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Abstract:
This article extends and expands the Hausmann *et al*. (2005) study by using data on a number of economic and political variables from 120 countries for the period 1957-1997. The data covered a total of 99 growth acceleration episodes to examine the causes and sustainability of growth acceleration. Empirical evidences show that although such political factors as political regime changes and peace are much stronger predictors of growth accelerations than macroeconomic policy variables, the variables that led to sustained growth accelerations are very different from those that led to unsustained growth accelerations.

JEL Classification: O10

Keywords: Growth acceleration, sustainability, political regime change, peace

I Introduction

Despite the difference between the neoclassical growth models that advocates for growth convergence and the "new growth" school advocating that endogenous factors would accelerate growth, a number of recent empirical studies have focused on the turning points in growth (Easterly *et al*., 1993; Ben-David *et al*., 2003; Reddy and Minoiu, 2009; Hausmann *et al*., 2006; Berg *et al*., 2008; Jones and Olken, 2008). Other studies on growth and globalization (Li and Zhou, 2010, 2011) for example, have shown that between economic openness and domestic factors, the latter plays a key role in growth sustainability. Evidences have shown that some countries' growth experience tended to last longer than other countries. Thus, information provided by the time dimension, in addition to the factors that explained growth, could be an important source for empirical studies. In other words, the timing and factors that appeared a turning point at time *T* when growth acceleration occurred could be a determining factor in the sustainability of a growth regime.

The study by Hausmann *et al*. (2005) (hereby refers as HPR) examined the time *T* turning point in a number of growth accelerations across the world economy. Empirically, HRP filtered out episodes of rapid growth acceleration, focused on changes in policies, political and external conditions that might precede or coincide with the turning points in growth, and concluded that growth accelerations occurred fairly frequently, but their sustainability posed more controversies.[1] This article revises and extends the empirical investigation in HRP by updating and expanding the baseline dataset that include additional factors, especially political or noneconomic factors that can impact on growth. The empirical findings in this article expand those in HPR in various aspects. The major conclusions are that political conditions are more powerful than economic policies in predicting growth accelerations, especially in developing countries, and that the predictors of growth accelerations are very different between sustained and unsustained growth episodes. These empirical results are useful in relation to the choice between economic reform and political reform, and the decision on the pace of reform, especially political reform.

[1] Jong-A-Pin and De Haan (2007a) have documented that some of HPR results have been contaminated by a human error in the computation of one of their explanatory variables.

Section II analyses the basic characteristics of growth accelerations. Section III discusses the various factors used for the analysis. Section IV constructs the econometric framework, while Section V discusses the empirical findings. Section VI concludes.

II Episodes of Growth Acceleration

We follow the method in HPR to filter out as many episodes of growth accelerations as possible. The filter used to identify growth acceleration in HPR suggests that a country's growth rate $g_{t,t+n}$ at a time horizon from t to n is defined by the least squares growth rate of the logarithm of real GDP per capita (y) from t to $t+n$ as:

$$\ln(y_{t+i}) = a + g_{t,t+n} \times t + \varepsilon, \quad i = 0,...,n. \qquad (1)$$

HPR applied the following three conditions in specifying growth accelerations, with a time horizon of eight years, and $n = 7$:

1) Rapid growth (percent per annum): $g_{t,t+7} \geq 3.5$ *ppa* .

2) Growth accelerates (percent per annum): $g_{t,t+7} - g_{t-7,t} \geq 2.0$ *ppa* , and

3) Post-episode output exceeds pre-episode peak: $y_{t+7} \geq \max\{y_i\} \quad i \leq t$.

In instances where there are a number of consecutive years that met these conditions, the "best" starting date is the year in which the F-statistic of the following linear spline regression is maximized:

$$\ln(y_{t+i}) = a + bt + cD_t(t - t_1) + \varepsilon, \qquad i = -n, -n+1, ...0, ..., n-1, n, \qquad (2)$$

where D is a dummy with score 0 for the years from t-n to t-1 and 1 for the years from t to $t+n$; t_1 is the count corresponding to the starting year of the growth acceleration so that $D(t\text{-}t_1)$=1,2,3,… is a count of the number of years since the start of the acceleration. Countries can have more than one instance of growth acceleration if the dates are more than 8 years apart.[2]

The baseline dataset in HPR is updated from Penn World Tables 6.1 to Penn World Tables 6.2 (Heston *et al*., 2002, 2006) that includes 4 additional years of data.[3] Countries with less than 20 observations and population less than one million are

[2] This is different from HPR whom allowed 2 consecutive episodes if dates are more than 5 years apart. We relax such a condition, as it would mean that the 3 years in between would be experiencing 2 accelerations at the same time.

[3] Country real GDP per capita is used to identify growth episodes. Data for all countries are taken from PWT 6.2 except 9 countries, which have more observations in PWT 6.1 than 6.2. Data in PWT 6.1 runs from 1950 to 2000 while data in PWT 6.2 runs from 1950 to 2004.

eliminated. In addition, to avoid ambiguities when investigating political factors like political leaders or political regimes, we include only countries with sovereign rights or countries that have achieved independence.[4] The 120 countries covered in this study and the data sources are reported in the Appendix.

With n=7, the earliest and latest years for which growth episodes could be identified in our sample are 1957 and 1997, respectively. A total of 99 growth episodes are identified where the starting year, the 8-year average growth rate before the starting year (Growth before), the 8-year average growth rate after the starting year (Growth during) and the difference between the two (Difference) are reported (see Appendix). The mean (median) average growth before an episode is 1.4% (1.4%) and the mean (median) average growth during an episode is 5.9% (5.1%), which means that the difference in the two mean (median) average growth rates is 4.4% (4.0%). This implies that on average output would rise by 35% at the end of a typical growth episode.

A considerably large number of countries in the sample have experienced growth accelerations. The data shows that there is a total of 45 (37.5%) countries have experienced one episode of growth acceleration. A total of 24 (20%) countries have experienced two growth accelerations and 2 (1.5%) countries have experienced three growth accelerations. This gives a total of 71 (59%) countries having had at least one growth episode in the last half century. If the number of countries that are experiencing a growth episode each year is computed, an average of 14.4 (12%) countries would be simultaneously experiencing growth acceleration at each given year. These numbers are remarkable and serve to reiterate the point that growth episodes are indeed a fairly frequent occurrence as emphasized in HPR.

Table 1 shows the episodes grouped by decade and region in the five decades from the 1950s to 1990s. The distribution of growth episodes across decades remains fairly stable at around 20 per decade. The global economic slowdown in the 1970s apparently did not affect the occurrence of growth accelerations. Africa has the largest number of growth episodes with 31, followed by Asia with 24 and Latin America with 22. On this count, Africa probably would have performed better than expected, with some of the poorest countries like Lesotho, Mozambique and Rwanda also having experienced rapid growth at some point in time. The growth episodes in Asia are dominated by the

[4] The three economies eliminated from the dataset are Hong Kong (no sovereign rights), Puerto Rico (not recognized as an independent nation), and Namibia (less than 20 observations after becoming independent in 1990).

East Asian (South Korea, Singapore and Taiwan with 2 apiece), China (2) and the emerging countries like Malaysia (2) and Thailand (2). Episodes in Latin America are mainly clustered around the 1960s and 1970s but have dwindled only to a few in the 1980s and 1990s when growth failed to keep pace. Episodes in Europe center mainly on high-income OECD countries.

Sustained and unsustained growth accelerations are distinguished by looking at the ten-year average post-episode growth rate of a country, namely:

$$g_{t+7,t+17} \geq 2.0 \; ppa. \qquad (3)$$

If the estimated parameter of the equation, $g_{t,t+n}$, is higher than or equal to / lower than 2 percent per annum, then the growth acceleration is classified as "sustained" / "unsustained". As ten more years of post-episode data are required to make this classification, the sample period for which a sustained or unsustained growth episode can be identified is reduced. The earliest and the latest years for which episodes can be identified now become 1957 and 1987, respectively.

This reduces the number of growth episodes to a total of 73 in the period 1957-1987, with 40 (55%) are sustained accelerations while 33 (45%) are unsustained accelerations (see Appendix). The mean (median) post-episode growth rate of 1.8% (2.3%) is markedly lower than the in-episode growth rate of 5.9% (5.1%). The standard deviation of post-episode growth (3.1%) is also markedly higher than the standard deviation of in-episode growth rate (2.2%), implying that the growth rate of a country becomes more volatile on average after a growth episode.

The classification of growth accelerations into sustained and unsustained episodes is important because achieving sustained rapid growth is the ultimate aim of countries, especially developing countries. Not coincidentally, the list of sustained growth episodes have included the most famous growth miracles around the world, like the East Asian economies (Korea Republic 1967, 1984; Singapore 1967; Taiwan 1961, 1985), China (1981), Indonesia (1967), Botswana (1971) and Mauritius (1970, 1983), while the list of unsustained growth episodes include cases from Latin America and Africa whose economies have either lost momentum or suffered outright collapse after experiencing rapid growth.

Table 2 provides the summary statistics of episodes. In the regional category, Europe performs best with 100% of episodes being able to sustain growth into the longer run. Asia is next with 70%, which is a relatively high number for a developing region.

