Doubling Kerala's NSDP In 3 Years – Implications for Investment and its Financing

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Abstract

This brief note was prepared for the State Planning Board of Kerala in India in response to a question on how to double Kerala's net state domestic product in three years and on its implications for investment and its financing. We show that this ambition lies in the realm of impossibles.

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1. Introduction

Kerala is adjudged as the best State in India in terms of human development, despite a fragile economic base, to the extent of elevating her achievements to the pedestal of a 'development model'. However, given her long-term poor record in the productive sectors of economy, serious doubts have been raised as to the sustainability of her human development capability. Though the state per capita income is a little higher than the national average, it is still below that of her neighbours (Government of Kerala 2008). This has in turn prompted the State Government to look for ways and means for raising the State income.

This brief note was prepared for the State Planning Board of Kerala in response to a question on how to double Kerala's net state domestic product (NSDP) in three years and on its implications for investment and its financing.

It should however be noted at the outset that any number to double in three years, it must grow at a rate of 26 percent per year! This growth rate is simply impossible for an economy today, let alone India or Kerala.

The present study is based on Kerala's NSDP for 2003-04: Rs. 397369.9 million at 1993-94 prices (Government of Kerala 2005). Doubling this (to reach Rs. 794739.8 million at constant prices) by 2007-08 requires a growth rate of 19 percent per annum (for the four years since 2003-04)!

The NSDP growth rate for 2003-04 was one of the highest for Kerala at 7.3 percent. If the economy can maintain a growth tempo of 7 percent a year during the coming years, it would take 10 years to double the income; an annual growth rate of 6 percent requires 12 years, 5 percent, 14 years and 4 percent, 18 years for the income to double.

2. Incremental Capital-Output ratio

Income as an output implies a dynamics of input-output relationship. It goes without saying that capital formation (investment) is a *sine qua non* for output, and the famous Harrodian Fundamental Equation gives growth rate as a ratio of the savings rate and capital coefficient (that is, incremental capital-output ratio) that simply describes the Keynesian identity between savings and investment (see, for example, Harrod 1939; Harrod 1949; Domar 1946; Allen 1967: chapter 10). In this light, we attempt below at an estimate of this input-output relationship and the level of investment required to ensure the output level desired.

At the outset, however, we must confess that the estimates might just be of indicative nature, owing to the unavoidable constraints of quality and availability of data, especially on investment. Available readily with us are the data on major sector-wise Gross Fixed Capital Formation for Kerala at current prices from 1981-82 to 1997-98, with data unavailable for two years 1991-93 (Economic and Political Weekly Research Foundation 2003).

Table 1: Incremental Capital - Output Ratio: Kerala

Sectors	1981-1982	1990-1991	1994-1995	1997-1998
Agriculture	7.02	0.65	0.38	0.57
Forestry Logging	-0.10	-0.03	0.07	0.61
Fishing	-0.70	0.13	1.47	0.71
Mining Quarrying	13.45	0.74	1.31	2.85
Primary Sector	**-4.26**	**0.58**	**0.36**	**0.59**
Manufacturing	2.69	6.00	0.31	1.52
Electricity Gas Water Supply	-4.02	-20.43	20.82	29.17
Construction	0.10	0.01	0.65	0.34
Secondary Sector	**2.91**	**3.57**	**1.29**	**2.00**
Transport Storage Communication	5.23	3.84	1.49	1.04
Trade Hotels Restaurants	3.89	0.13	0.04	0.05
Banking Insurance	0.12	0.35	0.59	0.36
Real estate Business Services	230.86	376.09	4.43	4.71
Public Administration	3.22	1.34	9.10	3.66
Other Services	0.73	0.56	0.50	NA
Tertiary Sector	**3.99**	**2.57**	**0.78**	**0.69**
Total	**4.45**	**2.08**	**0.78**	**0.96**

In Table 1 we present the sector-wise incremental capital-output ratio at certain time points estimated based on net state domestic product (NSDP) at current prices along with the investment series. (The ratio of two current price series might have some deflating effect and to that extent may somewhat approximate one with the constant price series.)

