

TFP Estimation for Pakistan-the Importance of the Collective Infrastructure to Feed the Poor



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Introduction:

Unfortunately, in the world of today the gap between rich and poor is widening.

Developed countries are simply more productive. For instance measured in GDP per capita for 2007, very basically assessed, a German on average had in gross terms **47 times "more" to live from** than a Pakistani (WORLD BANK, 2008).

The importance of the concept of (Total Factor) Productivity, the social infrastructure and human capital accumulation in relation with TFP for explaining economic growth and vice versa disparities worldwide shall be emphasized.



Methodological Approach:

On the basis of the geometric index number theory the level and growth rate of agricultural Total Factor Productivity for Pakistan for the entire period from 1960–2004 is estimated. In order to test the contribution of Total Factor Productivity growth to economic improvement, inputs are not entirely treated as exogenous.

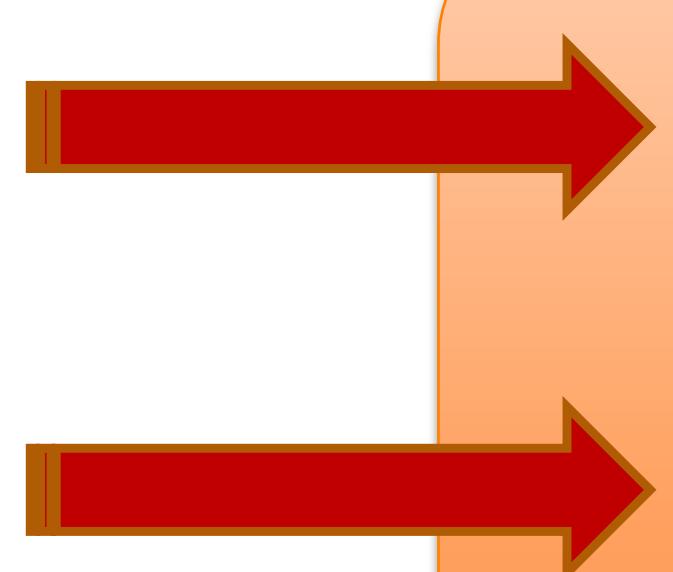
Province	Total Food Crop Area (in '000 ha)	Share in Total Food Cropped Area (in %)			Yield (kg/ha)		
		Wheat	Rice	Maize	Wheat	Rice	Maize
Punjab	7694	77,03%	18,10%	4,87%	2189,609	1382,779	1777,463
Sindh	1664	61,56%	37,74%	0,70%	2316,732	2544,54	520,87
N.W.F.P.	1398	58,31%	4,53%	37,16%	1330,483	1936,872	1554,785
Balochistan	462	70,73%	28,40%	0,87%	2067,09	2618,139	1015,957