Africa is third with 41% and Latin America performs the worst with 29%. If the episodes for Canada and the United States are excluded, Latin America would perform even worse, with only 20% of its episodes being sustained episodes. Thus, in terms of sustainability of growth, Africa and Latin America perform miserably.

In the summary statistics of episodes between developed and developing countries,[5] Table 2 shows that 13 out of 15 (86.7%) episodes in developed countries, while only 27 out of 58 (46.6%) episodes in developing countries, have been sustained. Episodes in developed countries show a much higher mean post-episode growth (3.6%) and a much lower standard deviation (1.9%) than developing countries (with 1.3% and 3.2%, respectively). Thus, developed countries are better at absorbing external shocks and maintaining stable long-run growth than developing countries (Rodrik, 1999).

III Explanatory Variables

Macroeconomic stability variables:

We select a similar set of economic variables used to proxy for macro stability in HPR. The inflation variable (*Post_inf*) that aims to capture the stabilization policies pursued by governments to counter an inflation crisis takes the value of 1 for the first five years after an inflation crisis and 0 otherwise. Bruno and Easterly (1998) provided a dataset that identifies all episodes of inflation crises based on the criterion that annual CPI inflation is 40% or higher in two consecutive years. Economic crisis resulting from high inflation are associated with a loss in the control of fiscal and monetary policies, but a regain in the policy control can occur at the end of the crisis. Hence the disinflation immediately after an inflation crisis is taken to be associated with the stabilization policies carried out by the government and serves as a proxy for stabilization policies.

The economic reform variable (*Econ_lib*), taken from Sachs and Warner (1995) and Wacziarg and Welch (2003), is indicated by an index which classifies countries as "open" or "closed" based on a comprehensive set of benchmarks that include black market exchange rate premium, presence of tariffs or non-tariff barriers to trade, presence of export marketing boards and whether a country is socialist. This variable takes the value of 1 during the first five years of a transition towards openness.

[5] All non-OECD countries are classified as developing countries. Korea Republic, Mexico, Poland and Hungary are included as developing countries because they had only entered the OECD in the 1990s, and t they are not OECD countries for the majority of the period under study.

HPR used the term of trade variable (*Tot_thresh*) as a proxy for external shock that captures favorable external circumstances, and specified that the term of trade variable takes the value of 1 whenever the change from year t to t-4 is in the upper 10 percent of the entire sample. The dataset in Easterly *et al*. (1993) provided the term of trade for a large number of countries. Another economic variable used in HPR is financial liberalization. The dummy, *Finance*, takes the value 1 for the first five years of a financial liberalization. Bekaert *et al*. (2001) provides a dataset listing all the timing and dates of financial liberalization based on a variety of qualitative information such as changing of investment tax code in favor of foreign investment or allowing foreign residents to buy local securities. For many developed countries, the timing of financial liberalization is censored at 1980. Another dummy variable, *Finlib_dev*, is also entered to allow countries with censored values to have a different effect for *Finance*. As explained in HPR, a value of 1 is entered for the first 5 years of financial liberalization. If it refers to a developing country, then another dummy variable, *Finlib_dev*, also takes a value of 1 for those 5 years. This dummy variable is to test if there is a different effect of financial liberalization on growth for developing and developed countries.

Political stability variables:

Political stability is measured by three sets of variables including leader qualities, peace and political regimes. Firstly, leadership as a causative force of growth is used. The two variables of *Leader_death* and *Tenure* are taken from HPR. The additional variable of *Leader_change* is added to proxy for a change in leader qualities brought about by an incoming leader. It takes the value of 1 during the first five years of an incumbent leader, and 0 otherwise. Data in Lentz (1994) and the Zarate Political Collections (Zarate, 2003) are used to compile the *Leader_change* for the 120 countries in the sample period of 1950-2004 (see Appendix). In order to eliminate the transitory nature of many leadership regimes which had only a short tenure and did not have sufficient time to exert their impact on the economy, we include only leaders with at least 5-year tenure.

In measuring peace, two additional variables are added to proxy for the end of international war and civil war separately. *Peace* is a dummy variable that takes the value of 1 during the first five years of attainment of peace within a country (implying the end of all wars, instead of one particular type of war), and 0 otherwise. The variable is computed using the State Failure Problem Set from the Political Instability Task Force

(PITF) (Monty *et al*., 2008) and the datasets on war by the Correlates of War (COW) (Sarkees, 2000). The PITF dataset classifies instances of armed conflicts into 4 categories: adverse regime change, ethnic war, revolutionary war, and genocide/politicide. The COW dataset classifies war into 3 categories: inter-state war, intra-state war, and extra-state war (war between states and non-state actors). The PITF dataset is more suitable for our study because the COW dataset has a more stringent definition of war (at least 1,000 battle-related deaths per year) while the PITF dataset has a more relaxed definition of armed conflicts (at least 100 battle-related deaths per year), allowing it to include more episodes of violence than the COW dataset. Furthermore, the PITF dataset only includes episodes of internal wars and failures of governance and does not include international wars like the COW dataset. Hence PITF directly provides measures that could lead to a compromise of peace *within* a country. In some cases, countries may engage in international war with another country, but still remain largely peaceful within the local domains. We agree with HPR that the direction of causation runs from peace to economic growth.

The variables *Regime_change*, *Aut_change* and *Dem_change* (the latter two are shown as *Neg_change* and *Pos_change* in HPR, respectively) follow the definitions in HPR. However, one particular difficulty is the different measurements and definitions of political regimes employed in each dataset. A dataset measuring the degree of political freedom inevitably contains a certain level of subjective measurement and discretion in defining the proxy variables for democracy. We use three datasets of political regimes to assess the sensitivity of results. The Polyarchy dataset from Vanhanen (2000) is used as baseline data, while the Polity IV (Marshall and Jaggers, 2002) dataset and the Przeworski *et al*. (2000) dataset are used as robustness checks.[6]

All three datasets define a political regime in terms of the broad concepts of political competition and participation. The main difference among the three datasets is that while the Vanhanen (2000) and Przeworski *et al*. (2000) datasets classify countries either as democracies or autocracies/dictatorships, the Polity IV dataset generates scores for countries on a continuous scale ranging from most autocratic (-10) to most democratic (10). A regime change in our study is defined by a 6-point change, but the implication is less clear as a change towards democracy takes place. For example, it could be a change from a mild autocracy to a weak democracy or from a weak democracy to a strong

[6] The Polity IV dataset is the only dataset used in HPR to study the effect of political regime changes.

democracy. The two other datasets, on the other hand, place relatively high thresholds for a democracy so that if a shift in regime is recorded, it is very likely that there is a substantial change in the content of the political regimes. Hence the two datasets of Vanhanen (2000) and Przeworski *et al*. (2000) are preferred, and since Vanhanen (2000) covers a longer period, it is used as the baseline dataset.

IV Econometric Analysis

The discrete (or limited) dependent variables models are used to predict the timing of growth accelerations. The baseline regression model takes the form:[7]

$$Episode_{i,t} = \beta_0 + \beta_1 Econ\_lib_{i,t} + \beta_2 Post\_inf_{i,t} + \beta_3 Leader\_change_{i,t} + \beta_4 Peace_{i,t} + \beta_5 Regime\_change_{i,t} + \varepsilon_{i,t}. \quad (4)$$

The dependent variable is a dummy that takes the value of 1 around the year of the onset of growth acceleration, namely *i=t-1, t, t+1*, and 0 otherwise. The comparison group consists of countries that have not had a growth episode in that same year, so the sample consists of all countries for which relevant data are available, including countries that have not experienced growth episodes. Data pertaining to years at *t+2* to *t+7* of an episode are dropped since growth episodes could not have initiated in those years.[8]

With regard to model specification, modifications are made to the unrestricted probit model used in HPR. Firstly, the conditional fixed effects logit (CFEL) model (Chamberlain, 1980) is tested against the unrestricted logit model using the Hausman (1978) test to find out if there are significant unobserved country fixed effects in the model. The null-hypothesis of no country specific effects is never rejected for various forms of the baseline model being tested even at the 10% level,[9] therefore the unrestricted logit model should be used since it is efficient and consistent under H_0 while the CFEL model is consistent but inefficient under H_0 as it does not utilize the full set of data.

Secondly, the F-tests are carried out to find out if the full set of year dummies (which have been included in the HPR study) are significant. The year dummies are never jointly significant at the 1% level, and though some are significant at the 5% or

[7] To address the concern of correlation among the political and policy variables, a simple correlation analysis involving all the explanatory variables has been carried out. Results do not show high correlations among the variables, with the highest correlation between political regime change and peace at only 0.29, hence the multicollinearity issue should not be too serious here. Results are available upon request.
[8] Data for years in which a growth episode is not initiated anywhere around the world should also be dropped, but since the years *t-1, t* and *t+1* span the entire sample 1957-1997, this adjustment can be ignored.
[9] This can be seen from the computer p-values of the Hausman tests, not included in the text.

10% level, the regression results are very similar when compared to the regressions run without time dummies. Hence the unrestricted logit model without time or country effects is chosen as the baseline model. A total of five different econometric models are used to check the robustness of the results to various model specifications.

