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ECONOMICS

GROWTH EPISODES

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I declare that this dissertation is my own work, and that where the material is obtained from published or unpublished work, this has been fully acknowledged in the references.

Signed: ……..

(Student's Signature)

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1 Introduction

Accelerating the process of economic growth in a sustained manner is perhaps one of the biggest challenges in economics. Economists have long used a variety of econometric approaches to throw light on why some countries grow faster than others. Early work focused on cross-section econometrics and more recently panel-econometrics[1] (Hausmann et al. 2005). A curious aspect of this literature is that it ignores the instability and volatility that characterize growth. Few but the richest countries experience a steady convergence process[2]. Elsewhere, growth is a story of distinct 'miracles' and 'failures'. This observation is moving a variant of 'growth' literature away from panel data and long run trends towards individual episodes as the key to explaining growth.

This study adopts a similar perspective to growth analysis and drops the traditional times-series analysis in favour of looking at growth as a series of distinct episodes. This study focuses on two extreme types of growth episode: Growth accelerations and growth decelerations. That is, periods where growth is exceptionally high or low. Through a largely empirical analysis the aim is to establish the political and economic conditions that determine growth episodes and where possible make broad policy prescriptions. Particular attention is paid to the initiation of these episodes and their duration. Research is based on a subset of Latin American countries over the period 1950 to 2000. Latin American has the desirable properties of being a relatively homogenous region with enough policy experiments to adequately assess the sources of growth episodes.

An early precursor of the current work Pritchett (2000) suggests that it may be useless to use 'panel data' to investigate long-term growth rates in developing

[1] There are a number of surveys of this empirical literature including Temple (1999) and Durlauf (2003)
[2] Demonstrated by Pritchett (2000)

countries (Pritchett 2000). Pritchett was one of the first to examine growth from the perspective of growth episodes. Ben-David and Pappell (1998) also make use of statistical methods to identify shifts in growth associated with the slowdown experienced by most of the developed world in the post-war period. Although growth episodes are not explicitly the subject the Paper demonstrates the worth of looking at changes in growth. More recently Jones and Olken (2005) and Hausmann et al. (2005) have concentrated specifically on growth episodes. Jones and Olken (2005) examine the 'start-and-stop' nature of growth by studying structural breaks in a large subset of countries across the world. The results point toward productivity as the driver of shifts in growth. Hausmann et al. (2005) investigate growth accelerations and their duration with the conclusion that the standard policy prescriptions of more traditional growth analysis are poor predictors of growth accelerations.

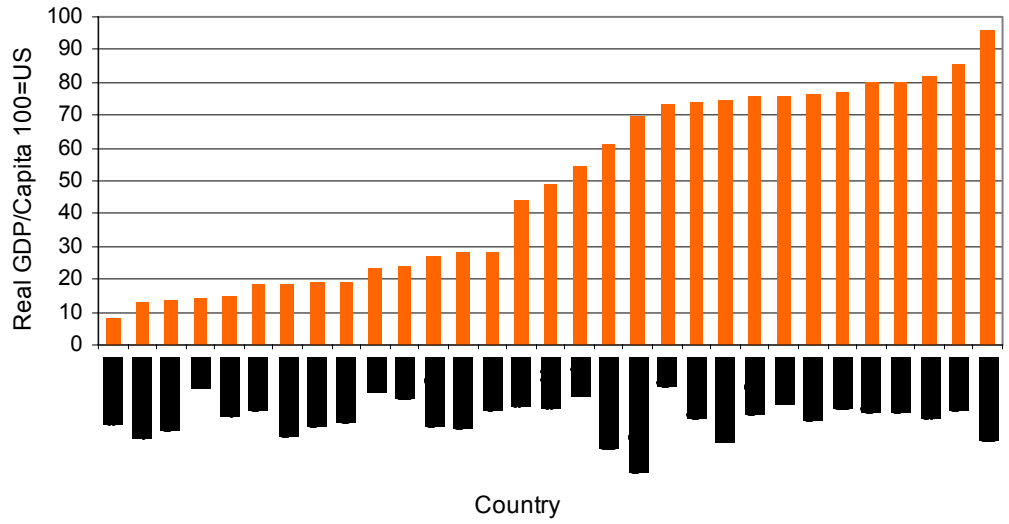
This study adds to the current literature in three dimensions. As opposed to considering a single aspect, both accelerations and decelerations are tackled simultaneously allowing direct comparisons to be drawn. Different statistical methods are also used to identify episodes. In particular high-pass filters, a recent development in time-series analysis, are employed. Lastly, a smaller subset of countries is considered to gain an appreciation of some of the more idiosyncratic causes of episodes.

The plan for the study is as follows: Chapter 2 opens the investigation by drawing a comparison between the view of Latin America's performance gained by using traditional long run trend analysis and analysis from the perspective of growth episodes. Chapter 3 develops a filter to identify growth accelerations and decelerations and presents stylized statistics on the resulting sample. Chapter 4 examines the mechanics of episodes. Chapter 5 attempts to relate the results to active policy. Chapter 6 closes with some concluding remarks.

2 Latin America's Growth Experience

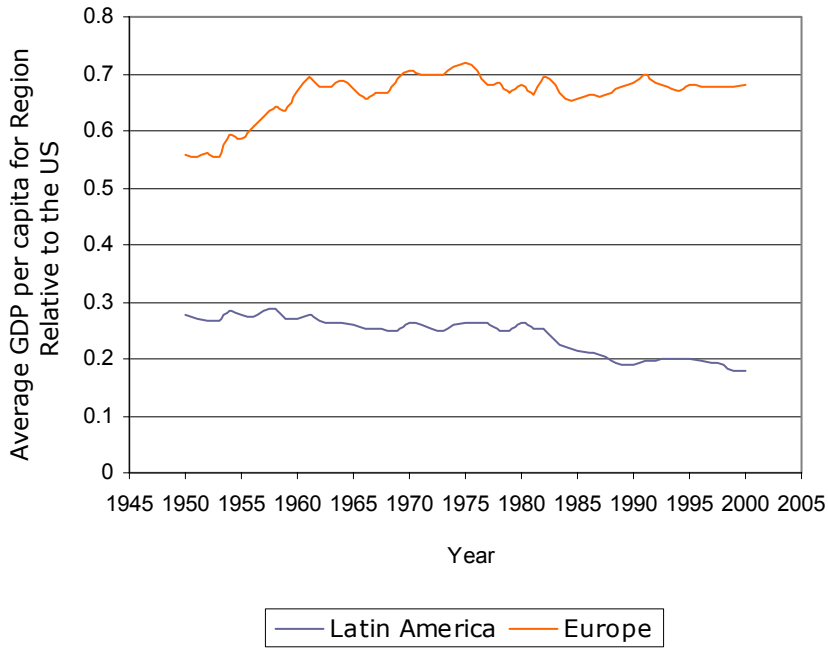
As first pointed out by Easterly et al. (1993) and confirmed by many since growth performance tends to be highly unstable. Pritchett vividly characterized patterns of growth as 'hills', 'plateaus' and 'mountains'. The literature suggests that countries typically feature abrupt and sustained changes in growth rather than a process of consistent convergence. This Section confirms that these observations are true of Latin American. To build on these insights stylized statistics are also presented to demonstrate how conflicting conclusions can be drawn using different approaches to growth analysis.

Fig 2.1: Real GDP Relative to the US in the 1990s



Latin America has a reputation for poor economic performance. Figure 2.1 demonstrates that Latin American countries are the poorest in the West. Average per capita income in the 1990's was 18% of that in the U.S. This is not a recent phenomenon either. Figure 2.2 shows income per capita relative to the U.S, Latin America not only started out in 1950 below that of other Western countries, but while others enjoyed convergence towards the U.S Latin America experienced a considerable divergence. The evidence across several decades does indeed suggest Latin American is a poor performer.

Fig 2.2: Real GDP per Capita in Latin America and Europe Relative to the USA 1950 to 2000



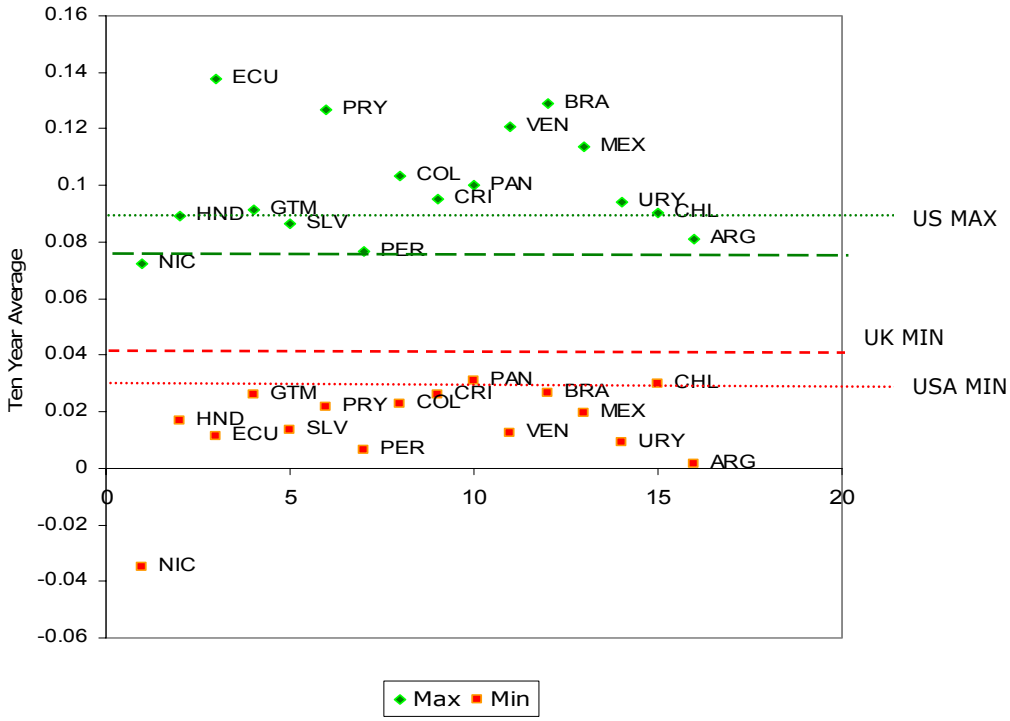
Latin America's performance is surprising. Table 2.1 documents the population origins of a number of Latin American Countries. Note the similarity with the West in terms of descent, language and religion. Given the Europeans who populated these regions established Western language, religion and culture it is not unrealistic to expect them to have established similar economic growth. In fact formal relationships between culture and economic activity have been identified[3]. This suggests that Latin America shares the same potential as Europe to achieve economic growth.

Figure 2.3 plots the best and worse ten year average growth rate for various Latin American countries. The striking feature is the ability of Latin American to attain periods of faster growth than either the US or Europe. Of the countries 56% enjoyed a period of faster growth than the US's best, and a further 87% attained periods of growth higher than the UK's best. However, all experienced a period of growth worse than that of the UK's or US's worst. These facts suggest that both

[3] Cole, Mailath and Postlewaite (1992) established a formal connection between culture and preference orderings.

'miracles' and 'failures' in the medium-run are within the experience of the same country. Suddenly Latin America's capacity for growth seems less distant from that of the US.

Fig 2.3: Best and Worst 10 year Average Percentage Real per Capita GDP Growth Rate Ranked by per Capita GDP in 1999 in Latin America 1950 to 2000



In addition to demonstrating Latin America's potential, growth extremes are a quantitatively important component of the region's growth experience. The highest average 10-year growth rate is observed in Ecuador where between 1970-1980 per capita income grew at 13.5%. For comparison, growth in the ten years prior averaged 3% and in the ten years post 0.67%. The compound properties of growth imply that such large differences in growth have a substantial impact on income. At 13.5% income doubles approximately every 6 years whereas at 0.67% every 100 years. Ecuador's income per capita would be substantially lower today in the absence of this episode. Although an extreme example there are numerous cases where growth rates change by 5-7% and more.

It becomes apparent that trends over a 50-year period are typically a bad description of a country's experience at any particular point in time. Some of the most telling variation occurs over shorter periods. Moreover, this variation can play a significant part in determining a country's economic performance.

3 Identifying Growth Episodes.

With the relevance of growth episodes clear the next step is to formulate a method to identify the structural breaks that mark episodes. To this end Section 3.1 opens with a discussion of empirical issues surrounding growth episodes. Section 3.2 follows with the development of a filter to identify and classify episodes into accelerations and decelerations. The filter is applied to Latin America and descriptive statistics presented. Finally, robustness checks are made and some caveats noted.

3.1 Conceptual Framework and Empirical Issues.

A qualitative definition of a growth episode:

> *A growth episode is a significant break in the structural economic growth rate of a country. Episodes are classified as accelerations where growth rates break up and decelerations where growth rates break down. Further, episodes that represent recoveries after periods of poor growth or declines after periods of accelerated growth are void.*

A conceptual framework is adopted where observed CGDP is the sum of three components:

$$y_t = g_t + s_t + c_t \qquad (t = 1,2...,T) \qquad (3.1)$$

A cyclical c_t, seasonal s_t and growth component g_t. Using annual data rids the seasonal component:

$$y_t = g_t + c_t \qquad (t = 1,2...,T) \qquad (3.2)$$

The cyclical component c_t represents high frequency cycles that have a relatively short period (for example business cycles). These fluctuations tend to be too

rapid to be explained by the slower movements of technological factors and factor accumulation. The new classical real business cycle model also predicts that the business cycles in c_t are initiated by stochastic shocks, often outside the control of governments. Clearly, these fluctuations do not represent structural breaks in the underlying growth rate. Therefore, c_t forms a problematic noise that surrounds the more interesting structural component g_t.

The contribution of c_t to observed CGDP can be reduced by taking a simple centered (2m+1) point moving average (MA). Observation y_t in the time series is replaced by the average of itself and its neighboring points. Define y_t^{MA} as the MA of y_t:

$$y_t^{MA} = \frac{1}{2m+1}\sum_{J=-m}^{m} y_{t+j} \qquad (t = m+1, m+2, ..., n-m) \qquad (3.3)$$

Increasing m gives a smoother solution series. Assuming c_t is composed largely of business cycles setting m=3 will significantly reduce their impact on y_t. Support comes from the business cycle literature which suggests averaging CGDP over seven years will substantially reduce the significance of business cycles. Intuitively consider that business cycles are composed of booms and busts. Overtime these will to some extent cancel out. That is, in the long run CGDP depends on economic growth rather than business cycles.

A stronger assumption is to assume that the business cycle component is a white noise. This assumption implies the expected value of CGDP at any t is simply the underlying growth component, g_t.

$$E[C_t] = 0 \qquad \text{var}(C_t) = \sigma^2 \quad \text{cov}(C_t, C_{t-s}) = \sigma^2 \qquad (3.4)$$

$$\Rightarrow \qquad E[Y_t] = g_t \qquad (3.5)$$

If this were true even over shorter periods, such as m=3 (an average over 7 years):

$$c_t = \frac{1}{2m+1}\sum_{j=-m}^{m} c_{t+j} \approx 0 \qquad (t = m+1, m+2, ..., n-m) \qquad (3.6)$$

$$\Rightarrow \qquad y_t^{MA} = \frac{1}{2m+1}\sum_{j=-m}^{m} y_{t+j} \approx g_t \qquad (t = m+1, m+2, ..., n-m) \qquad (3.7)$$

Modeling the business cycle component as a white noise even over shorter periods implies the cyclical component can be completely removed from the CGDP series by taking small sample moving averages. In this special case CGDP gives the underlying growth component, g_t, at any t.

The result in 3.7 implies: Filtering the y_t^{MA} series for growth episodes should return accelerations and decelerations that reflect changes in the structural economic growth rate rather than short run high frequency fluctuations.

This simple approach to purging the business cycle from macroeconomic time series relies heavily on the 'likely unrealistic' assumption that this component can be modelled as white noise even over short periods. Nevertheless, 3.6 and 3.7 are likely to hold approximately. That is, over averages of seven years the business cycle component is essentially dead. A further issue is whether c_t is composed of more than just business cycles. Despite business cycles having little significance over seven year averages these other cycles may have a significant impact, implying a MA of observed CGDP will not perfectly reflect g_t.

High-pass (HP) filters are an alternative technique for separating the cyclical and growth component. In particular they avoid the need to make the assumptions above. Essentially HP filters pass components of the data with periodicity less than a given parameter, disregarding other cycles in the series. Once this

component has been obtained differencing it with the original series yields the desired smoothed series. Assuming the correct parameter is chosen the solution series should reflect the growth component g_t. The Hodrick-Prescott filter (Hodrick and Prescott 1997) is an approximate high-pass filter (Baxter and King 1999) that specifies the following programming model:

$$\underset{\{g_t\}^T_{t=-1}}{Min} \{\sum_{T=1}^{T} c_t^2 + \lambda \sum_{t=1}^{T} [(g_t - g_{t-1}) - (g_{t-1} - g_{t-1})]^2\} \qquad (3.8)^4$$

Where λ is a positive parameter that penalizes variability in the growth component. For studying growth episodes a λ is required that after differencing with the original series conserves cycles with a period of approximately 8 years or longer. That is, all but the medium to longer term cycles are removed from the series[5]. Examining the limits of 3.8, as λ tends to infinity $g_{t-1} - g_{t-1}$ tends to a constant. This implies the growth component has a constant growth rate (when the natural logarithm of the CGDP series is used). As λ tends to zero the series tends to the original series. This implies none of the problematic cyclical component is removed. Neither limit is appropriate. For annual data Baxter and King (1999) recommend λ =10. Here λ =25 is used. No claims are made that 25 is an optimal filter for the purposes of this study but it provides a starting point. Therefore, the Hodrick-Prescott filter with λ =25 provides an alternative means of approximately removing the cyclical component, c_t, from the CGDP, y_t, series.

The following Section proceeds using data smoothed by moving averages. The methods of Hodrick and Prescott (1997) form the subject of robustness tests.

[4] Reproduced from Hodrick and Prescott (1997)
[5] The intuition behind this specification is that one would expect the growth component g_t to vary little over short periods, hence any short-run variation is of little interest.

