Growth Cycles: An Empirical Investigation

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Abstract

The process of economic growth varies considerably between countries as well as within countries across time. The latter source of variation has been, until recently, largely ignored by the empirical and theoretical research on economic growth. In this paper we focus on within-country changes in the growth process but also search for patterns common across countries, which may guide a theory of within-country growth transitions. We identify structural breaks in growth of output per worker for a sample of countries in the period 1870-2000 using both a standard Bai-Perron test and a Bayesian approach. After identifying these breaks, we analyze the dynamics of growth across breaks, i.e. the likelihood of experiencing a growth miracle after having suffered a growth disaster and vice versa. We conclude that, somewhat surprisingly, growth processes are characterized by cycles, as opposed to the traditional uniform convergence predicted by most growth models. Periods of exceptionally high growth are, on average, followed by periods of exceptionally low growth. There appears to be, at least for developing countries, a mechanism inherent in the growth process, which leads to cycles; after a successful period of high growth there inevitably follows a period of disappointing slowdown. We sketch some theoretical mechanisms that may rationalize this cyclical evolution.

1 Introduction

The fact that the process of economic growth is not uniform across countries is the motivation behind a large body of empirical and theoretical literature of the last two decades. The simple observation that this process also varies considerably within countries across time (Pritchett, (2000)), has been given much less attention. However, several recent papers have focused on this variation (Hausmann et al. (2005)), Jerzmanowski (2005), Jones and Olken (2005)).

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These papers document a large degree of within-country variability in the process of economic growth; for example, Hausmann et al. (2005) look for episodes of growth acceleration during 1950-2000 and find many such episodes even in countries that have under-performed during this period in terms of average growth. This approach highlights the complex nature of growth and implies that studying “growth transitions”, i.e. switches between periods of fast growth, stagnation, and collapse, is essential for understanding the process of long run growth.

Consider Figure 1, which illustrates the paths of output per worker in three countries over the period 1960-1995. The values have been normalized to equal one at the beginning of the period. The growth experiences of these three countries differ vastly: Portugal experienced a period of rapid growth followed by a mild slowdown and a return to fairly rapid growth, Congo presents a long period of rapid growth and then a period of equally rapid decline. Finally, Gabon grew faster than the two remaining countries until late 1970’s, but stagnated thereafter. Yet the average growth performance of all three countries is surprisingly similar.

As another example, consider Figure 2, which displays the evolution of Ghana’s (log) output per worker relative to that of the United States. The standard growth regression approach would focus on explaining Ghana’s (negative) average growth, i.e. the slope of the dashed line. This approach however
may be misleading since it completely ignores Ghana’s rich variation in growth during this time interval.

Figure 2: Path of Ghana’s log real output per worker relative to the United States.

The observation that developing countries experience both episodes of very rapid ("miracles") and extremely slow ("disasters") growth, challenges the concept of a poverty trap\(^1\). Poverty traps imply that a very poor country would have zero growth in per capita GDP unless a large enough amount of resources (a "big push") helped it reach some critical level of development. According to this hypothesis, after reaching this level, the country should escape the poverty trap forever. The growth transitions literature shows that there are very many “escapes” but they are rarely “forever”. This suggests that distinguishing between igniting growth and maintaining it is a crucial matter both for academics and policymakers, especially in the light of the attention that the UN Millennium goals have recently generated\(^2\).

This paper takes an approach similar to that of Hausmann et al. (2005) and Jones and Olken (2005). We identify structural breaks in the within-country time series of output per worker in different countries. To accomplish this

\(^1\)See Azariadis and Stachurski (2004) for a modern survey on this topic.
task we use two techniques; first, following Jones and Olken (2005) we use the Bai-Perron test\(^3\) for detecting multiple structural breaks. Our specification is somewhat different from theirs to allow for a subsequent elimination of the “recovery” effect in the estimated growth rates. Another difference between the two approaches is that we make use of the Maddison (1995) data to extend their analysis, that only uses the 1950-2000 period (from the Penn World Table). In addition, we recognize the fact that the standard Bai-Perron test may be problematic in a short time series like ours\(^4\) and proceed to use a Bayesian approach to estimate structural breaks following Wang and Zivot (2000).

