

# Economic Growth and Development in India and SAARC Countries

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## Abstract

Momentum of economic growth in India and other South Asian economies is analysed based on stylized facts of these economies along with trends of their fiscal, monetary, trade, education and income distribution policies. Macroeconomic, general equilibrium, trade and game theoretic models have been identified that could be applied to analyse micro, macro and sectoral issues of economic growth. Achieving higher rates of economic growth requires more systematic and scientific analysis of potentials, existing strengths and comparative advantages of these economies so that they can march ahead in the growth competition in the global economy. Policies should be consistent and comprehensive to link various sectors, regions and nations in this road for long run growth. A strong pro-growth government in India with a good vision for the regional integration and development is instrumental in turning this region as another example of economic miracles in the global economy within the next few decades. By maintaining average 8 percent growth, it is possible that India will catch up the countries in the Western Europe in per capita income within a generation. Other SAARC members may be able to converge to India in per-capita income if they are able to become more stable and ready to march single-minded on the highway of economic growth.

Keywords: Growth, economic development, South Asia, China, India,

JEL classification: O2, O4, O53

Note: An earlier version of this paper was presented at the growth and development workshop in the Institute of Economic Growth (IEG) Delhi on Aug 20, 2014. We acknowledge comments by Pradeep Agrawal, Manoj Panda, Meeta Keswani Mehra, Sushanta Mallick and other participants from this workshop in the earlier version of this paper. Correspondence address: Business School, University of Hull, HU6 7RX, Hull, UK. Phone: 441482463207; Fax:441482463484; email: K.R.Bhattarai@hull.ac.uk

## 1 Introduction

Election of pro-growth Modi government in India in May 2014 and initiation of growth oriented policies have raised optimism not only in India but also in all South Asian countries. India counts about 80 percent of GDP and population of South Asia. It is marching on path of rapid growth since pro-liberalisation policies were adopted in 1991. It has shown keen interest in harnessing the natural and human resources for economic development of the regions by taking international initiatives in establishing the BRICS Bank, concept of trans-Himalayan growth axis, road, rail and information networks to strengthen SAARC regional economic cooperation. It has provided vision and leadership for growth.

It has taken more than seven decades to come to this point. Many argue that about six decades were lost in process of finding right ideas, philosophies and techniques required for speedy economic growth in India. It is still the case in neighboring countries Afghanistan, Pakistan, Nepal and Sri Lanka. India can contribute to create atmosphere for structural changes and development of economic and social institutions required for such growth through out the region. The actions for liberalisation and economic reforms now being discussed and expected to be implemented in near future can have far reaching and more transformative effects for the long run growth than those implemented in 1990s.

By maintaining average 8 percent growth, it is possible that India will catch up the advanced countries in the West and the East in per capita income within a generation. Other SAARC member countries, may be able to converge to India in per-capita income taking appropriate actions to create stable institutions and socioeconomic conditions required for growth. By the size of the economy and manpower-strength, India is the centre of the economic gravity with seven smaller economies surrounding it. Considering the growth success story of China since 1980s, which is in the eastern neighbor of this region, it is very essential and beneficial to India to have an integrated approach for the development of these countries in South Asia. Modi's recent proposal for HIT-ways (highways, information technology and transmission ways) for the region is a timely and visionary proposal for growth. In an address on the Independence Day 2014 he has proposed new strategies including i) "no defect" and "zero effect" approach to manufacturing, ii) a model village in each constituency iii) new initiative for expanding bank accounts to million of poor households, iv) massive investment on skills and sanitation iv) fight against poverty in all SAARC countries and v) an open approach to the foreign direct investment or "make in India". Several strategic points for growth emerging from the analysis of facts in this paper are worth considering in this context. These are as follows:

1. Given the 20 percent population residing in South Asia this region should push for growth and increase its share of global GDP up to 20 percent from roughly 6.5 percent in 2014.
2. Such growth requires increasing the ratio of saving and investment about 10 percent above the current averages around 35 percent.

3. Process of structural transformation should continue so that output and employment increases substantially in industrial and services sectors and till both output and employment in the agriculture sector are less than 5 percent from around 17 and 50 percent in recent years.
4. Such transformation will occur as this region moves towards urbanisation so than about 90 percent of the population starts living in urban area with facilities. Building mega cities like this will create not only employment but also income. It also will gradually free up rural lands for more scientific cultivations and other meaningful economic uses.
5. On manpower issues it is important to reduce the student teacher ratio from 40 to close to 16 to raise the quality of education and cognitive skill among children. This is essential for human capital required for science and technology and for improving the PISA scores.
6. Revenue and spending of government should balance at least in the medium term and debt to GDP ratio should not increase over 50 percent of GDP; the size of the public sector is not over 30 percent of GDP.
7. Trade ratio should increase to around 100 percent from the 50 percent at this time. Free trade regimes can enhance both the supply and demand side of the economy.
8. Liquidity of the financial system need at least to treble to have a smooth flow of credits required for new and existing enterprises.
9. Free convertibility of currency is essential to protect this region from international shocks.
10. A high 8 percent growth strategy is consistent with all above and requires firm commitment, efficient and strong public administration. Gini coefficient should not be above 35 percent for social integrity and cohesion.