3.2 Methods

A country's growth rate at time t is defined as growth of the moving average series of CGDP:

$$\gamma_{y_t^{ma}} = \ln y_t^{ma} - \ln Y_{t-1}^{ma} \qquad (t = 1,2...,T) \qquad (3.9)$$

The change in the growth rate at t is then simply the difference between the current and previous year's growth rate.

$$\Delta\gamma_{y_t^{ma}} = \gamma_{y_t^{ma}} - \gamma_{y_{t-1}^{ma}} \qquad (t = 1,2...,T) \qquad (3.10)$$

Growth accelerations are identified by episodes that satisfy:

- $\Delta\gamma_{y_t^{ma}} \geq 0.02 \qquad (t = 1,2...,T) \qquad (3.11)$
- $\gamma_{y_{t+4}^{ma}} > \gamma^{MA}\{\max\} \qquad (t = 1,2...,T) \qquad (3.12)$

Similarly decelerations:

- $\Delta\gamma_t^{MA} \leq 0.02 \qquad (t = 1,2...,T) \qquad (3.13)$
- $\gamma_{y_{t+2}^{ma}} \leq \gamma_t^{MA} \qquad (t = 1,2...,T) \qquad (3.14)$

Where y_t^{MA} is the centered (3m+1) point moving average of CGDP at time t, with m=3.

The intuition behind 3.10-3.14 follow from the qualitative definition made at the outset. Conditions 3.11 and 3.13 identify significant breaks in a country's growth series. 3.12 is intended to prevent recoveries being identified as accelerations and 3.14 to ensure the end of accelerations are not identified as decelerations. Specifying a minimum percentage point (pp) change in condition 3.11 implies a somewhat subjective rather than statistical definition of significance. In fact, in a raw growth series fluctuations in excess of 2pp's are numerous. However, the MA series represents a country's 'core' economic growth cleansed of any short run high frequency fluctuations, little, if any, fluctuation in this underlying growth rate

would be expected. It becomes apparent therefore, that a 2pp break in the MA series does represent a significant event in a country's growth experience.

It is of interest to consider the duration of episodes. Notice, filtering for decelerations by condition 3.14 disregards years that mark the end point of accelerations. Making note of these and combining with accelerations found provides a means of estimating the duration of accelerations. By similar method the duration of decelerations can be found. A sustained episode is then defined as one that lasts ten years or longer[6]. Although less than perfect this exercise gives some way of systematically distinguishing between those episodes that have been sustained into the longer term and those that have not.

The Penn World Tables Version 6.1 forms the baseline data source. Of the 31 Latin American countries included, 5 with fewer than 30 entries and a population smaller than one million in their most recent entry are disregarded.

3.3 Descriptive Statistics

Applying the filter to the 16 countries in the truncated sample of Latin American yields 6 accelerations and 7 decelerations across 11 different countries between 1950-2000[7].

Table 3.1 and 3.2 report instances by initiation year, magnitude and country. The final columns refer to whether the episode was sustained into the longer term. Figures 3.1a through to 3.16a plot $\ln y_t^{MA}$ against time and mark the initiation of episodes and duration where applicable for each of the 16 countries considered.

[6] Given that episodes after 1997 cannot be identified an episode initiated after 1987 cannot be classified as sustained by this definition.
[7] The filter set out in chapter 3.2 is implemented using a series of algorithms that smooth the data and search for episodes that satisfy 3.11-3.14.

Overall instances of accelerations are low. Of 16 countries only 5 (31%) enjoyed a growth acceleration with Argentina experiencing two separate cases. Instances of decelerations are higher, 7 (43%) experienced a deceleration.

Another way to express the rate of occurrence of episodes is to estimate the unconditional probability of a growth episode. For the 16 countries data is available for 50 years, of which 15 data points are missing. A further 8 are lost due to averaging and calculating growth rates. This gives a possible 657 occasions for a growth episode. Therefore, between 1956 and 1997 the average Latin American country had a 9.1% chance of experiencing an acceleration and a 10.4% chance of a experiencing a deceleration in any decade. Hausmann et al. (2005) estimated the unconditional probability of a typical country anywhere in the world experiencing a growth *acceleration* at 35% for the same period. Latin American countries face a below average probability of experiencing a growth acceleration. These results reflect the finding in Chapter 2 that Latin America's performance over the last 50 years is generally poor.

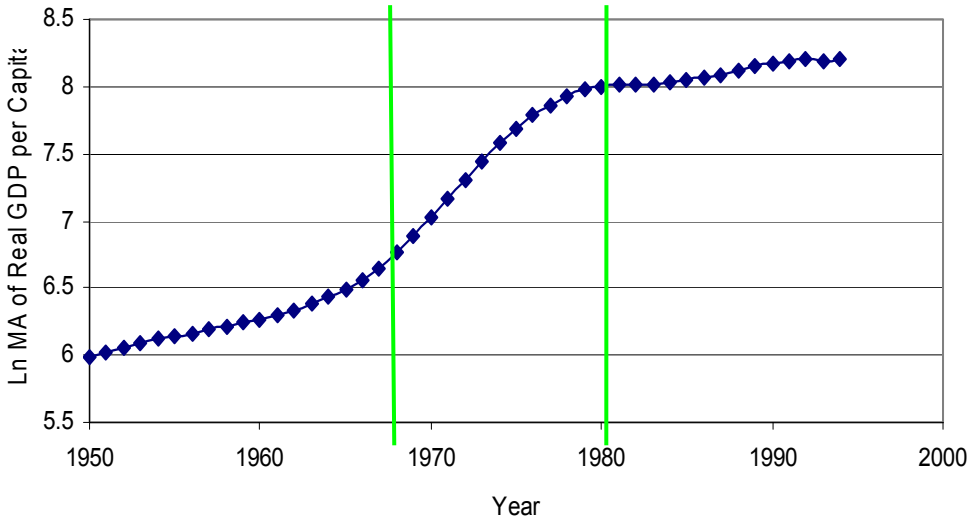
The magnitude of growth episodes is reasonably large. Accelerations are concentrated about a mean of 3.3pp's. Ecuador experienced the fastest acceleration at 5.3pp's in 1967. Decelerations average 3.5% with Nicaragua experiencing the fastest deceleration at 7.8pp in 1983. Both the sample of accelerations and decelerations have similarly low variances. Decelerations appear not only more common but marginally larger in magnitude.

With respect to decade accelerations are concentrated in the 1960s. Decelerations are more evenly distributed with at least one occurring in four of the five decades considered. However, examining growth episodes by decades

requires a caveat. Averaging entailed in smoothing data and calculating growth rates implies episodes cannot be identified before 1955 or after 1997.

Out of 6, 2 or 33% of accelerations are classed as sustained. Out of 7, 2 or 28% of decelerations identified are classified as sustained. In general it appears decelerations are marginally more likely to be sustained into the longer term.

Fig 3.6a: Example of A substantial growth acceleration. Ln of Moving Average (m=3) of Real GDP Capita Ecuador 1950 to 2000



Examining some particular cases, Figure 3.6a depicts a growth acceleration in Ecuador that was not sustained into the longer term. The key feature is the acceleration between 1967 and 1980.

Fig 3.16a: Example of a growth deceleration followed by an acceleration. Ln of Moving Average (m=3) of Real GDP Capita Venezuela 1950 to 2000

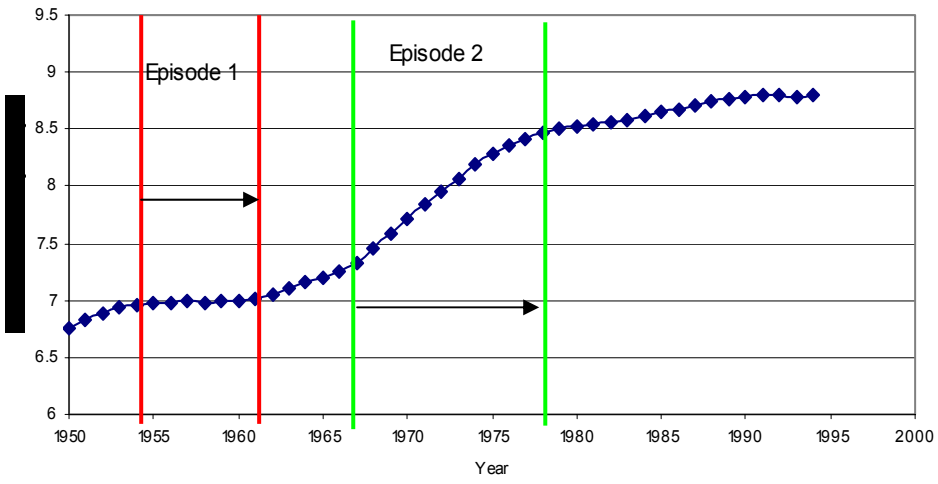
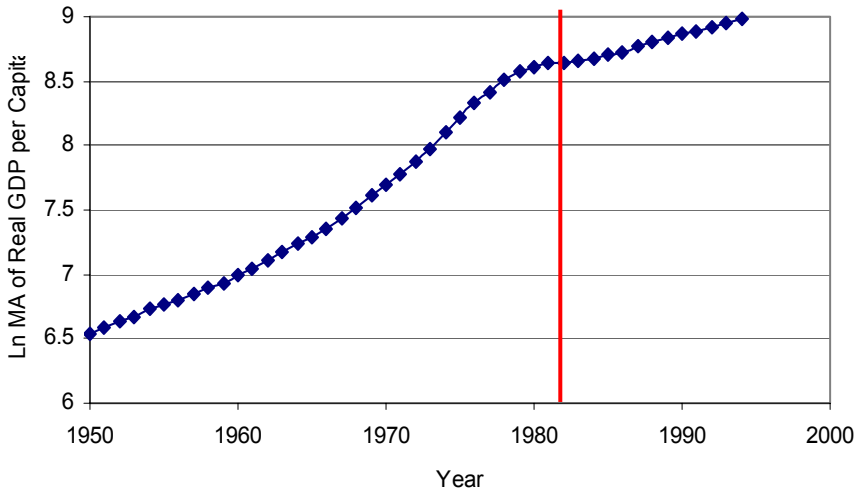


Figure 3.16a depicts a more interesting case in Venezuela of two consecutive episodes, a deceleration between 1954 and 1961 and an acceleration between 1967 and 1978 neither of which were sustained. Figure 3.10a is an example of sustained deceleration in Mexico starting in 1982. Note the y_t^{MA} series shows no sign of recovery within the observations.

Fig 3.10a: Example of a sustained growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Mexico 1950 to 2000



3.4 Robustness of Methods

Before embarking on the analysis of growth episodes three issues with respect to robustness warrant discussion: (1) methods of smoothing data; (2) assumptions and parameters; (3) data.

3.4.1 Methods of Smoothing Data

Fig 3.18: Ln of of Real GDP Capita Nicaragua 1950 to 2000

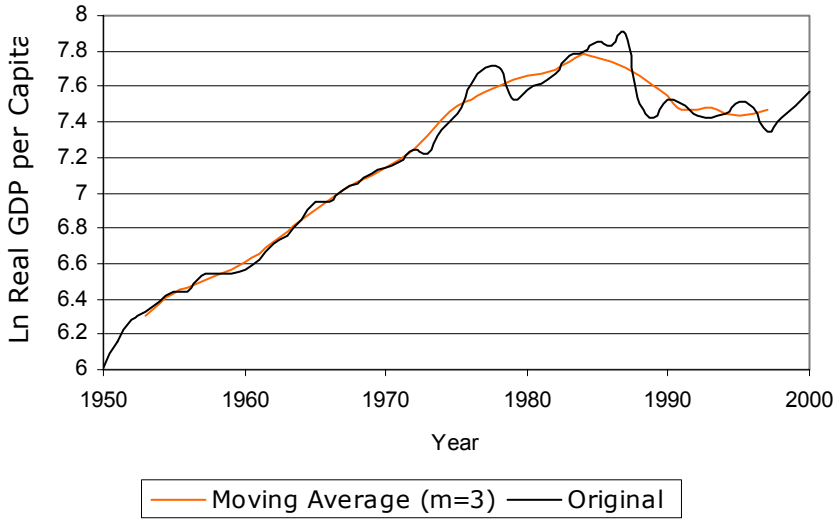
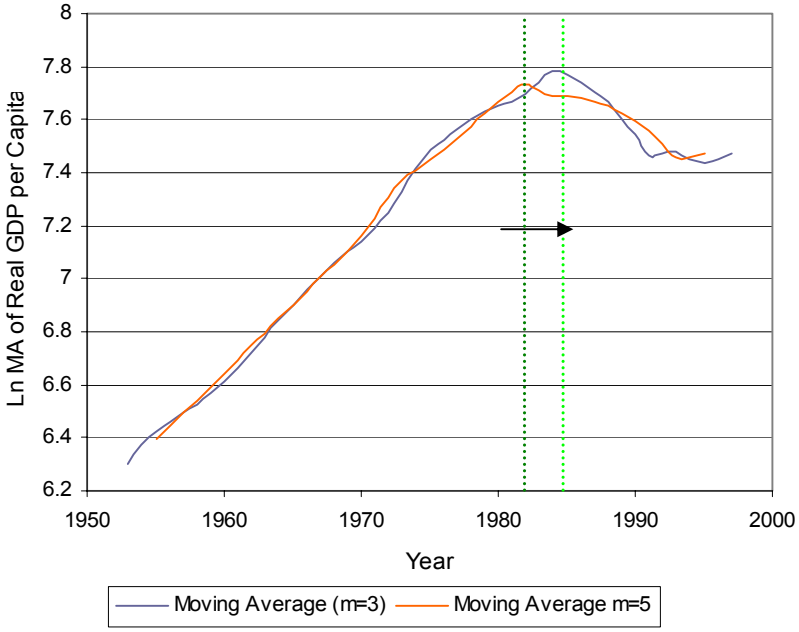


Figure 3.18 demonstrates the need to smooth CGDP series. The irregular component of Nicaragua's raw CGDP series obscures much of the underlying regularity and results in identifying numerous episodes. Filtering the raw series yields 20 episodes in Nicaragua alone, of which the majority are short, high frequency fluctuations of little value for studying growth episodes. The second series plotted in Figure 3.18, a simple centered moving average (or MA) (m=3), smoothes much of the less interesting variability. Increasing m has the expected effect, the solution series becomes smoother and fewer episodes are identified. Of the 13 episodes identified originally 7 are robust to increasing m to 5. Comparing the m=3 and m=5 solution series plotted in Figure 3.19 for Nicaragua it is

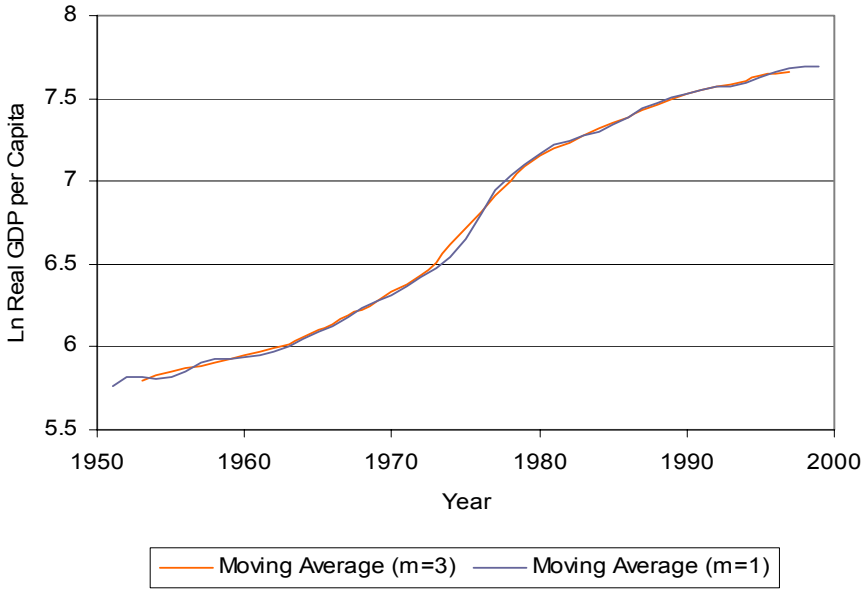
interesting to note as m rises the initiation of the 1980's deceleration moves forward from 1982 to 1985. For the set of episodes identified in both the m=3 and m=5 series the maximum discrepancy between initiation year is less than 4 years.

Fig 3.19: Ln Real GDP per Capita Nicaragua 1950-2000
Smoothed by Moving Average



A further issue with increasing m is the loss of observations due to averaging. Averaging required for m=5 looses two decelerations, Venezuela 1955 and Costa Rica 1956. Decreasing m identifies many more episodes, many of which are questionable. For instance Honduras, originally not associated with any episodes, is identified as experiencing an acceleration in 1975 when m=1 is used. The m=1 series plotted in Figure 3.20 casts doubt as to whether this a true structural break. Importantly the 13 growth episodes identified are robust reducing m to m=1.

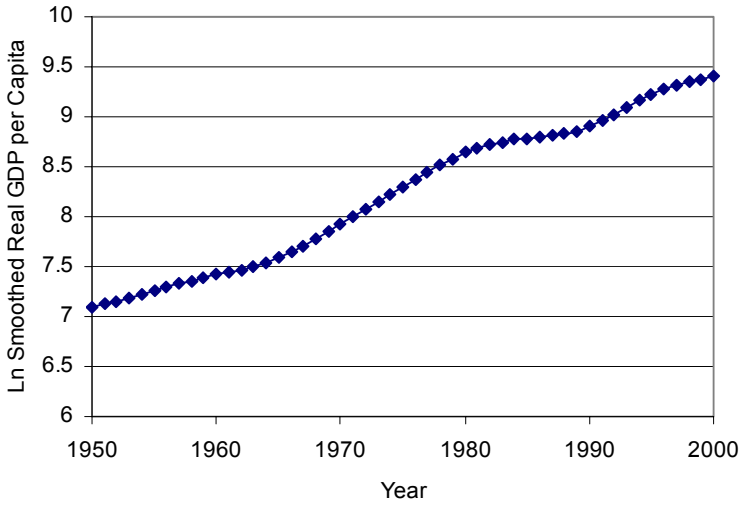
Fig 3.20: Real GDP per Capita Honduras 1950 to 2000



Of fundamental importance is whether smoothing by MA rids the data of cyclical variations while retaining the growth component. Robustness in this respect is checked by comparing the results obtained from data smoothed using the HP[8] filter discussed in Chapter 3.1. Tables 3.3 and 3.4 detail episodes found and Figures 3.1b through to 3.16b plot the solution series for each country. The results are encouraging, 5 of the 6 accelerations originally identified are robust to the change in technique. Further, Figures 3.1b through to 3.16b confirm there are no fundamental discrepancies in the shape of any country's growth history. A surprising result is a new acceleration identified in Brazil in 1968. Argentina's acceleration in 1966 is the only acceleration not robust to the technique change. A plot of the HP solution series, in figure 3.1b (reproduced on the following page for convenience), suggests that growth over the 60's has been rapid but no at no particular point did it suddenly accelerate, rather Argentina appears to have experienced a steady progression.