Kerala is already famous for her ease of the highly efficient translation of scarce inputs into 'optimum' output, as is evident in her achievements in human development. A similar dynamics is seen in the case of capital-output relationship also, with very low incremental capital output ratio (ICOR), implying a very high productivity level in general, (except in the major sector of electricity, gas and water supply, which is not only highly capital intensive but also fraught with wide scope for corruption, leading to avoidable cost escalations).

Table 2:
Sectoral Proportion in Investment and Incremental Output and Average Incremental Capital-Output Ratio.

Sectors	Investment		Incremental NSDP		Average Incremental COR
	5-Year* Average	Proportion in Total	5-Year* Average	Proportion in Total	
Agriculture	6585.72	0.133	11680.54	0.19	0.564
Forestry and Logging	182.64	0.004	1874.04	0.03	0.097
Fishing	636.18	0.013	1214.56	0.02	0.524
Mining and Quarrying	110.88	0.002	49.64	0.001	2.234
Primary	**7515.42**	**0.152**	**14818.78**	**0.241**	**0.507**
Manufacturing	7837.38	0.158	6333.18	0.103	1.238
Electricity, gas and water supply	10932.86	0.221	430.94	0.007	25.37
Construction	2095.36	0.042	5071.24	0.082	0.413
Secondary	**20865.6**	**0.422**	**11835.36**	**0.192**	**1.763**
Transport, storage & communication	7828.52	0.158	6084.46	0.099	1.287
Trade, hotels & restaurants	603.06	0.012	15299.18	0.249	0.039
Banking and Insurance	1280	0.026	3584.1	0.058	0.357
Real estate & ownership of dwellings	6067.1	0.123	4045.46	0.066	1.5
Public administration	3807.92	0.077	1701.42	0.028	2.238
Other services	1888.68	0.038	4129.32	0.067	0.457
Tertiary	**21097.54**	**0.426**	**34843.94**	**0.567**	**0.605**
Total	49478.56	1.	61498.08	1.	0.805

Note: * = 5-year average for 1993-94 to 1997-98; Rs. in million at current prices

That this scenario (of low capital-output ratio) is not just fortuitous is evident from Table 2, where we have estimates of average ICOR using smoothed (5-year average) series of investment and income increments during the period 1993-94 to 1997-98. It may also be indicative of a dismal economy of very low capital-intensive sectors; but the more than proportionate output increment, as noted earlier, is a surprising factor, calling for further inquiry into their possible inter-relationship. If in fact there does exist an input-output relationship, then Kerala has enough to take pride in an efficient economy.

Also note that both the secondary and the tertiary sector accounted for almost the same proportion (about 42 percent each) in total investment during the quinquennium, but the secondary sector output increment amounted only to about one-third of the tertiary sector output increment, its proportion in the total output increment during the period being only 19 percent as against 57 percent of the tertiary sector. Note that if there is an effective input-output relationship, then the ratio of these two proportions may be taken as a sort of capital elasticity of output (Table 3). The secondary sector appears much inelastic in this respect, and the primary sector more elastic than the tertiary one. It goes without saying that the least capital-intensive (sub) sectors are the most elastic. With a functional input-output dynamics, this suggests to follow a policy of focusing on these less capital-intensive sectors for more yields.

3. Investment Required

Now assuming as valid the incremental COR estimated in Table 2, we attempt to find out the quantum of investment required to double the NSDP. We structure the estimation in two scenarios at both constant (Table 4) and current (Table 5) prices. Our explanation below is based on Table 5 at current prices.

