Table 2.C Comparison of Inflation and URATE for US and Seven OECD Countries

Period	USA		Seven Countries	
	Inflation	URATE	Inflation	URATE
1956 – 1960	2.0	5.2	**2.8**	**3.0**
1961 – 1965	1.3	5.5	3.7	2.0
1966 – 1970	4.2	3.9	4.1	2.2
1971 – 1975	6.7	6.1	**9.3**	**2.9**

Note: The average value reported for the seven countries (including USA) is an unweighted average.

Over these sub-periods, the underlying economic cycles and policies with regard to unemployment differed across Europe and USA. The 'Great Society' policy in USA (1964–1968) under Democrat President Lyndon Johnson to lower unemployment was not followed in Europe. Hence the big reduction in URATE (5.5% in 1961–1965 to 3.9% in 1966–1970) and rise in inflation during 1966–1970 in USA is not present in European countries. Nevertheless, comparing the last sub period 1971–1975 with the first sub period 1956–1960, the natural rate hypothesis and vertical Phillips curve is *solidly* manifest in the data for all seven countries. The URATE average for all is virtually the same (3.0% in the first sub-period down to 2.9% at the end), while inflation had risen by over 6% points, a huge increase. This is strong evidence supporting the EAPC.

2.6 GLOBAL EVIDENCE ON THE NATURAL RATE HYPOTHESIS

Further evidence pertaining to the EAPC can be obtained by looking at the 1980s decade when inflation fell. For USA, comparing 1989 and 1979 we have seen (Section 2.5) that unemployment returned to the 5.5% range while inflation fell, in accordance with the NRH. Similarly, we examine data over the same period for twenty five, mostly OECD, countries. We look at GDP data because unemployment data across countries are not easily comparable and sometimes not available, while GDP data are easily available.[20] The average values of growth and inflation in 1979 and 1989 are listed in the Table below.

Table 2.D Average Values of Growth and Inflation for Select Countries

	1979	1989	Change (in percentage points)
Inflation	13.8	8.7	–4.9
GDP Growth	4.0	3.8	–0.2

[20] Looking at average values of GDP per capita and inflation for forty years for 21 OECD countries the Economist magazine in its annual survey "Navigators in Troubled Waters" by Woodall (1999) showed there was no correlation between the two.

Many of these countries followed disinflation policies during 1980s. For these countries, growth was barely changed over this period while inflation fell substantially: on average by 5 percentage points. This indicates that reducing inflation had no impact on growth, suggesting that the policy of ignoring growth and keeping inflation low is good. The EAPC does not apply merely to USA.

Equally informative is the scatter plot of the corresponding change in growth against the change in inflation for all countries. As can be seen in Figure 2.g, there is no correlation between the two, although there are some outliers: Iceland underwent a 23.6% drop in inflation and a 4.6% drop in growth.[21] The global cross country evidence, indicating that there is no long run trade-off between inflation and growth, strongly supports the natural rate hypothesis and the EAPC.

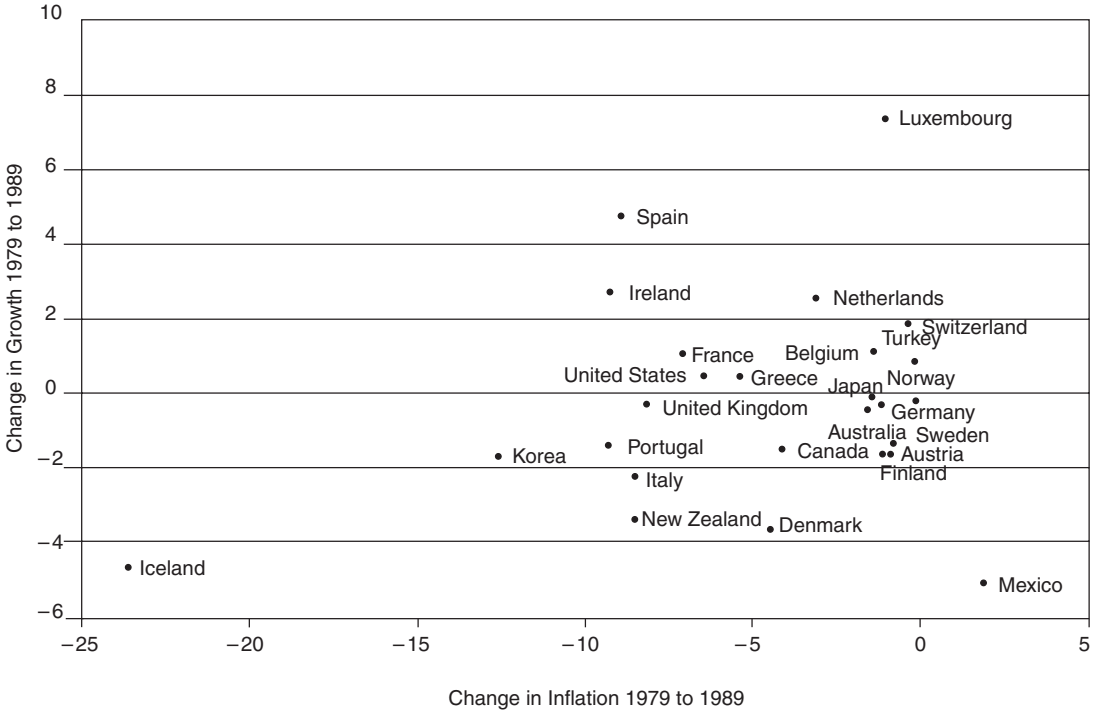

Figure 2.g Disinflation for Select Countries

Source: (for this figure and preceding table) World Bank data base: Author's computations