[8] The Hodrick-Prescott filter (Hodrick and Prescott 1997) an approximate High-pass filter is adopted.

Fig 3.1b: Ln Real GDP Capita Argentina 1950 to 2000 Smoothed using HP filter λ=25



Of the episodes identified in both the HP and MA series a maximum of 2 years discrepancy in initiation year is observed. No economy reacts instantly to political or economic reform, so such a discrepancy is relatively insignificant for the purposes of explaining episodes by such changes. Similar results are obtained for decelerations: 6 of the 7 decelerations identified in the MA series are identified in the HP, the only inconsistency arising is in the loss of a deceleration in Venezuela in 1955. Regarding years of initiation all but the deceleration in Panama in the 1980's, where there is a 2-year disparity, have the same initiation year.

A further issue with respect to the HP filter used above is whether the choice of the parameter λ is suitable. The solution series for the HP filter with λ=5, λ=25 and λ=1600 in Figure 3.21 give the expected results. Not surprisingly application of the filter to the λ=1600 series yields no episodes and to λ=5 numerous episodes. A more interesting result in Figure 3.22 is that the HP λ=25 series is virtually indistinguishable from the MA series m=3. The only diversity seems to arise following extreme periods of growth where the non-weighted averaging of the MA series still takes these into account in the following years. This result

generalizes to the set of Latin American countries. There is no reason to suspect that λ =25 is not appropriate.

Fig 3.21: Ln Real GDP Capita EL Salvador 1950 to 2000 Smoothed

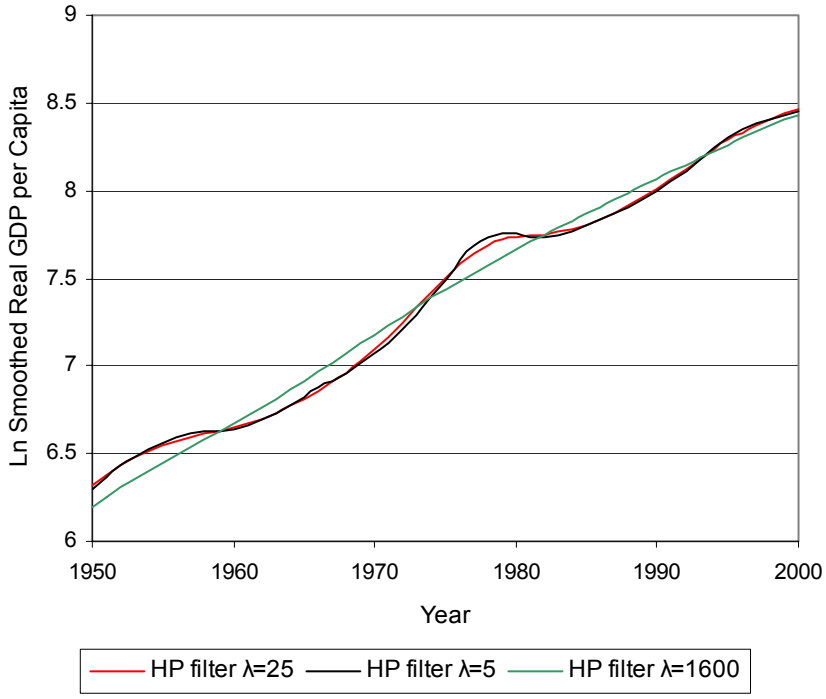
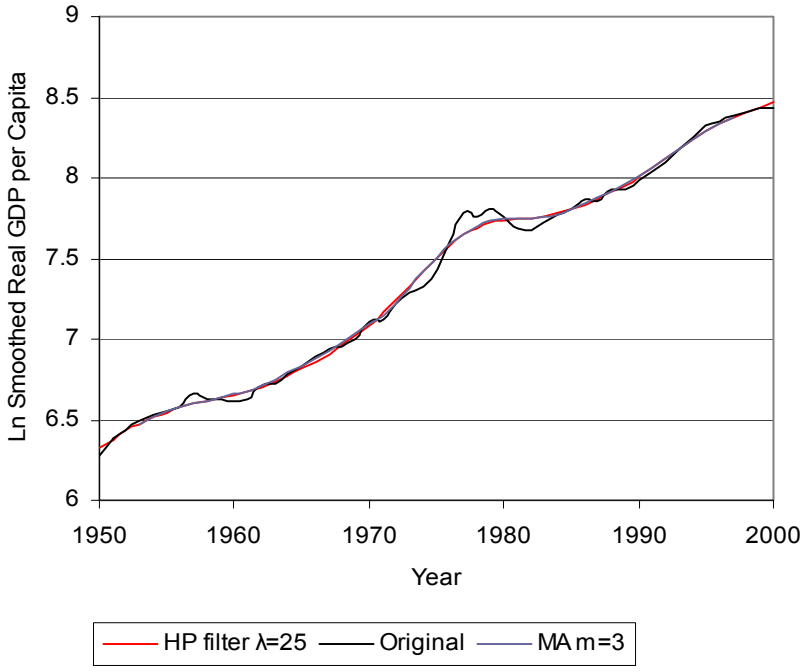


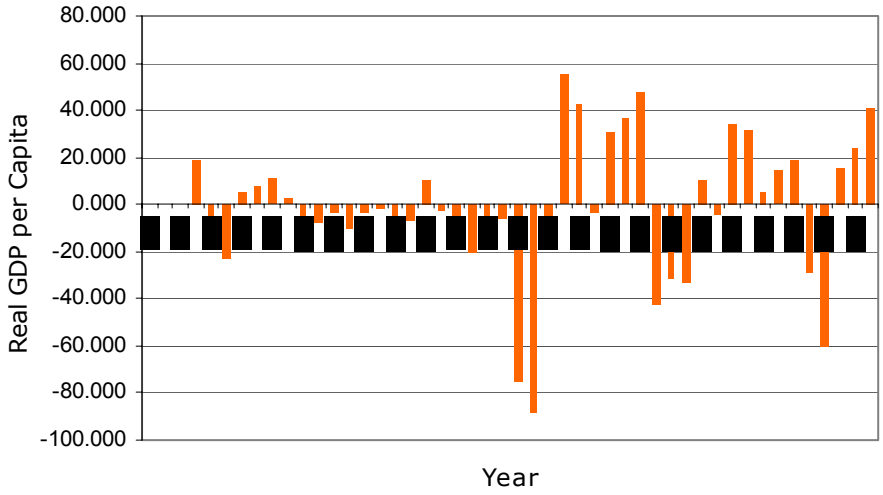
Fig 3.22: Ln Real GDP Capita EL Salvador 1950 to 2000 Smoothed. Note the similarity in the MA and HP series



3.4.2 Assumptions and Parameters Used to Define a Growth Episode

A key element of the filter is that only significant accelerations of growth are identified. There are many cases in which growth improves but does not reach the 2pp threshold of rapid. Tightening the threshold to 3pp yields 4 episodes, (87% fewer) while relaxing to 1.5 yields 26 episodes. The threshold of 2pp is defensible but remains somewhat arbitrary. The robustness of the threshold will become clearer in later Chapters when the episodes are studied in more detail.

Fig 3.23: Real GDP per Capita Honduras 1950 to 2000
Original less MA Solution Series (m=3)



A second issue is the assumption that the cyclical component is a white noise. A plot of the cyclical component, CGDP less MA (m=3), for Honduras in Figure 3.23 shows the characteristic random fluctuation of a white noise process about a constant mean. However, proportional heteroskedasticity is present. Figure 3.23 shows clearly that the variance of the series rises with the absolute value of the CGDP. Further autocorrelation exists. A Durban Watson test yields a DW statistic of 0.215 which strongly suggests autocorrelation. Given the cyclical component's variance is not constant and autocorrelation exists it cannot be modelled as a white noise. As suspected the strong assumptions made in expressions 3.6 and 3.7 are not valid.

3.4.3 Data

Unless otherwise stated Penn World Tables v.6.1 (Alan Heston et al. 2002) data is used. To ensure the estimates of growth episodes are robust to different original CGDP series the filter is implemented using data from the World Bank's Development Indicators (WDI's). Since WDI data is available from 1960, 2 of the episodes lack adequate data for comparison. Of the remaining 11 episodes 8 (72%) are identified with exactly the same date and 3 (28%) are identified as episodes with dates of initiation differing by less then three years. So on 72% of the 11 episodes there is agreement on the basics, an encouraging result.

With the addition of the Brazilian episode in 1968 and exclusion of the Venezuelan episode in 1955 the results are robust to changes in smoothing technique, parameters and data. No evidence is found to suggest m=3 where MA or λ=25 where HP smoothing is adopted are not suitable.

Tables 3.4 and 3.5 report results from Section 3.2 amended in the light of these robustness tests. These episodes form the subject of analysis in the remainder of the study.

4 Mechanics of Growth Episodes

The preceding has shown that growth episodes are a fairly common occurrence in Latin America. The data allowed 12 episodes to be identified over a time span of 46 years (1952 to 1998). Hence, in any 4 years a new growth episode is initiated. The task now is to investigate the determinants of these episodes.

4.1 Neoclassical Growth Accounting

A logical starting point for investigating the fundamentals of growth episodes is to examine their sources. Employing a traditional Solow decomposition (Solow 1957) the relative contribution of factor inputs and total factor productivity to CGDP growth can be evaluated. The standard assumptions of a neoclassical production function, perfectly competitive markets and constant returns to scale are made.

The neoclassical production function:

$$Y = F(A, K, L) \tag{4.1}$$

Where A is the level of technology, K the capital stock and L the quantity of labour. Differentiating equation 4.1 with respect to time, dividing by Y and rearranging yields:

$$\frac{\dot{Y}}{Y} = \gamma + (\frac{F_K K}{Y})(\frac{\dot{K}}{K}) + (\frac{F_L L}{Y})(\frac{\dot{L}}{L}) \tag{4.2}$$

Where F_k, F_L are factor social marginal products and γ the growth due to technological change or total factor productivity (TFP).

The assumptions imply factors are paid their marginal product and output is exhausted by factor payments. Defining α as capital's share of income:

$$\alpha = \frac{F_k K}{Y} \tag{4.3}$$

Therefore labour's share of income:

$$1 - \alpha = \frac{F_L K}{Y} \tag{4.4}$$

Subtracting the growth rate of population from both sides of 4.2 to give per capita terms and substituting in 4.3 and 4.4 yields:

$$\gamma_y = \gamma + \alpha\gamma_k + (1-\alpha)\gamma_l \tag{4.5}$$

Where γ_i is variable i's growth rate and lower-case variables represent per capita averages.

The rate of technological progress or TFP, γ, can be calculated from equation 4.5 as a residual:

$$\lambda = \gamma_y - \alpha\gamma_k - (1-\alpha)\gamma_l \tag{4.6}$$

The supply of capital per capita evolves overtime as the result of investment decisions:

$$\begin{aligned} \dot{k}_t &= I - (\delta + n)k_t \\ \frac{\dot{k}_t}{k_t} &= \frac{I}{k_t} - \delta - n \\ \gamma_{k_t} &= \frac{I}{k_t} - \delta - n \end{aligned} \tag{4.6}$$

Where δ is the capital depreciation rate and n the population growth rate. A depreciation rate of 0.07 is assumed. The initial capital stock[9] k_t is imputed by the perpetual inventory method.

[9] The initial capital stock is determined for each country assuming that investment grows in the unobserved pre-period at the same rate as the first ten years of the sample.

Given that $\gamma_y, \gamma_l, \gamma_k$ are either observed or imputed and γ is a residual from 4.6, expression 4.5 can be used to account for the sources of growth across episodes. Before this methodology can be applied two further empirical issues must be addressed.

Firstly, the growth rate of labour input is specified in the Solow Model as the growth rate of hours worked. However, panel data for hours of work is not readily available for the set of Latin American countries. The economically active population, obtained from the Oxford Latin American Economic History Database (Astorga, P. et al. 2003), provides a proxy for hours of work.

Secondly, α is typically taken as $0.\dot{3}$ for developed countries. De Gregorio (1992) estimates α over 12 Latin American countries for the period 1950-1980. The results suggest a labour share of income (1-α) between 0.39 and 0.58, considerably lower than that used as standard. The contrast can be explained by the prevalence of imperfect competition and increasing returns to scale in developing countries. However, there is reason to believe that the lower value, 0.33, is excessively small. Harberger and Wisecarver (1977) found the existence of independent workers, whose income share is imputed to capital rather than labour, causes labours share to be underestimated in such regression analysis. From this α is taken to be 0.4.

A final concern is the limitations of basic growth accounting. The method adopted takes no account of improvements in human capital. Particularly in developing regions such as Latin American policy often promotes education. Neglecting human capital means neglecting a possible source of growth. As a result the contribution of capital or TFP is likely to be overstated. Utilization of both physical and human capital is also ignored. Some of the relatively short episodes of 4-5

years may be rooted in factor utilization increases[10]. Once again this results in TFP being overstated. In general drawing conclusions from TFP requires a caveat. By definition the Solow residual assumed here as synonymous to TFP includes any measurement errors in capital and labour accumulation. Clearly the Solow residual will rarely reflect TFP perfectly.

4.2 Factor Accumulation

Tables 4.1 and 4.2 detail the basic results of growth accounting across growth episodes as defined in Section 3. The first Table considers growth accelerations and the second decelerations. Each gives the average contribution of factor accumulation and TFP for the five years preceding and proceeding growth episodes as well as the point change.

Looking first at accelerations, the growth rate increases on average by 5.17 percentage points (pp's). Growth preceding each is positive indicating the accelerations found are more than just recoveries; these are substantial changes with large implications for per-capita income.

Physical capital and labour accumulation have a modest role in explaining accelerations. Physical capital accounts for 15% and labour for an even more modest 7.30% of the average acceleration in growth across episodes. Although both capital and labour play a minor role capital appears marginally more important across accelerations.

Examining individual experiences Venezuela's acceleration in 1967 and Brazil's in 1968 are the only episodes where capital explains a larger proportion (37% and

[10] Following the techniques of Collins and Bosworth (1996) a seemingly obvious solution is to include measures that account for utilization and human capital formation. However, suitable panel-data is inherently difficult to obtain for the set of countries studied.

35% respectively) of the increase in growth. Surprisingly, accelerations in Brazil 1968 and Ecuador 1969 are associated with decreases in labour accumulation rather than increases as would be expected, although the significance is questionable. Elsewhere, the conclusion that factor accumulation plays a modest role seems reasonable.

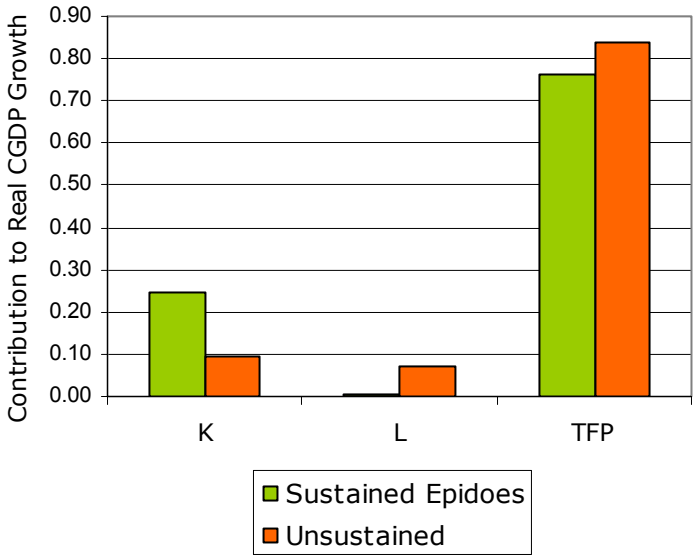
Similar to accelerations, decelerations are associated with large changes in income growth. The average growth rate across the region decreases by 7.6pp's. Physical capital has a modest role, explaining 18% of the deceleration in growth whilst labour contributes virtually nothing, explaining only 1.34%.

Individual experiences once again give some exceptions to the general trend. Decelerations in Panama 1983 and Peru 1982 are associated with small increases, rather than decreases in labour accumulation. However, given the economically active population (EAP) proxies for hours worked it is not surprising to observe continued rises in labour accumulation despite a growth deceleration. Natural population growth leads inevitably to increases in the size of the EAP whether there are job openings or not. In general decelerations seem associated more heavily with falls in capital than labour.

Distinguishing among sustained and unsustained episodes (as defined in Chapter 3.2) it appears that on average both sustained accelerations and decelerations are associated with a larger share of capital. Figure 4.1 draws a direct comparison between sustained and unsustained episodes by aggregating accelerations and decelerations according to duration. Capital, clearly, plays a larger role over sustained episodes. Examining Tables 4.1 and 4.2, on average capital explains a reasonable 27% of the growth observed across sustained accelerations. Across unsustained accelerations capital explains a more modest 4%. Across sustained and unsustained decelerations capital explains 30% and 14% of the growth

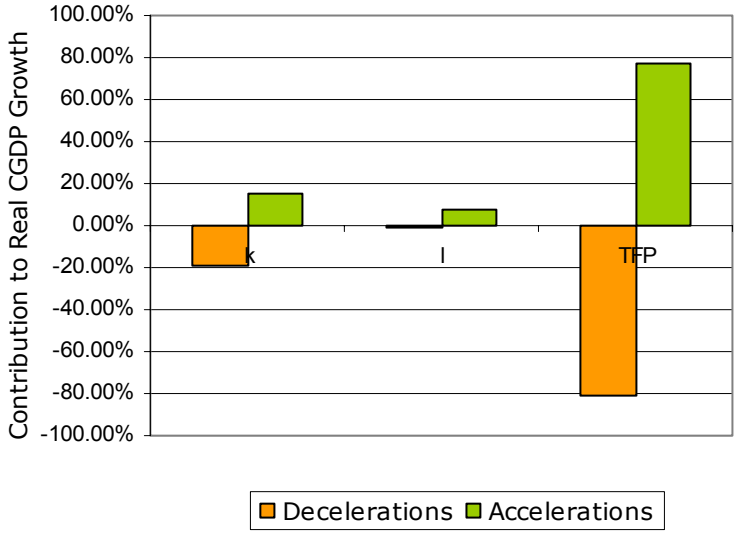
respectively. With respect to labour there is no systematic pattern. This suggests capital accumulation, hence investment is an important determinate of the duration of episodes.