It has become very important to implement the social choice and endowment theories of Sen (1999) to enhance the welfare of the people in the South Asia under the process of rapid globalization. Objective of this paper is to identify models that are essential for analysis of growth trajectories that may fit well to emerging stylized facts of the South Asian economies based on time series data and relevant literature<sup>1</sup>.

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<sup>1</sup>Data series used in this paper are obtained from the World Economic Outlook and International Financial Statistics of the IMF and the World Bank accessed through the data archive in the UK (UKdata.stat).

## 1.1 History on growth in South Asia

Systematic thinking about the process of economic growth in the South Asian economies started with the implementations of periodic plans in 1950s (Srinivasan (1964), Myrdal (1982), Sen (1983) ). Improvement in the national accounting and input output analysis in 1950s made it possible to focus on analysis of economic growth rates (Krishnamurty (1966), Swamy (1973)). These plans contained discussions about the strategies and programmes of the government for the development of agriculture, construction of road and telecommunication networks, industrialisation, literacy and numeracy, further education and health in process of creating human capital. Adoption of an appropriate technology of production, alleviation of poverty and regional and social balance were other elements. While government intervention in the economy increased under the ISI strategy, these planning exercises also contained programmes for decentralisation (Bardhan (2002)). Whether to follow the labour intensive technology under the Gandhian or Nehruvian theory of growth or capital intensive technology using the capitalist market economy were debated academically by (Srinivasan (1962), Sen (1968), Mahalanobis (1958)). There were strategic debates on whether a nation should push for big heavy industries first letting the trickle down effects to take care of poverty of masses. Social and economic institutions are still not appropriate in South Asia for growth as in China which created these between 1950s to 1980s, particularly during period of cultural revolutions (Basu (2007)). Challenges remained not only in transforming surplus labour from the rural agricultural sectors to industrial sectors in the dualistic economic set up but also disciplining them for the hard work in the industrial sectors (Lewis (1952), Myrdal (1972) Basu (2009) ). Macro, multisectoral and general equilibrium models were constructed for analysis (Parikh and Panda (1995), Fan (2002)). Governments actively intervened in the economy developing various state owned enterprises and increasing the role of state in every aspects of the economy. This resulted in massive build up of bureaucracy, red tapism and corruption in public life. This brought distortions in the efficient allocations of resources. Plans and programmes remained in the self of the planning commissions and could not get implemented resulting in dismal economic growth rates that barely averaged around 3 percent through out 1950 to 1980s (Ahluwalia (2002)). Growth could not occur in South Asia at a desirable space while other countries including the South Korea, Taiwan, Hong Kong and Singapore transformed themselves from developing to advanced economies during this period adopting good set of export oriented public private partnership approach to economic growth.

What were the golden keys for growth in China and India in recent years? Kotwal, Ramaswamy and Wadha (2011) attribute India's growth mainly to the export oriented strategies of high tech sector. Xu (2011) attributes the magic of growth in China to its disciplined workers and a regionally decentralised authoritarian system in which "The central government has control over personnel, whereas sub-national governments run the bulk of the economy; and they initiate, negotiate, implement, divert, and resist reforms, policies, rules, and laws". There are very few studies focusing on the aggregate growth

in the South Asia in other countries (Srinivasan (2005)). Rajan (2008) and Diamond and Rajan (2009) identified institutional reforms for an efficient financial sector required for economic growth.

Economic integration of the South Asian region must base on the strength of its members. India is stable, dynamic and economic power of the region. Bhutan and Maldives two tiny countries of the region are doing better economically by pursuing strategies appropriate to the vastly growing production sectors and middle classes in India. Bhutan is benefiting by proximity of India by developing a number of hydro power stations generating electricity to sell to India. Maldives is developing fast by tourism aiming at individuals in the growing middle income class in India. Bangladesh is achieving higher growth rates than before by exporting textiles but still caught in natural disasters and political problems. War torn Afghanistan and Pakistan could not emerge above the ethnic conflicts to focus on economic growth. Despite uprooting the age old monarchy and being able to restore the peace with Maoists it is an irony that Nepal is yet struggling to form a political consensus to draft a new constitution for the republic of Nepal. Given above potentials and absurdities a systematic study, particularly focusing on the role that India can play in development of the South Asia region has become an interesting topic of research, apparently very little is found on this in the existing literature.

## **2 SAARC in the Global Growth Competition**

The process of convergence and divergence has been going on in the global economy in the last three hundred years after the scientific discoveries and technical innovations that have fundamentally changed the nature of production, exchange and consumption. Industrialisation came to the current stage going through stages of development from 18th to the last quarter of 20th century. This process has further intensified in the last six decades. Every country in the world wants to achieve a higher rate of growth of GDP per capita. While the countries in the West were successful in achieving higher growth till 1980s the growth pole has now gradually shifted towards the countries in developing Asia including India in the South Asia. Stylized facts of growth and economic development presented here are based on the data sets from the World Economic Outlook of the IMF and World Bank Development Indicators (WBDI).

The average growth rate in developing Asia has been 7 to 8 percent in the last 30 years, twice the global average and three times or more of that in the EU economies. After decades of sluggishness, growth rates in South Asian countries have been higher than those in other regions of the world; particularly very impressive in India (5.5 to 7.0 percents) and china (8.5 to 10.3 percents). Bosworth and Collins (2008) provide growth accounting at aggregate and sectoral levels of the extraordinarily growth occurring in China and India, residence of over one third of the global population; less than 20 percent population reside now in advanced countries.