TFP

$$A = \frac{Y}{[\alpha * K^\rho + (1 - \alpha) * H^{(1-\alpha)}]^{(1/\rho)}}$$

$$H = L * D * P * \exp(\phi * S)$$

$$gA = gY - \gamma [\alpha gK + (1 - \alpha) gH]$$



The geometric index of TFP

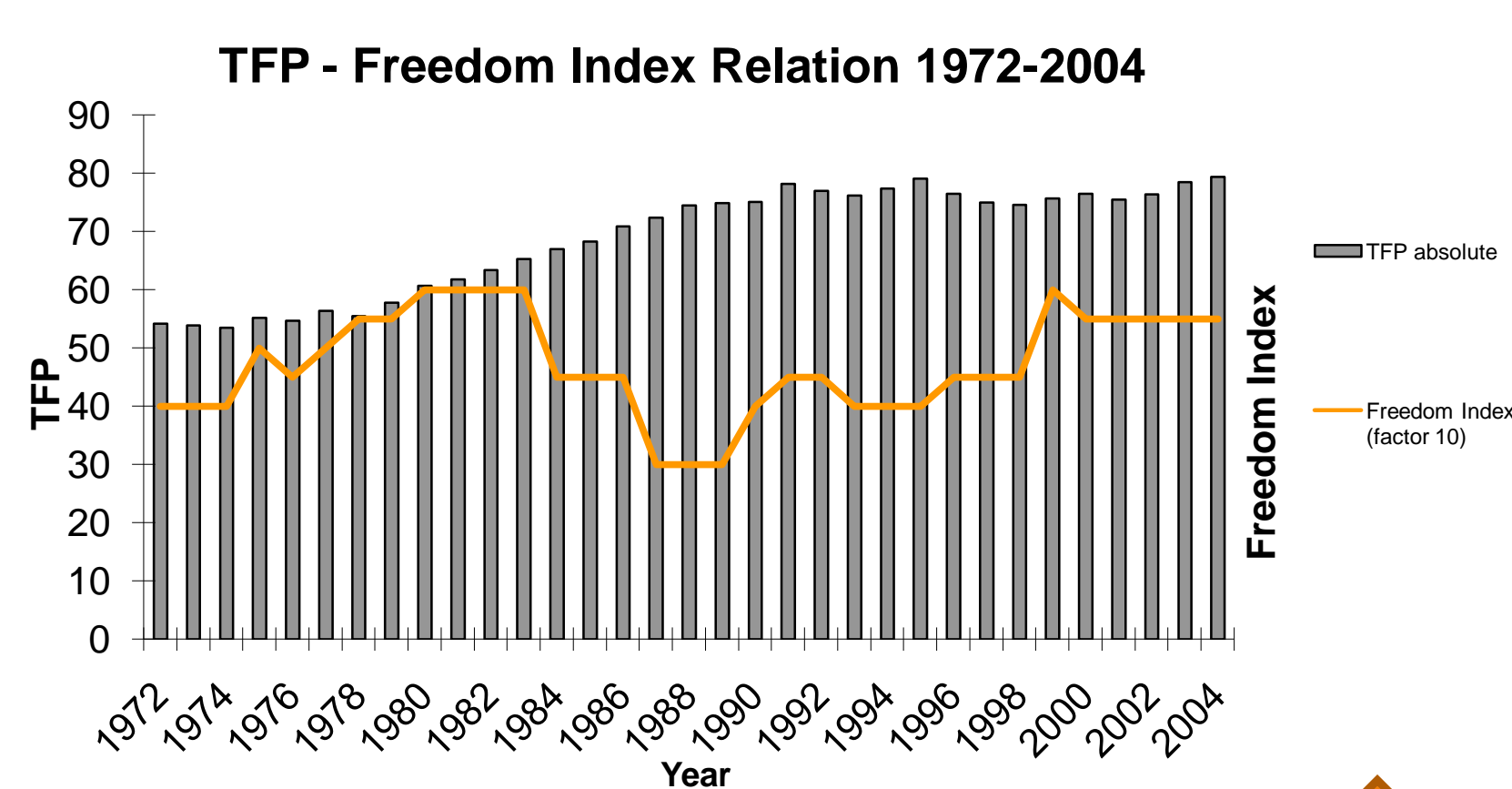
The growth rate of TFP

- Y= aggregate Output
- A= Total Factor Productivity
- α = relative importance of capital
- ρ = extent of returns to scale
- H= human capital scaled labor input
- K= gross domestic capital stock
- L= Population
- D= Population aged 15-64
- S= years of schooling
- ϕ = returns to education
- P= Labor Force Participation Rate
- g= growth rate

The Concept of TFP:

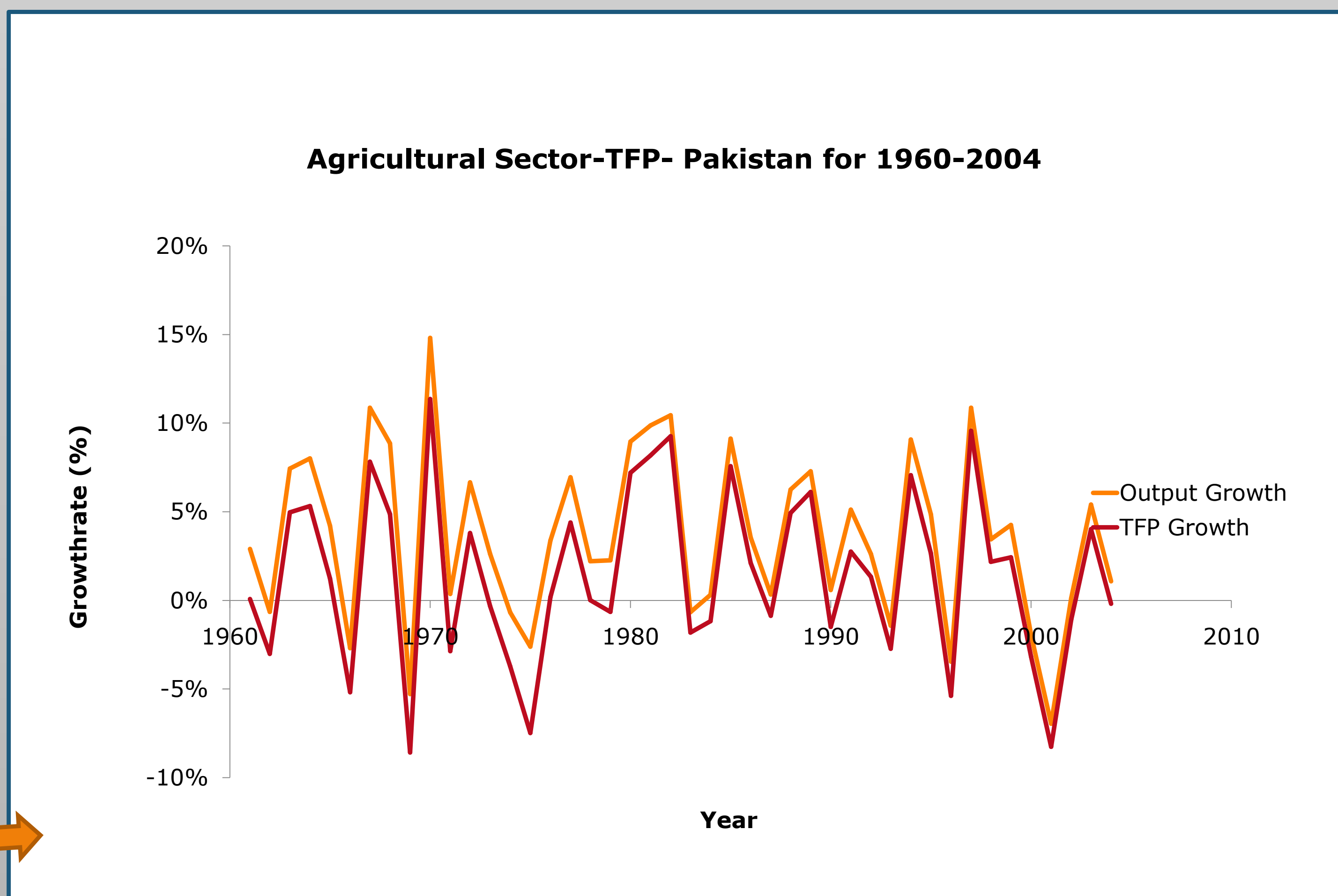
since A (TFP) is a pure number, it carries no interesting information in itself. But changes in the number indicate shifts in the relation between measured aggregate inputs and Outputs and changes are assumed to be caused by changes in technology and changes in efficiency and/or in the scale of operations of countries.