*Fig 4.1: A Comparision of Sources of Growth Across Sustained and Unsustained Epiodes**



**Average includes both accelerations and deccelerations*

Fig 4.2: A Comparison of Sources of Growth Across Growth Accelerations and Decelerations*



**Average point change in contributions of K,L, TFP*

Figure 4.2 draws comparison between growth accelerations and decelerations. Labour tends to play a larger role in accelerations. Whereas capital plays a larger role in decelerations. A two-sample t-test of the null hypothesis that the changes are symmetric confirms that accelerations and decelerations are asymmetric events with respect to both capital and labour accumulation. A p-value of 0.00 for labour accumulation and 0.028 for factor accumulation allows the null hypothesis to be rejected at the 95% confidence level.

The primary conclusion is that accelerations and decelerations are asymmetric events. Labour accumulation tends to play a larger role in accelerations whereas capital accumulation plays larger role in decelerations. With respect to duration, capital accumulation tends to be more significant when episodes are sustained into the longer term. This suggests investment maybe a critical feature of sustained episodes. In general neither of the observable factors explain a large proportion of the growth implying growth episodes are largely an efficiency story.

4.3 Sources of Productivity Gains

As the residual of growth accounting TFP is left as the primary explanation of growth episodes. A natural question to ask is where these changes in productivity come from.

Growth literature tends to point toward the re-employment of existing factors in more or less productive combinations as the source of TFP changes. A more precise view of the production function set out in Section 4.1 (equation 4.1) would recognize that 'aggregate output is the summation of various outputs produced using different production processes' (Torado and Smith 2006).

$$Y = \sum_i p_i F_i(A_i, K_i, L_i)$$

Where i represents different production processes. TFP improvements could come from re-allocating capital or labour or alternatively by increasing the productivity of a particular process.

This Section analyses two areas that suggest that the re-allocation of resources between sectors can lead to the dramatic shifts in TFP observed across growth episodes. Firstly, international trade is considered. Secondly, shifts in labour employment.

4.3.1 International Trade

A basic source of productivity gains may be increased openness. Beyond the classic Ricardian reasons, re-allocation of factors towards comparative advantage, openness may increase productivity through enhanced technology spillovers and increased scale economies.

Table 4.3 shows that changes in the share of GDP traded are substantial across accelerations. A short run (5-year) comparison of the average share of GDP traded shows trade increases by 23% and over the longer run (10 years) increases further to 39%. These large increases in trade are due on average in equal parts to expanding shares of exports and imports, with little shift in the trade balance. However, Table 4.5 demonstrates this average precludes some extreme variation between countries. For instance Paraguay's acceleration in 1986 is associated with a significant increase in imports and a fall in exports while in Brazil's acceleration in 1969 exports increased by 70% more than imports. Thus the evidence is mixed regarding the relative importance of exports versus imports.

Trade expansions are difficult to incorporate in growth accounting since sector-level panel data is not observed for Latin America. However, generally speaking the trade literature shows some association between trade shares and greater per-capita income. Frankel' and Romer's (1999) instrumental variables estimate of the casual effect of trade shares suggests a 30% increase in the trade share implies a 60-70% expansion in per capita income. Although highly approximate this suggests trade may be a critical component of growth accelerations.

Growth decelerations show no systematic changes in trade shares. Examining Table 4.5 it is clear that the importance of trade depends primarily on the individual country. A similar result follows for the shares of imports and exports reported in Table 4.6.

Making the distinction between sustained and unsustained episodes experiences vary between countries. Among both sustained and unsustained episodes the size and share of trade expansions show no consistent pattern.

Given that substantial trade expansions are found across accelerations it is important to ask whether these events are associated with terms of trade shocks. Easterly et al. (1993) argue that shocks to the terms of trade are an important determinate of variations in growth rates over periods of ten years. Table 4.7 shows modest terms of trade changes across accelerations. Both the short and longer run comparisons give an insignificant worsening, -2.7 and -.0.5 respectively. With respect to decelerations a similar result holds with the exception of El Salvador where a significant improvement in the terms of trade has been experienced. On the whole it seems episodes are not related to terms of trade shocks, implying trade policy is behind these changes rather than the 'luck of international prices' (Easterly et al. 1993).

4.3.2 Labour Employment

There is a long standing view, particularly amongst development economists, that moves out of agriculture and into manufacturing may bring growth. A fundamental theory of development, the Lewis Theory (Lewis 1954), attributes industrialization and the associated rapid growth entirely to the movement of labour out of the 'backward' traditional sector into the modern capitalist sector. More generally manufacturing may be intrinsically more productive and may also provide learning-by-doing-spillovers[11]. Literature provides a strong case for the association of labour re-allocations and progressive increases in growth. The question is can such lead to the rapid growth observed across episodes.

Labour re-allocations are investigated using panel data from the Oxford Latin American Database. Particular attention is paid to the growth rate of labour in manufacturing versus agriculture.

Table 4.8 reports the growth rate of number economically active in manufacturing and agriculture as a percentage of the total economically active population. Accelerations are associated with a reasonable increase in the manufacturing labour growth rate, on average 2.2 percentage points, and a small decrease in the agricultural labour growth rate, on average -0.2 percentage points. Meanwhile decelerations are associated with a reasonable decrease in the manufacturing labour growth rate and with little change in the agricultural labour growth rate. This suggests that changes in the manufacturing labour growth rate could play a role in growth episodes while changes in the agriculture growth rate are relatively insignificant.

[11] Demonstrated for instance by Kuznets (1953)

Another feature of Table 4.8 is the general association between higher absolute levels of labour growth in manufacturing and accelerations. Countries that experience accelerations tend to have faster labour growth in manufacturing. However, Columbia an exception to this general trend stands as a reminder that comparative advantage cannot be ignored. Columbia achieved a growth acceleration in 1968 with relatively slow manufacturing labour growth. A probable explanation is Columbia's highly productive agriculture[12]. An explanation confirmed to some extent by Columbia's relatively high agricultural labour growth rate.

Comparing labour growth rates across sustained and unsustained episodes there appears little difference in either manufacturing or agricultural labour growth rates. In fact at the 95% confidence level a hypothesis test confirms that there is no significant difference in either manufacturing or agriculture labour growth rates between sustained and unsustained episodes.

Overall the results in this Section show that changes in trade can be associated with accelerations and significant moves into and out of manufacturing associated with both accelerations and decelerations. This provides evidence that the re-allocation of resources towards and away from higher productivity sectors could be a driving force behind the changes in growth across episodes. In terms of duration the evidence shows that productivity gains are less critical. Here the decisive feature tends to be investment.

[12] Discussed by Perkins et al. (2001) Chapter 15

5 Association with Policy

The analysis of Chapter 4 established productivity as the force driving growth episodes. Although a fundamental result this conclusion is rather bland in terms of active economic policy. To relate the findings of the preceding Chapters to economic policy this final Chapter considers variables that fit into three broad policy areas. Variables that reflect international policy, domestic policy and monetary policy are considered. The purpose is not to make statements about the direction of causality between variables examined and the dramatic changes in growth observed; rather, examining changes in other variables during growth episodes is intended to further the understanding of how these events relate to economic policy.

5.1 International and Domestic Policy

A view extending back to Adam Smith argues that barriers to competition discourage innovation and impede improvements in productivity. The literature suggests reducing competition is detrimental to productivity through the channel of 'X inefficiency' where organizations fail to produce at minimum cost[13]. In particular Cole H.L et al. (2004) show significant barriers raised by many Latin American countries go some way to explaining the regions poor economic performance over the last 50 years. A natural question to ask is can policy towards international and domestic markets be associated with the dramatic productivity changes observed across episodes.

[13] A number of Economists have developed formal models that generate low productivity as an outcome of competitive barriers including Parente and Prescott (1994, 1999) and Holmes and Schmitz (2001)

5.1.1 International Trade

A logical starting point given the large trade expansions found across episodes is to consider policy with respect to international trade. Trade liberalization is investigated using the Sachs-Warner-Wacziar-Welch (SWWW) index. The index is intended to capture changes in economy's openness but as argued by Rodriguez and Rodrik (2001) the index incorporates measures of structural and macroeconomic reform. The index is taken here as indicating substantial economic reforms toward free trade, essentially trade liberalization.

Table 5.1 shows that accelerations can be associated with trade liberalizations. Out of 6, 2 or 33% of accelerations are initiated within three years of trade liberalization. Further, 3 out of 6 or 50% are initiated during a period of uninterrupted openness. In part this result confirms the association between trade expansions and growth accelerations. It also provides evidence that active policies towards free trade can be associated with accelerations.

Brazil experienced one of the few accelerations that took place neither close to a trade liberalization nor during a spell of openness. This exception is well documented[14] and suggests that inward looking polices do not preclude growth accelerations nor are they a sufficient condition for decelerations.

Surprisingly Table 5.1 gives no evidence to suggest that the initiation of sustained accelerations is related to trade liberalization. Of sustained accelerations 100% are initiated in periods outside uninterrupted trade openness. However, the data is silent regarding trade liberalization's role in maintaining accelerated growth after initiation.

[14] See A. C. Pinheiro, A. C. (2001) for a discussion.

Decelerations, by comparison, tend to occur during periods of protection. No deceleration shares an initiation year within three years of a trade liberalization. Further, 1 or 16% take place during a period of uninterrupted openness. Distinguishing between sustained and unsustained decelerations there appears no systematic pattern. In fact 50% are sustained despite a spell of uninterrupted openness.

The results suggest that policy towards free trade and international competition increase the likelihood of experiencing a growth acceleration. On some occasions such policies link directly with the initiation of an acceleration. The opportunity for accelerations under protectionist polices also cannot be ruled out.

5.1.2 Domestic Markets

With respect to domestic policy, analysis focuses on labour and capital market policies.

Chapter 4.2 documented the relationship between sustained episodes and capital accumulation. Poorly functioning capital markets tend to impede capital accumulation, hence are a potential barrier to the productivity gains observed across sustained accelerations.

Government ownership of banks provides a proxy for the functioning of capital markets[15]. Table 5.2 shows some association between accelerations and government bank ownership. On average countries that experience growth accelerations have a 10 percentage point lower level of government ownership. It

[15] Cole H.L et al. (2004) argue the extent of government bank ownership indicates how bank lending is preferably directed to politically connected enterprises. This inhibits competition and productivity gains particularly in an environment of high entry costs and liquidity constraints.

is interesting to note the general decline in government bank ownership documented in Table 5.2 coincides with the lower propensity for decelerations in the late 1980's and 1990's.

As suspected sustained accelerations are associated with lower average levels of government ownership, 64% for sustained versus 72% for unsustained. Comparing sustained and unsustained decelerations the results are mixed. Panama's 1983 sustained deceleration is associated with the sample's lowest level of government ownership, while Peru's 1982 deceleration, the only other sustained deceleration, is associated with above average government ownership.

Another feature of growth episodes, documented in Chapter 3, was the role of labour accumulation. Table 5.3 reports the expected discounted cost of conforming to various labour market regulations, providing an indication of the level of regulation. Cross country comparisons suggest accelerations are related with marginally higher levels of regulation, a surprising result. Total costs of conforming are on average 15% higher across accelerations. However, 3 of the 7 measures disagree with this result. A possible explanation is that labour market regulation maybe a feature of more developed, healthy labour markets. In this case labour regulation may well be associated with growth accelerations.

It is difficult to investigate these weak associations further since labour regulation panel data is not readily available. However, contrary to the result above the labour literature shows broadly that greater labour regulation leads to lower productivity (Heckman and Pages 2003). The results are, therefore mixed. The impact of labour regulation seems to depend largely on the individual episode.

Domestic policy towards capital markets it would seem is important for growth accelerations, particularly those that are sustained for ten years or longer. The

evidence in terms of the labour policies considered is mixed, a surprising result in light of the substantial labour movements across accelerations documented in Chapter 4. However, the results do not preclude other policy areas related to labour, not captured by the variables considered, from having an association with growth episodes.

5.2 Monetary Policy

Misguided monetary policy frequently results in high inflation implying that inflation rates give some indication of the integrity of monetary policy. Table 5.4 shows that growth decelerations are associated with increases in inflation. On average inflation rises by 25 percentage points across decelerations. This result includes Nicaragua's hyperinflation in the 1980's and a number of episodes of relatively high inflation elsewhere. Overall 3 out of the 5 decelerations documented in Table 5.4 show increases in inflation. The observed inflation is surprising considering that the typical contraction would present deflationary pressure. This suggests that inflationary price instability is more likely a *cause of* rather than a *consequence of* these contractions. Growth accelerations, by comparison show no significant increase in inflation.

On average, distinguishing between sustained and unsustained episodes, sustained decelerations show a modest 5 point drop in inflation. Meanwhile, unsustained show a substantial 54.5 point rise. Once again, this rise in the price level, despite the deflationary pressure of a contraction, implies that inflationary price instability is a likely *cause* of temporary decelerations. While, inflationary price instability is a likely *consequence* of sustained decelerations. The results point towards inflationary monetary polices as a cause of temporary growth decelerations.

The evidence suggests that sound monetary policy helps to avoid short run decelerations but does necessarily provide immunity from sustained decelerations.

5.3 Implications for Policy

Overall the results in this Section show, not surprisingly, that policies that promote international trade, the functioning of capital markets and sound monetary policy improve the likelihood of growth acceleration. It is tempting to dismiss such 'Washington Consensus' type policies as ground covered by more traditional growth analysis. However, by definition of growth episodes the associations documented above imply dramatic shifts in growth, rather than progressive changes.

More interestingly, changes in policy can on occasion be linked directly with accelerations. That is, in certain cases a policy move towards trade liberalization for instance will accelerate underlying economic growth by 2 percentage points or more. In general, the evidence suggests that no single policy area is sufficient for triggering growth acceleration. Rather a combination where some policies reflect the idiosyncratic characteristics of a country are required.

An encouraging result is that no evidence is found to suggest a movement towards increases in international or domestic competition trigger decelerations. Such evidence discounts arguments for protection on the grounds of competition 'hurting' industries key for growth.

On the whole the results imply economic policy has a central role in accelerating the processes of economic growth.

6 Conclusion

This study has presented a number of stylized facts to describe growth episodes. Dramatic shifts in growth are shown to be a ubiquitous feature of Latin American's growth experience occurring at intervals of 5 years or less. The majority of these episodes represent a significant event in terms of determining present day income with often the difference between achieving convergence or stagnation being a single episode. Perhaps the most promising result is that rapid growth over the medium term is well within reach of most Latin American countries.

Methods of identifying and classifying growth episodes received considerable attention. The problem of identifying episodes is shown to be inherently a problem of identifying significant breaks in the structural economic growth rate of a country. The efficacy of both moving averages and high-pass filters for removing problematic growth components are demonstrated. Only minor discrepancies in initiation year and duration are encountered when the various parameters of the final filter are altered. The analysis gives no reason to believe that the filter developed is not suitable for use over larger subsets of countries.

After systematically identifying the initiation of growth episodes growth accounting is used to decompose shifts in growth. Episodes are found to be rooted in TFP changes rather than accumulation of observable factors. Neither capital nor labour play a major role, however it is suggested that this may be a result of the limitations of basic growth accounting. The primary source of productivity gains is shown to be the re-allocation of resources towards those activities with higher productivity levels. In particular, trade expansions and labour movements towards manufacturing, where this represents comparative advantage, are shown to be significant across accelerations. Productivity shifts across decelerations are suggested to be the result of more idiosyncratic events. That is the explanatory

variables considered are not adequate in fully explaining rapid productivity slowdowns; productivity across decelerations is certainly an area for future research.

Regarding the duration of episodes the decisive feature of those sustained is found to be investment. Particularly amongst decelerations capital collapses lead to poor performance for ten years or more. Shorter episodes are shown to be associated less with capital and more with TFP. The evidence also points towards inflationary price instability being responsible for temporary decelerations.

Accelerations and decelerations are shown to be asymmetric events. Relative to decelerations, accelerations show: (1) Less capital whilst more labour accumulation. (2) Larger trade expansions. (3) Faster growth in manufacturing with slower growth in agricultural labour. (4) A closer association with trade liberalization.

In terms of policy the results point towards focusing on ways to improve the efficient use of resources. In particular, an avenue of trade liberalization, improved market functioning and strong incentives for investment may directly trigger a growth acceleration or provide the conditions where sustained accelerations are more likely. Sound monetary policy on the whole helps avoid temporary decelerations but does not necessarily provide immunity from sustained episodes of decline.

To close attention is drawn to an almost palpable, yet noteworthy message that lies implicit throughout the analysis: Accelerating the process of economic growth in a sustained manner is as much a challenge of avoiding deceleration as promoting acceleration.