	ASEAN-5	ADV Econ	CIS	CE Europe	DevAsia	EmDevEcon.	EuroA	EU Majadv (G7)	MENA	MENAP	OthAdv	SSA	WestHm	World	
1980-89	5.30	3.12		2.11	6.79	3.51		2.15	3.03	1.47	1.99	4.73	2.60	2.12	3.24
1990-99	5.03	2.78	-4.26	1.70	7.36	3.67	1.97	2.16	2.55	4.35	4.37	4.33	2.23	2.97	3.09
2000-09	4.87	1.78	5.98	3.90	8.31	6.15	1.35	1.75	1.45	5.42	5.34	3.37	5.53	3.18	3.62
2010-14	5.61	1.88	3.72	3.30	7.37	5.66	0.68	0.93	1.87	3.99	3.94	3.28	5.39	3.86	3.75

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980-89		3.28	9.37	9.76	5.54	10.52	4.10	6.59	4.21
1990-99		4.80	5.33	10.00	5.63	6.61	4.87	4.50	5.61
2000-09	9.23	5.82	8.10	10.29	7.00	7.10	4.14	4.69	4.64
2010-14	6.72	6.15	8.66	8.46	5.81	4.33	4.25	3.34	7.13

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980		236	321	307	277	413	138	374	301
1990		284	544	341	386	1092	215	483	509
2000		355	802	946	461	2967	247	581	917
2010	641	703	2063	4423	1432	6668	596	1034	2429
2014	641	1006	3042	7138	1389	7501	703	1234	3360

Size of the SAARC region has increased to around 7 percent of global GDP in PPP which more has more than doubled since 1980. However this growth in global share pales when compared to China which raised its global share to 16.5 in 2014 percent compared to 6 percent of India. Srinivasan (2005) reports on TFP growth rates underlying these trends.

Economists generally agree on the factors that lead to economic growth as above based on experience of Western Europe, North America, Japan and other advanced economies. Policies that raise the rate of accumulation of physical and human capital and advancement in the production technology lead to higher economic growth (Madison (1995)). Classical, neoclassical and endogenous growth models have been constructed to show the precise relationships among these factors and economic growth. Early versions of South Asian growth models used by the Planning Commission of these nations were based on basic Harrod-Domar set up where given the capital output ratio increasing growth required just increasing the rate of national saving. Then there were various sectoral decomposition exercises aimed to fit the aggregate target. Big gaps remained between targets and accomplishments. Levels of per capita income were similar across all SAARC countries till 1980 but these started to differ substantially following the economic reforms and liberalisations that started in India in late 1980s (after the success of similar trend in China). Kotwal, Ramaswami and Wadhwa (2011) explain how the recent growth in India was spurred by exports of high tech services rather than manufacturing products as in China.

## 2.1 Size of the market

Big size of the markets are the factors driving the momentum of growth in the South Asia . A large size of population, 1.3 billion in India, not only generates the huge amount of demand for consumption but also provides factors of production required to produce goods and services. Being the home of nearly two billion people comprising about 20 percent

of the global population living in the Southern Himalayan belt the South Asia has full potential for becoming the most dynamic region of the world. Its share in the global economy can increase at least up to the 20 percent from 7 percent existing today. Level of GDP in current dollars were 1.8 thousands in India in contrast to 9.8 thousands in China. China's 16 trillion dollar economy (in PPP) is about three times of 5.8 trillion dollars of India. China's per capita in PPP is 2.5 times bigger than that of India (10.7 thousands in comparison to 4.2 thousands).

South Asia has made significant improvements in reducing the population living the poverty line in the last decade. After the initiation of the millennium development goals, percent of population living below the poverty-line had reduced substantially from 38.2 percent to 24.5 percent in India. Incidence of poverty was higher in Bangladesh 30.3 percent but lower in Nepal (19.1%), Pakistan,(18.0%), Sri Lanka (5.4%) and a lot lower in Bhutan (2.6%) and Maldives (2.5%). This success has made it possible to make the "sustainable growth" the only major policy objective now as the redistribution issue will take care of itself if new generation of workers comes with skills and productivity required for dynamics of growth across sectors of the economy.

## 2.2 Capital accumulation

Capital accumulation is the key for economic growth. It includes construction of highways, schools and universities, information networks for speedy communication, generation and transmission lines electricities, centres of research and technologies to create public infrastructure. These are essential for flourishing of businesses and industries in the private sector. For India Agrawal et al. (2010) had found that higher income per capita and improved access to banking facilities significantly improves savings. Saving ratio now is around 51 percent in China compared to 31.3 percent in India. All other SAARC countries had saving ratios lower than in India except Nepal. On the supply side savings of households and retained earning from firms generate funds that can be channelled to investment projects. Remittances and net export surpluses also contribute to the national savings up to 25.3 percent of GDP in Nepal compared to 3.7 percent in India.

There has been significant transformation of investment ratios in India (35.1%), Nepal (35.2%), Bangladesh (29.0%) and Bhutan (46.2%) in last thirty years while it has declined a bit in Pakistan (15.9%), Sri Lanka (33.9%) and Maldives (17.7%). Shahbaz, Ahmad and Chaudhary (2009) find FDI, trade and remittance to be important determinant of growth in Pakistan.