In this framework, the main questions are about the timing, magnitude, and direction of breaks. Here we focus on the latter two aspects of growth transitions. We study the dynamics of growth across breaks, i.e. whether conditioning on growth before a given break, and other country-specific covariates, growth is likely to be higher or lower in the next structural break. This question also turns out to be of consequence to the theory because different dynamics across breaks imply different underlying growth models, as we shall see later on.

Our results indicate that growth rates exhibit cycles, that is periods of exceptionally high growth are, on average, followed by periods of exceptionally low growth. This phenomenon seems to hold for both the more recent data (1950-2000) as well as in longer series (1870-1990) and it is especially pronounced for developing countries. There appears to be, at least for developing countries, a mechanism inherent in the growth process, which leads to cycles: after a successful period of high growth there inevitably follows a period of disappointing slowdown. Our finding suggests that the challenge for developing countries seems not to be to just achieve positive growth rates in per capita GDP, but to maintain them for a sustained period of time, i.e. avoid the downward part of the cycle.

This paper is organized as follows. Section 2 briefly overviews the existing literature on growth transitions. The datasets used in the analysis are presented in Section 3. Section 4 conducts the empirical exercise. We start by running two different tests of structural breaks and then we study the dynamics between these breaks. Section 5 sketches some theoretical implications of our findings. Finally, Section 6 concludes and suggests future research directions.

### 2 Related Literature

He claims that, in most developing countries, a single time trend does not accurately characterize the evolution of GDP per capita, and distinguishes between different growth regimes: steady growth (hills and steep hills), rapid growth followed by stagnation (plateaus), rapid growth followed by decline (mountains), catastrophic falls (cliffs), continuous stagnation (plains), and steady declines (valleys). He also points out that growth rates are much more volatile in developing than in industrial countries, and concludes that the empirics of growth should focus on explaining factors that initiate and stop growth, instead of analyzing what causes average growth.

Jerzmanowski (2005) builds on Pritchett’s idea and estimates a Markov-switching regression model to characterize four distinct regimes and transitions among them. These four regimes are stable growth, “miracle” catch-up, stagnation, and crisis. He finds that institutions are crucial to explain the probabilities of switching regimes. Better institutions significantly increase the likelihood of having persistent periods of fast growth, whereas countries with weak institutions have lower growth rates, in great part because they spend more time in stagnation regimes. He also finds, however, that while having weak institutions limits the sustainability of growth take-offs, it does not preclude them. The impact of different macro policies on the probability of switching regimes is studied in Jerzmanowski (2006).

Hausmann, Pritchett, and Rodrik (2005) study episodes of growth accelerations (sustained for at least 8 periods) on a sample of countries in the period 1950-2000, and find that these episodes are quite frequent, even for developing countries. They correlate these turning points with different exogenous variables and conclude that growth accelerations are associated with increases in investment, trade, and real exchange rate depreciations. Also, political-regime changes explain part of these abrupt increases in growth rates. On the other hand, external shocks tend to produce growth accelerations that die out quite soon, whereas economic reforms are associated with episodes of sustained acceleration. In spite of being able to identify causes of some of the accelerations, they conclude that most episodes remain unexplained.

Jones and Olken (2005) extend the analysis of Hausmann et al. (2006) to include both accelerations and decelerations in growth episodes. They confirm that these episodes are frequent for most rich and developing countries and find that the role of physical capital accumulation is limited, while total factor productivity changes seem to account for most of the structural breaks. Finally, they document that accelerations and decelerations are asymmetric phenomena: collapses are often associated with price instability and reduced manufacturing and investment, while take-offs are correlated with large and steady expansions in international trade. They conclude that these findings challenge theories based on poverty traps, which claim that countries that are extremely poor cannot grow at all.
3 The Data

We use two main data sets. The first one is the Penn World Table (Heston et al. (2002)). This dataset contains data on real per capita GDP for 125 countries during the period 1950-2000. This analysis is then extended using Maddison (1995), which presents data and estimates of real GDP for some of these countries, approximately during the period 1870-1990.

One potentially important variable to explain turning points in growth is the quality of political institutions (or changes therein) In the next section, we use a proxy for democracy which is obtained from POLITY IV.

4 Empirical Strategy

Our first goal is to identify structural breaks in the growth of per capita output in a sample of countries. To estimate break dates we start by following Ben-David et al. (2001), and Jones and Olken (2005), who use the Bai-Perron test. However, as we argue below, the properties of this test rely on the use of long time series. Since our data has at most, one-hundred and twenty observations per country, and in most cases only fifty, we proceed by running a Bayesian test that does not rely on sample size.