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Figures

Fig 3.1a: Ln of Moving Average (m=3) of Real GDP Capita Argentina 1950 to 2000

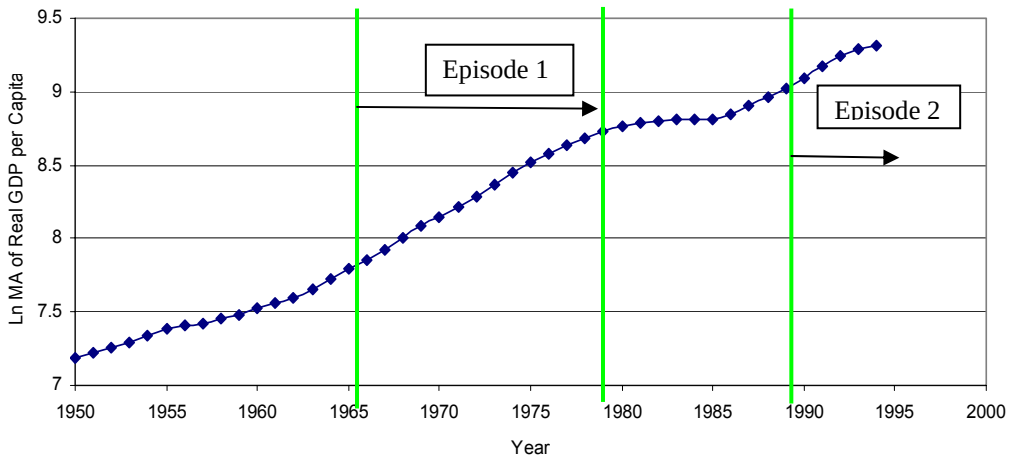


Fig 3.1b: Example of a growth acceleration. Ln Real GDP per Capita Argentina 1950 to 2000 Smoothed using HP filter λ=25

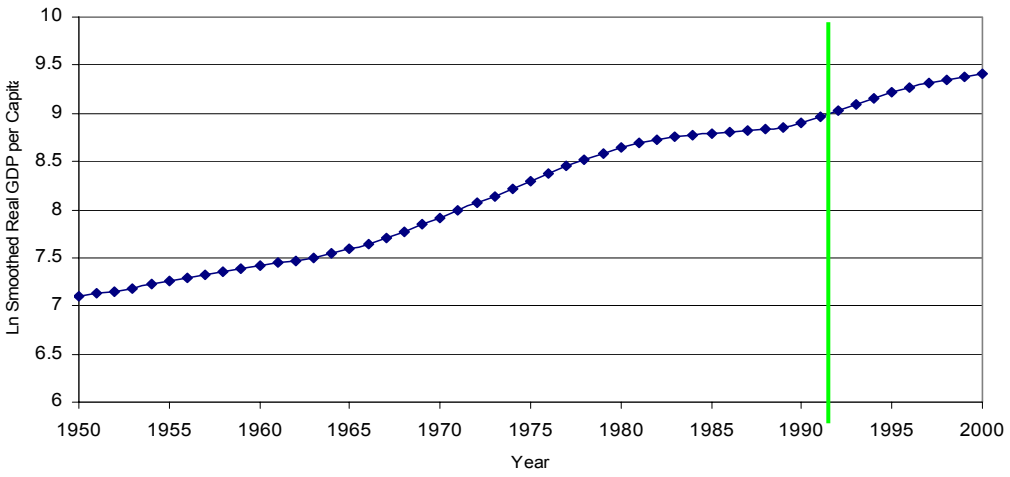


Fig 3.2a: Ln of Moving Average (m=3) of Real GDP Capita Brazil 1950 to 2000

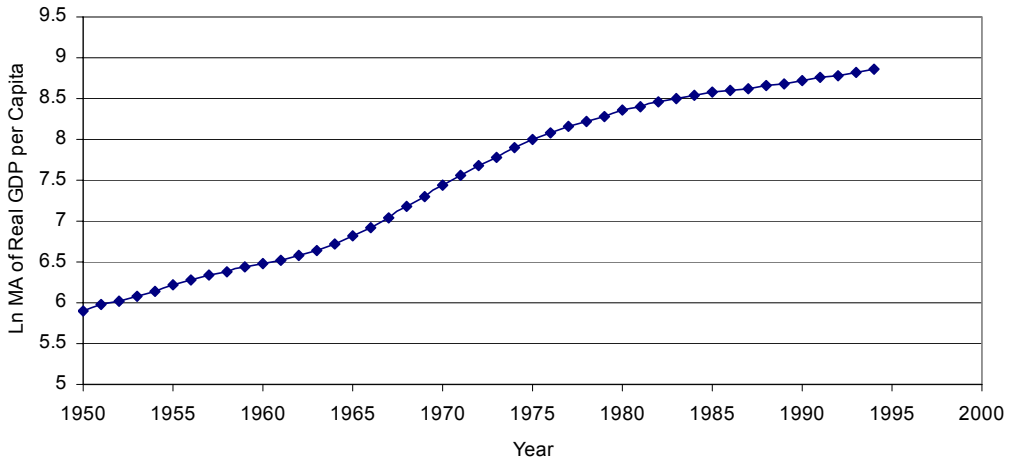


Fig 3.2b: Example of growth acceleration. Ln Real GDP Capita Brazil 1950 to 2000
Smoothed using HP filter λ=25

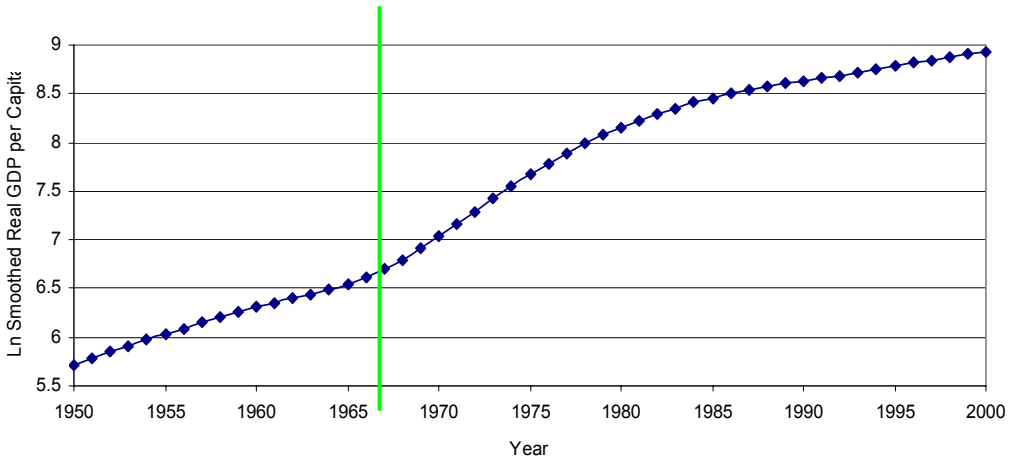


Fig 3.3a: Ln of Moving Average (m=3) of Real GDP Capita Chile1950 to 2000

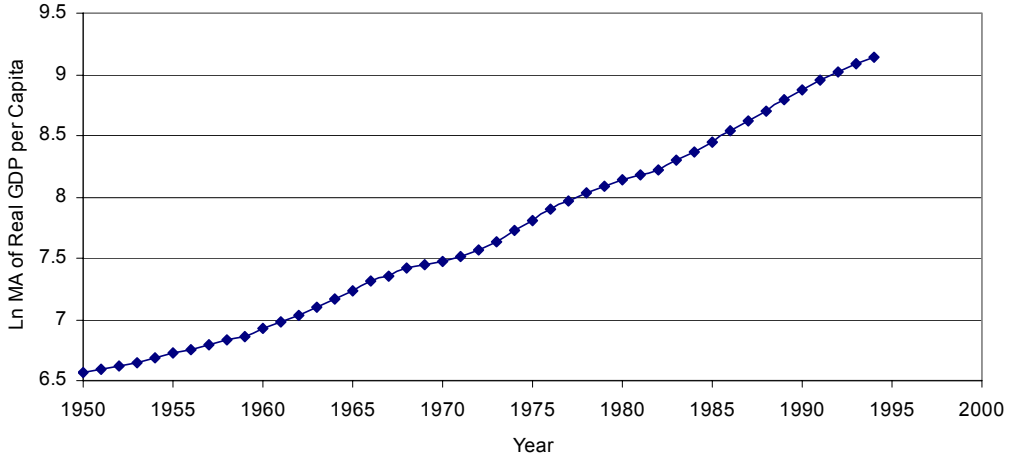


Fig 3.3b: Ln Real GDP Capita Chile 1950 to 2000 Smoothed using HP filter λ=25

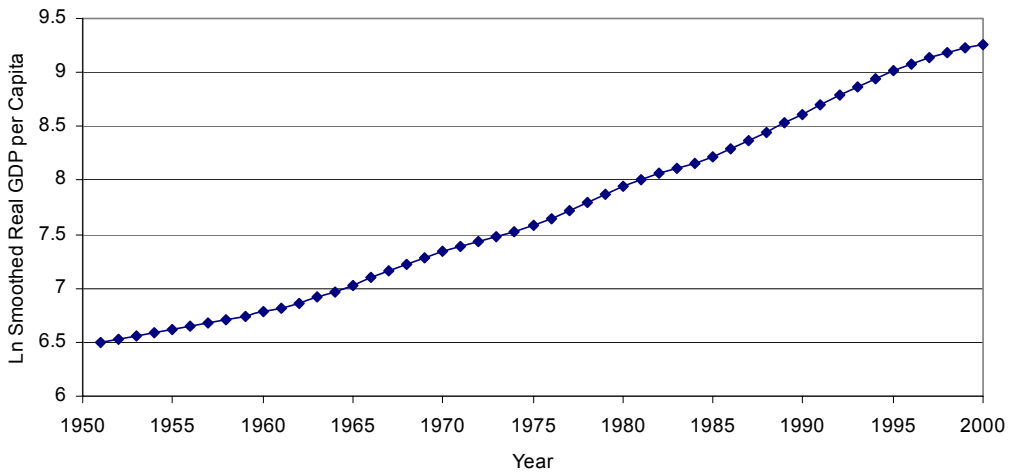


Fig 3.4a: Example of a sustained growth acceleration. Ln of Moving Average (m=3) of Real GDP Capita Columbia 1950 to 2000

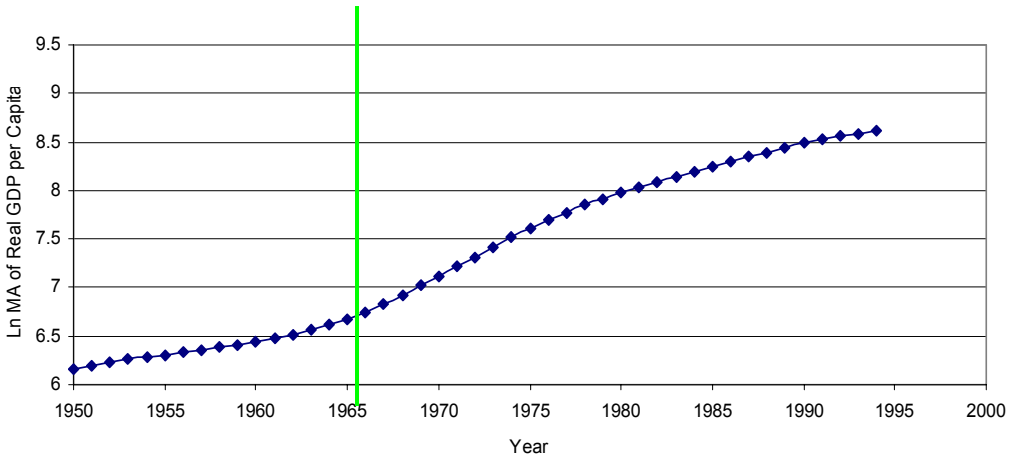


Fig 3.4b: Example of a sustained acceleration. Ln Real GDP Capita Columbia 1950 to 2000 Smoothed using HP filter λ=25

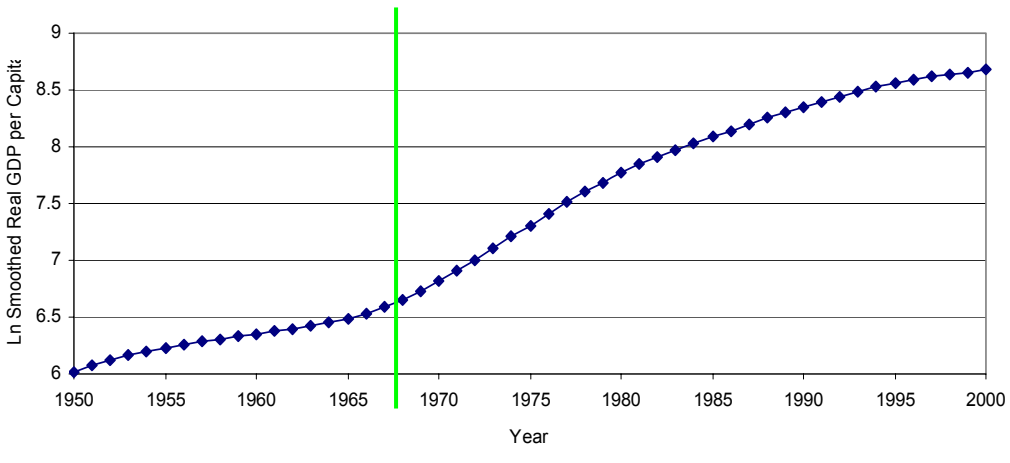


Fig 3.5:a Example of a short growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Costa Rica 1950 to 2000

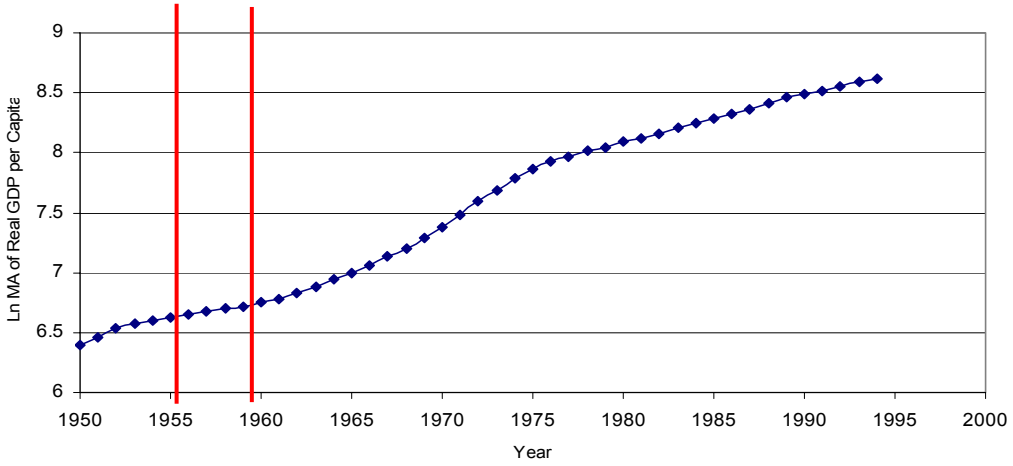


Fig 3.5b: Example of growth deceleration. Ln Real GDP Capita Costa Rica 1950 to 2000 Smoothed using HP filter λ=25

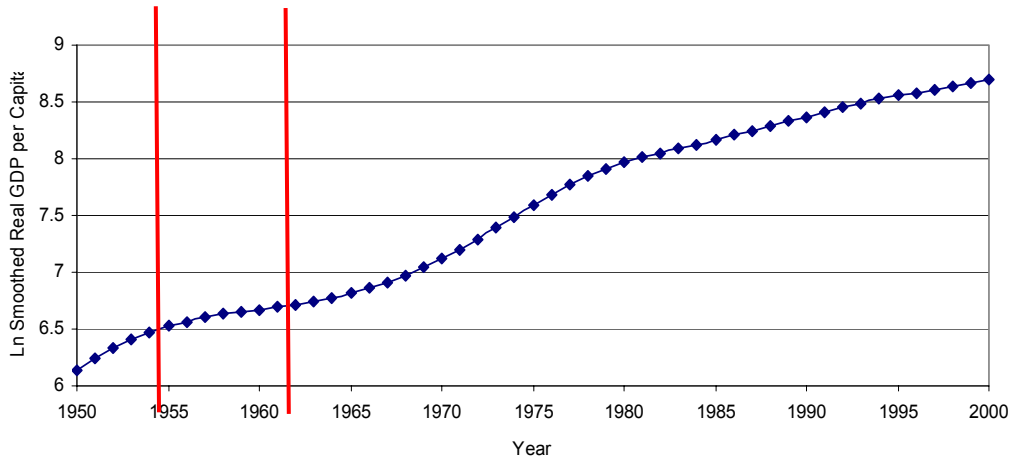


Fig 3.6a Example of A substantial growth acceleration. Ln of Moving Average (m=3) of Real GDP Capita Ecuador 1950 to 2000

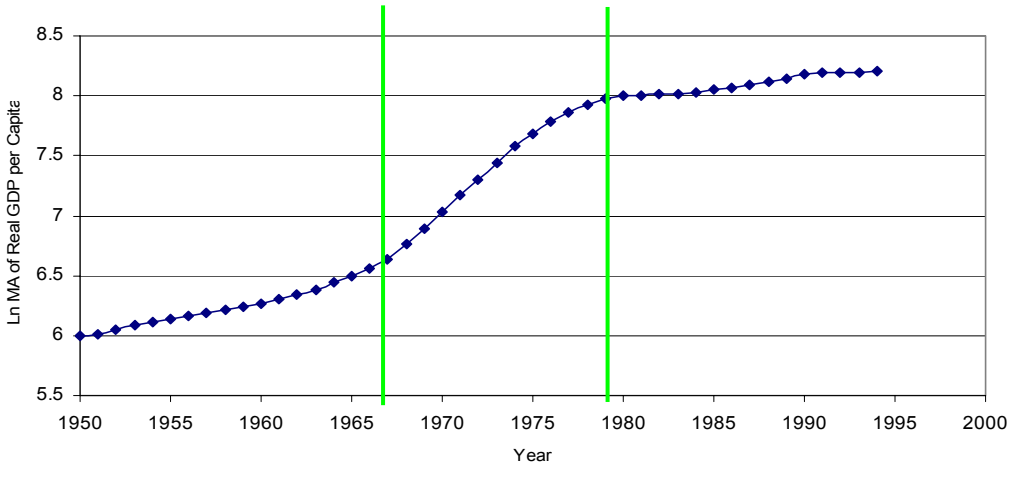


Fig 3.6b Example of a substantial growth acceleration. Ln Real GDP Capita Ecuador 1950 to 2000 Smoothed using HP filter λ=25

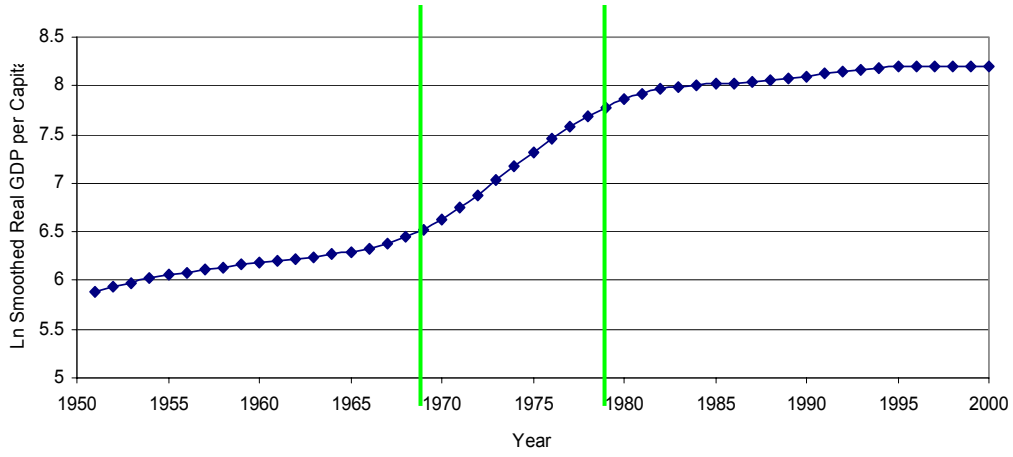


Fig 3.7a: Example of short growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita El salvador 1950 to 2000

