# What Triggers Inflation in Emerging Market Economies?

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**Abstract:** This study aims at investigating the factors associated with the start of 24 inflation episodes in 15 emerging market economies (EMEs) between 1980 and 2001. The paper employs pooled probit analysis to estimate the contribution of the key factors to inflation starts. The empirical results suggest that increases in the output gap, agricultural shocks, and expansionary fiscal policy raise the probability of inflation starts in EMEs. The findings also indicate that a more democratic environment and an increase in capital flows relative to GDP reduce the probability of inflation starts. JEL no. E31, E58
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## 1 Introduction

Emerging market economies (EMEs) have experienced a noticeable decline in inflation since the mid-1990s. Average inflation in these countries declined from triple-digit figures in the late 1980s to low single-digit figures by the end of 2001 once a few outlier countries are excluded. This marked decline in inflation in EMEs is attributed to a more favorable external environment and the implementation of more prudent macroeconomic policies arising mainly from public discontent with high inflation (IMF 2001). More specifically, evidence suggests that fiscal consolidation—a prerequisite for macroeconomic stability—was one of the key contributing factors to disinflation: Fiscal deficits in EMEs were lowered by one-half from the levels that prevailed in the 1970s and 1980s (IMF 2001). External developments also contributed to the decline in inflation mainly through two channels: (i) the fall in global inflation; and (ii) the decline in oil prices in the first

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half of the 1990s. In addition to these factors, institutional reforms such as the enhancement of central bank independence, structural reforms in trade, product, and labor markets along with the improved access to global capital markets were among the forces behind the noticeable decline in inflation in EMEs.

In view of the adverse consequences of high inflation (Bruno and Easterly 1998; Ghosh and Phillips 1998; Khan and Senhadji 2000), the observed decline of inflation in EMEs is clearly a positive development. However, whether this salutary development of a stable price environment in these countries is likely to be permanent and what kind of policies need to be pursued to maintain price level stability still remain questions of considerable policy relevance. The objective of this paper is to shed some light on these questions by investigating the factors associated with the start of 24 inflation episodes in 15 EMEs between 1980 and 2001. To this end, we rely on a cross-country data set and employ pooled probit analysis to estimate the contribution of the key factors to inflation starts.[1] Some earlier research has examined the determinants of inflation in EMEs.[2] To the best of our knowledge, however, there has not been any empirical study investigating the contributing factors to inflation starts in the case of EMEs, which would enhance the ability of policy makers in these countries to pursue appropriate policy actions in a preemptive manner.

The empirical findings suggest that an increase in the output gap—above-trend real economic activity—agricultural shocks, and expansionary fiscal policy raise the probability of inflation starts in EMEs. On the other hand, the results indicate that a more democratic environment and an increase in capital flows relative to GDP reduce the probability of inflation starts in these countries.

The remainder of the paper is structured as follows. The next section provides a brief overview of the literature on the determinants of inflation in EMEs. Section 3 discusses the definition of inflation episodes and inflation starts. Section 4 presents the empirical framework and estimation results. Section 5 highlights the salient features of inflation starts, in view of the

[1] Our approach is very similar to a recent study by Boschen and Weise (2003), which focuses on the OECD countries. This study includes the following countries: Argentina, Brazil, Colombia, India, Indonesia, Israel, Korea, Malaysia, Mexico, Peru, the Philippines, South Africa, Thailand, Turkey, and Venezuela. The selection of the countries is dictated by data availability for the period under consideration.

[2] See, for instance, Loungani and Swagel (2001) and Mohanty and Klau (2001) as well as the references therein.

empirical findings. Finally, Section 6 concludes the paper by summarizing the policy implications.

## 2 Review of the Literature

The nature of the mechanisms underlying the dynamics of inflation in EMEs has stimulated much discussion. A quick glance at the literature points to two different explanations.[3] According to the first view, inflation is largely influenced by nonmonetary factors, most notably frequent supply shocks, which render the prediction of inflation a difficult task. Such shocks are likely to complicate the monetary transmission mechanisms by obscuring the role of demand side factors in the inflation process. The second view puts forth that nonmonetary factors affect only the short-run path of inflation, while, in the long run, monetary variables determine the inflation rate. As a result, it is argued that the standard output gap model should offer a reasonable explanation of the inflation dynamics in EMEs. As was pointed out by Mohanty and Klau (2001), however, the reality for EMEs is likely to lie somewhere between the two competing explanations. With this in mind, we will highlight the main tenets of the relevant literature in the context of EMEs below.

The nexus between the fiscal deficits, monetary growth, and inflation emerges as an important reason for sustained high rates of inflation.[4] In spite of the theoretical links, the empirical evidence concerning the link between fiscal deficits and inflation has been rather elusive. At the level of any particular country, it may be difficult to establish a clear short-term link between fiscal deficits and inflation. In fact, the correlation may be even negative during extended periods of time. Evidence suggests that the existence of a positive correlation in the long run is also not a clear-cut phenomenon (Agenor and Montiel 1999). For instance, Fischer et al. (2002) find that the relationship between fiscal deficit and inflation is only strong in high inflation countries—or during high inflation episodes—but they find no obvious relationship between fiscal deficits and inflation during low inflation episodes or for low inflation countries.

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[3] The objective of this section is not to offer a thorough review of the literature. Instead, it intends to highlight the pertinent issues for the purpose of this investigation. Mohanty and Klau (2001) and Loungani and Swagel (2001) provide a comprehensive review of the relevant literature.

[4] See, for instance, Dornbusch (1992) and Bruno (1993).

A recent study by Catão and Terrones (2001), however, was successful in relating long-run inflation to the permanent component of the fiscal deficit scaled by the inflation tax base, measured as the narrow money to GDP ratio. Their findings suggest that a 1 percent reduction in the fiscal deficit to GDP ratio typically lowers inflation by 1.5 to 6 percentage points depending on the size of the money supply.