Real interest reflects the true cost of capital and is the difference between the nominal interest and inflation. These have been very unstable as low as negative -6.1 percent in Nepal, 3.2 and 4.1 percents in India and China. Such volatility in the real interest rate creates uncertainty and is not good for growth. This results from the lack of coordination between fiscal and monetary policies.

Smooth supply of energy resource is the source of worries in most of the South Asian countries who pay a lot in importing most of the petroleum products. It is irony that the

development of hydro potentials did not speed up in the past despite a vast potential in the rivers flowing from the Himalayas. Energy intensity in production (as measured by kg of oil equivalent per \$1,000 GDP) has been lowered from 514 to 203 in China and from 201.1 to 129.4 in India. Growing cost of energy will be a major constraint in the economic growth of this region unless they focus on harnessing these renewable sources of energy. Mallick (2009) quantifies casual relation between economic growth and demand for fuel on the basis of Granger causality tests and VAR analysis.

### **2.3 Labour market**

Capital accumulation enhances productivity of labour. It raises their wages and the level of income. This leads to increase in consumption and further demand for investable goods. South Asia had 655 million people in the labour force in 2012, it was more than the entire population in the European Union. About 74 percent of them belonged to India. How many of working age people actually working or ready to work determine the labour force of a country. Ratio of total of these two to the labour force is the participation rate. Total population multiplied by participation rate, hours of work and output per hours gives GDP of an economy. Increase in the level of education of the work force, reforms in the labour market institutions, change in habits and cultural factors play roles in determining employability and income of workers. The participation rate varies from 48 percent in Afghanistan to 83 percent in Nepal. Krishnamurty (1966) had found inverse relation between income and birth rates which may explain the declining trends in birth rates in these countries. Participation of female in the labour force is low not only in Afghanistan but also in Pakistan, India and Sri Lanka. It is possible to increase the labour force participation rate by increasing the flexibility of work hours, creation of new job opportunities and changing the attitude towards the works. Dualism between organised and unorganised sectors, rural and urban area and the vast amount of under utilised labour are the real problems in South Asia. This is the reason for high gaps in income wages between skilled and unskilled sectors. While there is a shortage of skilled labour there is mass disguised unemployment among minorities as Kadirgamar (2009) discusses unemployment of people belonging to Tamil ethnicity in Sri Lanka.

### **2.4 Structural Transformation in Production**

Fall in the share of agriculture and rise in the industrial and services sectors is the general process of structural transformation in the process of economic growth. This is happening in general in all economies of South Asia. What is striking in South Asia compared to China is the rise of the service sector share more than the share of the manufacturing sector. Indian economy expanded in recent by exporting IT services (more than 50 %), tourism is the major service sector in Maldives, Nepal and Sri Lanka. Is this a healthy trend of structural transformation? It depends on how much creative employments can service sector generate. Employment in agriculture is still high 65 percent in Nepal to 45 percent in India . Employment in the industrial sectors is still less than 25 percents in

these countries.

A structural transformation is not complete unless the share of output and employment are not less than 5 percent of total output and employment. This will happen when the private and public sectors expand, new enterprises get started and new technologies are employed in production. The process of structural transformation has just started but will take decades for these South Asian economies to reach below 5 percent share of agriculture.

### 3 Economic Policies

Good economic policies inspire people to work hard and be innovative. Policies designed scientifically help to achieve micro and macro economic objectives for growth and prosperity. While the industrial, manpower and employment, environmental or for research and development policies are designed for micro economic efficiency, fiscal, financial and trade policies impact at the macro levels. In general each of these policies aim at achieving the most efficient outcome possible within the resource constraints of the economy. Diamond approach that Rao and Seth (2009) applied to Bhutan could be adopted for analysis of fiscal issues in other countries too.

#### 3.1 Fiscal Policy

Governments in modern welfare states need to provide not only the basic public services such as law, order and defence but also create economic and social infrastructure required for growth. Remaining under the guidance of the overall policies of the time, governments in South Asia implement budgets to achieve macroeconomic stability, better distribution of income and higher rates of investment in public and private sectors of the economy (GOI; Jetly: 2014). One part of these expenditure is for current expenditure to meet the administrative costs of those basic services but the another part is for public investments. These are spent in construction of physical infrastructure such as roads, ports, canals, irrigation network, telecommunications and research and development. Then there are spending to provide for health and education and other services. Size of public spending as a ratio GDP increases with the public commitments like this. It was about 28 percent of GDP in India and Bhutan but around 20 percent in Nepal, Pakistan and Sri Lanka and slightly lower in Bangladesh (Table 4).

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	..	15.0	..	..	..	..	..	..	..
1990	..	12.5	37.7	21.0	23.9	33.3	..	..	30.0
2000	..	13.2	45.3	17.1	24.8	29.1	13.1	17.3	25.8
2010	26.6	14.6	44.7	22.8	27.2	40.1	18.8	20.2	22.8
2014	26.6	17.5	28.2	24.5	28.2	44.9	20.3	19.9	19.2

Governments raise more revenue from the indirect taxes on goods and services and on international trade than the direct taxes on income and wealth in South Asian countries. Ratio of total revenue to the GDP collected in this way is a slightly lower than the ratio of public spending in these countries. Taxes increase prices of goods and services and

put burden on both producers and consumers in the economy. These burden increase proportionately with the rate of taxes. Higher taxes discourage business and growth of the private sector. Therefore it is neither optimal nor desirable to raise tax ratio beyond a certain limit.