Productivity in Pakistan 1960-2004 – Results and Interpretation



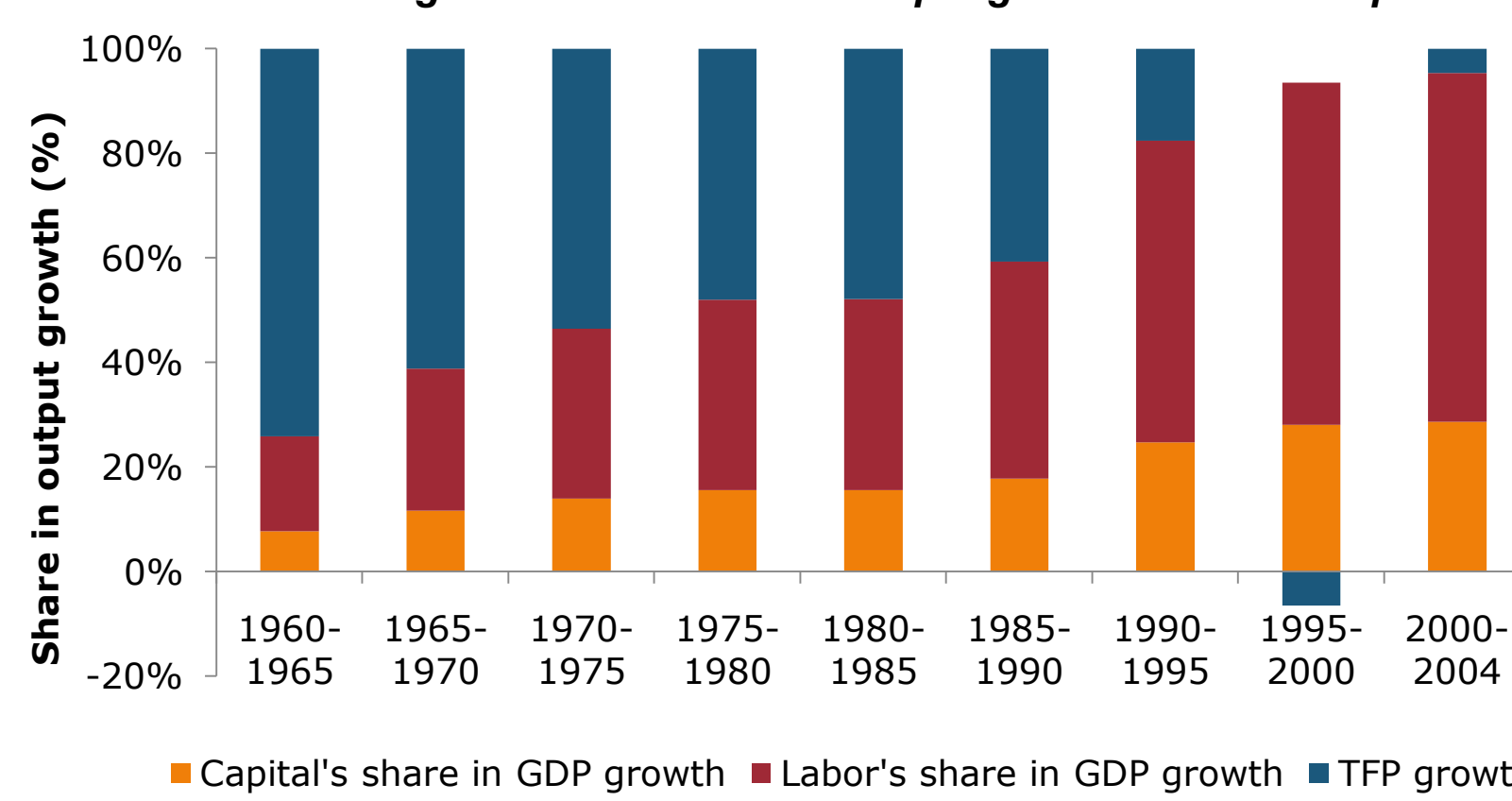
The country's weak collective infrastructure (control of corruption, political stability, rule of law) has led to productivity declines.

TFP explains a large fraction of output growth in the Pakistan economy, for the aggregate analysis values close to 50% have been retrieved, representing the share of TFP in total output. A sharp decline in the 90's owes to the failure to enhance on human capital in Pakistan especially with regard to research and development. Thus poverty and hunger have grown at faster paces than the growth in agricultural output.



"The best road to progress is freedom's road." (Kennedy, 1961)

Growth accounting and contributions to output growth for selected periods



Period	GDP growth (%)	Minus share of Capital (%)	Minus share of Labor (%)	TFP growth (%)
1960-1965	4,38%	0,80%	1,87%	1,71%
1965-1970	5,13%	0,96%	2,25%	1,92%
1970-1975	3,53%	1,02%	2,38%	0,13%
1975-1980	3,52%	0,87%	2,04%	0,61%
1980-1985	6,35%	0,44%	1,03%	4,88%
1985-1990	4,52%	0,44%	1,02%	3,06%
1990-1995	3,47%	0,56%	1,32%	1,59%
1995-2000	3,01%	0,49%	1,14%	1,38%
2000-2004	-0,46%	0,38%	0,89%	-1,73%

Conclusion:

Despite rising per capita income, food demand is likely to grow rapidly given the low level of current per capita income. Recent projections for future food supply and demand, call for sustained efforts for increasing production of essential items (wheat, edible oils, etc.). Faced with limits to further expansion of cultivated land and slowing returns to further input intensification, productivity growth assumes a central role in meeting the challenges of the future. In agriculture TFP explains a substantial part of growth. The periods of high/low agricultural growth have generally coincided with periods of robust/poor performance of the national economy. Over the entire period Pakistan's agricultural TFP has grown with an annual average of 1,8%, however investments in agriculture as compared to other sectors remain very low. The analysis of the country's collective infrastructure reveals the main determinants of failure being hidden in the political instability, the elitist political structure since independence in 1947 and corruption. Further research into the determinants of the productivity increases and decreases will be substantial.