The two scenarios considered correspond to two possible ways of achieving the goal of doubling the NSDP. One is to double the NSDP to Rs. 1803430.4 million at current prices compared with Rs. 901715.2 million in 2003-04 by doubling each of the component sub-sectoral

Table 3:
Iinvestment Elasticity of Output Increment

Agriculture	1.43	Transport, storage & communication	0.63
Forestry and Logging	8.26	Trade, hotels & restaurants	20.41
Fishing	1.54	Banking and Insurance	2.25
Mining and Quarrying	0.36	Real estate & ownership of dwellings	0.54
Primary	**1.59**	Public administration	0.36
Manufacturing	0.65	Other services	1.76
Electricity, gas and water supply	0.03	**Tertiary**	**1.33**
Construction	1.95		
Secondary	**0.46**		

Table 4:
Two Scenarios of Investment Required to Double the NSDP (at Constant Prices)

Sectors	Average Sectoral share in NSDP		NSDP Increment		Required Investment	
	1993-97	1999-03	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Agriculture	0.235	0.16	51646.5	75116.2	29119.3	42352.0
Forestry Logging	0.028	0.023	8787.0	9311.3	856.4	907.5
Fishing	0.024	0.018	6604.0	7596.0	3459.1	3978.7
Mining Quarrying	0.002	0.002	872.6	927.3	1949.1	2071.3
Primary Sector	**0.290**	**0.202**	**67910.1**	**92950.7**	**34441.0**	**47140.4**
Manufacturing	0.128	0.093	30670.0	43201.7	37954.5	53462.6
Electricity Gas Water Supply	0.01	0.027	13954.2	7211.2	354015.2	182945.9
Construction	0.075	0.078	32123.2	30084.6	13272.8	12430.5
Secondary Sector	**0.213**	**0.198**	**76747.4**	**80497.4**	**135304.8**	**141916.0**
Transport, storage & communication	0.077	0.112	56848.2	31850.0	73143.3	40979.6
Trade Hotels Restaurants	0.189	0.211	82920.8	84823.5	3268.6	3343.6
Banking Insurance	0.057	0.088	39966.8	30355.3	14273.5	10840.9
Real estate & ownership of dwellings	0.053	0.044	14830.0	20348.3	22241.0	30516.9
Public Administration	0.043	0.053	20522.7	21462.8	45931.5	48035.6
Other Services	0.079	0.091	37623.9	35081.8	17208.5	16045.8
Tertiary Sector	**0.497**	**0.6**	**252712.4**	**223921.8**	**153014.0**	**135581.6**
Total	**1**	**1**	**397369.9**	**397369.9**	**319705.8**	**319705.8**

Note: Scenario 1: with sectoral NSDP doubled; Scenario 2: with sectoral NSDP increasing by the average sectoral share in total NSDP during 1999-2003; Rs. in million at constant 1993-94 prices

outputs (Scenario 1). In Scenario 2, we allow the sub-sectoral output to increase according to the average sectoral share in total NSDP estimated for the period 1999-2003 such that the aggregate NSDP amounts to Rs. 1803430.4 million. Now given these scenario-wise estimates of NSDP increment at current prices both sectoral and total, and assuming that the average ICOR estimates (in Table 2) are valid, we estimate the investment required for this growth. The total investment needed turns out to be Rs. 725479.1 million.

Table 5:
Two Scenarios of Investment Required to Double the NSDP (at Current Prices)