Governments borrow from the private sector and central banks when revenues are not enough to pay for the public spending. Crowding out occurs when government competes for funds from the private sector. Inflation spirals when government borrows from the central banks, which essentially means printing money to pay for the deficit. Larger deficit destabilises the economy as it also causes an accumulation of public debt over time. The debt GDP ratio was 50 percent in India in 2012. Countries which have higher public debt have very limited ability to engage in development activities as most of their revenues end up on serving the public debt. Privatisation of public enterprises may reduce debt but Ghosh and Sen (2012) argue for privatisation and liberalisation simultaneously otherwise it will be infeasible as it reduces wages and welfare of workers.

### 3.2 Monetary and financial sector policies

Money is required for exchange of goods and services and it is also used for deferred payments. Liquidity of the financial system is essential for flow of credits in the private sector. Good financial system encourages risk averse people to save. It motivates entrepreneurs to invest borrowing from the financial institutions. Large, medium and small scale enterprises flourish and businesses expand when the financial system is more liquid and reliable. Excess liquidity, however, can cause spiraling inflation and negative real interest rate in the economy. India and its neighbors differ quite a lot in the degree of liquidity in the system (Table 5).

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	28.9	14.2	..	36.8	33.9	44.6	23.5	41.5	32.0
1990	..	23.3	20.6	78.6	41.5	26.1	32.0	39.1	28.3
2000	..	34.6	50.3	137.0	53.7	41.1	51.3	38.6	38.4
2010	35.2	67.4	71.7	180.8	76.2	58.1	73.2	41.1	37.4
2012	31.9	69.7	61.2	187.6	75.6	58.6	77.5	39.9	38.6

Efficiency of the financial system means smaller spread between the lending and borrowing rates, from 3 to 8.5 percents among SAARC countries. This raises the cost of capital and harms initiatives for investment.

Ratio of credits to the private to the GDP and market capitalisation ratios show the strength of economy to channel savings to the investment. Developing countries of South Asia are still far away from reaching the optimal ratio of the financial assets to GDP. While China had this ratio 1.34 but India has only 0.51. Further liberalisation of banking sector, strengthening of rules and regulations for contracts can create an environment for trust and creditworthiness of these economies. Despite this India has better market capitalisation rate of listed companies than that of China; 68 percent compared to 45 percents.

### 3.3 Trade policy

Trade is considered an engine of growth. Asian tigers earlier and South Korea and China in recent years have achieved phenomenal growth rates by pursuing the export oriented trade policies. Reduction in tariffs and liberalisations in trade has significantly raised the rate of globalisation in the world. Based on Prowes database Goldberg et al. (2010) estimate about 31 percent of introduction of new products account for such reduction in tariffs in India. Kaushik, Arbenser and Klein (2008) used the error correction and cointegration to study relation between economic growth, export growth, export instability and gross fixed capital formation (investment) in India during the period 1971- 2005.

It is possible to transform economies from a developing one to more advanced ones following trade promotion policies including the free trade area (FTA), South Asian Trade and Partnership Arrangement (SAPTA), Bay of Bengal initiative for Multi Sectoral Technical and Economic Cooperation (BIMSTEC) and power transformation agreement (PTA) and project development agreements (PDA). However clarity is required in process of tariff reforms. Should they be unilateral, multilateral and customs union of South Asia (Nearby 1998). Athukorala (2000) for simultaneous reforms of exports, imports and support mechanism. Dutta (2007) found workers in high tariff protected sectors received higher wages than sectors not protected by tariff; with liberalisation wage inequality increased as the wages declined in the protected sectors. Mottaleb and Sonobe (2011) found the education level of manufacturers and performance was higher in garment industry in Bangladesh and foreign owned companies did better than endogenous firms.

Table 6: Trade ratios in SAARC countries

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	..	23.4	51.3	21.7	15.1	358.7	30.3	36.6	87.0
1990	..	19.7	57.5	29.2	15.2	168.1	32.2	38.9	68.2
2000	..	33.2	82.5	44.2	26.4	161.1	55.7	28.1	88.6
2010	55.0	43.4	98.2	55.0	48.3	173.4	46.0	32.9	53.1
2012	44.7	55.3	87.3	51.8	54.7	212.6	43.4	32.6	59.3

Trade ratio has been growing remarkably in each of the country in South Asia (Table 6). However the deficit in the current account as a percent of GDP around 4 percent of GDP in India and above 5 percent in Sri Lanka means opening of economies for free trade also need to complemented by net inflows of foreign direct investment to avoid ever growing amount of outstanding international debt or depreciation of domestic currency with respect to reserve currencies. Running current account surplus each year China has accumulated about 2.5 trillion SDRs 13 times more than that of India (Table 7).