V Empirical Findings

Table 3 shows the regression results for the full set of episodes. With regard to the performance of the macroeconomic variables, results in Table 3 shows that *Econ_lib* is never significant in all but two equations, where it enters with the wrong sign. *Post_inf* is positive and marginally significant at 10% in three of the equations. Financial liberalization (*Finance*) is positive and highly significant to growth accelerations after the *Finlib_dev* variable is added to allow a different effect for countries whose financial liberalization occurred before 1980. Favorable external conditions also have some leverage in predicting growth accelerations, as the terms of trade (*Tot_thresh*) is positive and significant in Column 7 of Table 3.

The result on economic reform indicated by *Econ_lib* is puzzling, as it never turns up to be a significant factor of rapid growth in all the equations. There are some plausible explanations of such a result; for example, the 5-year window period for economic reforms to have an effect on the economy might be too short. Further explanations are shown when the episodes are separated into sustained and unsustained episodes. Both *Finance* and *Tot_thresh* are significantly related to rapid growth, a result which is similar to that in HPR.

The results on the political variables fall largely within expectations. The results show that *Regime_change* is positive and highly significant in all regressions, and further investigation indicates that a regime change towards autocracy is positive and highly significant in predicting growth accelerations. The idea that an autocratic change might be more conducive for growth than democratic change has been found in many previous empirical findings. Przeworski and Limongi (1993) suggest possible reasons that an autocratic regime encourages long-term investments and that it insulates the government from particularistic pressures.

Peace is positive and highly significant in almost all regressions, indicating that growth accelerations are accompanied by periods of peace within countries. The result on peace is different from that in HPR in that it has a very strong positive effect on rapid

growth. *Leader_change* is also positive and significant in most regressions, indicating that leader qualities have some predictive powers over the occurrence of growth accelerations. *Leader_death* is not significantly related to the occurrence of growth accelerations, but *Tenure_death* is positive and significantly related to growth accelerations. Results in Column 4 suggest that a leader's death would have a positive effect on growth accelerations when his tenure starts to exceed 13 years. The results lend support to the theory that autonomous rulers, especially those with a long tenure, are predatory in nature and a source of inefficiency to the economy (North, 1990). Leader shake-ups in countries are also a contributing factor to rapid growth, which confirms casual observations of many countries' growth experiences in the past.

The first four columns of Table 4 show that regime changes are tested with two alternative datasets, the Polity IV dataset and the Przeworski *et al*. (2000) dataset. Results from the Polity IV dataset show that the regime variables are not significant, though the sign on *Aut_change* still remains positive. Results from the Przeworski dataset show that *Regime_change* is positive and significant at 10%, and *Aut_change* is positive and significant at 5%. This seems to support the earlier argument that autocratic regimes are more pro-growth than democratic regimes. *Peace* remains highly significant throughout these regressions.

In the last four columns of Table 4, the different components of armed conflicts and wars that make up the *Peace* variable are investigated in greater detail. The PITF dataset is used as the baseline dataset while the COW datasets on war are used as a robustness check on the *Peace* variable. In Column 6, *Reg, Rev, Eth* and *Gen* (representing adverse regime changes, revolutionary wars, ethnic wars and genocide/ politicide, respectively) are dummy variables for the first five years of the end of the respective events. The first three variables enter with the correct sign but only ethnic wars are significant. The last variable for genocides enters with the wrong sign and is significant. This seemingly irregular result is possibly due to the small number of episodes of genocides making the estimation unreliable. In Column 7, *Peace* is calculated using the COW dataset. The variable is positive and just insignificant at the 10% level. *Extra_state* has to be dropped because it predicts failure perfectly. Both *Inter_state* and *Intra_state* are not significantly different from zero. This is possibly due to the infrequent nature of their occurrences making inference difficult. *Regime_change* and

Leader_change remain significant in all regressions while *Post_inf* is marginally significant in 3 of the 4 equations tested.

The results of Table 3 and Table 4 suggest that political determinants are stronger predictors of growth than economic policies. While monetary stabilization has some leverage in predicting growth accelerations, in none of the equations do economic reforms show up as a positive and significant predictor of growth. On the other hand, the three types of political conditions, namely leader qualities, political regime changes and peace, all seem to have varying degrees of predictive powers over growth accelerations. *Leader_change* is significant at least at the 10% level in most equations; *Regime_change* is significant in two out of three datasets and *Aut_change* is positive and significant in the two datasets; and finally *Peace* is positive and significant at 1% and 5% level in almost all specifications for the baseline dataset. Results from an alternative dataset for *Peace* also show the correct sign and is just insignificant at the 10% level.

As for other determinants, both *Finance* and *Tot_thresh* significantly increase the probability of growth accelerations, similar to the conclusion drawn in HPR. Overall, the results tend to suggest that across all episodes of growth accelerations, political determinants, especially regime changes and peace, are much more powerful predictors of growth episodes than economic policy determinants.

Sustained and unsustained episodes

Tables 5 and 6 show the regression results for sustained and unsustained episodes respectively. *Post_inf* is dropped in Table 5 and *Econ_lib* is dropped in Table 6 because both are perfect predictors of failures in the respective groups.[10] Comparing across the results for sustained and unsustained episodes reveal a number of striking differences. Firstly, *Econ_lib* turns up positive and significant in all but one equation for sustained episodes, while *Econ_lib* obviously is never associated positively with unsustained episodes. In fact, if the variable is left to stay in the equation, it would show up as a highly negative value in all the equations in Table 6. This result partially explains the puzzling result found in Table 4, where economic reforms are never significantly related

[10] Some econometric software like Stata automatically drops variables that are perfect predictors of success or failure. This is to increase the numerical stability of the optimization process. In those cases, the effective coefficient on the dropped variables is infinity (negative infinity) for variables that completely determine a success (failure). Dropping the variable and perfectly predicted observations has no effect on the likelihood of the remaining coefficients.

to rapid growth for the full set of episodes that includes both sustained and unsustained episodes. However, if sustained episodes are identified and tested, economic reforms become positive and significant. This suggests that economic reforms have a very different effect for the two types of episodes, and that if sustained growth is the ultimate goal, economic reform *is* indeed an important ingredient. This finding shows that attempts by governments to liberalize their economies are not necessarily futile.

Secondly, while *Post_inf* is never associated positively with sustained episodes, it turns up positive and significant in half of the equations for unsustained episodes. This finding suggests that a recovery from inflation crisis could only give the country a temporary boost to its economy and would do little in securing long-term improvement of the economy, but recovering from inflation crises and regaining monetary stabilization is more likely to produce unsustained episodes, while comprehensive economic reform is needed to produce sustained episodes. For the other variables, *Finance* is positive and significant in both cases after *Finlib_dev* is added to allow for a different effect for censored values. *Tot_thresh* is positive and highly significant for unsustained episodes but not significant for sustained episodes. The result on terms of trade shocks is interesting because it refutes the argument from some scholars that countries achieved rapid growth because of pure luck (Easterly *et al.*, 1993). While short-term growth could be attributed to favorable external conditions such as terms of trade shocks, results here suggest that they are related to growth that could not last and more fundamental reforms and other favorable internal conditions need to be in place to initiate growth that could last in the longer run.

Besides the policy determinants, the political determinants also show striking differences between the two types of episodes. While *Peace* is positive and highly significant for sustained episodes, it is never significant for unsustained episodes. It is positive and always significant at the 1% level for sustained episodes, even when an alternative dataset is used, whereas it is never significantly different from zero for unsustained episodes, and when an alternative dataset is used, this variable has the wrong sign and is significant. This result reveals a crucial difference between a sustained and unsustained acceleration. While the onset of peace is a crucial element of sustained growth, it is not related to unsustained growth. Hence peace is very important for countries trying to secure long-run growth.

With respect to political regimes, there are also huge differences between the two groups of episodes. While *Regime_change* is never significant for sustained episodes and has a negative sign, it is positive and highly significant for unsustained episodes. For sustained episodes, the coefficients for *Regime_change* and both *Dem_change* and *Aut_change* always show up negative for all three datasets, but is only significant when using the Przewroski *et al*. (2000) dataset. Using that dataset, both *Regime_change* and *Aut_change* show up as negative and significant. On the other hand, for unsustained episodes, the coefficients for *Regime_change*, and *Aut_change* are always positive and significant at the 1% level for two of the three datasets used. *Dem_change* enters as negative and marginally significant at 10% in one of the datasets used. These results tend to suggest that while sustained episodes are supported by relative stability in the countries' regimes, unsustained episodes are more likely to happen after an autocratic regime has been in place. This finding on political regime change is quite different from that found in HPR which shows that while sustained growth is more likely to be accompanied by democratic change, unsustained growth is more likely to be accompanied by autocratic change. Results here suggest that *any* kind of political regime change, democratic or autocratic, is not conducive for sustained accelerations, which implies that regime stability provides a more conducive environment for sustained growth. For unsustained accelerations, the findings are similar to HPR that an autocratic change increases the likelihood of such accelerations.