[21] Seen in isolation, Iceland may seem to suggest that there is a long run tradeoff. Statistical tests with quarterly data for Iceland over this period would most likely indicate a negatively sloped Phillips curve, violating the natural rate hypothesis. The case of Iceland indicates that time series tests for small economies may not be reliable. There may be outliers. However, simple cross section regressions for countries, if the data are reliable and comparable, provide robust results. The conclusions in this text largely rely on such robust results.

2.6.1 Inflation and Growth in Developing Economies

For developing economies, it was believed and still is that some inflation (more than the 2% deflation threshold, discussed in the next chapter) is necessary and desirable for growth: about 5–6% in Indian policy writings. However, the prophetic Indian economist, B.R. Shenoy (1962) argued against this view. He pointed to very rapid growth in West Germany and Japan in the 1960s despite inflation about 1%, loosely implying the natural rate hypothesis.

In standard, orthodox development economics, it was argued that poor countries are different from rich ones. Unlike rich countries which are capital abundant but scarce in labour, poor or developing countries have surplus labour. The Lewis Model (Section 1.4) assumed unlimited supplies of labour. The implicit argument above is that while the natural rate hypothesis (NRH) may be valid for rich countries, in developing countries the constraint is capital stock, in particular infrastructure. An expansion that raises inflation along with utilization of capital stock will not lead to accelerating inflation because wage inflation catch up does not exist. The higher capacity utilization rate puts pressure on resources and may lead to a one time rise in prices, but not a *continuing inflation* which requires ongoing wage increases. With surplus labour, continuing wage inflation is unlikely to happen.

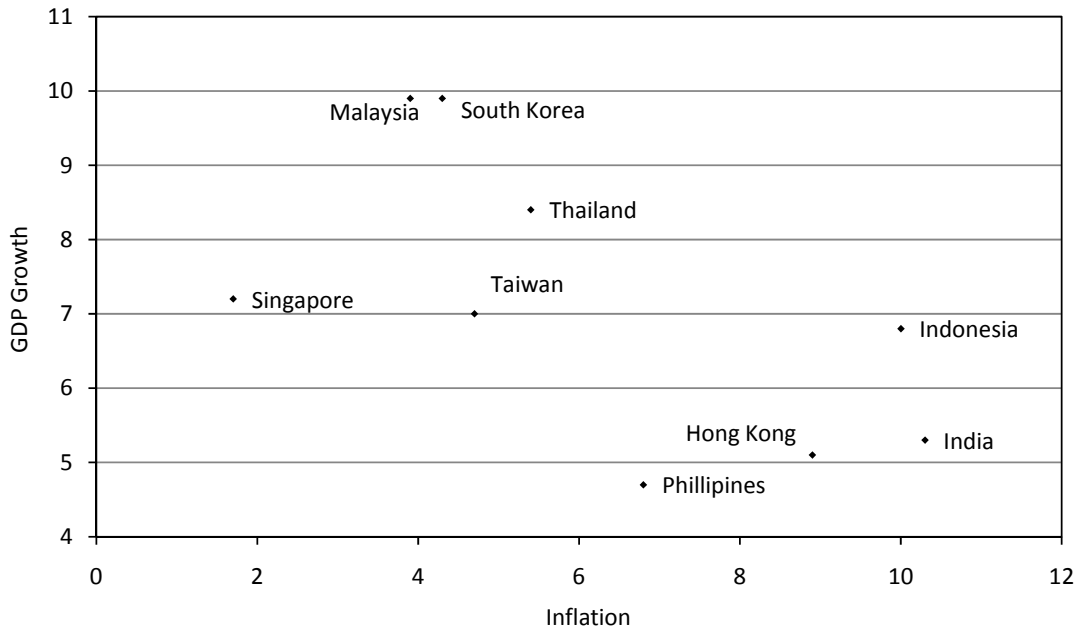

Figure 2.h Growth and Inflation Rate for India and Select Asian Countries

Source: Moorthy (August 1995) based on data taken from International Financial Statistics

The above arguments need to be carefully evaluated. To begin with, although in poor countries labour is cheap relative to capital, this does not imply that there is surplus

labour, that can be eliminated through higher aggregate demand which can increase output in a sustainable, non-inflationary manner. Some of the labour supply is seasonal: it is related to the harvest and the need to earn extra income before festival times, as casual but careful observation indicates. Unfortunately, accurate unemployment data that could clearly indicate the presence of the EAPC are not easily available.