Table 7: International reserves (Millions of SDRs)

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	325	237	..	2,444	5,745	1	149	452	195
1990	221	445	62	21,241	1,443	17	213	276	299
2000	..	1,144	244	129,600	29,493	94	731	1,235	809
2010	2,735	6,875	651	1,862,240	179,375	237	1,923	9,388	4,369
2013	4,208	11,421	644	2,494,400	180,169	248	3,478	3,421	4,319

According to findings reported in Bhattarai (2011) India is not only the dominant coun-

try of the region but also the mostly diversified economy in terms of trading partners and range of commodities traded; Nepal and Bhutan are landlocked (India-locked) countries—they trade mostly with India; remittance from exports of skilled and unskilled labour plays a very important role in filling the gap in the balance of payment for this region; among external trading partners EU is more integrated to the South Asia region on both exports and imports than the United States; despite a long shared border very little trade seems to occur between India and Pakistan; manufacturing products usually accounts for about 60 percent of exports and while agricultural products accounts between 10 to 20 percent except for Bhutan; fuels are significant components of imports, roughly half of the manufacturing imports tariff rates are around 15 percent for both agricultural and non-agricultural goods.

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	0.25	0.05	..	..	0.04	-0.31	0.02	0.27	1.07
1990	..	0.01	0.53	0.98	0.07	2.60	0.16	0.61	0.54
2000	..	0.59	..	3.20	0.75	3.57	-0.01	0.42	1.06
2010	0.47	0.91	1.20	4.11	1.60	10.14	0.55	1.14	0.96
2012	0.46	1.01	0.54	3.08	1.29	12.78	0.49	0.38	1.51

Countries engage also in investment abroad for various reasons. Getting the control of raw materials and resources or to extend the markets for its products. It might be easier to operate in subsidiary operation or partnership when investment occurs across the borders. India invests less about 0.5 percent of its GDP abroad, China was three times bigger in 2012. It was possible because China had above \$559 billion in the current surplus.

One consequence of rising trade deficit is on the depreciation of the values of its own currency with respect to reserve currencies of the world. Indian currency has depreciated by 9 times against the SDR (from 10.1 Rs to 95.3 Rs per SDR) and 8 times against the US dollars (from 7.5 Rs to 58.6 Rs per SDR) in the last 33 years. This makes foreign good more expensive to its citizens and some deterioration in the standard of livings in international comparison. Rate of depreciation of currencies were much higher in all other countries of South Asia than in India except Maldives.

Global economy is becoming very competitive. Under international product cycle hypothesis production of standard commodities are transferred to emerging countries. China and India have now potential of becoming the workshop for the world for such product under the current set of the WTO regulations. Increase in export earning in this way could be employed to expand production in various sectors of the economy thus creating more jobs for the young and talented individuals.

### 3.4 Education and technology

Producing quality products for the national and international markets requires skilled labour force. South Asian economies can achieve such skills by educating its children and young individuals properly. Good teachers are required to provide quality education. About 40 percent of adult population is still illiterate in South Asia now. These countries

need to invest in adult and school education to raise their literacy rates. It is also important to insure the quality of the literacy so that any literate person can follow instructions required in their employment to produce goods and services (Lohani et al. (2010)). This requires raising education expenditure to GDP ratios.

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980s	0.0	29.2	52.8	65.5	40.8	92.2	20.6	25.7	86.8
2010s	0.0	57.7	52.8	95.1	62.8	98.4	57.4	55.5	91.2

Share of the exports of high tech goods in manufacturing have increased in both China and India in the last 25 years; to 26.3 percent in China and 6.6 percent in India. These can increase further with the sound education in the primary and secondary schools. It is difficult to achieve such standards when student teacher ratios (STR) are high; compare STR of 40 of India and Pakistan to 18 of China. China had 5.8 million primary teachers compared to 2.8 in India. Bloom and Williamson (1998) explain income as the main factor in reducing birth and death rates and demographic transition in India.

Good communication is essential for right ways of processing the information. Rapid expansions in the cell phones in the last 15 years have increased the awareness of people in South Asia (Table 10). Cost of consumption and productions are significantly reduced because of these easy means of communication.

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
2000	0.00	0.21	0.00	6.66	0.34	2.80	0.02	0.21	2.28
2010	45.78	44.95	55.00	63.17	62.39	151.78	0.07	57.28	83.62
2012	60.35	62.82	75.61	80.76	69.92	165.63	59.62	67.06	91.63

### 3.5 Poverty and inequality

High quality of living is the overall objective of the development process. Long life, good income and better education are dimensions of these qualities. Life expectancy has increased significantly in all South Asian countries from 50s in 1980 to mid 70s in 2012 (Table 11). It is also indicated by the growth rate in consumption as well as the proportions of people living in urban areas relative to those in rural areas. Poverty reduction strategies have succeeded to some extent in reducing poverty (Panda and Ganesh-Kumar (2007), (Banerjee and Duflo (2007)). Datta and Ravallion (2011) however suggests that poverty reduction strategies have reduced poverty but raised inequality.