On time consistency, central bank independence has received a great deal of attention in the literature. It is argued that a lack of central bank independence can lead to succumbing to political considerations, thereby engendering a monetary policy looser than optimal. For instance, if there is a perception that pursuing expansionary monetary policy can increase output, politicians could put pressure on the central bank—say during the election period—to trade off a boost to growth against higher inflation. In fact, the IMF (1996) finds that inflation performance between 1975 and 1995 in industrial countries is negatively correlated with an index of central bank independence. However, the findings of this study also suggest that the same relationship did not hold over the same period for developing countries. This conclusion may be attributed to imprecision in the measurement of central bank independence arising from a divergence between *de jure* and *de facto* central bank independence in these countries.[5]

Indeed, a recent study by Gutierrez (2003) explores the relationship between inflation performance and the level of independence of the central bank entrenched in the constitution as opposed to the *de jure* independence established in the central bank law. Her results suggest that Latin American countries that entrench the independence of the central bank in the constitution tend to have lower inflation, even after controlling for other factors.[6] Central bank independence, however, cannot, by itself, ensure the credibility of monetary policy, which hinges on the overall stance of macroeconomic policy. For example, if the fiscal policy is deemed to be inconsistent with the inflation target, credibility is impossible to attain, even with an independent central bank.

Evidence suggests that the significance of the exchange rate in the evolution of domestic inflation tends to be greater in EMEs compared to advanced economies (Ho and McCauley 2003). In these countries, the pass-through

[5] Independence is typically assessed by evaluating the central bank's founding legislation and its institutional structure.

[6] Typically constitutions are better enforced than ordinary laws in view of their superior legal rank. Furthermore, modifications generally required qualified majorities to make the constitution much harder to amend than a law.

of a depreciation into domestic prices could be much larger than the share of imported goods in the consumption basket would indicate. This is because an increase in the price of imports in the face of a depreciation would also affect inflation expectations. An increase in inflation expectations, in turn, would tend to depreciate the exchange rate as agents buy foreign currency to maintain purchasing power. In view of this feedback between the exchange rate and domestic prices, a country can easily fall victim to a vicious circle of depreciation and inflation.

Large supply shocks emerge as an important source of inflation in EMEs. As pointed out by Fischer (1981), supply shocks may have major macroeconomic implications for EMEs. Notwithstanding the nature of the shock—i.e., temporary versus permanent—the size of the overall price impact hinges on the importance of the sector in question for overall consumer inflation. For instance, food and energy have a relatively larger share in the consumer price index (CPI) compared to advanced economies. Consequently, a marked increase in prices of these commodities not only raise short-run inflation owing to their high weight in CPI, but also can engender a sustained increase in the inflation rate if it raises expectations.[7]

Political determinants of inflation have also received considerable attention in the literature. Political business cycle models developed by Nordhaus (1975) and Lindbeck (1976) envision that central banks pursue an expansionary monetary policy in the period leading up to an election in order to increase the governing party's chances for reelection. The empirical evidence on the political business cycle hypothesis is mixed. McCallum (1978) and Alesina (1988) reject the hypothesis. A recent study by Alesina and Roubini (1997) finds that while elections have no impact on output and unemployment, they do affect inflation.

Political underpinnings of inflation remain closely linked with theories of group conflict.[8] Depending upon the relative importance of particular groups and the nature of their demands, there appears to be two competing schools of thought: *populist approaches* and *state-capture approaches*. The variants of existing theories under the umbrella of the populist view put forward that electoral competition and political participation aggravate both demands for inflation as well as the coordination problems inherent in preventing inflationary spirals. In the presence of conflicts over the distribu-

[7] In this respect, it should be noted that if supply shocks are accommodated by monetary policy, they can lead to demand-driven inflationary pressures.

[8] See Desai et al. (2003) and references therein.

tion of economic gains and losses, politicians responding to public demands increase government expenditures by resorting to inflationary finance. The institutional characteristics of democracy—electoral competition, separation of powers, partisanship, and political fragmentation—in turn raise pressures on politicians to use inflation tax. In light of this conjecture, the populist view asserts that inflation is less likely if governments with consolidated, autonomous—even dictatorial—powers can avoid these pressures (Nelson 1993; Haggard and Kaufmann 1992; O'Donnell et al. 1986).

State-capture approaches, on the other hand, contend that price instability is not a result of demand for inflationary financing by the public, but by incumbent politicians and their elite patrons, who receive at least two kinds of private benefits from money creation (Hellman et al. 2000). First, credits issued by the central bank can be directed to favored firms or sectors either directly or through the commercial banks. Second, resulting inflation lowers real interest rates and erodes the real value of outstanding liabilities—both the loans held by borrowers and the deposits held by banks—that have to be repaid. Contrary to the populist view, under the state-capture view the main elements of political regimes including partisanship, separation of powers, and political participation constrain the power of incumbents. This, in turn, promotes price stability since the reliance on the inflation tax is eroded once these elite groups encounter credible challenges to their authority.

Two recent studies focusing on the determinants of inflation in EMEs are noteworthy to discuss briefly in this section. A study by Loungani and Swagel (2001) employs vector autoregressions (VARs) to study the experience of 53 developing countries between 1964 and 1998. They estimate VARs consisting of the following variables: (i) money growth and exchange rates; (ii) the output gap and a measure of the world business cycle; (iii) changes in the price of oil and nonoil commodities; (iv) past realizations of inflation. Their findings suggest that either money growth or exchange rate movements—depending on the ordering—explain two-thirds of the variance of inflation at both short and long horizons. Their results indicate that inflation expectations also play an important role in the inflation process in developing countries: Past realizations of inflation explain between 10 and 20 percent of inflation movements. Overall, their findings suggest that cost shocks or the output gap are not significant factors affecting the evolution of inflation in these countries.

By contrast, Mohanty and Klau (2001), who study the experience of 14 EMEs in the 1980s and 1990s, find that exogenous supply shocks—in

particular those to food prices—play an important role in the inflation process. Food prices typically account for a larger percentage of the CPI in EMEs than in industrial countries. Furthermore, food prices tend to be very volatile owing to the influence of weather and the presence of trade restrictions. Their results suggest that although demand factors, captured by the output gap and excess money, have significant impact on inflation, their unique importance cannot be established for all countries. Wage growth and exchange rate changes, on the other hand, appear to make important contributions to inflation volatility in many countries. Their findings also indicate that inflation persistence plays an important role in explaining both the average level of inflation and its variation.