Once we have identified the breaks, we look at what affects the magnitude and direction of the change in growth rates that occurs at the break. We are primarily interested in whether there is a relationship between growth rates in two subsequent regimes; that is, whether fast growth tends to be followed by faster or slower growth when we control for a country’s level of income, time effects and possibly other country-specific covariates. The next two sections describe in more detail the two steps in our approach: identification of breaks, and the study of growth dynamics across breaks.

4.1 Testing Structural Breaks

In an interdependent world, growth of any individual country depends importantly on the knowledge spillovers from other countries, mainly the technology leaders (Howitt (2000), Klenow and Rodriguez-Clare (2005)). However, whether a country reaps more or less benefits form the world pool of knowledge depends on its individual institutions and policies, which create or limit incentives for investment in technology transfer. Because it is the country-specific determinants of changes in the growth process that we are interested in, we study growth of output relative to the technology frontier. Consider the following model (we drop country subscripts for brevity)

\[ y_t = \alpha_s + \gamma_s t + \epsilon_t \] for $t_{s-1} < t \leq t_s, \forall t = 1, \ldots, T \] (1)
where $y_t$ represents the logarithm of real output per worker in country $i$ relative to the United States, which is taken as the technological leader. The variable $t$ indexes time, and it is multiplied by the constant growth rate $\gamma_s$. Finally, $\varepsilon_t$ is a white noise error term.

According to this model, growth continues at a constant rate $\gamma_s$ until time $t_s$ when a structural break occurs. After the break, a new constant-growth regime is in effect, with growth equal to $\gamma_{s+1}$. The structural break test allows us to identify the break points $t_s$’s, as well as the within-regime parameters of the growth process $\alpha_s$’s and $\gamma_s$’s.

Our focus is on the dynamics of growth across breaks, that is, the relationship between $\gamma_s$ and $\gamma_{s-1}$. However, before we proceed with this analysis, we want to correct the estimated within-regime growth rates for the “recovery effect”. Suppose that a break in the growth process occurs because of a catastrophic event such as a war, which is associated with a large one-time drop in output; the subsequent growth might be rapid simply due to a recovery effect. While interesting in their own right, such recovery effects are not the object of our study, and so we decided to remove them. To do so we use the following estimate of growth in regime $s$

$$\tilde{\gamma}_s = \frac{\hat{y}_{t_s} - \hat{y}_{t_{s-1}}}{t_s - t_{s-1}} = \alpha_s + \gamma_s t_s - (\alpha_{s-1} + \gamma_{s-1} t_{s-1})$$

(2)

Figure 3 illustrates this correction for the case of Ghana. The thin solid line represents the actual evolution of real per worker output relative to the US, the vertical lines mark the break dates, and the thick line segments represent the linear trend models (1) fitted for each regime. Growth after the break in 1964 is rapid but part of the reason for this is recovery from the dramatic fall in output that occurred at the time of the break. The correction in (2) amounts to calculating the slope of the dashed segment connecting $\hat{y}_{t_{s-1}}$ and $\hat{y}_{t_s}$ and using it as the estimate of the growth in the post 1964 regime instead of the (higher) slope of the thick segment.

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5 We have considered using other leaders like, for instance, the G-8 or the OECD countries. The results are very similar to those presented here.

6 Serial correlation in $\varepsilon_t$ would be problematic for the Bai-Perron test. Hegwood and Papell (2005) estimate a similar specification for a group of developed countries. Their dependent variable is log of absolute GDP per capita, not relative to the US, as is the case here. They test for serial correlation of the residuals and find little evidence of this problem in the PWT sample.
Figure 3:
4.1.1 Bai-Perron Test

The Bai-Perron test has been widely used to test the existence of structural breaks in economic variables\(^7\). The test can be informally described as follows. An algorithm searches all possible sets of breaks (a maximum number needs to be determined) and, for each number, it provides a measure of goodness-of-fit. According to this measure, there is an optimal amount of structural breaks in a given time series. This optimal number is found when, by adding a new break, the improvement in fit is not larger than the improvement caused by an arbitrarily small change in the error term. The test also specifies a parameter to constraint the minimum distance between consecutive breaks.

