economic stability and fiscal sustainability—in fact, interactive regressors act in the opposite direction, and are both statistically and economically significant.

In sum, while the pace of economic policies matters for strengthening a country's growth prospects, there is also evidence that optimal policy sequences exist—or, in other words, second best arguments are at play if economic distortions are already in place.

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