Another political determinant, *Leader_change*, also shows differences between the two types of episodes. While *Leader_change* is positive and always significant at the 1% level for sustained episodes, it is never significant and turns up with a negative sign for unsustained episodes. Hence sustained episodes are more likely to happen after a leader change while there is no obvious effect for unsustained episodes. This result implies that strong leadership is a crucial factor in achieving sustained growth.

Separating all growth episodes into sustained and unsustained episodes provides many interesting differences. In short, sustained episodes are more likely to happen in periods of peace and political regime stability, after a new leader has taken office, and after economic reforms and financial liberalization have been carried out. On the other hand, unsustained episodes are more likely to happen after an inflation crisis, a switch towards autocracy, financial liberalization and in an environment of favorable terms of trade. This suggests that in order to achieve sustained growth, governments need to

improve the internal conditions of the country, like achieving political stability and peace, and carry out painstaking reforms in the economy (Li and Zhou, 2010). Such a process is usually slow and gradual and requires persistent effort from the government. On the other hand, unsustained accelerations tend to be triggered by more temporary factors like stabilization after an inflation crisis and terms of trade shocks. These factors could only provide a short-term boost to the economy and if governments were to attempt to transform their growth into a long-term one, they might still have to introduce more permanent changes to the politics and policies of their economy.

Developing countries

Table 7 shows the regression results for episodes in developing countries only. Episodes in these countries are harder to predict as indicated by the lower pseudo-R-squared and fewer significant variables in the equations. As far as the macroeconomics variables are concerned, *Finance* and *Tot_thresh* are all positive and significant predictors of growth episodes, similar to the results obtained for the full sample of countries. *Econ_lib* remains an insignificant predictor of growth. However, *Post_inf* and *Leader_change* are now never significant in all the equations for developing countries. Among the political variables, *Regime_change* is still a positive and significant predictor of growth accelerations. *Aut_change* is positive and highly significant regardless of which dataset is used. *Peace* is now only significant in four of the eleven equations tested. *Leader_death* is negative and significant to growth while *Tenure_death* is positive and significant to growth, confirming the earlier results that the longer the tenure of the dying ruler, the more positive effect his death would bring to the country's growth. These findings indicate that political factors have a much greater effect than policy factors in developing countries, which are not too surprising given the fact that the political situations in developing countries are usually much more unstable and unpredictable and normally have great effects on the economy.

Autocracy and democracy

Table 8 disaggregates the episodes into episodes in autocratic regimes and episodes in democratic regimes. The variables that are of most interest are probably those regarding leaders, such as *Leader_change*, *Leader_death* and *Tenure_death*. Interestingly, *Leader_change* is never significant in "autocratic" episodes while it is always highly

significant at the 1% level for "democratic" episodes. They seem to suggest that people in democratic regimes are more likely to choose leaders who would lead them to growth accelerations. Although *Leader_death* is never significant in both cases when it enters the equation alone, some interesting results arise when *Tenure_death* is added into the equation. In the "autocracy" case, leader death has a negative effect on growth but the effect starts to become positive if the tenure of the dying ruler reaches roughly 14 years. This confirms the predatory hypothesis of long-serving rulers in autocratic regimes. However, for the "democracy" case, leader death has a positive effect on growth but the effect turns negative if the tenure of the dying ruler reaches roughly one and a half years. This suggests that the instability brought about by the leader's death after he has settled in office is going to have a negative effect on growth accelerations. These results suggest that there are different mechanisms behind the effect of a leader's death in a democratic and an autocratic regime. In an autocratic regime, the death of a long-serving ruler is actually beneficial to the economy whereas in a democratic regime, a leader's death is almost always detrimental to the economy.

In a nutshell, both peace and a shift towards an autocratic regime are significant predictors of almost all different types of growth episodes. Leader changes and recovery after an inflation crisis are significant predictors of growth in some cases. Economic liberalization is significant and with the right sign only for sustained episodes. Lastly, both financial liberalization and favorable terms of trade are significant predictors of growth episodes, confirming the earlier results by HPR.

Robustness test

In order to assess the sensitivity of the results to the model specifications used, the variables would be tested on five different econometric models. The models being tested are: 1) logit model with standard errors clustered for each country group and corrected for heteroskedasticity; 2) unrestricted (pooled) probit model with robust errors; 3) logit model with country random effects; 4) logit model corrected for rare occurrence bias as suggested by King and Zeng (2001); and 5) linear probability model with robust errors.

The regression results for each different model are shown in Table 9. Except for the logit model with cluster errors, all the other models display very similar results to the unrestricted logit framework adopted in this article. The results are generally very robust

to the method of estimation used, confirming that the derived results should stand regardless of which model specification is used.

To check the sensitivity of the results to the filter used, a variant of the filter as suggested by Jong-A-Pin and De Haan (2007b) is used and the results for selected equation forms are shown the first four columns in Table 10. Results show that *Econ_lib*, *Post_inf*, *Finance* and *Tot_thresh* are never significant in the equations, but both *Leader_change* and *Peace* are always significant, with *Peace* always significant at the 1% level. *Dem_change* is negative and significant while *Aut_change* is positive and significant. Results are generally robust when the alternative filter is used, with *Leader_change*, *Peace* and *Aut_change* in particular robust to both filters used.

Finally, to check the sensitivity of the results to the dataset used in determining growth episodes, a list of growth episodes determined by the World Development Indicators (WDI) is used. Results are shown in the last four columns of Table 10. *Finance* is positive and significant in both Columns 7 and 8 while *Econ_lib*, *Post_inf*, *Leader_change* and *Tot_thresh* are almost never significant. *Peace* and *Regime_change* are highly significant in almost all equations. As shown in Column 6, *Aut_change* is positive and significant at 1%. Thus when using the WDI to determine growth episodes, *Peace*, *Regime_change*, *Aut_change* and *Finance* still remain robust while the other variables become insignificant.

VI Conclusion

This study extends the HPR study by incorporating additional factors and datasets to study the predictors of growth accelerations. Results are different in some aspects. In general both political conditions and economic policies are significant predictors of such turning points to varying extent. Two conclusions can be drawn from this study.

Political conditions in general are much more powerful than economic policy in predicting growth accelerations, especially in developing countries. All the three determinants of leader changes, political regime changes and transitions to peace are significant predictors of growth accelerations to varying degrees. Both transitions to peace and political regime changes are especially strong predictors of growth accelerations, as they are found to be highly significant in most cases. For regime changes, a shift towards autocracy seems to be more likely to produce growth accelerations. Leader qualities also matter in some cases, as many growth accelerations

are accompanied or preceded by leader changes. The notion that political determinants matter more than economic determinants is particularly strong in developing countries, as growth episodes in these countries are dominated by changes in political regime, leader deaths and peace whilst variables that proxy for economic reforms and monetary stabilization are never significant.

Secondly, the predictors of growth accelerations are very different between sustained and unsustained episodes. While economic reforms, leader changes, political regime stability and peace characterize the start of sustained growth, monetary stabilization, transitions towards autocracy and favorable terms of trade characterize the start of unsustained episodes. It is also worth mentioning that the variable that proxies for economic liberalization is always insignificant in all types of episodes except sustained episodes, where it is found to be consistently positive and significant. Hence while political changes characterize the start of many growth accelerations, it is only when the pursuit of comprehensive economic reforms would a country achieving sustained growth acceleration. It does suggest that if governments are aiming for sustained growth, both favorable political conditions and the right policies have to be achieved.

The results of this study suggest that favorable political conditions are equally, if not more, important than the right policy because political changes characterize most growth accelerations while economic reforms only has an effect on whether the episode can be sustained in the longer run. On the contrary, economic growth might come from continuously implementing gradual economic reforms whilst not dramatically unsettling the political order within the country. The idea that policymakers have to pay close attention to the contingent circumstances of the local economy was forcefully laid out in Rodrik (2005).

There is often a tendency to focus more on economic policy and reform and less on political issues in the academic circle of economic growth. Popular models like the Solow model or endogenous growth models of different variations have always focused on factors like capital and investment and policies to stimulate their growth. However, in many cases, political issues often play a bigger role than economic policy, especially in developing countries. Hence having a stable and conducive political environment for growth might be more pressing than finding the right policy. This article incorporates many different factors into the study of growth accelerations. With the abrupt political turmoil and events unfolding in Egypt and other Middle East countries since early 2011,

this article provides timely lessons on the relevance of stable political performance and the process of initiating sustainable growth accelerations.