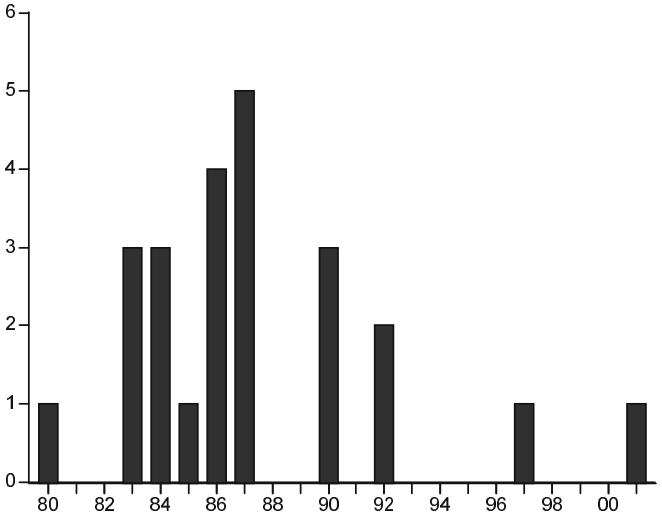
## 3 Definition of Inflation Episodes and Inflation Starts

Prior to proceeding with the empirical investigation, it is important to clarify the definition of inflation episodes and starts. To this end, we rely on Ball (1994) and Boschen and Weise (2003) and construct the trend inflation series by calculating the nine-quarter moving average of the quarterly consumer price inflation rate. Next, we turn to the determination of trough and peak dates of inflation, which are identified as dates at which trend inflation is lower (higher) than in the preceding and succeeding four quarters. An inflation episode is then defined as a period of time over which trend inflation rises by at least 1 percent from trough to peak and which is preceded by four or more quarters of stable or declining trend inflation.[9] In total, we capture 24 inflation episodes for which detailed information can be found in the Appendix (Figure A1 and Tables A1 and A2).

Following Boschen and Weise (2003), we define the start date for an inflation episode as the year following the year in which the trough took place. As can be seen from Figure 1, which depicts inflation starts, 17 out of the 24 inflation starts occurred before 1990. This indicates that roughly

[9] In the definition of an inflation episode, we require a 1 percent rise from trough to peak though Boschen and Weise (2003) employ a 2 percent threshold for the OECD countries. The rationale behind our choice of 1 percent rise is that EMEs included in this paper have experienced long lasting periods of high inflation and, as a result, a lower threshold—1 percent as opposed to 2 percent—seems to be more appropriate in capturing the periods of sustained increase in inflation. The fact that the average rise in inflation per quarter during inflation episodes in Boschen and Weise (2003) amounts to 0.36 percent, while the same figure in our case is 2.18 percent, supports this conjecture. Nevertheless, the empirical results remain intact when we employ a 2 percent threshold in lieu of 1 percent.

Figure 1: *Number of Inflation Starts Per Year*




3 out of every 4 episodes in our sample took place in the 1980s, the years of 1986 and 1987 witnessing the largest number of episode starts. Table 1 presents the summary statistics for the 24 inflation episodes. Over the full sample, the average length of inflation episodes is roughly 15 quarters, and 21 of them last for more than 8 quarters. Average rise in inflation, from trough to peak, is about 26 percent. In Table 1, we decompose our sample into three periods: 1984–1989, 1990–1995, and 1996–2001. The first period captures the period during which access to global capital markets

Table 1: *Summary Statistics for Inflation Episodes*

| | | Episodes ending | | |
|---|---|---|---|---|
| | Full sample | 1984–1989 | 1990–1995 | 1996–2001 |
| Number of episodes | 24 | 12 | 8 | 4 |
| Length (quarters) | 14.83 | 13.33 | 18.13 | 12.75 |
| Initial inflation rate | 9.82 | 10.99 | 9.62 | 6.71 |
| Ending inflation rate | 35.85 | 54.61 | 19.87 | 11.56 |
| Rise in inflation | 26.03 | 43.62 | 10.25 | 4.85 |

*Note:* Figures are average values over the respective periods. Inflation figures come from our series obtained through a nine-quarter centered moving average process.

was relatively limited. For the 12 episodes ending this period, the average length and the rise in inflation are about 13 quarters and around 44 percent, respectively.

There are 8 episodes between 1990 and 1995 with an average length of 18 quarters and an average rise in inflation of roughly 10 percent. It is interesting to note that during this period, which is characterized by increased access to capital markets, the average length of episodes are longer but the rise in inflation is substantially lower when compared to the 1984–1989 period. For the 1996–2001 period, we have only four episodes. Average length of episodes is around 13 quarters, similar to that of the 1984–1989 period. Average rise in inflation, on the other hand, is noticeably lower, around 5 percent, compared to other periods. In the next section, we will present the empirical framework and estimation results for 24 inflation starts in 15 EMEs between 1980 and 2001.

## 4 Empirical Framework and Results

We employ probit analysis to investigate the factors associated with the start of the above highlighted inflation episodes in 15 EMEs between 1980 and 2001. In the estimations, the dependent variable is a binary variable, which takes on a value of 1 if an inflation start took place in that country during that year and a value of 0 otherwise. We stack the data for each country and estimate the probit models using maximum likelihood.[10] The variables that we consider largely draw on the empirical specifications employed in previous studies.

Table 2 presents the probit estimates for the models included in our study. We report the marginal effect of the independent variables evaluated at the means of variables involved along with the z-statistic associated with the coefficient estimate. The first model that we consider, Model 1, includes output gap, *GAP*, the percentage change in food production index, *FP*, and the percentage change in oil prices, *OIL*, with a view to study the importance of above-trend real activity and supply shocks for inflation starts in these countries.[11] The results point to a strong positive relationship between *GAP*

[10] The Appendix provides a detailed description of the data.

[11] The results do not change when we consider the percentage change in oil prices in national currency instead of in U.S. dollars. In view of the possibility of a close correlation between the *FP* variable and *GAP*s, we have calculated the correlation between these two variables, which turned out to be quite low (0.195).

Table 2: *Probit Estimations for Inflation Starts*[a]

| Independent variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| CONSTANT | −1.381* (12.191) | −1.591* (10.370) | −1.497* (7.808) | −1.292* (5.424) | −1.374* (6.614) | −1.088* (4.153) |
| *GAP* | 0.076* (2.418) | 0.090* (2.916) | 0.088* (2.922) | 0.097* (3.011) | 0.084* (2.804) | 0.097* (3.005) |
| *FP* | −0.049* (2.194) | −0.051* (2.308) | −0.051* (2.312) | −0.058* (2.431) | −0.043** (1.928) | −0.051* (2.094) |
| *OIL* | −0.004 (0.955) | −0.004 (0.914) | −0.004 (0.948) | −0.004 (0.861) | | |
| *DEMOC* | | | | −0.052 (1.512) | | −0.067** (1.834) |
| *DURABLE* | | | −0.006 (0.891) | | −0.007 (1.031) | |
| *BS* | | −0.050* (2.233) | −0.048* (1.987) | −0.058* (2.501) | −0.058* (2.277) | −0.067* (2.461) |
| *CF* | | | | | −0.077* (2.785) | −0.086* (2.900) |
| Log likelihood | −81.6 | −79.2 | −78.7 | −77.7 | −76.8 | −75.12 |
| McFadden $R^2$ | 0.052 | 0.079 | 0.084 | 0.093 | 0.107 | 0.123 |
| Number of observations (0/1) | 306/24 | 306/24 | 306/24 | 301/24[b] | 306/24 | 301/24[b] |