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	41.23	54.87	44.96	67.02	55.38	52.26	47.65	58.07	68.31
1990	48.57	60.01	52.46	69.47	58.53	60.60	55.82	61.19	69.68
2000	54.85	65.32	60.29	72.14	62.16	69.46	61.44	63.89	71.16
2010	59.60	69.49	67.00	74.89	65.69	76.79	62.62	66.13	73.76
2012	60.51	70.29	67.89	75.20	66.21	77.57	67.98	66.44	74.07

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	15.7	14.9	10.1	19.4	23.1	22.3	6.1	28.1	18.8
1990	18.2	19.8	16.4	26.4	25.5	25.8	8.9	30.6	17.2
2000	20.6	23.6	25.4	35.9	27.7	27.7	13.4	33.1	15.7
2010	23.2	27.9	34.8	49.2	30.9	40.0	16.7	35.9	15.0
2012	23.9	28.9	36.3	51.8	31.7	42.2	17.3	36.5	15.2

Urban areas benefit from agglomeration economies; there are positive as well as negative externalities in cities. There are not only good means of transport and communications, good schools and better hospitals but also better recreational activities. It is easier to access public services there compared to those in rural areas. More than 90 percent of population lives in urban areas in advanced countries. Therefore new cities need to be developed in South Asia for additional 60 percent of its population if the South Asia has to achieve the growth objectives (Table 12). However, unplanned development also causes an increase in petty crimes including pick-pocketing and stealing; unacceptable ways of redistribution.

Ever since Kuznet (1995) propounded inverse U-shape hypothesis of income distribution there have been many studies to test this in real economies. Inequality starts rising as economies grow and is indicated by gini- coefficients. In South Asia such inequality has been rising slightly in the last two decades but can become alarming as indicated in case of China as these economies grow (Table 13). While there is some trade-off between equity and efficiency tolerance to the greater inequality is harmful for economic growth in the long run. Traditionally land redistribution has been found to be associated with decentralisation and reducing poverty in India (Bardhan (2008) and Besley and Burgess (2000)) and emergence of the middle class society (Banerjee and Duffo (2008)). Recent efforts by the Modi government to eliminate "financial untouchability" by increasing access to financial assets to marginal income groups seems to be a better means of redistributing wealth.

	Afghanistan	Bangladesh	Bhutan	China	India	Maldives	Nepal	Pakistan	Sri Lanka
1980s	27.8	27.2	46.8	29.8	31.5	62.7	30.1	33.3	32.5
2010s	27.8	32.1	38.4	42.3	33.9	37.4	32.8	30.0	38.3

Given above stylized facts on the major indicators and policy choices what are the models that could be used to analyse issues of sustainable growth and development properly. This issue is taken up in the next section.

#### 4 Models of Growth and Development of India and South Asian Countries

A model is a systematic representation of an economy in a set of variables related to each other by parameters expressing the behavior of producers, consumers and policy makers. Economist use partial and general equilibrium models to study growth and development.

Firms produce output employing capital and labour inputs given the production tech-

nology to maximise profit. Some of them operate under more competitive markets and others in more monopolistic structure. These private firms are key drivers of economic growth as there are significant spill over effects within and between industries as firms engage in the research and development activities. Demand for their products by households change with the level of their income. Analysis of supply and demand by firms and the industry, pricing, costing and output decisions in response to the policies over time are usually analysed using partial equilibrium models. Elasticities of demand and supply or substitutions among inputs provide information in the structural features of these markets. Multiple regression, cross section and panel data analysis, AR, MA, ARIMA, ARCH GARCH models are applied to estimate parameters of functions derived from the optimisation of objectives of firms and households subject to budget or technology constraints. These partial equilibrium models have been applied to study the volatility of prices and trade in the financial markets and their consequences in the welfare of households (Fama (2014), Shiller (2014)).

General equilibrium solutions are obtained when all markets clear to a set of equilibrium relative prices consistent to Pareto optimal allocations across all these markets (Balasko and Geanakoplos (2012)). These models rest on the detailed information obtained from the input-output tables, tax-transfer system, social accounting matrices and national accounts of these economies. Then there are static and dynamic strategic models to analyse interdependence of activities of economic agents.

There is no single economic model that is perfect and fit for analysis of all important issues relating to growth and development. Each type of model has its strength and limitations. Since the overall objective is having a comprehensive understanding of underlying factors that influence on growth and development it is essential to consider each of these models and appreciate how it can contribute to our understanding of the economy. We illustrate this by applying a panel data model of growth, dynamic CGE model with financial deepening, macroeconometric model for macroeconomic forecasting and a policy coordination model to analyse gains from cooperation to enhance growth and development in India and SAARC countries in this section.

#### **4.1 Dynamic Panel Data Model of Economic Growth**

Growth models show how the output per capita increases over time with accumulation of physical and human capital and improvement in technology (Solow (1956), Lucas (1988), Romer (1990)). However the growth rates differ significantly by countries and the degree of convergence in per capita income varies substantially across nations. Frustrated from the dismal growth performance from 1950-1980s Malenbaum (1982) even stated pessimistically that "decades of slow growth lie ahead before either nation emerges as a modern industrial state of developed-nation status". Fortunately there occurred a structural break in the growth process around mid 1980s in India motivating Rodrik and Subramanian (2005) to assess policy and structural factors that caused a surge from "Hindu growth" to productivity surge. These surges occurred because of the reforms of the labour market giving