Sectors	Average Sectoral share in NSDP		NSDP Increment		Required Investment	
	1993-97	1999-03	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Agriculture	0.241	0.15	108747.8	161940.5	61314.2	91305.3
Forestry Logging	0.027	0.018	11176.3	20854.6	1089.2	2032.4
Fishing	0.025	0.021	16994.4	21251.3	8901.6	11131.3
Mining Quarrying	0.002	0.003	2258.6	2402.5	5045.0	5366.5
Primary Sector	**0.294**	**0.192**	**139177.1**	**206448.9**	**70584.4**	**104701.6**
Manufacturing	0.123	0.093	73681.7	94568.9	91181.9	117030.1
Electricity Gas Water Supply	0.009	0.026	29114.4	18309.5	738626.4	464509.3
Construction	0.084	0.1	96800.0	82764.2	39996.3	34196.9
Secondary Sector	**0.216**	**0.219**	**199596.1**	**195642.7**	**351885.6**	**344915.8**
Transport, storage & communication	0.075	0.099	96310.5	82958.2	123917.1	106737.5
Trade Hotels Restaurants	0.201	0.219	199337.9	194973.2	7857.5	7685.4
Banking Insurance	0.052	0.053	50929.2	45340.1	18188.5	16192.4
Real estate & ownership of dwellings	0.047	0.068	68992.0	54505.2	103469.4	81743.2
Public Administration	0.04	0.051	45792.4	45712.8	102487.2	102309.1
Other Services	0.074	0.099	101580.0	76134.1	46460.8	34822.3
Tertiary Sector	**0.49**	**0.589**	**562942.0**	**499623.6**	**340853.9**	**302515.4**
Total	**1**	**1**	**901715.2**	**901715.2**	**725479.1**	**725479.1**

Note: Scenario 1: with sectoral NSDP doubled; Scenario 2: with sectoral NSDP increasing by the average sectoral share in total NSDP during 1999-2003; Rs. in million at current prices

Available data for 1981-82 shows the public-private distribution of gross fixed capital formation in Kerala in the proportion of 35:65. Assuming this still holds on an average, we find an investment requirement to the tune of Rs. 253917.7 million at current prices in the public sector of Kerala.

4. Financing the Investment

Now the final question is about the financing of this public investment, assuming perfect capability in the private sector. The State is to finance its investment commitment out of its total revenue, which was growing at an average annual rate of 10 percent over the last 10 years. Assuming this growth tempo will sustain in the future and given the State revenue at Rs. 118153.7 million in 2003-04, we find that it will take 8+ years for the State revenue to equal the above investment requirement. A 3-year time horizon requires the revenue to increase by 29 percent per annum, and a 5-year horizon by 16.5 percent! Implied here is the assumption that the whole State revenue goes to meet the investment requirement.

However, we observe that the share of the capital expenditure in total expenditure by the government was in the range of 9 – 4 percent in the past 10 years, and that in total revenue receipts in the range of 10.4 – 5.4 percent. Hence assuming about 8 percent of the total revenue goes into investment, we have a revenue requirement of Rs. 3173971.1 million to meet the target. Then it takes 34.5 years for the revenue to increase to this level at an average annual growth rate of 10 percent. A 3-year time horizon requires the revenue to increase by about 200 percent per annum, and a 10-year time horizon by 39 percent per annum! It is quite a Herculean task.

Table 6 presents different scenarios of growth rates required for the State revenue receipts to meet such an investment target under different combined conditions of investment ratio (in total revenue

receipts) and income growth horizon. We find that if the share of investment in revenue receipts were 20 percent, then at the current growth rate of 10 percent of the revenue, it would take 25 years to achieve the target of doubling the income! We are mostly in the realm of impossibles!

Table 6:
Growth Rate (%) Required for the State Revenue Receipts to meet the Investment Target vis-à-vis Investment Share and Growth Horizon

Years (Growth Horizon)	Share of Investment in Total Revenue (%)					
	5	8	10	12	15	20
3	250.3	199.5	178.0	161.6	142.9	120.7
5	112.2	93.1	84.7	78.1	70.3	60.8
8	60.0	50.9	46.7	43.4	39.5	34.6
10	45.7	39.0	35.9	33.4	30.5	26.8
12	36.8	31.6	29.1	27.2	24.8	21.9
15	28.5	24.5	22.7	21.2	19.4	17.2
18	23.2	20.1	18.6	17.4	15.9	14.1
20	20.7	17.9	16.6	15.5	14.2	12.6
25	16.2	14.1	13.1	12.2	11.2	10.0
30	13.4	11.6	10.8	10.1	9.3	8.2
40	9.9	8.6	8.0	7.5	6.9	6.1

By way of concluding, it should be noted that the above exercises are only indicative in nature due mostly to data constraints.

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