*,** denote statistical significance at the level of 1 and 5 percent, respectively.
[a] Absolute values of z-statistics, calculated using the Huber–White procedure, are given in parentheses under the corresponding coefficient estimates. – [b] Five observations are missing since the *DEMOC* variable for South Africa (1992 and 1993), Korea (1987), Peru (2000), and for the Philippines (1986) were indetermined.

and inflation starts, lending support to the policy mistake hypothesis.[12] More specifically, the findings show that a 1 percent rise in GDP growth above trend increases the probability of an inflation start by 7.6 percent. The results also suggest that there is a statistically significant negative correlation between *FP* and inflation starts—a finding underscoring the importance of agricultural shocks in inflation starts. On the other hand, there is no evidence that oil price shocks triggered inflation episodes during the period under consideration. Indeed, the coefficient associated with *OIL* is negative though not statistically significant.

[12] The policy mistake hypothesis puts forth that policies aimed at expanding real economic activity above its potential are associated with inflation episodes (Sargent 1999; Taylor 1992).

Model 2 incorporates budget surplus as a percentage of GDP (*BS*) to assess the role of fiscal policy in inflation starts.[13] The results underline the important link between fiscal policy and inflation starts: a 1 percent rise in *BS* reduces the probability of an inflation start by 5 percent. *GAP* and *FP* continue to be statistically significant with their expected signs for inflation starts in this specification.

In Models 3 and 4, we attempt to assess the importance of political determinants for inflation starts. To this end, we employ two variables, namely *DEMOC* and *DURABLE* for which the Appendix provides a detailed explanation.[14] The first variable is a measure for institutional democracy, while the second variable captures the durability of the regime in the countries involved. The empirical results suggest that both *DEMOC* and *DURABLE* are negatively correlated with inflation starts, though only the former variable is marginally significant. The contributions of *BS*, *FP*, and *GAP* to inflation starts still remain statistically significant with their expected signs in Models 3 and 4.

In view of the substantial increase in capital flows to EMEs particularly during the 1990s, we also consider the impact of capital flows in relation to GDP, *CF*, on inflation starts in Models 5 and 6. A priori, it is expected that this development should be beneficial for disinflation since an increase in *CF* would reduce the need for seigniorage.[15] The empirical results concerning Models 5 and 6 point that *CF* has a negative and statistically significant impact on the probability of inflation starts. Focusing on Model 6, the findings indicate that a 1 percent increase in *CF* reduces the probability of inflation starts by 8.6 percent. Consistent with the findings in other models, an increase in the output gap raises the probability of inflation starts, while a rise in food production and budget surplus reduce the probability of inflation starts.

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[13] The lack of data for the majority of countries considered did not let us to examine the effect of government debt on inflation starts.

[14] Several recent studies—i.e., Desai et al. (2003) and Broz (2002)—also utilize the same database explained in Table A3.

[15] It should be noted that despite their obvious benefits—increased efficiency and a better allocation of capital, and associated transfer of technology—the inflows have generated concerns in view of their potential adverse impact on macroeconomic stability, the competitiveness of the export sector, and external viability. Indeed, the inflows are viewed as a serious risk, which can fuel inflation and lead to an unsustainable real appreciation of the real exchange rate. However, the link between the inflows and inflation is not straightforward; it is influenced by the recipient country's economic objectives, exchange rate regime, institutional constraints, and, particularly, the causes and the composition of the inflows. Consequently, this issue needs to be settled empirically.

Moreover, the findings indicate that a higher democracy score reduces the probability of inflation starts: a 1 unit increase in the democracy score lowers the probability of an inflation start by 6.7 percent. The results seem to lend support to the state-capture view, which argues that strong, insulated governments are needed to prevent inflation.[16] According to this view, inflation does not stem from voters or consumers pressuring politicians to ease monetary or fiscal constraints, but rather because incumbents obtain private benefits from money creation and from public spending (which they can then channel to favored constituents).[17] This, in turn, suggests that the main challenge of price stability is to force accountability upon incumbents to limit their private accumulation of wealth. This finding is consistent with the experience of transition countries in the 1990s during which the persistence of high inflation was attributed to the failure of democratic procedures and the unconstrained behavior of elites who benefited from rapid money creation in a liberalizing economy (Aslund et al. 1996; Mikhailov 1997).[18]

In addition to the specifications presented in Table 2, we have experimented with the inclusion of the lags of the variables involved and considered other models incorporating money growth, presence of a pegged exchange rate (de facto classification due to Levy-Yeyati and Sturzenegger 2003), broad money in relation to GDP, change in the exchange rate, excess domestic credit growth, openness, current account balance in relation to GDP, and the ratio of broad money to international reserves as well as their lags. These variables turned out to be statistically insignificant and, as a result, were not included.[19] This finding, however, does not necessarily imply that these variables were not important in individual episodes; it simply suggests that they did not have systematic effects in our sample of inflation episodes.

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[16] This finding is consistent with Cukierman et al. (1992), who find that seignorage is larger in more totalitarian countries.

[17] See Geddes (1995) for more on this.

[18] More specifically, transition countries that liberalized their political system rapidly were able to contain inflation by 1995. Transition countries that have single-party systems and quasi-dictatorial heads of state, on the other hand, failed to bring inflation under control.

[19] Furthermore, we have also considered the U.S. budget deficit in relation to GDP (*USBD*) in all models presented in Table 2. The estimated coefficient on this variable is negative and statistically significant, suggesting that an increase in *USBD* raises the probability of an inflation start in EMEs. The inclusion of this variable does not change the main thrust of the results reported in Table 2, except for the variable *DEMOC* whose significance declines in the presence of *USBD*. The results of these experiments are available upon request.

## 5 A Quick Glance at Inflation Starts

In this section, we examine the contribution of the variables involved in triggering inflation starts. We derive the decomposition of these contributions, presented in Table 3, from Model 6, in which all of our key variables are statistically significant. The figures under the column labeled probability are the fitted values of probabilities of the inflation start and are defined as:

$$prob_{jt} = 1 - F\left(-\sum_i X_{i,jt}\beta_i\right), \tag{1}$$

where $F(.)$, $\beta_i$, and $i$ are the cumulative density function for the normal distribution, the estimated coefficients from Model 6, and the index for the independent variables, respectively. These probabilities can be compared with a baseline probability, which is the fitted probability value when all the variables are set to their mean values over the full sample period.