![Figure 4: Distribution of $\tilde{\gamma}_s - \tilde{\gamma}_{s-1}$; PWT data.](#)

Figure 4 presents an histogram of the estimated changes in growth rates for the PWT data. The average size of a break is close to zero with a standard deviation of 0.043. The average number of breaks is 4.2, the average number of breaks when growth goes up is 2, while that when growth falls is 2.2. The minimum number of breaks is 2 and the maximum is 7. Figure 5 illustrates the fact that, over time, there is no trend on the sign of the structural breaks. The corresponding figures for the Maddison data are 6 and 7, leading to qualitatively

\(^7\)See, for example, Jones and Olken (2005) and Hamilton (2005).
similar results. The average duration (using PWT data) of a regime is 10 years and the median is 9 years (see Figure 8). Finally, Figure 9 shows the relationship between growth before and after the break using the PWT dataset\(^8\). Without controlling for country and period-specific variables there doesn’t appear to be much correlation between the two.

4.1.2 Bayesian Test

As argued by Wang and Zivot (2000), the advantages of the Bayesian approach to the analysis of structural-change models has long been acknowledged. These advantages are, first, that the method is technically simpler. Second, it allows

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\(^8\)A similar picture is obtained if one uses the Maddison data.
finite-sample inferences and nonnested model comparisons. Third, inference is the same for nontrending and trending data. Finally, it allows for explicitly use the prior knowledge of the researcher on the timing, form and maximum number of structural changes. For all these reasons, we believe it is reasonable to use this different methodology and compare the results with the ones obtained using the standard Bai-Perron test.

The procedure followed to run a Bayesian test of structural breaks can be summarized as follows\(^9\). To start with, in a Bayesian context, inference of the unknown parameter \(\theta\) is made from the joint posterior distribution of \(\theta\): given a prior specification \(f_0(\theta)\), the researcher’s knowledge of the parameter is then updated using the information contained in the corresponding likelihood function. Therefore, in our framework, the first step is to specify a prior for the parameters \(\alpha, \beta\), and, most importantly, the break dates. Given these specification, sample draws from the posterior distribution of \(\theta\) can be easily drawn using the Gibbs’ sampler\(^{10}\). The results are shown in Table 1.

\[\text{[INSERT TABLE HERE: TO BE ADDED]}\]

\(^9\)A more technical explanation can be found, for instance, in Wang and Zivot (2000).

\(^{10}\)See, for instance, Casella and George (1992), and Tanner (1993).
4.1.3 Sensitivity Analysis

In this subsection we provide two robustness checks. The first one is to run the test of structural breaks for different sets of countries, based on their income. A casual look at the frequency of breaks across countries indicates that less developed ones tend to experience a larger number of such episodes, confirming the claim made in Pritchett (2000). The second sensitivity check is to change the length of the intervals considered in the test and analyze if the number of breaks changes significantly.

Poor and Rich Countries In order to classify countries by their income we use the rank provided by the World Bank\(^{11}\). Their approach is to divide countries in five groups: low-income economies, lower-middle-income economies, upper-middle-income economies, high-income economies, and high-income OECD members. For the purposes of this paper, we only separate the high-income economies from the rest of the sample. The results are summarized in the next table. We conclude that, as suspected, structural breaks in growth are more common in developing countries than in developed ones.

\(^{11}\)See The World Bank, Country Classification.
Figure 8: The distribution of regime duration; PWT data.

| INSERT TABLE HERE: TO BE ADDED |

**Change Minimum Duration between Breaks**  It is important to underline that the changes in growth rates that we analyze in this paper should not be interpreted as standard business cycles. In order to make this distinction clear, we calculate the average duration of the breaks we have identified above, and rerun the test for longer time intervals. The following table summarizes our findings.

| INSERT TABLE HERE: TO BE ADDED |
Figure 9: Growth before the break versus growth after the break; PWT data.
4.2 Growth Transitions

The second part of the empirical exercise conducted in this paper is to study the transition from growth disasters to growth miracles, and vice versa. Consider the following specification:

\[
\hat{\gamma}_{is+1} = \beta_0 + \beta_1 \hat{\gamma}_{is} + \beta_2 y_{is} + \beta_3 X_{is} + \varepsilon_{is+1}
\]  

(3)

where \( \hat{\gamma}_{is} \) represents the estimated growth rates in regime \( s \) for country \( i \). The variable \( y_{is} \) stands for real per worker output, relative to the U.S, at the time of the break “into” growth regime \( s \), whereas \( X_{is} \) is a vector of additional regime and country specific covariates that we include in the analysis, and \( \varepsilon_{is+1} \) is the error term.