Table 1 Growth Accelerations by Decades and Regions

Decades/Regions	Total
1950s Asia: Japan (1958). Africa: Morocco (1958). Europe: Belgium (1958), Denmark (1958), Finland (1958), Ireland (1958), Portugal (1959), Spain (1959). Latin America: Panama (1959), Peru (1959). Others: Israel (1958), New Zealand (1958).	12
1960s Asia: Indonesia (1967), Iran (1966), Korea, Rep. (1967), Malaysia (1969), Pakistan (1961), Singapore (1967), Taiwan (1961), Thailand (1960). Africa: Congo, Rep. (1969), Dominican Rep. (1969), Gabon (1969), Ghana (1966), Nigeria (1968), Syria (1969), Tunisia (1968), Zambia (1963). Americas: Argentina (1963), Brazil (1968), Canada (1961), Colombia (1967), Nicaragua (1960), United States (1961). Others: Israel (1967).	23
1970s Asia: Bhutan (1977), Laos (1979), Pakistan (1978), Philippines (1970). Africa: Algeria (1975), Botswana (1971), Cameroon (1978), Congo, Rep. (1977), Egypt (1975), Lesotho (1975), Malawi (1970), Mali (1973), Mauritius (1970), Niger (1974), Rwanda (1975). Europe: Romania (1970). Latin America: Ecuador (1970), Honduras (1974), Panama (1975), Paraguay (1974), Trinidad & Tobago (1974), Uruguay (1974), Venezuela (1971).	23
1980s Asia: China (1981), Indonesia (1986), Japan (1984), Korea, Rep. (1984), Malaysia (1988), Singapore (1987), Taiwan (1985), Thailand (1986). Africa: Mauritius (1983), Swaziland (1984). Europe: Ireland (1986), Portugal (1985), Spain (1984), U. K. (1983). Latin America: Cuba (1980), Jamaica (1986), Uruguay (1989). Others: Israel (1989), Papua New Guinea (1988).	19
1990s Asia: Bhutan (1994), China (1991), India (1994). Africa: Burkina Faso (1997), Dominican Rep. (1995), Ethiopia (1991), Lesotho (1992), Malawi (1992), Mozambique (1996), Swaziland (1995), Syria (1990), Tanzania (1994). Europe: Finland (1995), Greece (1997), Hungary (1997), Ireland (1994), Norway (1992), Poland (1993). Latin America: Argentina (1990), Chile (1990), Haiti (1991), Trinidad & Tobago (1996)	22
Total: Asia: 24; Africa: 31; Europe: 17; Americas: 22; Others: 5.	99

Table 2 Summary Statistics of Growth Accelerations

	Asia	Africa	Europe	Latin America	Others	All Developed	All Developing
Mean magnitude of acceleration	3.9	5.7	3.4	4.4	2.8	3.1	4.8
Std Dev of magnitude of acceleration	1.7	2.6	1.2	3.0	1.0	1.0	2.6
Mean post-episode growth	3.0	0.6	4.0	0.2	2.7	3.6	1.3
Std Dev of post-episode growth	3.2	3.2	1.5	2.3	3.0	1.9	3.2
No. of sustained episodes	14/20 (70%)	9/22 (40.9%)	11/11 (100%)	5/17 (29.4%)	1/3 (33.3%)	13/15 (86.7%)	27/58 (46.6%)

Table 3 Predicting Growth Accelerations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Macroeconomic variables							
Econ_lib	-0.407	-0.343	-0.376	-0.387	-0.561	-0.677	-0.741
	(1.45)	(1.22)	(1.33)	(1.36)	(1.72)*	(1.98)**	(1.59)
Post_inf	0.595	0.567	0.604	0.641	0.598	0.497	0.473
	(1.68)*	(1.60)	(1.71)*	(1.79)*	(1.41)	(1.11)	(0.82)
Finance					0.276	0.858	1.431
					(0.99)	(2.45)**	(3.39)***
Finlib_dev						-1.619	-2.308
						(2.40)**	(2.79)***
Tot_thresh							0.542
							(2.06)**
Political variables							
Leader_change	0.278	0.305			0.277	0.293	0.512
	(1.85)*	(2.03)**			(1.72)*	(1.81)*	(2.67)***
Peace	0.500	0.378	0.537	0.521	0.668	0.654	0.407
	(2.16)**	(1.49)	(2.35)**	(2.27)**	(2.73)***	(2.59)***	(1.31)
Regime_change	0.502		0.515	0.532	0.555	0.527	0.703
	(2.66)***		(2.77)***	(2.85)***	(2.72)***	(2.55)**	(2.90)***
Dem_change		0.143					
		(0.56)					
Aut_change		0.914					
		(3.56)***					
Leader_death			0.096	-0.615			
			(0.32)	(1.25)			
Tenure_death				0.048			
				(2.59)***			
Observations	2,735	2,735	2,735	2,735	2,290	2,290	1,802
Pseudo R^2	0.02	0.02	0.01	0.02	0.02	0.03	0.05

Notes: The dependent variable is a dummy for the timing of growth accelerations. Estimated by logit with robust standard errors. The absolute value of z statistics in shown in parentheses. Pseudo R^2 is calculated by McFadden's R-squared. *, ** and *** indicate significance at 10%, 5% and 1%, respectively.

Table 4 Predicting Growth Accelerations Using Alternative Datasets

	Regime Change According to				Peace According to			
	Polity IV		Przeworski *et al*.		PITF		COW	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Econ_lib	-0.384	-0.352	-0.320	-0.328	-0.407	-0.351	-0.442	-0.363
	(1.38)	(1.27)	(0.90)	(0.91)	(1.45)	(1.23)	(1.56)	(1.28)
Post-inf	0.594	0.555	0.490	0.463	0.595	0.619	0.624	0.583
	(1.67)*	(1.55)	(1.13)	(1.06)	(1.68)*	(1.69)*	(1.74)*	(1.61)
Leader_change	0.291	0.286	0.207	0.201	0.278	0.292	0.287	0.295
	(1.94)*	(1.90)*	(1.23)	(1.19)	(1.85)*	(1.93)*	(1.93)*	(1.97)**
Peace	0.647	0.510	0.692	0.642	0.500		0.348	
	(2.77)**	(2.14)*	(3.00)***	(2.50)**	(2.16)**		(1.63)	
Regime_ change	0.030		0.406		0.502	0.493	0.595	0.641
	(0.15)		(1.76)*		(2.66)***	(2.53)**	(3.32)***	(3.41)***
Dem_change		-0.179		0.077				
		(0.60)		(0.24)				
Aut_change		0.296		0.716				
		(1.14)		(2.50)**				
Reg						0.265		
						(1.01)		
Rev						0.358		
						(1.03)		
Eth						0.779		
						(2.25)**		
Gen						-0.949		
						(1.89)*		
Inter_state								0.414
								(1.48)
Intra_state								-0.004
								(0.02)
Observations	2,735	2,735	2,384	2,384	2,735	2,735	2,735	2,700
Pseudo R^2	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01

Notes: *Extra_state* is dropped because it is a perfect predictor of failure. Associated observations that are perfectly predicted are also dropped.

Table 5 Predicting Growth Accelerations: Sustained Episodes Only

								Regime change according to Polity IV		Regime change according to Przeworski *et al*.		Peace according to COW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Econ_lib	0.778	0.790	0.938	0.974	0.864	0.810	0.651	0.774	0.773	0.770	0.789	0.714
	(1.79)*	(1.81)*	(2.13)**	(2.20)**	(1.94)*	(1.76)*	(0.93)	(1.76)*	(1.76)*	(1.78)*	(1.82)*	(1.56)
Finance					0.580	1.993	2.249					
					(1.25)	(2.32)**	(2.53)**					
Finlib_dev						-1.821	-2.341					
						(1.84)*	(2.18)**					
Tot_thresh							-1.593					
							(1.58)					
Leader_change	0.907	0.905			1.009	0.993	1.108	0.918	0.918	0.993	1.001	0.923
	(3.60)***	(3.61)***			(3.60)***	(3.51)***	(3.17)***	(3.67)***	(3.65)***	(3.87)***	(3.89)***	(3.67)***
Peace	1.157	1.183	1.217	1.175	1.448	1.467	1.489	1.309	1.305	1.355	1.389	1.145
	(3.43)***	(3.35)***	(3.73)***	(3.56)***	(3.88)***	(3.87)***	(3.29)***	(3.55)***	(3.49)***	(4.51)***	(4.54)***	(3.78)***
Regime_change	-0.298		-0.192	-0.156	-0.265	-0.272	-0.006	-0.394		-0.949		-0.040
	(0.80)		(0.55)	(0.44)	(0.65)	(0.67)	(0.01)	(1.07)		(2.31)**		(0.12)
Dem_change		-0.158							-0.406		-0.583	
		(0.34)							(0.67)		(1.06)	
Aut_change		-0.421							-0.385		-1.251	
		(0.80)							(0.92)		(2.06)**	
Leader_death			0.577	-1.204								
			(1.39)	(1.35)								
Tenure_death				0.088								
				(3.60)***								
Observations	2,134	2,134	2,134	2,134	1,827	1,827	1,427	2,134	2,134	2,136	2,136	2,134
Pseudo R^2	0.05	0.05	0.03	0.05	0.07	0.07	0.10	0.05	0.05	0.05	0.05	0.05

Notes: Post_inf is dropped because it is a perfect predictor of failure. Associated observations that are perfectly predicted are also dropped.