We decompose the index, $\sum_i X_{i,jt}\beta_i$, in order to observe the contribution of each individual variable to the start of inflation episodes. The percentage contribution of variable $i$ for country $j$ in year $t$ is calculated as:

$$cont_{i,jt} = \frac{\beta_i(X_{i,jt} - \bar{X}_i)}{\left|\sum_i \beta_i(X_{i,jt} - \bar{X}_i)\right|}. \tag{2}$$

Our approach to computing the contributions differs slightly from that of Boschen and Weise (2003) since we divide the contribution of each variable by the absolute value of the total contribution of variables considered by the index. The use of the absolute value operator in the denominator of (2) enables us to obtain the percentage contributions with correct signs since the total contribution to the index can take negative values.

The numerator of (2) is the product of the coefficient estimate of variable $i$, $\beta_i$, and the deviation of $X_{i,jt}$ from the sample mean, $(X_{i,jt} - \bar{X}_i)$. In other words, the individual contribution of each variable is determined by the coefficient estimate and the deviation of the actual value of the variable from the full sample mean at the year of the episode start. Percentage contribution of each variable to the index at each episode start is reported in Table 3, which presents the average probabilities and percentage contributions for the years of episodes.

Although it is rather difficult to generalize the salient features of inflation starts across countries, several brief comments are in order concerning the

Table 3: *Relative Importance of Major Variables in Inflation Starts*

| | | | Percent due to[a] | | | | |
|---|---|---|---|---|---|---|---|
| | | Probability[b] | *GAP* | *FP* | *DEMOC* | *BS* | *CF* |
| *Episodes* | | | | | | | |
| Argentina | 1987 | 0.16 | 0.27 | 0.73 | −0.19 | −0.06 | 0.25 |
| Brazil | 1986 | 0.49 | 0.32 | 0.16 | −0.03 | 0.41 | 0.15 |
| | 1992 | 0.02 | −0.51 | −0.32 | −0.24 | 0.04 | 0.04 |
| Colombia | 1984 | 0.03 | −0.04 | −0.37 | −0.53 | 0.24 | −0.30 |
| India | 1990 | 0.12 | 0.00 | 0.25 | −0.28 | 0.62 | 0.41 |
| Indonesia | 1986 | 0.09 | −0.23 | −0.54 | 1.31 | −0.03 | 0.48 |
| | 1997 | 0.17 | 0.19 | 0.47 | 0.60 | −0.27 | 0.01 |
| Israel | 1983 | 0.19 | −0.07 | −0.26 | −0.24 | 1.99 | −0.42 |
| Korea | 1986 | 0.16 | 0.36 | −0.08 | 0.64 | −0.35 | 0.43 |
| Malaysia | 1987 | 0.11 | −0.27 | −0.15 | 0.18 | 0.46 | 0.78 |
| Mexico | 1985 | 0.19 | 0.09 | −0.11 | 0.45 | 0.35 | 0.23 |
| | 1990 | 0.07 | 1.74 | −1.52 | 1.67 | −0.39 | −0.50 |
| Peru | 1980 | 0.10 | 0.02 | 0.63 | −0.15 | −0.19 | 0.68 |
| | 1987 | 0.16 | 1.15 | −0.63 | −0.08 | 0.28 | 0.29 |
| Philippines | 1983 | 0.20 | 0.04 | 0.56 | 0.51 | −0.12 | 0.01 |
| | 1987 | 0.16 | 0.41 | 0.40 | −0.19 | −0.11 | 0.49 |
| South Africa | 1984 | 0.10 | 1.47 | −0.74 | −0.16 | 0.21 | 0.22 |
| Thailand | 1986 | 0.20 | −0.31 | 0.65 | 0.26 | 0.06 | 0.34 |
| Turkey | 1983 | 0.12 | 0.24 | 0.61 | −0.12 | −0.19 | 0.46 |
| | 1987 | 0.17 | 0.61 | 0.33 | −0.08 | 0.00 | 0.14 |
| | 1990 | 0.06 | 5.45 | −3.20 | −2.54 | −0.43 | 1.72 |
| | 2001 | 0.15 | −1.04 | 0.58 | −0.20 | 1.36 | 0.29 |
| Venezuela | 1984 | 0.06 | 0.99 | 4.42 | −2.34 | −5.55 | 3.48 |
| | 1992 | 0.06 | 2.58 | −0.45 | −1.01 | −0.21 | 0.09 |
| *Averages* | | | | | | | |
| | 1980 | 0.10 | 0.02 | 0.63 | −0.15 | −0.19 | 0.68 |
| | 1983 | 0.17 | 0.07 | 0.30 | 0.05 | 0.56 | 0.02 |
| | 1984 | 0.06 | 0.81 | 1.11 | −1.01 | −1.70 | 1.13 |
| | 1985 | 0.19 | 0.09 | −0.11 | 0.45 | 0.35 | 0.23 |
| | 1986 | 0.24 | 0.03 | 0.05 | 0.54 | 0.02 | 0.35 |
| | 1987 | 0.15 | 0.44 | 0.13 | −0.07 | 0.11 | 0.39 |
| | 1990 | 0.08 | 2.39 | −1.49 | −0.38 | −0.06 | 0.54 |
| | 1992 | 0.04 | 1.03 | −0.39 | −0.62 | −0.09 | 0.06 |
| | 1997 | 0.17 | 0.19 | 0.47 | 0.60 | −0.27 | 0.01 |
| | 2001 | 0.15 | −1.04 | 0.58 | −0.20 | 1.36 | 0.29 |

[a] Figures presented are the percentage differences between point probability estimate and the baseline probability, where the baseline probability $= 1 - F(\bar{X}\beta) = 0.050$. – [b] Probability figures are the fitted values from Model 6.

results presented in Table 3. In majority of the inflation starts—17 out of 24—the contribution of *GAP* is positive, documenting the importance of the above-trend real activity in triggering inflation. This, in turn, suggests that in the case of 17 episodes *GAP* at the start dates was higher than the full sample mean of this variable. The percentage contribution of *DEMOC* carries a negative sign in 16 out of 24 inflation episode starts, suggesting that in these episodes this variable reduced the probability of an inflation start. However, in the case of the remaining 8 episodes the *DEMOC* variable contributes positively to inflation starts since the democracy score is below the sample average.