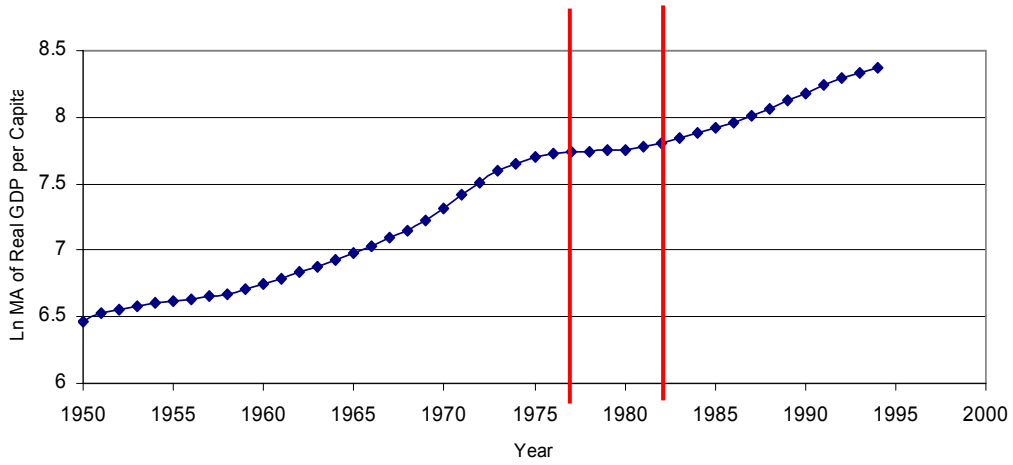


Fig 3.7b: Example of short growth deceleration. Ln Real GDP Capita EL Salvador 1950 to 2000 Smoothed using HP filter λ=25

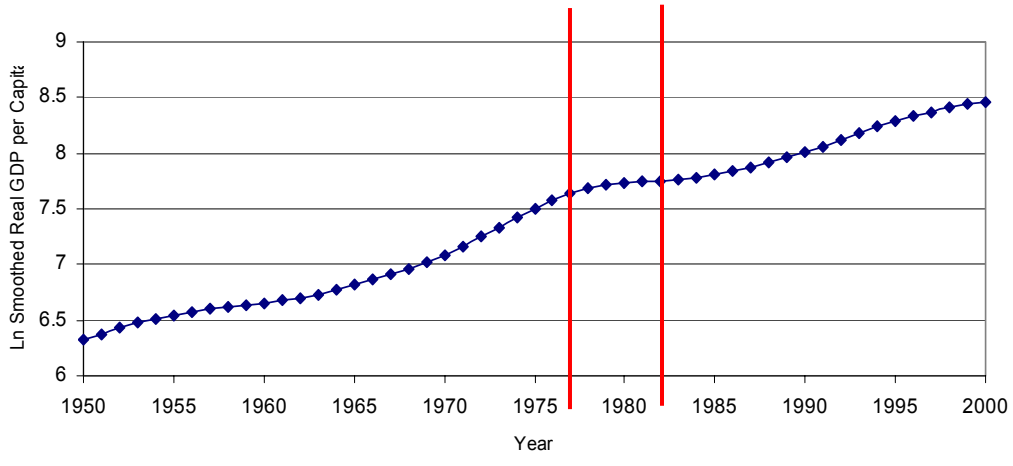


Fig 3.8a: Example of a growth series with variation, none of which large enough to be Picked up by filter. Ln of Moving Average (m=3) of Real GDP Capita Guatemala 1950 to 2000

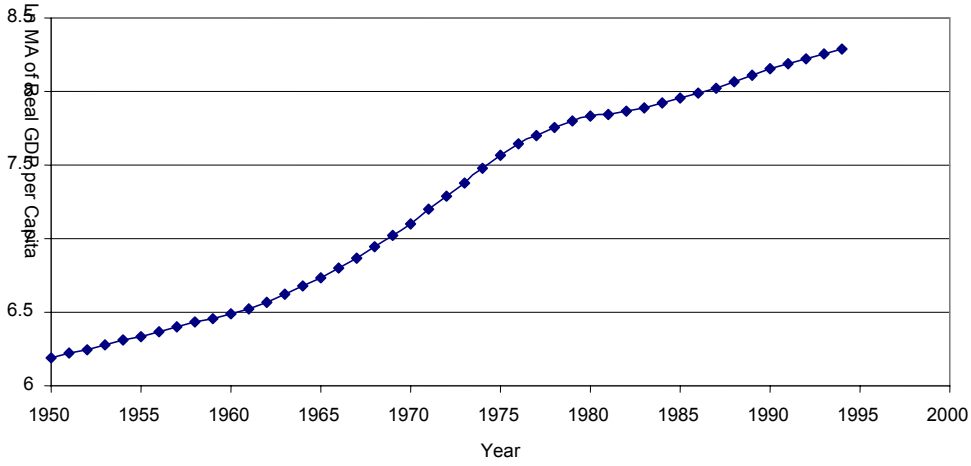


Fig 3.8b: Example of a growth series with variation, none of which large enough to be picked up by filter. ln Real GDP Capita Guatemala 1950 to 2000 Smoothed using HP filter λ=25

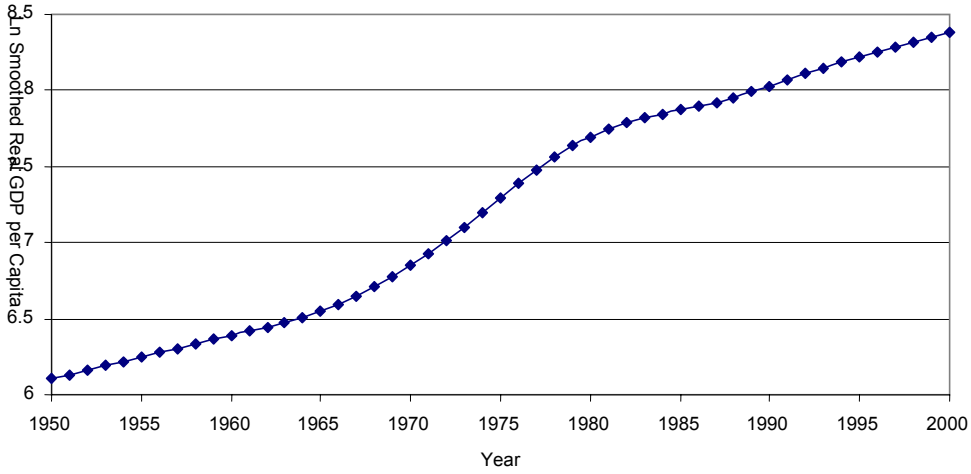


Fig 3.9a: Example of a growth acceleration. Ln of Moving Average (m=3) of Real GDP Capita Honduras 1950 to 2000

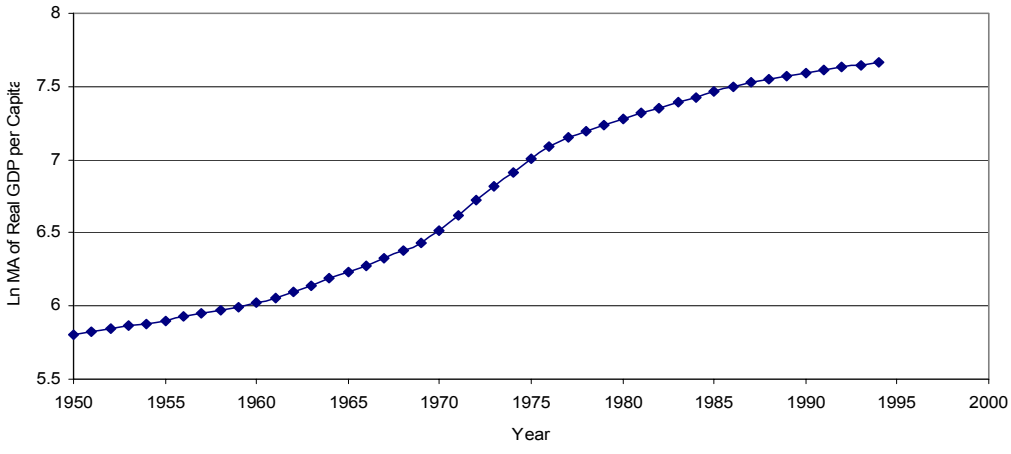


Fig 3.9b: ln Real GDP Capita Honduras 1950 to 2000 Smoothed using HP filter λ=25

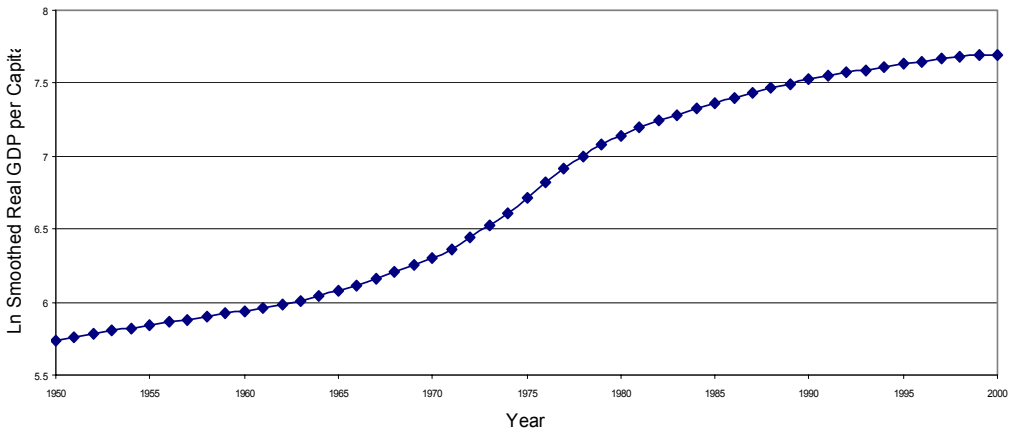


Fig 3.10a: Example of a sustained growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Mexico 1950 to 2000

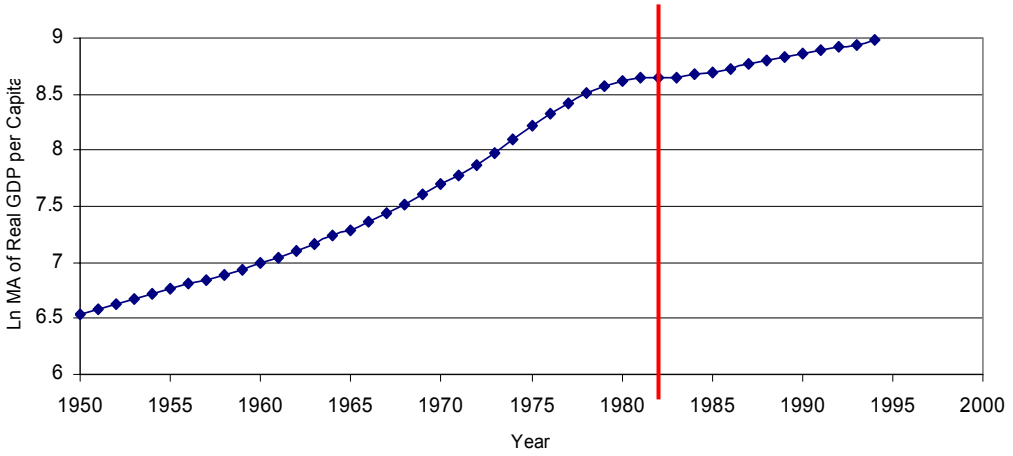


Fig 3.10b: Example of a sustained growth deceleration. Ln Real GDP Capita Mexico 1950 to 2000 Smoothed using HP filter λ=25

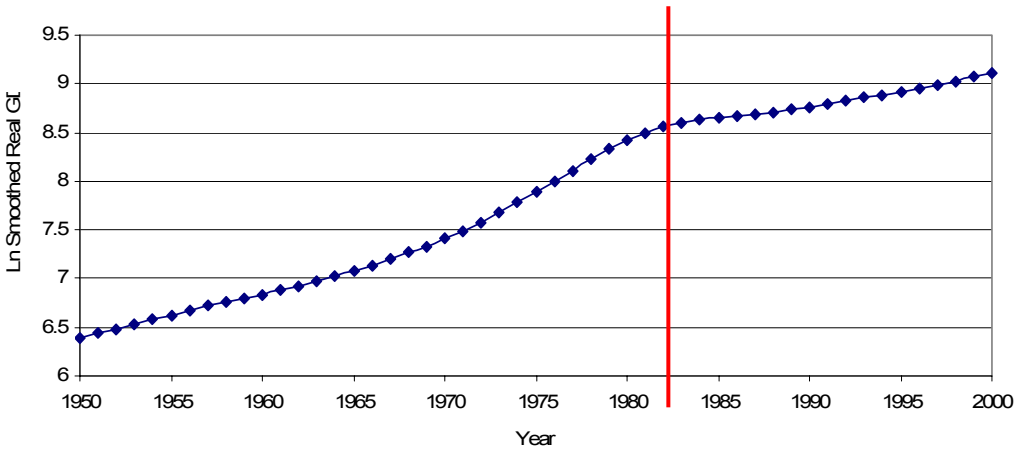


Fig 3.11a: Example of a substantial growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Nicaragua 950 to 2000

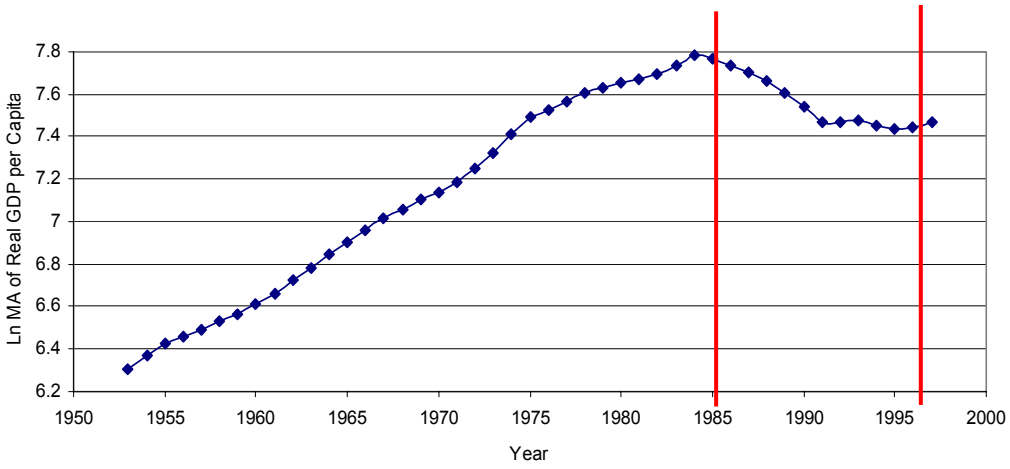


Fig 3.11b: Example of a substantial growth deceleration. Ln Real GDP Capita Nicaragua 1950 to 2000 Smoothed using HP filter λ=25

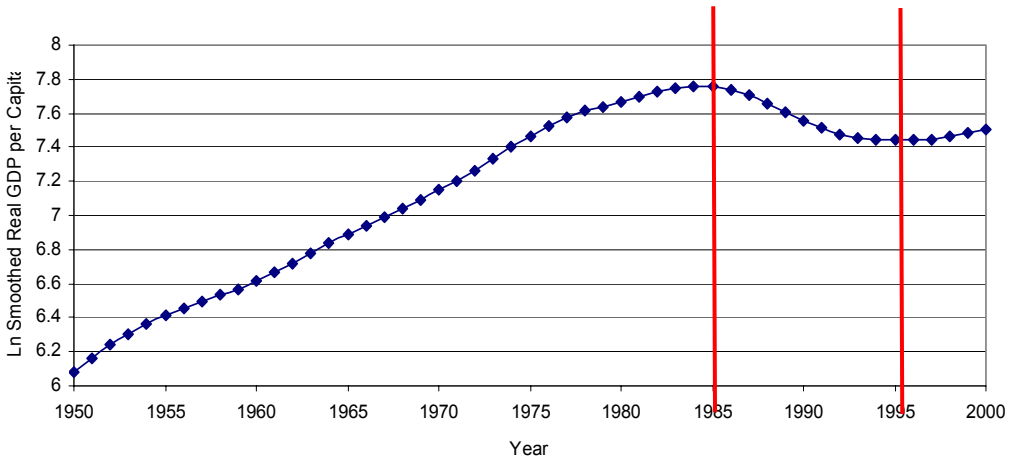


Fig 3.12a: Example of a sustained growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Panama 1950 to 2000

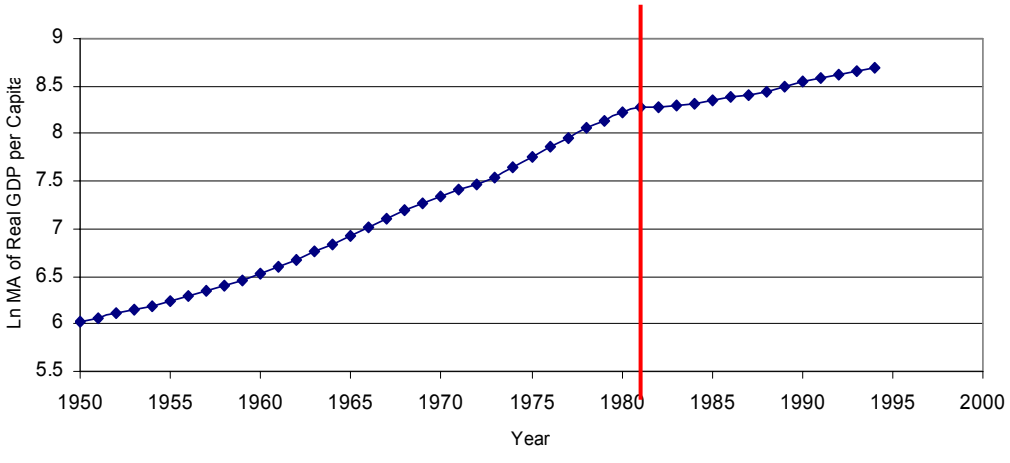


Fig 3.12b: Example of a sustained growth deceleration. Ln Real GDP Capita Panama 1950 to 2000 Smoothed using HP filter λ=25

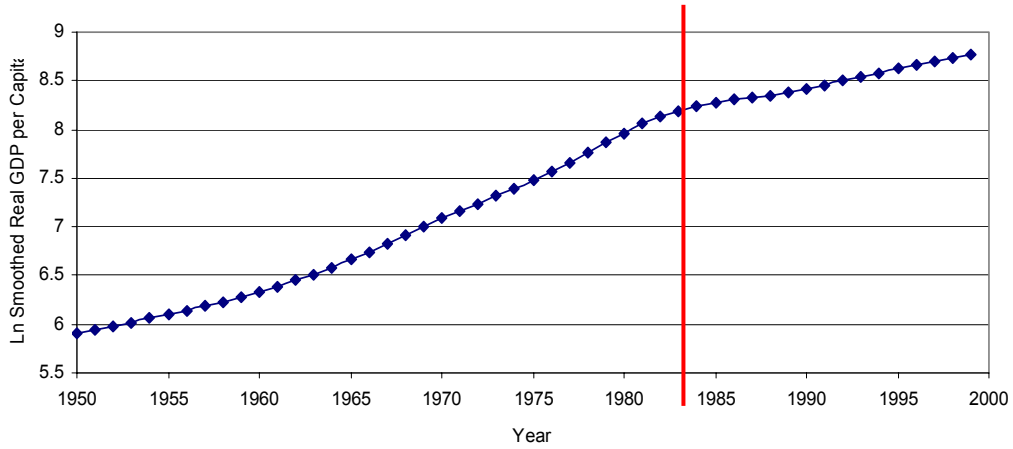


Fig 3.13a: Example of a growth acceleration. Ln of Moving Average (m=3) of Real GDP Capita Paraguay 1950 to 2000