A standard convergence equation, with an individual observation in this setting being a country-regime pair \((is)\), would call for running a regression of growth on \( y_{is} \) and \( X_{is} \). A finding of \( \hat{\beta}_2 < 0 \) would imply (conditional) convergence; countries with higher income grow slower. However, the parameter of interest in our case is \( \hat{\beta}_1 \). Consider the possible values of this parameter, and what they imply for the dynamics of growth.

If \( \hat{\beta}_1 = 0 \) then there is no memory across breaks; on average, the growth rate in regime \( s \) does not help predicting the growth rate after a break, in regime \( s + 1 \). If \( \hat{\beta}_1 \in (0, 1) \) we again have convergence story, although this time it is in growth rates rather than levels; countries that grew faster before the break are likely to slow down after the break. This a reversion-to-the-mean dynamics, i.e. exceptionally fast growers before the break still grow fast after the break, just slightly less so. In the long run there is reversion to the steady state. Figure 10 illustrates the dynamical system for this case. When interpreting the figure recall that “periods” here are not calendar years but break dates. Note also that if we also find that \( \hat{\beta}_2 < 0 \), the intercept will shift down over time and the long run steady state is zero growth (or constant gap, determined by \( X \), relative to the U.S income). Ignoring this for the moment, the figure indicates that for \( \hat{\beta}_1 \in (0, 1) \) we have monotonic evolution of growth rates over time.

If \( \hat{\beta}_1 < 0 \) the dynamical system changes. This is illustrated in Figure 11. Here there is also convergence to the long run steady state (and again if \( \hat{\beta}_2 < 0 \), the eventual steady state exhibits zero (relative) growth). In this case, however, growth is not monotonic - it exhibits cycles.

\[\text{At this moment we only use the estimates provided by the Bai-Perron test, for which we have results for the entire sample of countries.}\]

\[\text{At this stage of the paper the only covariate that we include is a proxy for democracy.}\]
The paths of output for the standard convergence ($\hat{\beta}_1 \in (0, 1)$), the convergence with memoryless breaks ($\hat{\beta}_1 = 0$), and the convergence with cycling ($\hat{\beta}_1 < 0$) are shown in Figure 12.
Figure 12: Growth paths.
We start with a naive OLS estimation of equation (3). The results using the Penn World Table data are shown in Table 1. The first column is the specification without democracy as a right-hand-side variable, whereas this variable is included in the second column. In both cases the standard convergence story holds ($\hat{\beta}_2 < 0$). Interestingly, $\hat{\beta}_1 < 0$ in both specifications, which indicates the presence of growth cycles. Democracy does not seem to have a significant effect.

When we use the Maddison data (Table 2) we run the regression for the subperiod 1950-1990 (to make the results comparable to those obtained with the PWT data) and for the entire period 1870-1990. The coefficient of standard convergence is still negative when one uses the entire sample, but it is not significant in the other two specifications. We do observe cycles ($\hat{\beta}_1 < 0$) when using the full sample and the 1870-1990 subsample, but they vanish out in the period 1950-1990.

\begin{table}
\centering
\begin{tabular}{lcc}
\hline
Growth Rate before Break & -0.152** & -0.191* \\
 & (0.061) & (0.103) \\
\hline
Log relative $y$ before the Break & -0.019*** & -0.036*** \\
 & (0.007) & (0.013) \\
\hline
Year of Break & -0.001*** & -0.001*** \\
 & (0.000) & (0.000) \\
\hline
Average Democracy before Break & -0.001 & \\
 & (0.001) & \\
\hline
Constant & 1.564*** & 1.544*** \\
 & (0.317) & (0.561) \\
\hline
N & 339 & 141 \\
\end{tabular}
\caption{PWT data. Fixed effects,* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$}
\end{table}
<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>1870-1990</th>
<th>1950-1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Rate after the Break</td>
<td>-0.267***</td>
<td>-0.519**</td>
<td>0.070</td>
</tr>
<tr>
<td></td>
<td>(0.098)</td>
<td>(0.233)</td>
<td>(0.184)</td>
</tr>
<tr>
<td>Log relative $y$ before the Break</td>
<td>-0.022**</td>
<td>-0.013</td>
<td>-0.019</td>
</tr>
<tr>
<td></td>
<td>(0.008)</td>
<td>(0.011)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Year of Break</td>
<td>-0.000</td>
<td>0.000</td>
<td>-0.001**</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.024</td>
<td>-0.193</td>
<td>1.839**</td>
</tr>
<tr>
<td></td>
<td>(0.240)</td>
<td>(0.286)</td>
<td>(0.739)</td>
</tr>
<tr>
<td>N</td>
<td>162</td>
<td>30</td>
<td>95</td>
</tr>
</tbody>
</table>