In the case of the variable *BS*, the findings suggest that this variable lowered the probability of an inflation start only in the case of 12 episodes. Since *BS* has a negative coefficient estimate in Model 6, this implies that the budget performance in the remaining 12 episodes was worse than the full sample average. The results also indicate that the variable *FP* contributed positively to inflation starts in half of the episodes, while that of capital flows in relation to GDP appears to be positive in 21 episodes. The latter result, in turn, implies that inflation starts are associated with *CF* lower than the full sample average.

## 6 Conclusions

Following the dramatic decline in inflation in emerging market economies (EMEs) since the mid-1990s, safeguarding the stable price environment has emerged as one of the most important policy priorities. Existing studies have largely focused on the determinants of inflation in EMEs in lieu of the factors triggering the inflation episodes. With a view to enhance the ability of policy makers in EMEs to take appropriate actions in a preemptive manner, we investigate the factors associated with the start of 24 inflation episodes in 15 EMEs between 1980 and 2001 by employing pooled probit analysis. The empirical results show that an increase in GDP growth above trend, agricultural shocks, and expansionary fiscal policy raise the probability of inflation starts in EMEs. The findings, on the other hand, indicate that a more democratic environment and an increase in capital flows relative to GDP reduce the probability of inflation starts in these countries.

Policy implications of this investigation can be summarized as follows. First, our results document the importance of prudent fiscal policy in reducing the probability of inflation starts. In spite of the widespread view that

fiscal policy is closely connected with inflation in many EMEs, the empirical evidence pertaining to this link has been rather elusive. In this respect, the findings provide the much-needed additional empirical support concerning the importance of fiscal discipline for maintaining price stability. Second, earlier research has been inconclusive in establishing a close link between inflation and output gap in the context of EMEs.[20] Based on our findings, however, the link between economic activity above trend and inflation starts in EMEs appears to be quite robust, suggesting that central banks in EMEs should closely monitor the current and future path of aggregate demand in the economy.

Third, the importance of agricultural shocks for inflation in EMEs has also been acknowledged in previous studies.[21] The fact that food accounts for a larger share of the consumption basket in EMEs and that food prices are subject to the vagaries of the weather complicates the conduct of monetary policy in these countries.[22] This is because the role of monetary policy is more lucid and its impact is more potent when inflation is mainly driven by demand shocks and when demand changes can be traced by indicators such as monetary growth or output gap. By contrast, the strong impact of agricultural shocks on inflation engenders questions about the appropriate target for policy. Moreover, in view of the relatively high weight of food in the CPI in EMEs, agricultural shocks not only increase short-run inflation, but also can generate a sustained increase in the inflation rate if it raises inflationary expectations. As a consequence, EMEs should endeavor to liberalize agriculture to reduce the volatility of food prices, and central banks in these countries should make an effort not to accommodate such shocks as their accommodation can lead to demand-driven inflationary pressures.

Fourth, the negative association of inflation starts with capital inflows highlights the importance of creating a conducive environment in EMEs for ensuring a high quality of external financing. In fact, the movement away from more stringent exchange rate arrangements toward inflation targeting or some form of this monetary policy in EMEs renders the quality of external financing an important policy issue. In this respect, recent studies offer the following insights: (i) countries with less stable external financing encounter difficulties in using the exchange rate to weather external shocks;

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[20] See, for instance, IMF (1996) and Loungani and Swagel (2001).

[21] See, for instance, Debelle (2001) and Mohanty and Klau (2001).

[22] As noted by Debelle (2001), the share of food in the consumption basket is under 20 percent in Australia, while its share is around 50 and over 40 percent in the Philippines and Indonesia, respectively.

and (ii) flexible exchange rate regimes are viable in financially open economies provided external financing is not based on very volatile capital.[23]

Finally, the negative association of the democracy indicator employed in this study, which mainly reflects the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive, with inflation starts implies that a more democratic environment promotes price stability. This, in turn, underscores the significance of a more democratic environment for the preservation of price stability and efforts for greater democratization in EMEs.

[23] See, for instance, Goldfajn and Olivares (2001).