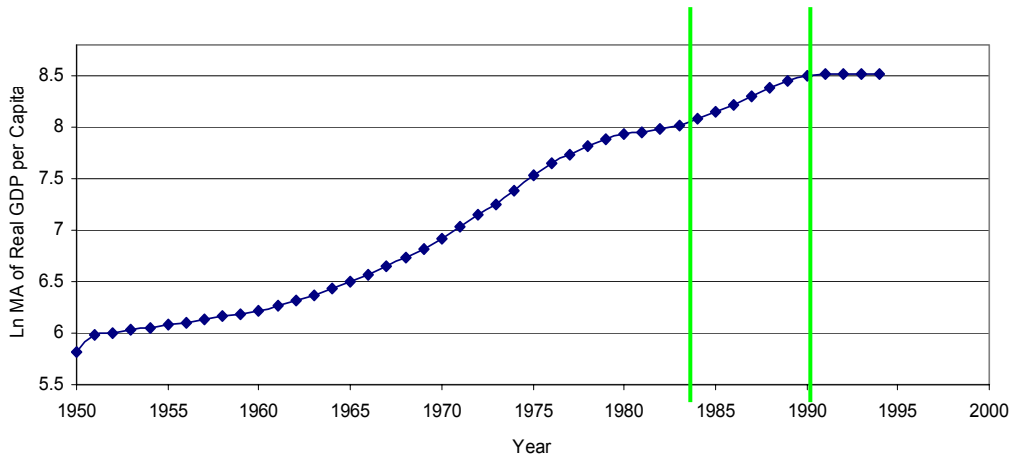


Fig 3.13b: Example of a growth acceleration. Ln Real GDP Capita Paraguay 1950 to 2000 Smoothed using HP filter λ=25

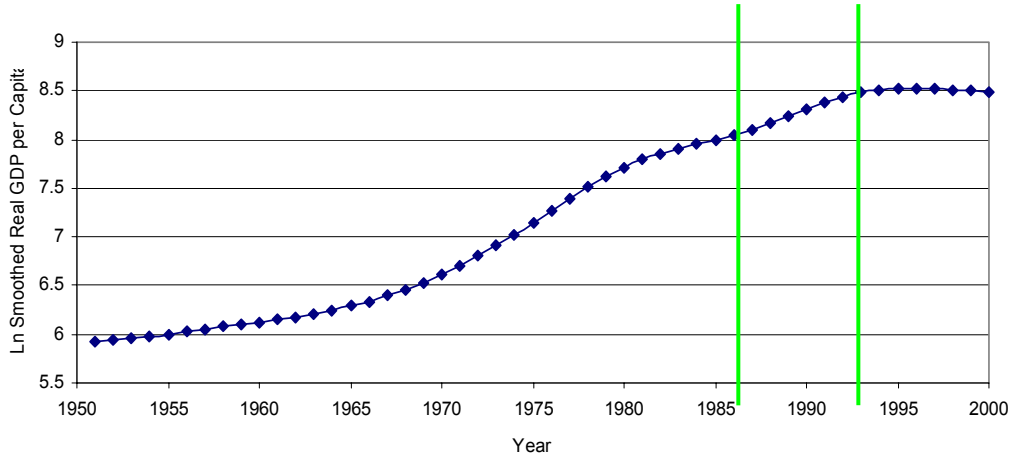


Fig 3.14a: Example of a growth deceleration. Ln of Moving Average (m=3) of Real GDP Capita Peru 1950 to 2000

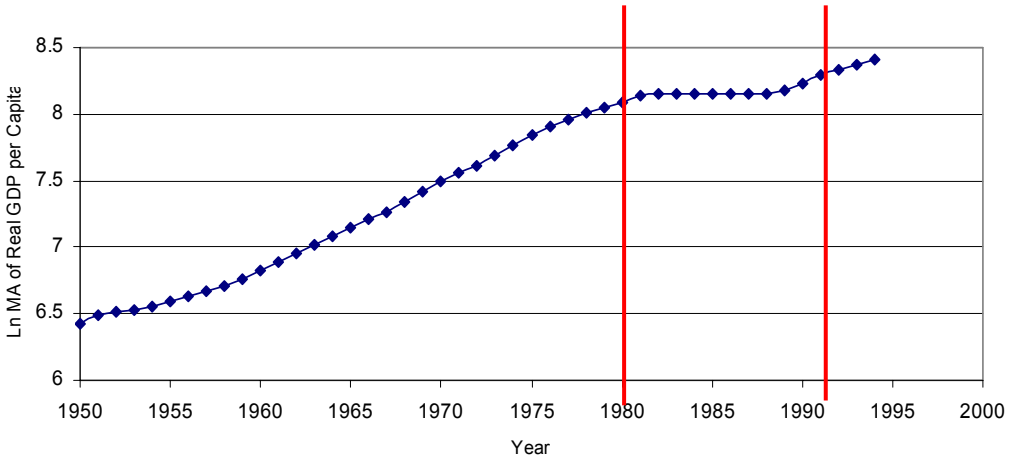


Fig 3.14b: Example of a growth Deceleration. Ln Real GDP Capita Peru 950 to 2000 Smoothed using HP filter λ=25

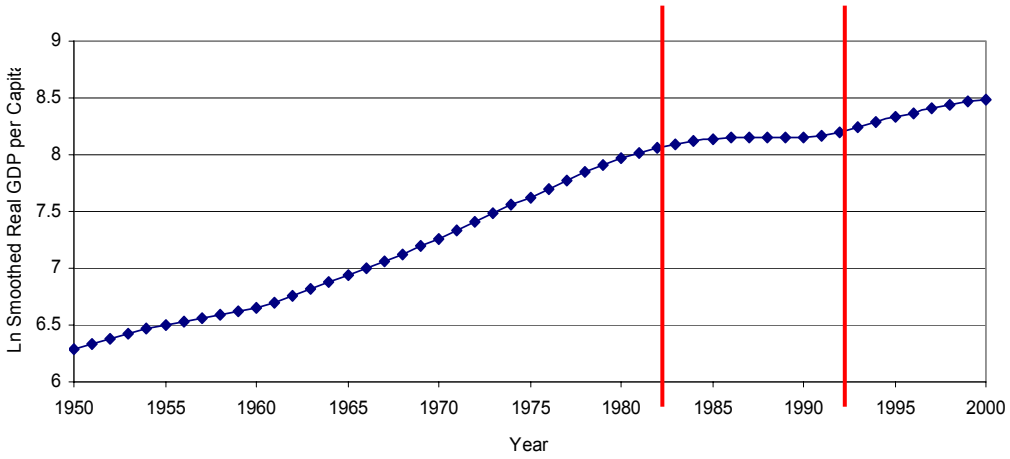


Fig 3.15a: Ln of Moving Average (m=3) of Real GDP Capita Uruguay 1950 to 2000

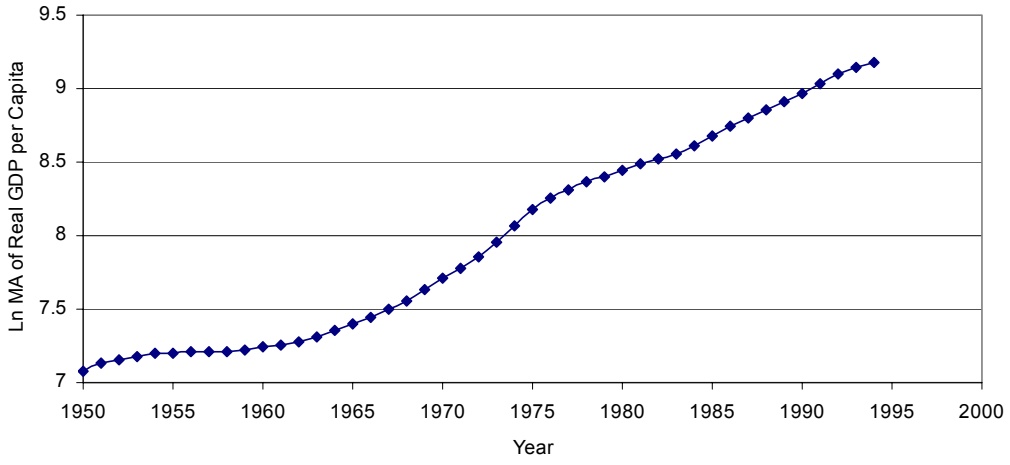


Fig 3.15b: Ln Real GDP Capita Uruguay 1950 to 2000 Smoothed using HP filter λ=25

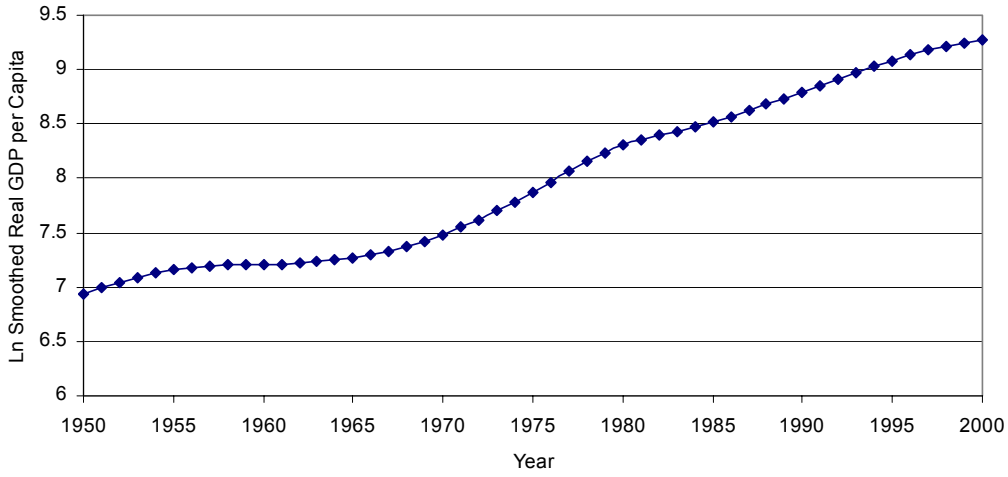


Fig 3.16b: Example of a growth acceleration. Ln Real GDP Capita Venzuela 1950 to 2000 Smoothed using HP filter λ=25

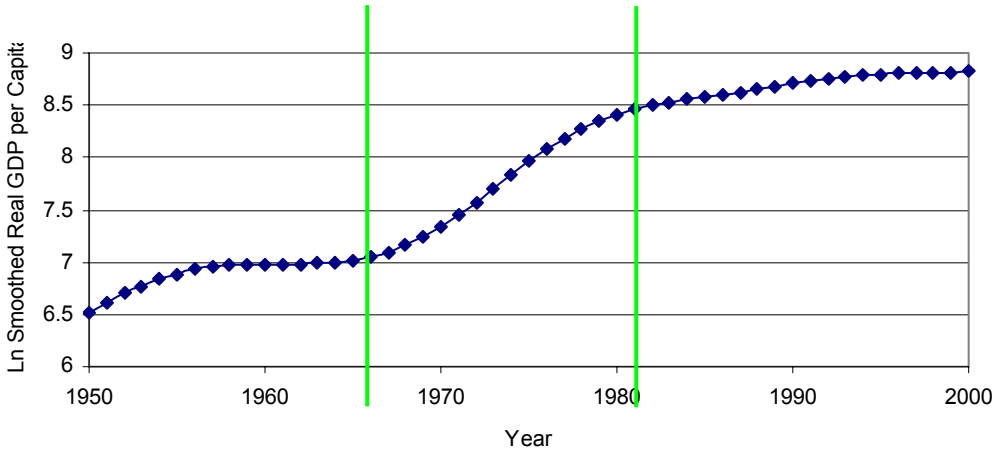
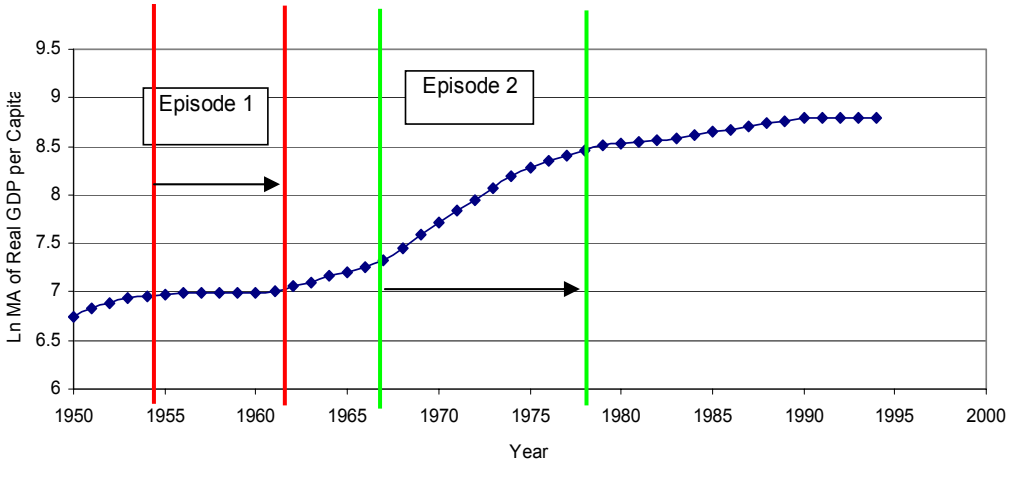


Fig 3.16a: Example of a growth deceleration followed by an acceleration. Ln of Moving Average (m=3) of Real GDP Capita Venezuela 1950 to 2000



Tables

Table 2.1 Percentage of population of Western Decent, Language and Religion.

Country		Decent	Language	Religion
Argentina	ARG	97	99	96
Brazil	BRA	93	95	80
Chile	CHL	95	97	100
Columbia	COL	92	94	90
Costa Rica	CRI	94	99	92
Ecuador	ECU	65	82	95
Mexico	MEX	69	98	95
Paraguay	PRY	95	59	90
Peru	PER	52	80	90
Uruguay	URY	96	98	69
Venezuela	VEN	89	99	98

Data Source: Gall (2004)

Table 3.1: Episodes of rapid economic growth in Latin America by year and magnitude. (Data: MA (m=3) CGDP series)

Decade	Country		Year	Growth*		Point Change	Sustained
				Before	After		
1960's	Columbia	COL	1966	3.80%	5.90%	2.10%	1
	Argentina	ARG	1966	3.80%	6.60%	2.80%	0
	Venezuela	VEN	1967	4.00%	6.53%	2.53%	1
	Ecuador	ECU	1967	8.70%	13.90%	5.20%	0
1980's	Paraguay	PAR	1984	4.12%	8.05%	3.93%	0
	Argentina	ARG	1989	0.80%	3.60%	2.80%	0

*Growth rate proceeding and preceding the initiation year, calculated from the smoothed series.

Table 3.2: Episodes of economic decline in Latin America by year and magnitude. (Data: MA (m=3) CGDP series)

Decade	Country		Year	Growth*		Point Change	Sustained
				Before	After		
1950s	Venezuela	VEN	1955	0.089	0.057	-3.20%	0
	Costa Rica	CRI	1956	0.071	0.042	-2.90%	0
1970's	El Salvador	SLV	1977	0.086	0.064	-2.20%	0
1980's	Panama	PAN	1981	0.084	0.054	-3.00%	1
1990's	Peru	PER	1982	0.072	0.047	-2.50%	1
	Mexico	MEX	1982	0.05	0.029	-2.10%	0
	Nicaragua	NIC	1985	0.02	-0.058	-7.80%	0

*Growth rate proceeding and preceding initiation year, calculated from the smoothed series.

Table 3.3: Episodes of rapid economic growth in Latin America by year and magnitude. (Data: HP filtered (λ=25) real CGDP)

Decade	Country		Year	Growth*		Point Change	Sustained
				Before	After		
1960's	Venezuela	VEN	1967	0.05	0.06	0.02	1
	Columbia	COL	1968	0.06	0.08	0.02	1
	Brazil	BRA	1968	0.09	0.12	0.03	1
	Ecuador	ECU	1969	0.06	0.09	0.03	0
1980's	Paraguay	PAR	1986	0.08	0.14	0.06	0
1990's	Argentina	ARG	1991	0.03	0.06	0.03	0

*Growth rate proceeding and preceding the initiation year, calculated from the smoothed series.

Table 3.4: Episodes of economic decline in Latin America by year and magnitude (Data: HP filtered (λ=25) real CGDP)

Decade	Country		Year	Growth *		Point Change	Sustained
				Before	After		
1950's	Costa Rica	CRI	1956	0.06	0.04	-2.10%	0
1970's	El Salvador	SLV	1977	0.03	0.01	-2.06%	0
1980's	Mexico	MEX	1982	0.04	0.02	-2.18%	0
	Nicaragua	NIC	1985	0.02	0.00	-2.57%	0
	Panama	PAN	1983	0.08	0.04	-4.30%	1
	Peru	PER	1982	0.05	0.03	-2.10%	1

*Growth rate proceeding and preceding the initiation year, calculated from the smoothed series.

Table 4.1: Growth Accounting Across Growth Accelerations***

Year	Country			5 Year Averages		
				Before	After	Point Change
1967	Venezuela	VEN	CGDP	2.40	6.44	4.04
			k	-0.35	1.17	1.52
			l	1.77	2.13	0.36
			TFP	1.03	3.14	2.11
1968	Columbia	COL	CGDP	2.99	8.84	5.85
			k	0.41	0.91	0.50
			l	1.47	1.70	0.23
			TFP	1.11	6.20	5.09
1968	Brazil	BRA	CGDP	3.56	11.30	7.74
			k	1.07	3.80	2.73
			l	1.91	1.80	-0.11
			TFP	0.59	5.60	5.01
1969	Ecuador	ECU	CGDP	4.77	12.40	7.63
			k	1.59	2.89	1.30
			l	1.86	1.69	-0.17
			TFP	1.32	7.90	6.58
1986	Paraguay	PAR	CGDP	3.62	8.34	4.72
			k	1.94	0.87	-1.07
			l	0.54	2.47	1.93
			TFP	1.13	4.99	3.86
1991	Argentina	ARG	CGDP	0.40	6.60	6.20
			k	-0.40	0.10	0.50
			l	0.8	1.2	0.40
			TFP	0	5.3	5.30

*Basic growth accounting set in section 4.1.
**Accelerations as defined in chapter 3.