Table 2: Maddison data. Fixed Effects.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Full sample: all countries for all available dates, 1870-1990 sample: only countries with no missing observations in 1870-1990 period, 1950-1990 sample: only countries with no missing observations in 1870-1990 period.
When one includes a fixed effect in the estimation of 3, the OLS estimates are not guaranteed to be consistent. To remedy this, we use the instrumental variable procedure proposed by Arellano and Bond (1991). The results using the PWT data are shown in Table 3. Again, in both specifications the standard convergence holds, i.e. $\hat{\beta}_2 < 0$. As before, the negative coefficient in $\hat{\beta}_1$ suggests the existence of cycles in economic growth. In this case, democracy seems to have a negative impact on growth. Using the Maddison data (Table 4) the main difference is that now democracy has a slightly positive effect on growth. Also, the size (in absolute value) of the cycling coefficient increases (except in the third column, where it is not significant) whereas the standard convergence one is smaller (and not significant in the third and fourth columns).

<table>
<thead>
<tr>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Growth Rate before the Break</td>
<td>-0.126*</td>
<td>-0.198***</td>
</tr>
<tr>
<td></td>
<td>(0.070)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Log relative $y$ before the Break</td>
<td>-0.048**</td>
<td>-0.070***</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Year of Break</td>
<td>-0.001***</td>
<td>-0.001***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Average Democracy before Break</td>
<td>-0.002***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>226</td>
<td>91</td>
</tr>
</tbody>
</table>

Table 3: PWT data. Arellano-Bond.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Possible Theories

The empirical finding that growth rates follow a cyclical pattern is the most important result of this paper. We next proceed to sketch two possible types of theoretical models that may explain this behavior.

5.1 Vested Interests

Krusell and Rios-Rull (1996) develop an overlapping generations political economy model based on Chari and Hopenhayn (1991) in which investment in human capital is required to operate a given technology. Consequently, some agents (the most experienced ones) tend to block the adoption of new technologies and this creates a decline in the economy’s growth rate. The equilibrium of their
model is characterized by a long cycle of stagnation and growth, qualitatively similar to our new empirical finding. This model could potentially explain why developing countries may experience a growth miracle by adopting "the right" technology. As they become very specialized, i.e. they accumulate a high stock of human capital (specific to that technology) it is easier for them to collapse because vested interests become now very powerful.

5.2 Spoils of Growth/Reform in a Through

Ethnic, religious, and social conflicts are common in developing countries. According to one argument, a rapid growth of the economy leads to an increase, perhaps uneven, in wealth and opportunity. Successful or well-connected businessmen prosper and the government coffers get full. This may have all sorts of growth reducing effects, from violent conflict to seize power and property, to a backlash against economic reform in more democratic countries. On the other hand, periods of extremely low growth may make it more likely to implement drastic reforms that spur growth.

6 Conclusions and Future Research

This paper focuses on the variation of the economic growth process within countries over time. We present two different empirical tests of structural breaks in
economic growth during the time interval 1870-1990. The first one is the traditional Bai-Perron test, and the second one uses a Bayesian approach, acknowledging the poor performance of Bai-Perron in small samples. Both tests show that growth miracles and disasters are very frequent, especially in developing countries. We then use these growth estimates to infer the likelihood of having a decrease in growth if in the previous break growth was high, and vice versa. The surprising result of this analysis is that there exist cycles in economic growth, especially in developing countries: a country that has a very high growth rate in the current period will have large growth slowdown in the future. The next obvious step is to rationalize this new finding with a theoretical model in the lines of those sketched in section 5.
References