## Appendix

Figure A1: *Inflation Episodes in 15 EMEs (1980–2001)*

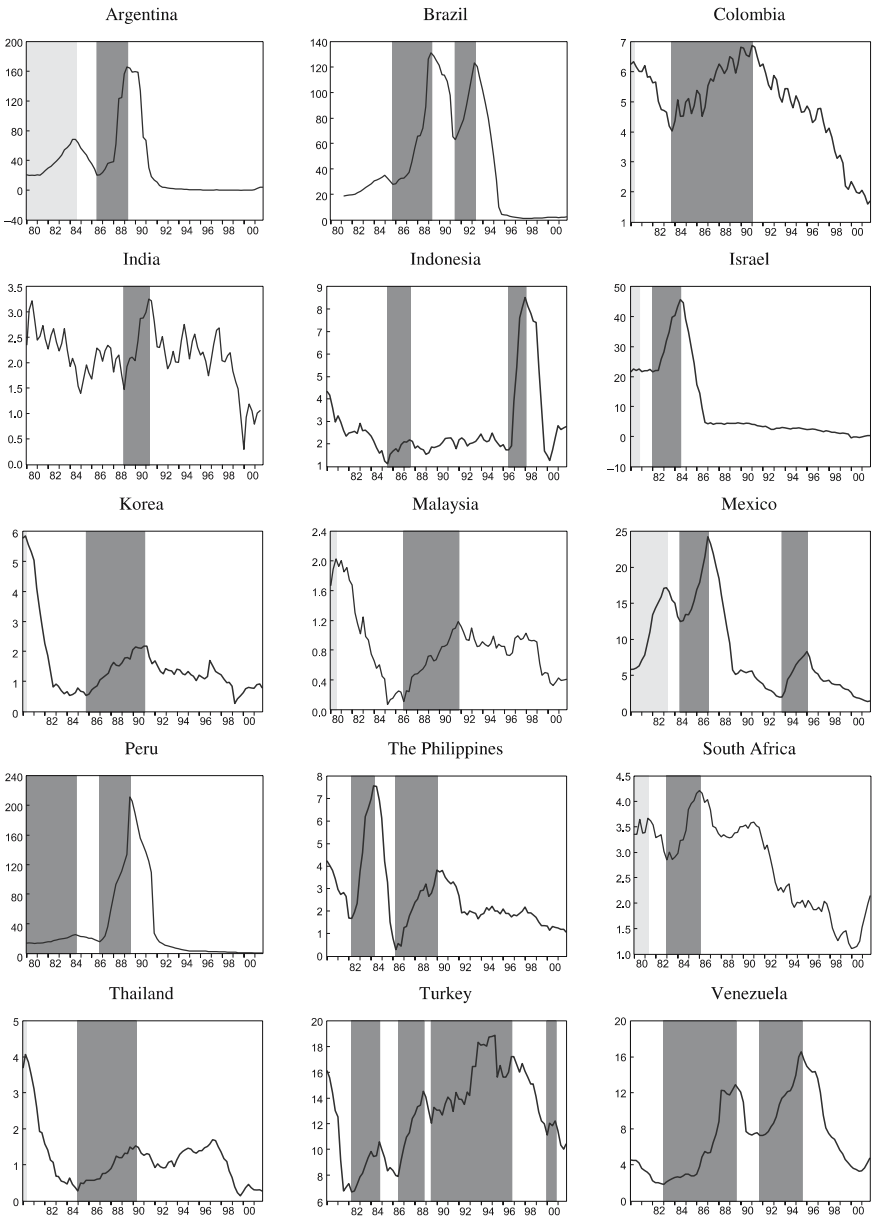

Table A1: *Data Definitions and Sources*

| Variable | Definition | Source |
|---|---|---|
| *INFLATION* | CPI inflation rate. | *International Financial Statistics* CD-ROM of the IMF, Version 1.1.54 (line 64) |
| *GAP* | Deviation of the real GDP growth from its trend, which is computed using Hodrick–Prescott filter with a smoothness parameter of 100. | *World Development Indicators*, World Bank |
| *FP* | Percentage change in the index of food production. | *World Development Indicators*, World Bank |
| *DEMOC* | The democracy indicator; it is an additive eleven-point scale (0–10). The operational indicator of democracy is a weighted average of the scores of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive. | Polity IV Database |
| *DURABLE* | Regime durability; the number of years since the most recent regime change. The first year during which a new regime is established is set as baseline year and *DURABLE* is assigned the value of zero for that year. Each subsequent year adds one to the value of the variable. | Polity IV Database |
| *BS* | Overall government balance expressed as percentage of gross domestic product.[a] | *World Development Indicators*, World Bank |
| *CF* | Ratio of net private capital flows to gross domestic product. | *World Development Indicators*, World Bank[b] |

[a] Without undermining the integrity of our data set, we had to resort to IMF Country Staff Reports for the missing data points for the *BS* variable in few cases. – [b] For Israel and South Africa the series are constructed by taking the ratio of the financial account—obtained from *International Financial Statistics* (IFS) of the IMF (line 78bjd)—to nominal GDP measured in US dollar, taken from *World Development Indicators*. For South Africa, the financial account is proxied by the Net Errors and Omissions taken from *IFS* of the IMF (line 78cad) for the years 1980–1984.

Table A2: *Inflation Episodes*[a]

| | Trough date | Trough inflation percent | Peak inflation percent | Peak date |
|---|---|---|---|---|
| Argentina | 1986:3 | 19.88 | 165.60 | 1989:2 |
| Brazil | 1985:4 | 27.61 | 131.34 | 1989:2 |
| | 1991:3 | 63.01 | 123.53 | 1993:2 |
| Colombia | 1983:4 | 4.02 | 6.88 | 1991:1 |
| India | 1989:1 | 1.47 | 3.25 | 1991:2 |
| Indonesia | 1985:3 | 1.11 | 2.18 | 1987:3 |
| | 1996:3 | 1.73 | 8.51 | 1998:1 |
| Israel | 1982:1 | 21.45 | 45.68 | 1984:3 |
| Korea | 1985:4 | 0.52 | 2.17 | 1991:1 |
| Malaysia | 1986:4 | 0.10 | 1.18 | 1991:4 |
| Mexico | 1984:3 | 12.48 | 24.30 | 1987:1 |
| | 1993:4 | 1.96 | 8.29 | 1996:1 |
| Peru | 1979:4 | 12.73 | 24.93 | 1984:3 |
| | 1986:4 | 15.72 | 211.42 | 1989:3 |
| Philippines | 1982:2 | 1.66 | 7.56 | 1984:2 |
| | 1986:2 | 0.27 | 3.82 | 1990:1 |
| South Africa | 1983:1 | 2.85 | 4.21 | 1986:1 |
| Thailand | 1985:1 | 0.27 | 1.53 | 1990:2 |
| Turkey | 1982:2 | 6.68 | 10.58 | 1984:4 |
| | 1986:3 | 7.88 | 14.52 | 1988:4 |
| | 1989:3 | 12.04 | 17.23 | 1996:4 |
| | 2000:1 | 11.12 | 12.21 | 2000:4 |
| Venezuela | 1983:1 | 1.80 | 12.94 | 1989:3 |
| | 1991:4 | 7.28 | 16.61 | 1995:3 |

[a] There were inflation episodes in Argentina, Colombia, Israel, Korea, Malaysia, Mexico, South Africa, and Thailand whose start date turned out to be before 1980 and, as a result, could not be included in the investigation. The lightly shaded areas in Figure A1 present some of these episodes, which commenced before 1980 and ended in the early 1980s. We have also considered including Chile in our study. However, the evolution of the inflation rate in this country displays a significantly different pattern since Chile has reduced its trend inflation noticeably during the late 1970s and the early 1980s compared to the countries involved. On this ground, we have not included Chile in our analysis.

*Note:* As was explained in Section 3, the inflation figures presented in the table are the filtered values of actual quarterly consumer price inflation using a nine-quarter centered moving average process.