Table 6 Predicting Growth Accelerations: Unsustained Episodes Only

								Regime change according to Polity IV		Regime change according to Przeworski *et al*.		Peace according to COW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post_inf	0.991	0.856	0.956	0.905	1.078	1.084	1.046	1.098	0.908	0.857	0.751	0.898
	(1.70)*	(1.43)	(1.64)*	(1.57)	(1.81)*	(1.82)*	(1.75)*	(1.88)*	(1.51)	(1.45)	(1.24)	(1.49)
Finance					-0.144	2.737	3.651					
					(0.24)	(3.62)***	(4.18)***					
Finlib_dev						-	-					
						-	-					
Tot_thresh							0.941					
							(2.90)***					
Leader_change	-0.326	-0.256			-0.287	-0.349	-0.153	-0.304	-0.328	-0.441	-0.432	-0.290
	(1.27)	(0.99)			(1.13)	(1.34)	(0.50)	(1.21)	(1.31)	(1.63)	(1.58)	(1.17)
Peace	0.226	-0.012	0.175	0.191	0.236	0.253	-0.265	0.691	0.260	0.292	0.115	-2.288
	(0.64)	(0.03)	(0.50)	(0.54)	(0.66)	(0.70)	(0.59)	(2.05)**	(0.62)	(0.86)	(0.30)	(2.29)**
Regime_change	1.009		1.009	0.995	0.948	0.957	1.275	-0.143		1.020		1.141
	(3.86)***		(3.81)***	(3.72)***	(3.50)***	(3.51)***	(4.06)***	(0.46)		(3.44)***		(4.73)***
Dem_change		0.205							-1.681		0.075	
		(0.46)							(1.65)*		(0.14)	
Aut_change		1.554							0.552		1.624	
		(4.87)***							(1.34)		(4.57)***	
Leader_death			0.062	0.499								
			(0.14)	(1.05)								
Tenure_death				-0.063								
				(2.31)**								
Observations	2,062	2,062	2,062	2,062	1,741	1,656	1,283	2,062	2,062	2,064	2,064	2,062
Pseudo R^2	0.03	0.04	0.03	0.03	0.03	0.04	0.08	0.01	0.02	0.03	0.04	0.05

Notes: Econ_lib is dropped because it is a perfect predictor of failure. Finlib_dev is dropped in Column (7) because it is a perfect predictor of failure. Associated observations that are perfectly predicted are also dropped.

Table 7 Predicting Growth Accelerations: Developing Countries Only

							Regime change according to Polity IV		Regime change according to Przeworski *et al*.		Peace according to COW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Econ_lib	-0.402	-0.317	-0.390	-0.411	-0.633	-0.772	-0.384	-0.337	-0.312	-0.320	-0.425
	(1.32)	(1.04)	(1.26)	(1.32)	(1.71)	(1.53)	(1.27)	(1.11)	(0.75)	(0.77)	(1.39)
Post_inf	0.140	0.105	0.142	0.188	-0.044	-0.453	0.120	0.058	-0.261	-0.300	0.162
	(0.33)	(0.25)	(0.34)	(0.44)	(0.08)	(0.60)	(0.29)	(0.14)	(0.44)	(0.52)	(0.38)
Finance					0.508	1.110					
					(1.30)	(2.35)**					
Tot_thresh						0.509					
						(1.92)*					
Leader_change	0.103	0.142			0.087	0.263	0.112	0.103	0.031	0.024	0.115
	(0.62)	(0.86)			(0.48)	(1.19)	(0.68)	(0.62)	(0.17)	(0.13)	(0.70)
Peace	0.360	0.219	0.373	0.346	0.510	0.305	0.423	0.220	0.499	0.426	0.193
	(1.53)	(0.396)	(1.58)	(1.46)	(2.04)**	(1.01)	(1.83)*	(0.95)	(2.10)**	(1.67)*	(0.81)
Regime_change	0.409		0.417	0.461	0.439	0.622	0.104		0.460		0.469
	(2.14)**		(2.20)**	(2.42)**	(2.13)**	(2.63)***	(0.54)		(2.00)**		(2.51)**
Dem_change		-0.061						-0.174		0.101	
		(0.22)						(0.59)		(0.31)	
Aut_change		0.887						0.475		0.796	
		(3.56)***						(1.98)**		(2.63)***	
Leader_death			0.009	-0.975							
			(0.03)	(1.76)*							
Tenure_death				0.063							
				(3.22)***							
Observations	2,181	2,181	2,181	2,181	1,736	1,336	2,181	2,062	1,902	1,902	2,181
Pseudo R^2	0.01	0.02	0.01	0.02	0.02	0.03	0.01	0.01	0.01	0.01	0.01

Notes: Same as Table 3.

Table 8 Predicting Growth Accelerations: Comparison of Episodes in Autocracies and in Democracies

	Episodes in Autocracies					Episodes in Democracies				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Econ_lib	-0.700	-0.684	-0.695	-0.751	-	-0.519	-0.616	-0.419	-0.395	-0.959
	(1.14)	(1.11)	(1.13)	(1.21)	-	(1.42)	(1.45)	(1.16)	(1.08)	(1.54)
Post_inf	-0.164	-0.169	-0.174	-0.091	0.256	1.611	1.761	1.564	1.553	2.409
	(0.28)	(0.29)	(0.30)	(0.15)	(0.37)	(3.14)***	(3.32)***	(3.07)***	(3.04)***	(2.95)***
Finance					-0.390					2.593
					(0.36)					(5.29)
Finlib_dev					-					-3.232
					-					(4.50)***
Tot_thresh					0.346					0.821
					(1.09)					(1.62)
Leader_change	0.003	0.008			0.142	0.754	0.898			1.206
	(0.02)	(0.04)			(0.52)	(3.04)***	(3.52)***			(3.73)***
Peace	0.454	0.436	0.466	0.441	0.258	0.989	1.282	1.038	1.033	1.820
	(1.79)*	(1.65)*	(1.85)*	(1.73)*	(0.81)	(1.74)*	(2.27)**	(1.84)*	(1.83)*	(2.28)**
Regime_change	0.466		0.462	0.513	0.794	0.691		0.701	0.719	1.099
	(2.09)**		(2.08)**	(2.28)**	(2.93)***	(2.04)**		(2.14)**	(2.19)**	(2.54)**
Dem_change		0.394					-0.233			
		(1.26)					(0.49)			
Aut_change		0.527					2.990			
		(1.83)*					(5.58)***			
Leader_death			0.277	-0.787				-0.262	1.039	
			(0.79)	(1.25)				(0.43)	(1.38)	
Tenure_death				0.058					-0.611	
				(2.85)***					(2.51)**	
Observations	1,665	1,665	1,665	1,665	952	1,070	1,070	1,070	1,070	807
Pseudo R^2	0.01	0.01	0.01	0.02	0.03	0.05	0.09	0.03	0.03	0.15

Notes:. Econ_lib and Finlib_dev are dropped in Column (5) because they are perfect predictors of failure. Associated observations which are perfectly predicted are also dropped.

Table 9 Predicting Growth Accelerations: Robustness to Five Different Model Specifications

	Cluster logit				Probit				Random effects logit			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Econ_lib	-0.407	-0.343	-0.677	-0.741	-0.208	-0.176	-0.328	-0.336	-0.536	-0.446	-0.787	-1.055
	(1.09)	(0.93)	(1.49)	(1.16)	(1.55)	(1.32)	(2.06)**	(1.58)	(1.61)	(1.33)	(2.13)**	(2.17)**
Post_inf	0.595	0.567	0.497	0.473	0.299	0.285	0.276	0.274	0.975	0.949	0.733	0.799
	(1.06)	(1.02)	(0.67)	(0.49)	(1.58)	(1.50)	(1.17)	(0.96)	(2.14)**	(2.06)**	(1.44)	(1.23)
Finance			0.858	1.431			0.444	0.744			1.132	2.185
			(1.56)	(2.20)**			(2.45)**	(3.36)***			(3.05)***	(4.49)***
Finlib_dev			-1.619	-2.308			-0.845	-1.174			-1.795	-2.889
			(1.44)	(1.92)*			(2.78)***	(3.23)***			(2.38)**	(3.00)***
Tot_thresh				0.542				0.275				0.738
				(1.52)				(1.99)**				(2.33)**
Leader_change	0.278	0.305	0.293	0.512	0.147	0.160	0.154	0.270	0.407	0.474	0.461	0.846
	(1.19)	(1.29)	(1.15)	(1.67)*	(2.00)**	(2.16)**	(1.94)*	(2.92)***	(2.33)**	(2.68)***	(2.46)**	(3.54)***
Peace	0.500	0.378	0.654	0.407	0.258	0.206	0.359	0.217	0.361	0.166	0.702	0.662
	(1.35)	(0.92)	(1.65)*	(0.85)	(2.13)**	(1.61)	(2.74)***	(1.37)	(1.33)	(0.58)	(2.45)**	(1.73)*
Regime_change	0.502		0.527	0.703	0.258		0.277	0.372	0.595		0.677	1.192
	(1.80)*		(1.74)*	(1.85)*	(2.70)***		(2.67)***	(3.06)***	(2.55)**		(2.75)***	(3.63)***
Dem_change		0.143				0.068				0.100		
		(0.41)				(0.54)				(0.34)		
Aut_change		0.914				0.483				1.281		
		(2.24)**				(3.60)***				(4.16)***		
Observations	2,735	2,735	2,290	1,802	2,735	2,735	2,290	1,802	2,735	2,735	2,290	1,802
Pseudo R^2	0.02	0.02	0.03	0.05	0.02	0.02	0.03	0.05	-	-	-	-

Notes: Cluster logit is a logit regression with standard errors clustered for each country group and corrected for heteroskedasticity.
Probit is a pooled (unrestricted) probit regression with robust standard errors. Random effects logit is a logit regression with random country effects. Rare events logit is a logit model corrected for rare occurrence bias with robust standard errors. Linear probability model is a linear regression with robust standard errors.