Table 4.2: Growth Accounting Across Growth Decelerations***

Year	Country			5 Year Averages		
				Before	After	Point Change
1956	Costa Rica	CRI	CGDP	-	1.82	-
			k	-	3.16	-
			l	-	-	-
			TFP	-	-	-
1977	El Salvador	SLV	CGDP	9.20	-2.20	-11.40
			k	2.29	0.59	-1.70
			l	1.82	1.29	-0.53
			TFP	4.45	-4.14	-8.59
1982	Mexico	MEX	CGDP	11.80	0.21	-11.59
			k	2.23	0.18	-2.05
			l	2.15	1.90	-0.25
			TFP	7.49	-1.91	-9.40
1982	Peru	PER	CGDP	7.40	3.10	-4.30
			k	2.08	0.25	-1.83
			l	1.98	2.04	0.06
			TFP	3.40	0.89	-2.51
1983	Panama	PAN	CGDP	10.60	2.70	-7.90
			k	1.30	-0.52	-1.82
			l	1.59	1.90	0.31
			TFP	8.01	1.38	-6.63
1985	Nicaragua		CGDP	5.53	-4.90	-10.43
			k	0.36	-0.89	-1.25
			l	2.60	2.4	-0.20
			TFP	3.30	-6.5	-9.80

*Basic growth accounting set in section 4.1.
**Decelerations as defined in section 3.

Table 4.3: Total Trade as a Percentage of CGDP about Accelerations

Country		Year	5 Year Average			10 Year Average		
			Before	After	Change	Before	After	Change
Venezuela	VEN	1967	42	38	-9.52%	45	47	4.44%
Columbia	COL	1968	27	30	11.11%	26	29	11.54%
Brazil	BRA	1968	13	15	15.38%	13	16	23.08%
Ecuador	RCU	1969	34	45	32.35%	34	49	44.12%
Paraguay	PAR	1986	35	59	68.57%	37	78	110.81%
Argentina	ARG	1991	15	18	20.00%	15	-	-
				Average:	22.98%			38.80%

Data Source: *Penn World Table Version 6.1* Alan Heston, Robert Summers and Bettina Aten, (2002)

Table 4.4: Imports and Exports as a Percentage of CGD Across Accelerations

Country		Year	Imports 5 Year Average			Exports 5 Year Average		
			Before	After	Change	Before	After	Change
Venezuela	VEN	1967	0.05	0.04	-20.00%	0.05	0.04	-20.00%
Columbia	COL	1968	0.06	0.07	16.67%	0.06	0.07	16.67%
Brazil	BRA	1968	0.013	0.017	30.77%	0.011	0.019	72.73%
Ecuador	ECU	1969	0.08	0.09	12.50%	0.07	0.13	85.71%
Paraguay	PAR	1986	0.013	0.017	30.77%	0.008	0.007	-12.50%
Argentina	ARG	1991	0.082	0.129	57.32%	-	-	-
				Average:	21.34%	Average		28.52%

Data Source: *Penn World Table Version 6.1* Alan Heston, Robert Summers and Bettina Aten, (2002)

Table 4.5: Total Trade as a Percentage of CGDP Across Decelerations

Country		Year	5 Year Average			10 Year Average		
			Before	After	Change	Before	After	Change
Costa Rica	CRI	1956	53	49	-7.55%	-	-	-
El Salvador	SLV	1977	67	64	-4.48%	58	55	-5.17%
Mexico	MEX	1982	25	34	36.00%	22	35	59.09%
Nicaragua	NIC	1985	53	60	13.21%	61	71	16.39%
Panama	PAN	1983	93	68	-26.88%	95	69	-27.37%
Peru	PER	1982	40	33	-17.50%	35	27	-22.86%
				Average:	-1.20%			4.0%

Data Source: *Penn World Table Version 6.1* Alan Heston, Robert Summers and Bettina Aten, (2002)

Table 4.6: Imports and Exports as a Percentage of CGDP Across Decelerations

Country		Year	Imports 5 Year Average			Exports 5 Year Average		
			Before	After	Change	Before	After	Change
Costa Rica	CRI	1956	0.04	0.03	-33.33%	0.038	0.038	0.00%
El Salvador	SLV	1977	0.287	0.694	58.65%	0.225	0.502	123.11%
Mexico	MEX	1982	0.01	0.01	0.00%	0.02	0.01	-50.00%
Nicaragua	NIC	1985	-	-	-	-	-	-
Panama	PAN	1983	0.34	0.165	-106.06%	0.458	0.472	3.06%
Peru	PER	1982	0.012	0.014	14.29%	0.015	0.016	6.67%
				Average:	-13.29%	Average		16.6%

Data Source: *Penn World Table Version 6.1* Alan Heston, Robert Summers and Bettina Aten, (2002)

Table 4.7: Terms of Trade Across Episodes

Episode	Country		Year	5 Year Average			10 Year Average		
				Before	After	Change	Before	After	Change
Accelerations	Venezuela	VEN	1967	105	101	-4	108	111	3
	Columbia	COL	1968	104	103	-1	106	114	8
	Brazil	BRA	1968	104	103	-1	106	114	8
	Ecuador	ECU	1969	103	108	5	105	107	2
	Paraguay	PAR	1986	136	131	-5	134	131	-3
	Argentina	ARG	1991	115	105	-10	123	102	-21
					Average:	-2.7			-0.5
Decelerations	Costa Rica	CRI	1956	131	111	-20	117	108	-
	El Salvador	SLV	1977	116	139	23	108	134	26
	Mexico	MEX	1982	136	130	-6	126	131	5
	Nicaragua	NIC	1985	139	129	-10	133	130	-3
	Panama	PAN	1983	139	139	0	130	130	0
	Peru	PER	1982	136	130	-6	126	131	5
					Average:	-3.2			6.6

Source: Oxford Latin American Database

Table 4.8: Labour Growth in Manufacturing and Agriculture Across Growth Episodes

Country		Episode		Agriculture			Manufacturing		
		Initiation	Sustained*	Before	After	Change	Before	After	Change
Accelerations	Argentina	1991	0	-0.190	-		0.000	-	
	Brazil	1968	1	0.022	0.013	-0.009	0.032	0.058	0.026
	Columbia	1968	1	0.025	0.028	0.003	0.030	0.039	0.009
	Ecuador	1969	0	0.020	0.010	-0.010	0.033	0.057	0.024
	Paraguay	1986	0	0.011	0.010	-0.001	0.028	0.055	0.027
	Venezuela	1967	1	0.000	0.000	0.000	0.037	0.068	0.031
					Average	-0.003		Average	0.023
Decelerations	Costa Rica	1956	0	0.021	0.025	0.004	0.040	0.034	-0.006
	El Salvador	1977	0	0.011	0.000	-0.011	0.037	0.023	-0.014
	Mexico	1982	0	0.010	0.012	0.002	0.034	0.025	-0.009
	Nicaragua	1985	0	0.010	0.009	-0.001	0.030	0.023	-0.007
	Panama	1985	1	0.010	0.020	0.010	0.030	0.021	-0.009
	Peru	1982	1	0.020	0.024	0.004	0.020	0.024	0.004
					Average	0.001		Average	-0.007

Data Source: Oxford Latin American Economic History Database, Astorga, P. Thorp, R., FitzGerald, F., Driggs and Sanint, C (2003)
*Where 1 refers to a sustained episode as defined in Chapter 3.2

Table 5.1: Trade Liberalization Dates

Country		Episode Experienced				
		Initiation	Type	Sustained	Periods Of Temporary Liberalization	Year Uninterrupted Openness Began
Argentina	ARG	1991	A	0		1991
Brazil	BRA	1968	A	1	-	1991
Colombia	COL	1968	A	1	-	1986
Costa Rica	CRI	1956	D	0	1952-61	1986
Ecuador	ECU	1969	A	0	1950-82	1991
El Salvador	SLV	1977	D	0	1950-61	1989
Mexico	MEX	1982	D	0	-	1986
Nicaragua	NIC	1985	D	0	1950-60	1991
Panama	PAN	1983	D	1	-	-
Paraguay	PRY	1986	A	0	-	1989
Peru	PER	1982	D	1	1948-67	1991
Venezuela	VEN	1967	A	1	1950-59;89-93	1996
Chile	CHL	-	-	-	-	1976
Guatemala	GTM	-	-	-	1950-61	1988
Honduras	HND	-	-	-	1950-61	1991

Source: Wacziarg and Welsh (2003)

Table 5.2: Government Ownership of Banks % of Total

Country		Initiation	Episode*	Sustained	1970	1995
Chile	CHL	-	-	-	91.49	19.72
Guatemala	GTM	-	-	-	32.1	22.2
Honduras	HON	-	-	-	49.2	29.9
Uruguay	URY	-	-	-	42.29	68.79
Argentina	ARG	1991	A	0	71.94	60.5
Ecuador	ECU	1969	A	0	100	40.61
Paraguay	PAR	1986	A	0	55	48.02
Brazil	BRA	1968	A	1	70	31
Columbia	COL	1968	A	1	57.67	53.92
Venezuela	VEN	1967	A	1	82.88	57.98
Costa Rica	CRI	1956	D	0	100	90.92
El Salvador	SLV	1977	D	0	100	26.53
Mexico	MEX	1982	D	0	82.66	35.62
Nicaragua	NIC	1985	D	0	90.44	63.36
Panama	PAN	1983	D	1	17.93	17.08
Peru	PER	1982	D	1	87.38	26.46

**Where A refers to an acceleration as defined in chapter 3*

Data Source: La Porta, R., F. Lopez-de-Silanes and Shleifer, A. (2002),

Table 5.3: Expected Discounted Cost of Conforming To Labour Regulation in 1990

Country	Initiation	Episode	Sustained	Advance Notice	Indemnities for Dismissal	Seniority Pay	Social Security Contributions	Total Cost	Social Security Contributions % Total	Social Security Contributions % wage
Argentina	1991	A	0	0.80	2.20	0.00	44.49	47.48	0.94	0.34
Brazil	1968	A	1	0.59	2.45	9.82	37.65	50.51	0.75	0.29
Colombia	1968	A	1	0.30	3.49	9.82	38.75	52.35	0.74	0.30
Ecuador	1969	A	0	0.59	3.30	9.82	22.85	36.56	0.63	0.18
Paraguay	1986	A	0	0.68	1.49	0.00	27.26	29.43	0.93	0.21
Venezuela	1967	A	1	0.93	2.03	5.97	18.43	27.36	0.67	0.14
		Acceleration Average:		0.65	2.49	5.91	31.57	40.62	0.77	0.24
Costa Rica	1956	D	0	1.05	2.60	0.00	35.05	38.69	0.91	0.27
El Salvador	1977	D	0	0.06	2.99	0.00	27.26	30.31	0.90	0.21
Mexico	1982	D	0	0.59	2.57	0.00	29.50	32.66	0.90	0.23
Nicaragua	1985	D	0	0.59	1.97	0.00	19.47	22.04	0.88	0.15
Panama	1983	D	1	0.59	2.09	0.75	15.19	18.62	0.82	0.12
Peru	1982	D	1	0.00	3.80	9.82	27.26	40.88	0.67	0.21
		Deceleration Average:		0.48	2.67	1.76	25.62	30.53	0.85	0.20

Data Source: Heckman, J. and C. Pages, (2003),

Table 5.4: GDP Deflator Across Episodes

Country		Initiation	Type	Sustained	Before	After	Point Change	Before	After	Point Change
Argentina	ARG	1991	A	0	-	-	-	-	-	-
Ecuador	ECU	1969	A	0	3.33%	13.08%	9.75	82.98	133.00	50.02
Paraguay	PRY	1986	A	0	17.59%	22.56%	4.97	126.00	213.00	87.00
		Unsustained Acceleration Average			*10.46%*	*17.82%*	*7.36*	*104.49*	*173.00*	*68.51*
Brazil	BRA	1968	A	1	68.45%	48.93%	-19.52	-	-	-
Colombia	COL	1968	A	1	14.48%	11.05%	-3.43	11.29	20.68	9.39
Venezuela	VEN	1967	A	1	10.01%	28.60%	18.59	4.00	8.00	4.00
		Sustained Acceleration Average			*30.98%*	*29.53%*	*-1.45*	*7.65*	*14.34*	*6.70*
			Acceleration Average		*22.77%*	*24.84%*	*2.07*	*56.07*	*93.67*	*37.60*
Costa Rica	CRI	1956	D	0	2.89	-2.21%	-2.91	5.62	6.63	1.01
El Salvador	SLV	1977	D	0	5.22%	20.80%	15.58	117.00	238.00	121.00
Mexico	MEX	1982	D	0	24.91%	65.70%	40.79	23.14	303.00	279.86
Nicaragua	NIC	1985	D	0	20.37%	184.90%	164.53	19.82	125.00	105.18
		Unsustained Deceleration Average			84.88%	67.30%	54.50	41.40	168.16	126.76
Panama	PAN	1983	D	1	10.32%	1.38%	-8.94	217.00	276.00	59.00
Peru	PER	1982	D	1	64.79%	88%	-	235.00	375.00	140.00
		Sustained Deceleration Average			*37.56%*	*44.69%*	*-8.94*	*226.00*	*325.50*	*99.50*
			Deceleration Average		*69.10%*	*59.76%*	*41.81*	*102.93*	*220.61*	*117.67*

Data Source: Oxford Latin American Economic History Database, Astorga, P. Thorp, R., FitzGerald, F., Driggs and Sanint, C (2003)

Appendix III

Interim Report

Words:950

Growth Episodes and Economic Policy.

Since the 1960s few but the richest nations have experienced steady exponential GDP growth. Elsewhere, miracles, failures yet scarce incidents of sustained growth characterise growth. However, volatility brings with it a rich source of experiences that promise to provide an insight into growth accelerations, declines and sustainability.

For the typical country that has experienced phases of growth, stagnation or decline (Pritchett 2000) consider some questions:

- What caused growth to accelerate?
- What caused growth to decline?
- Why was growth sustained/not sustained?

The answers will go along towards understanding what Hausmann, Pritchett and Rodrik (2005) regard as the most important policy issue in economics, accelerating the process of economic growth in a sustained manner.

In this vein this study will go beyond the traditional method of examining average growth and consider growth episodes. Growth episodes since 1960 for countries in the Penn World tables will be identified and a selection examined. The aim in brief is not too identify rigid policies that are good for growth rather to outline the political and economic conditions that accompanied episodes or made it easy to adopt policies that brought about growth episodes.

In 1998 Lant Pritchett demonstrated the variability of growth rates in developing countries. The paper shows the promise of the approach of investigating shifts in growth rates as well as levels (Pritchett 1998). A paper published at a similar time by Ben-David and Papell (1998) examines growth slowdowns in the 1970s and 80s by identifying significant breaks in the deterministic growth of GDP. Break ups, slowdowns and meltdowns (Ben David and Papell 1998) are identified and considered in three dimensions, timing, regional characteristics and severity. More recently Hausmann, Pritchett and Rodrik (2005) concentrated on growth accelerations between 1957 and 1992. Using regression analysis they comment on the importance of external context, domestic policies and political circumstances. Jones and Olken (2005b) emphasize the start stop nature of growth by finding break-ups and break-downs in time series growth data. A Growth accounting approach is then used to expose the mechanics of structural breaks. In brief these papers have similar conclusions. Each tends to find significant breaks however, their causes are less clear. Hausmann, Pritchett and Rodrik (2005) found standard explanatory variables, external context, domestic policy and political circumstances had little significance and Jones and Olken (2005b) find that break-ups and break downs are asymmetric in their composition.

To build on this work once growth episodes have been identified this study endeavors to look more closely at a selection of episodes using both empirical and cross country analysis. It is hoped that such an approach will allow factors that determine the: (1) Rise (2) Fall (3) Longevity of growth episodes to be identified with more clarity than studies that take a large set of episodes. An appreciation of these characteristics will help answer the questions posed at the outset.

In order to show the proposed methods of investigation a preliminary outline of the final report follows.

1. *Introduction*

Aim: Provide a brief résumé of current work on understanding causes of growth variations. Explain the concept of a growth episode.

- Detail of current work
- Introduction to concept of growth episodes
- Outline aims and objectives
- Brief Overview of report

2. *Economic Growth Stylized Facts*

Aim: Sustain argument that growth variations are an integral part of countries growth experiences. By doing so justify the study of growth episodes as opposed to long run growth trends.

- Outline variability of growth across time and between regions
    - Graphical representation
    - Present examples.

3. *Identifying Growth Episodes, Method and Robustness*

Aim: Identify growth episodes for the countries in the Penn World Tables and confirm robustness of method.

- Discuss the parameters chosen to define a growth episode
- Sight methods used in other works
- Comment on robustness
- Present results

4. *Economic Theory and Growth Episodes*

Aim: Examine how economic theory can be used to explain growth episodes.

- Consider neoclassical framework both of the traditional and endogenous variety.
- Consider the prescriptions of the Washington Consensus
- Discuss implications for factors that may affect the rise, fall and longevity of episodes.

5. *Empirical Analysis of Growth Episodes*

Aim: For a selection of countries ascertain which variables are significant in explaining the rise, fall and longevity of growth episodes by conducting regression analysis.

- Justify the choice of countries
- Regression of growth episodes against explanatory variables
    - Polity IV Dataset (Marshall and Jaggers 2002) used for measures of Political influences.
    - Sachs Waczairg Warner Welch index (Waczairg and Welch 2003) for measures of trade liberalization
    - Penn World Tables 6.1 for other variables
- Discuss results with respect to policy making implications and common views, such as the Washington Consensus.

6. *Cross Country Analysis*

Aim: For the same selection of countries identify and discuss political, economic and external differences that prevailed at times of growth episodes.

- Provide graphical analysis
- Summary statistics
- Sight other work to sustain reasoning

7. *Conclusion*

This method of investigation presents a problem. A growth episode regression will have a dummy explanatory variable (1, if year was part of a growth episode). As such usual least squares methods are not the best choice (Griffins, Hills and Judge 2000). If a suitable method cannot be identified section 6 will be expanded and a case study approach adopted to provide evidence for the significance of variables.

To conclude on completion this study will provide a new data set detailing growth episodes for the countries in the Penn world tables, an empirical and cross country analysis of growth episodes for a selection of countries and a discussion of the implications for policy.