Table A3: *Democracy and Regime Durability Indicators*

| | Argentina | | Brazil | | India | | Indonesia | | Korea | | Malaysia | | Mexico | | Philippines | | Turkey | | Venezuela | | Thailand | | South Africa | | Israel | | Colombia | | Peru | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* | *DEMOC* | *DURABLE* |
| 1980 | 0 | 4 | 2 | 6 | 8 | 30 | 0 | 21 | 0 | 8 | 5 | 9 | 1 | 3 | 0 | 8 | 2 | 0 | 9 | 11 | 3 | 2 | 7 | 70 | 9 | 31 | 8 | 23 | 7 | 0 |
| 1981 | 0 | 5 | 2 | 7 | 8 | 31 | 0 | 22 | 0 | 9 | 5 | 10 | 1 | 4 | 0 | 0 | 2 | 1 | 9 | 12 | 3 | 3 | 7 | 71 | 9 | 32 | 8 | 24 | 7 | 1 |
| 1982 | 0 | 6 | 2 | 8 | 8 | 32 | 0 | 23 | 0 | 10 | 5 | 11 | 1 | 5 | 0 | 0 | 2 | 2 | 9 | 13 | 3 | 4 | 7 | 72 | 9 | 33 | 8 | 25 | 7 | 2 |
| 1983 | 8 | 0 | 2 | 9 | 8 | 33 | 0 | 24 | 0 | 11 | 5 | 12 | 1 | 6 | 0 | 0 | 7 | 0 | 9 | 14 | 3 | 5 | 7 | 73 | 9 | 34 | 8 | 26 | 7 | 3 |
| 1984 | 8 | 1 | 2 | 10 | 8 | 34 | 0 | 25 | 0 | 12 | 5 | 13 | 1 | 7 | 0 | 1 | 7 | 1 | 9 | 15 | 3 | 6 | 7 | 74 | 9 | 35 | 8 | 27 | 7 | 4 |
| 1985 | 8 | 2 | 7 | 0 | 8 | 35 | 0 | 26 | 0 | 13 | 5 | 14 | 1 | 8 | 0 | 2 | 7 | 2 | 9 | 16 | 3 | 7 | 7 | 75 | 9 | 36 | 8 | 28 | 7 | 5 |
| 1986 | 8 | 3 | 7 | 1 | 8 | 36 | 0 | 27 | 0 | 14 | 5 | 15 | 1 | 9 | n.a. | 0 | 7 | 3 | 9 | 17 | 3 | 8 | 7 | 76 | 9 | 37 | 8 | 29 | 7 | 6 |
| 1987 | 8 | 4 | 7 | 2 | 8 | 37 | 0 | 28 | n.a. | 0 | 5 | 16 | 1 | 10 | 8 | 0 | 7 | 4 | 9 | 18 | 3 | 9 | 7 | 77 | 9 | 38 | 8 | 30 | 7 | 7 |
| 1988 | 8 | 5 | 8 | 3 | 8 | 38 | 0 | 29 | 7 | 0 | 5 | 17 | 2 | 0 | 8 | 1 | 7 | 5 | 9 | 19 | 4 | 10 | 7 | 78 | 9 | 39 | 8 | 31 | 7 | 8 |
| 1989 | 7 | 6 | 8 | 4 | 8 | 39 | 0 | 30 | 7 | 1 | 5 | 18 | 2 | 1 | 8 | 2 | 9 | 6 | 9 | 20 | 4 | 11 | 7 | 79 | 9 | 40 | 8 | 32 | 7 | 9 |
| 1990 | 7 | 7 | 8 | 5 | 8 | 40 | 0 | 31 | 7 | 2 | 5 | 19 | 2 | 2 | 8 | 3 | 9 | 7 | 9 | 21 | 4 | 12 | 7 | 80 | 9 | 41 | 8 | 33 | 8 | 10 |
| 1991 | 7 | 8 | 8 | 6 | 8 | 41 | 0 | 32 | 7 | 3 | 5 | 20 | 2 | 3 | 8 | 4 | 9 | 8 | 9 | 22 | 1 | 0 | 7 | 81 | 9 | 42 | 9 | 34 | 8 | 11 |
| 1992 | 7 | 9 | 8 | 7 | 8 | 42 | 0 | 33 | 7 | 4 | 5 | 21 | 2 | 4 | 8 | 5 | 9 | 9 | 8 | 23 | 9 | 0 | n.a. | 0 | 9 | 43 | 9 | 35 | 2 | 0 |
| 1993 | 7 | 10 | 8 | 8 | 8 | 43 | 0 | 34 | 7 | 5 | 5 | 22 | 2 | 5 | 8 | 6 | 9 | 10 | 8 | 24 | 9 | 1 | n.a. | 0 | 9 | 44 | 9 | 36 | 3 | 0 |
| 1994 | 7 | 11 | 8 | 9 | 8 | 44 | 0 | 35 | 7 | 6 | 5 | 23 | 4 | 0 | 8 | 7 | 9 | 11 | 8 | 25 | 9 | 2 | 9 | 0 | 9 | 45 | 9 | 37 | 3 | 1 |
| 1995 | 7 | 12 | 8 | 10 | 9 | 45 | 0 | 36 | 7 | 7 | 4 | 24 | 4 | 0 | 8 | 8 | 9 | 12 | 8 | 26 | 9 | 3 | 9 | 1 | 9 | 46 | 7 | 38 | 3 | 2 |
| 1996 | 7 | 13 | 8 | 11 | 9 | 46 | 0 | 37 | 7 | 8 | 4 | 25 | 4 | 0 | 8 | 9 | 9 | 13 | 8 | 27 | 9 | 4 | 9 | 2 | 9 | 47 | 7 | 39 | 3 | 3 |
| 1997 | 7 | 14 | 8 | 12 | 9 | 47 | 0 | 38 | 7 | 9 | 4 | 26 | 6 | 0 | 8 | 10 | 8 | 14 | 8 | 28 | 9 | 5 | 9 | 3 | 9 | 48 | 7 | 40 | 3 | 4 |
| 1998 | 7 | 15 | 8 | 13 | 9 | 48 | 0 | 39 | 8 | 10 | 4 | 27 | 6 | 1 | 8 | 11 | 8 | 15 | 8 | 29 | 9 | 6 | 9 | 4 | 9 | 49 | 7 | 41 | 3 | 5 |
| 1999 | 8 | 16 | 8 | 14 | 9 | 49 | 8 | 0 | 8 | 11 | 4 | 28 | 6 | 2 | 8 | 12 | 8 | 16 | 7 | 30 | 9 | 7 | 9 | 5 | 10 | 50 | 7 | 42 | 3 | 6 |
| 2000 | 8 | 17 | 8 | 15 | 9 | 50 | 8 | 1 | 8 | 12 | 4 | 29 | 8 | 3 | 8 | 13 | 8 | 17 | 7 | 31 | 9 | 8 | 9 | 6 | 10 | 51 | 7 | 43 | n.a. | 0 |
| 2001 | 8 | 18 | 8 | 16 | 9 | 51 | 8 | 2 | 8 | 13 | 4 | 30 | 8 | 4 | 8 | 14 | 8 | 18 | 7 | 32 | 9 | 9 | 9 | 7 | 10 | 52 | 7 | 44 | 9 | 0 |

*Source:* Polity IV Database.

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