Table 9 continued

	Rare Events logit				Linear Probability Model			
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Econ_lib	-0.375	-0.311	-0.631	-0.665	-0.025	-0.021	-0.044	-0.046
	(1.34)	(1.11)	(1.86)*	(1.44)	(1.67)*	(1.36)	(2.51)**	(2.04)
Post_inf	0.635	0.607	0.545	0.535	0.048	0.046	0.045	0.048
	(1.79)*	(1.71)*	(1.22)	(0.93)	(1.36)	(1.30)	(0.98)	(0.92)
Finance			0.878	1.438			0.081	0.146
			(2.52)**	(3.43)***			(2.01)**	(2.51)**
Finlib_dev			-1.483	-2.080			-0.119	-0.180
			(2.21)**	(2.52)**			(2.63)***	(2.92)***
Tot_thresh				0.557				0.039
				(2.12)**				(1.67)*
Leader_change	0.279	0.305	0.293	0.509	0.019	0.021	0.021	0.033
	(1.86)*	(2.03)**	(1.81)*	(2.67)***	(1.81)*	(1.97)**	(1.80)*	(2.54)**
Peace	0.510	0.388	0.662	0.425	0.046	0.035	0.067	0.039
	(2.21)**	(1.54)	(2.64)***	(1.38)	(1.94)*	(1.44)	(2.32)**	(1.29)
Regime_change	0.507		0.530	0.702	0.041		0.047	0.058
	(2.69)***		(2.58)**	(2.91)***	(2.41)**		(2.39)**	(2.64)***
Dem_change		0.164				0.009		
		(0.64)				(0.51)		
Aut_change		0.922				0.092		
		(3.60)***				(2.93)***		
Observations	2,735	2,735	2,290	1,802	2,735	2,735	2,290	1,802
Pseudo R^2	-	-	-	-	0.01	0.01	0.02	0.03

Table 10 Predicting Growth Accelerations Using Alternative Filter and Dataset

	Alternative Filter for Growth Episodes				Alternative Dataset to Identify Growth Episodes			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Econ_lib	0.088	0.202	-0.078	0.048	-0.086	-0.042	-0.684	-0.896
	(0.30)	(0.69)	(0.24)	(0.13)	(0.28)	(0.14)	(1.61)	(1.72)*
Post_inf	0.208	0.167	0.153	0.307	0.417	0.377	0.317	0.527
	(0.041)	(0.33)	(0.27)	(0.51)	(0.86)	(0.077)	(0.55)	(0.87)
Finance			-0.290	0.030			0.881	1.019
			(0.53)	(0.05)			(1.96)**	(2.21)**
Finlib_dev			-0.309	-0.518			-2.511	-2.501
			(0.39)	(0.63)			(2.27)**	(2.26)**
Tot_thresh				0.228				0.198
				(0.79)				(0.72)
Leader_change	0.308	0.353	0.436	0.514	0.146	0.169	0.202	0.214
	(1.83)*	(2.10)**	(2.48)**	(2.66)***	(0.86)	(0.99)	(1.08)	(1.05)
Peace	0.982	0.770	0.952	0.763	0.939	0.842	1.011	0.488
	(4.15)***	(2.82)***	(3.7)***	(2.61)***	(4.12)***	(3.38)***	(4.10)***	(1.77)*
Regime_change	0.135		0.211	0.320	0.701		0.609	0.802
	(0.060)		(0.90)	(1.28)	(3.55)***		(2.83)***	(3.67)***
Dem_change		-0.879				0.412		
		(2.06)**				(1.52)		
Aut_change		0.841				0.990		
		(2.90)***				(3.75)***		
Observations	2,652	2,652	2,257	1,842	2,562	2,562	2,187	1,858
Pseudo R^2	0.02	0.03	0.02	0.02	0.03	0.04	0.05	0.04

Notes: Same as Table 4. The filter in Jong-A-Pin and De Haan (2007b) is used as the alternative filter in Columns (1) to (4). The World Development Indicator is used as the alternative dataset in Columns (5) to (8).

Appendix

Country list: Afghanistan, Algeria, Angola, Argentina, Australia, Austria, Bangladesh, Belgium, Benin, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo Democratic Republic, Congo Republic, Costa Rica, Cote d'Ivoire, Cuba, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Korea Democratic Republic, Korea Republic, Kuwait, Laos, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papa New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Somalia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Syria, Taiwan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Zambia, Zimbabwe.

Growth Accelerations: 99 Episodes

Country /Starting year/Growth before/Growth during/Difference
Algeria/1975/0.4/3.6/3.2. Argentina/1963/0.8/3.5/2.7; 1990/-2.2/4.2/1.7.
Belgium/1958/2.4/4.5/2.1. Bhutan/1977/3.2/7.9/4.7; 1994/1.0/4.4/3.4.
Botswana/1971/4.3/10.1/5.8. Brazil/1968/2.6/6.8/4.2. Burkina Faso/1997/-0.3/3.8/4.1.
Cameroon/1978/1.3/8.2/6.9. Canada/1961/1.0/3.7/2.7. Chile/1990/3.8/6.4/2.6.
China/1981/5.2/9.2/4.0; 1991/7.3/9.7/2.4. Colombia/1967/1.5/3.8/2.3. Congo
Rep/1969/1.5/3.6/2.1; 1977/2.9/10.4/7.5. Cuba/1980/5.0/9.4/4.4. Denmark/1958/2.2/5.1/2.9.
Domin. Rep/1969/-0.9/4.8/5.7; 1995/2.5/5.1/2.6. Ecuador/1970/1.3/8.5/7/2.
Egypt/1975/0.3/4.8/4.5. Ethiopia/1991/-0.5/5.0/5.5. Finland/1958/2.8/5.0/2.2; 1995/-2.1/3.9/6.0.
Gabon/1969/6.7/9.7/3.0. Ghana/1966/1.8/11.0/9.2. Greece/1997/0.5/3.7/3.2.
Haiti/1991/-1.1/15.5/16.6. Honduras/1974/1.3/3.5/2.2. Hungary/1997/0.5/4.5/4.0.
India/1994/1.8/4.7/2.9. Indonesia/1967/-0.9/7.9/8.8; 1986/1.7/5.9/4.2. Iran/1966/4.6/9.3/4.7.
Ireland*/1958/0.9/4.1/3.2; 1986/0.3/4.2/3.9; 1994/4.1/8.1/4.0. Israel/1958/3.6/5.8/2.2;
1967/3.3/7.3/4.0; 1989/1.5/3.5/2.0. Jamaica/1986/-1.0/3.6/4.6. Japan/1958/5.9/9.0/3.1;
1984/2.3/4.4/2.1. Korea, Rep/1967/4.6/6.9/2.3; 1984/4.4/8.5/4.1. Laos/1979/-2.9/3.7/6.6.
Lesotho/1975/2.8/6.4/3.6. Lesotho/1992/0.2/5.7/5.5. Malawi/1970/1.6/4.2/2.6; 1992/-2.4/4.0/6.4.
Malaysia/1969/3.4/7.3/3.9; 1988/1.9/6.1/4.2. Mali/1973/1.7/3.7/2.0. Mauritius/1970/-2.6/6.7/9.3;
1983/0.5/5.9/5.4. Morocco/1958/-1.0/8.0/9.0. Mozambique/1996/-2.7/5.7/8.4. New
Zealand/1958/2.0/4.0/2.0. Nicaragua/1960/0.3/4.8/4.5. Niger/1974/-5.3/4.9/10.2.
Nigeria/1968/-4.4/5.8/10.2. Norway/1992/1.4/3.9/2.5. Pakistan/1961/-0.1/4.5/4.6;
1978/1.9/4.0/2.1. Panama/1959/1.4/5.2/3.8; 1975/1.9/6.1/4.2. P.N.Guinea/1988/0.6/4.3/3.7.
Paraguay/1974/2.2/6.7/4.5. Peru/1959/0.7/5.1/4.4. Philippines/1970/1.1/3.8/2.7.
Poland/1993/-0.6/5.1/5.7. Portugal/1959/3.4/5.7/2.3; 1985/0.9/5.2/4.3. Romania/1970/6.6/8.9/2.3.
Rwanda/1975/-0.5/4.6/5.1. Singapore/1967/2.1/9.2/7.1; 1987/2.7/6.0/3.3. Spain/1959/4.4/7.9/3.5;
1984/0.3/3.9/3.6. Swaziland/1984/1.2/4.7/3.5; 1995/0.9/3.5/2.6. Syria/1969/0.7/6.7/6.0;
1990/-4.2/4.0/8.2. Taiwan/1961/3.2/7.3/4.1; 1985/4.9/7.1/2.2. Tanzania/1994/-0.3/9.8/10.1.
Thailand/1960/2.6/4.7/2.1; 1986/4.0/8.3/4.3. Trini.&Tobago/1974/3.0/5.0/2.0; 1996/3.0/7.2/4.2.
Tunisia/1968/2.1/5.6/3.5. UK/1983/0.9/3.5/2.6. United States/1961/0.9/4.0/3.1.
Uruguay/1974/1.4/4.5/3.1; 1989/1.8/4.2/2.4. Venezuela/1971/1.1/4.9/3.8.
Zambia/1963/-1.8/4.1/5.9.
Mean: 1.4/5.9/4.4; Median: 1.4/5.1/4.0; Standard deviation: 2.3/2.2/2.4.