Even without taking an average over a long period, cross-section data at *a point of time* can somewhat reveal long run behaviour. For the selected Asian countries below, the simple scatter plot for 1995 reveals there is no long run trade off. In other words, the NRH applies to Asian countries as well.

Indeed, this Figure 2.h is taken from my response to a former RBI Governor, Venkitaramanan,who was recommending a pro-growth policy for India in 1995. He stated,

> "As the Chinese leadership has decided recently, it is better to risk a bit of inflation now through money financing than to lower the targets of growth."

and he emphasized that the standard 'textbook mantra' does not hold in developing economies (Venkitaramanan, 1995). At that time, China's GDP growth was about 10%. He argued that, compared to India, higher inflation was the price China had to pay for higher growth relative to India.

However, the ASEAN country data indicate this conclusion is invalid. Both Malaysia and South Korea in 1995 had GDP growth close to 10% but inflation rates lower than India, as can be seen. Also, Singapore with steady low inflation had fairly high growth.[22] In my second rejoinder to him, I wrote,

> "their situation is more closely comparable to India than that of the Western countries. What is clear that real growth across these countries has not been enhanced by monetary stimulus and inflation." (Moorthy, 1995).

Looking at Chinese growth and inflation data further supports the Natural Rate Hypothesis. Post 2000, China has had both higher growth and lower inflation compared to India, indicating the long run independence of growth and inflation. Very simply, whatever its inflation, and whatever the reliability of its data, China's potential GDP growth rate has been much higher.[23]

Unfortunately knowledge or acceptance of the NRH is still limited in Indian policy circles. For instance, the Times of India columnist and economist Swaminathan Aiyar stated

> "I have no hesitation in saying that I would rather have 9% growth with 7% inflation than 6% growth with 4% inflation, which is what we roughly had between 1997 and 2003. We are much better off today despite inflation."

[22] China was left out of the chart because of its unreliable interest rate data, also used in that article.

[23] In the course of that debate it became evident that acceptance of natural rate hypothesis in Indian policy circles was limited. This debate was a starting point for the analytical framework developed,and emphasis given to NRH, in this text.

In fact, his article was titled "*9% + 7% is better than 6% + 4%*", Aiyar, (2007). Similarly, the Nobel Laureate Joseph Stiglitz, a frequent visitor to India and influential in policy circles, said

"In a trade-off between growth and moderate inflation, I would plump for growth" (2012).

However, the NRH, based on solid evidence, implies that we do not really have this choice. Therefore, we are better off just pursuing low inflation. Unfortunately, most policy makers and economists in India have generally not accepted this.

2.7 OUTPUT BASED VERSION OF THE EAPC: THE BASIC MODEL

At the root of the EAPC lie the URATE and the labour market process. However, it is convenient and often necessary for economists and policy makers to look at output based variables rather than the unemployment rate. This is certainly the case when recent or comprehensive economy wide URATE data are not available, as for India. This calls for converting the EAPC into a product market or output based version. This can be done using the Lokun coefficient to link aftOR with URATE (from Section 1.7)

Accordingly, let us build on Table 1.F, to construct the output based version of the EAPC. In addition to output variables, there will now be inflation and Nominal GDP growth. Assume:

(a) a 3% trend growth rate and a starting output level of 200 (as in Table 1.F);
(b) a starting inflation rate of 4% in Period A, corresponding to point F in the earlier chart.
(c) a Phillips curve coefficient of 1 (a 1 percentage point decrease in URATE causes a 1 percentage point increase in the inflation rate)
(d) a Lokun coefficient of 0.5, linking unemployment and aftOR, i.e., a 1% point rise in aftOR reduces URATE by 0.5% point and vice versa.

Changes in URATE, the underlying variable, drive the EAPC process. However, since aftOR is *strictly* linked to URATE, we can effectively treat aftOR as the exogenous variable, which is convenient to calculate output levels and then, growth rates. So, therefore, the ADSGAP coefficient will also be 0.5 (response of inflation to aftOR) and we can ignore URATE for the calculations. For completeness, URATE is included in the Table as the first column, since it is the underlying variable that drives the inflationary process.

The basic identity is: Growth in Nominal GDP = Growth in Real GDP + Inflation, or

$$g_Y = g_y + \pi$$

Adding real GDP growth and inflation from EAPC equation yields nominal GDP Growth. In Period B, as aftOR rises to 101, inflation rises to 4.5% based on 0.5 coefficient for ADSGAP. In Period C, ADSGAP increases to 2, with an inflation impact of 1%. Simultaneously expected inflation, based on the previous period B is 4.5%. Thus, their combined effect pushes up inflation to 5.5% in Period C. It is the sum of the ADSGAP impact term and expected inflation, i.e., last period's inflation. So, $\pi = 0.5$ (ADSGAP) + π_{t-1}.