Note: * For Ireland, as the years in between 1984 and 1996 all fulfill the requirement for the starting date of a growth acceleration, they are broken up into 2 growth episodes with years apart, instead of finding only one "best fit" starting year amongst all continuous dates.

Sustained and Unsustained Growth Accelerations

Country/Starting year/Average 10-year post-episode growth
No. of Sustained Episodes: 40/73 (54.8%) Mean: 3.9; Median: 3.3; Standard deviation: 1.8 Belgium/1958/4.2. Bhutan/1977/2.8. Botswana/1971/4.3. Canada/1961/2.9. China/1981/9.1. Colombia/1967/2.0. Congo Republic/1969/6.9. Denmark/1958/2.3. Dominican Rep/1969/2.6. Egypt/1975/3.1. Finland/1958/4.5. Indonesia/1967/2.2. Ireland/1958/3.9; 1986/7.3. Israel/1958/6.1. Japan/1958/7.0. Korea, Rep/1967/5.4; 1984/4.2. Laos/1979/2.5. Malaysia/1969/3.6. Mauritius/1970/2.3; 1983/4.1. Morocco/1958/2.7. Pakistan/1961/2.5; 1978/2.2. Panama/1959/2.5. Peru/1959/2.5. Portugal/1959/2.5; 1985/2.6. Romania/1970/3.5. Singapore/1967/5.3. Spain/1959/4.7; 1984/2.6. Swaziland/1984/2.3. Taiwan/1961/7.5; 1985/4.3. Thailand/1960/4.5. Tunisia/1968/2.5. United Kingdom/1983/2.4. United States/1961/2.2.
No. of Unsustained Episodes: 33/73 (45.2%) Mean: -0.8; Median: 0.2; Standard deviation: 2.3 Algeria/1975/0.6. Argentina/1963/0.8. Brazil/1968/0.7. Cameroon/1978/-5.4. Congo Republic/1977/-3.0. Cuba/1980/-4.6. Ecuador/1970/-0.8. Gabon/1969/-5.5. Ghana/1966/-0.8. Honduras/1974/-0.1. Indonesia/1986/1.1. Iran/1966/-5.6. Israel/1967/0/5. Jamaica/1986/-0.4. Japan/1984/0.8. Lesotho/1975/1.0. Malawi/1970/0.8. Mali/1973/1.5. New Zealand/1958/1.6. Nicaragua/1960/1.5. Niger/1974/-2.9. Nigeria/1968/-3.6. Panama/1975/0.7. Paraguay/1974/0.2. Philippines/1970/-0.8. Rwanda/1975/-2.5. Singapore/1987/1.1. Syria/1969/1.4. Thailand/1986/1.0. Trinidad&Tobago/1974/-4.8. Uruguay/1974/0.7. Venezuela/1971/-2.2. Zambia/1963/0.2.
Summary Statistics of post-episode growth for all 73 episodes Mean: 1.8; Median: 2.3; Standard deviation: 3.1

Compilation of the Leaders of States Dataset

Based on Zarate Political Collections (Zarate, 2003) and *Heads of States and Governments: A Worldwide Encyclopedia of Over 2,300 Leaders, 1945 through 1992* (Lentz, 1994) and many other various sources including the extensive use of the online Wikipedia as a source of general information, a dataset of all leaders for the 120 countries of interest during the period 1950-2004 has been compiled. Excluding the years for which countries have not become independent, the dataset contains a total of 4,608 country-years for which the leaders in office have been identified. Only leaders who have been in office for at least five years are identified; those who have been in office for less than five years are considered transitional in nature. In most cases, determining the leaders of states is straightforward: most countries either have their Prime Minister or President as the leader of the state with no ambiguity. However, in a number of cases, the process of determining the *de facto* leaders of states require judgment and discretion as there are no clear-cut consensus as to which particular person is holding power. There are some exceptional cases without a recognizable figure that we could call a leader of the country.

Broadly classified, there are three different systems of governments: parliamentary republics, presidential republics and monarchies. Presidential republics can be further classified into full presidential systems and semi-presidential systems and monarchies can be classified into constitutional monarchies and absolute monarchies. Parliamentary republics mostly exist in European countries, where the Prime Minister is clearly the person holding actual power. The full presidential systems exist in many Latin American and African countries, where the President is the unambiguous leader of the state. Absolute monarchies, which are popular in oil-producing countries in the Middle East and some countries in North Africa such as Morocco, are systems where the King holds absolute power in office. Constitutional monarchies exist in many

Commonwealth countries where the Prime Minister holds executive and the monarchs merely serve a ceremonial role.

The semi-presidential system is more problematic because it often involves power-sharing between the President and the Prime Minister. Normally the President is directly elected by the country's citizens into the post while the Prime Minister comes from the head of the party gaining the majority of seats in the legislature. In countries such as France or Finland, the President is in charge of foreign policy while the Prime Minister is in charge of domestic policy. In such cases, the President is classified as the leader of the state as the President is normally regarded as holding more power personally than the Prime Minister, although the Prime Minister could hold more power collectively with his ruling party in the legislature.

Former Communist countries also pose some difficulties in identifying the leaders who hold actual power because it is the norm rather than the exception that people holding formal titles do not have actual powers and are just figureheads of the Communist Party. Many former or existing Communist countries such as China, Laos, Cambodia and Eastern European countries like Romania and Poland have their Party Secretary-General as their paramount or *de facto* leaders who might or might not hold formal titles like President or Prime Minister. These leaders normally hold office for a very long time and pass on their power only upon their deaths or through exits forced upon by military uprising. The exact manner and date of leader transitions in such regimes are often unclear to outsiders and can only be determined by the best estimations of political analysts and historians.

The Swiss Federal Council in Switzerland provides an example of an extreme form of democracy where there is no single recognizable figure that can appropriately represent the government or the state because the seven-member executive council shares power equally among its members and operates as a collective presidency. Since 1848, the Federal Council is composed of a coalition of members from the major parties and transitions of Federal Council members have taken place in a very stable manner. In this dataset, no leader changes were recorded in the entire 55-year period for Switzerland as the Swiss Federal Council is simply regarded as having held office for the entire period as a form of collective governance.

In another extreme case, Somalia has left vacant its government since 1991 due to years of internal wars and political violence. In some years, U.N.-sanctioned transitional governments were set up, but they were never successful as opposition powers quickly established their presence by throwing the country into war and chaos. However, opposition powers also could never hold office for long, resulting in a government that might as well be considered non-existent. In a rare case, Cambodia has seen two co-Prime Ministers at the same time from 1993 to 1998. Prince Norodom Ranariddh and Hun Sen settled on being co-Prime Ministers during that time in a perceived power struggle between the two. Although Hun Sen clearly won the battle and ruled Cambodia since 1998 as sole Prime Minister, history offers little clue as to who was the superior co-Prime Minister at the time. Therefore in the dataset, both persons were recorded as co-leaders of the country during that period.

In some cases, leader transitions are interwoven with periods ruled by military junta, although military rule is mostly temporary in nature. Examples include Ethiopia from 1974 to 1977 and Nicaragua from 1979 to 1984. In such cases, the Chairman of the junta is identified as the leader of state or simply the group of generals is identified as collective heads of state if the junta has the practice of regularly rotating its chairman, a practice quite common in many junta councils. In yet other countries, the formal titles of positions of power can change as circumstances change. For example, in Pakistan the actual power lay in the hands of the Prime Minister before 2002. In 2001, Pervez Musharraf had declared himself President before his term as Prime Minister expired in 2002. From 2002 onwards, the power of leaders shifted from the Prime Minister to the President, even after Musharraf's departure from politics in 2008. Another example where the formal title of those who hold *de facto* power has changed over time is Spain. Before 1975, power lay in the hands of the King Francisco Franco Bahamonde, who ruled Spain as a dictator for 37 years. In 1975, the King passed away and his successor Juan Carlos I de Borbon took over the office. However, shortly after, he voluntarily relinquished power to the

President of Spain and became a non-ruling monarch. The President of Spain became the position of power from then on.

The last case that needs special mention is Thailand, which has seen various power-sharing deals between the King Bhumibol and the Prime Minister holding office at the time. King Bhumibol is supposed to have only a ceremonial role in the country, but his popular status in Thailand and his timely intervention or non-intervention during political crises have prompted some analysts to say that he, not the Prime Minister, holds the *de facto* power of the military and the country. In this dataset, however, the Prime Minister is considered the *de facto* head of the state because he could be seen as best representing Thailand both on the international stage and on the domestic front. The King seems to yield certain influence on the domestic front, but the Prime Minister is, in my opinion, not subordinate to the King in terms of domestic policymaking or foreign affairs, hence the Prime Minister is still considered the position of power.

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