freedom in hiring and firing of workers to firms, end of reservation in small scale industries, reforms of the banking sector, simplification of FDI rules, improvement in infrastructure and reduction of debt. These policy factors accelerated growth in India starting in early 1990s (Kaur (2007)). Agrawal (2010) empirically establishes causality between savings and economic growth in India. Bosworth and Collins (2008) provided growth accounting at aggregate and sectoral levels of the extraordinarily growth occurring in China and India. From the panel data analysis and endogenous growth models Basu and Bhattacharai (2012a) found that cognitive skill and openness to be factors of higher economic growth. Shocks to the technology sectors caused more macroeconomic fluctuations than the total productivity shocks in the short run in their models. Education is the key for growth but it is the joint responsibility of public and private sectors to educate children. Public bias to education does not produce desired results (Basu and Bhattacharai (2012b)). South Asia forms the part of global economy in both of these endogenous growth models. We estimate coefficient the dynamic panel data model of growth for the South Asian economies report results in Table 14. This shows in general trade ratio and investment ratios contribute significantly and positively on the growth rates of per capita income but the higher population growth rates reduced output growth rates significantly. However there are country and time specific factors at play as growth rate vary significantly across countries and time years.

#### 4.1.1 GMM 2-step Estimation of Growth in South Asia

Consider a dynamic panel data model of the form where growth rate of output of country  $i$  at time  $t$ ,  $y_{i,t}$  is explained by its lagged values and a set of exogenous explanatory variables  $x_{i,t}$ . Here  $\alpha_i$  is individual specific effects and  $\lambda_t$  represents the time specific effects.

$$y_{i,t} = \gamma y_{i,t-1} + \alpha_i + \beta_i x_{i,t} + \lambda_t + e_{i,t} \quad \gamma < 1 \quad (1)$$

A generalised method of moments (GMM) as proposed by Hansen (1982) for a panel data model generates the unbiased estimate of  $\gamma$  and  $\alpha_i$  solving endogeneity and bias in estimation due to the presence of correlation between the lagged values of dependent variables  $y_{i,t-1}$  and errors terms  $e_{i,t}$ . Right instrument for lagged  $y_{i,t-1}$  say by  $y_{i,t-2}$  solves this inconsistency and generates unbiased estimator (ignoring  $x_{i,t}$  and  $\lambda_t$ ):

$$\hat{\gamma}_{IV} = \frac{\sum_t \sum_i y_{i,t-2} (y_{i,t-1} - \bar{y}_{i,t-2})}{\sum_t \sum_i y_{i,t-2} (y_{i,t-1} - y_{i,t-2})} \quad (2)$$

where  $y_{i,t-2}$  is used as instrument of  $(y_{i,t-1} - y_{i,t-2})$ .

GMM method includes the most efficient instrument,  $Z_i$ :

$$\gamma_{GMM} = \left( \left( \sum_{i=1}^N \Delta y_{i,t} Z_i \right) W_N \left( \sum_{i=1}^N Z_i' \Delta y_{i,t} \right) \right)^{-1} \times \left( \left( \sum_{i=1}^N \Delta y_{i,t} Z_i \right) W_N \left( \sum_{i=1}^N Z_i' \Delta y_{i,t} \right) \right) \quad (3)$$

Arrelano and Bond (1995), Wijndmeir (2000), Blundell and Smith (1989) and Verbeek (2004), Wooldridge (2002) among others have more extensive analysis of the GMM estimation. The essence of the GMM estimation remains in finding a weighting matrix that can guarantee the most efficient estimator. This should be inversely proportional to transformed covariance matrix.

$$W_N^{opt} = \left( \left( \frac{1}{N} \right) \sum_{i=1}^N Z_i' \Delta e_{i,t} \Delta e_{i,t} Z_i \right)^{-1} \quad (4)$$

The GMM estimator with instrument (levels, first differences, orthogonal deviations, deviations from individual means, combination of first differences and levels) used in PcGive is:

$$\hat{\delta} = \left( \left( \sum_{i=1}^N W_i^* Z_i \right) A_N \left( \sum_{i=1}^N Z_i' W_i \right) \right)^{-1} \left( \left( \sum_{i=1}^N W_i^* Z_i \right) A_N \left( \sum_{i=1}^N Z_i' y_i^* \right) \right) \quad (5)$$

where  $A_N = \left( \sum_{i=1}^N Z_i' H_i Z_i \right)^{-1}$  is the individual specific weighting matrix.

	1-Step Estimation		2-step estimation	
	Coefficient	t-prob	Coefficient	t-prob
Trade ratio	0.0025	0.0500	0.0038	0.0200
Investment ratio	0.0086	0.0080	0.0089	0.0040
GDP growth rate	0.9749	0.0000	0.9773	0.0000
Population growth rate	-2.9055	0.0000	-0.1275	0.0000
Constant	-0.3575	0.0000	0.3424	0.0000
T2005	-0.1797	0.0590	-0.1390	0.0790
T2006	-0.0435	0.4000	0.10750	0.4090
T2007	-0.0516	0.0320	-0.0299	0.3790
T2008	0.0208	0.0120	0.0439	0.0000
T2009	0.1764	0.0060	0.1001	0.2210
T2010	0.1353	0.0020	-0.1493	0.0200
T2011	0.1301	0.0000	-0.1664	0.0000
T2012	0.2791	0.0000	0.2791	0.0000
Afghanistan	0.2191	0.0000	0.0454	0.0000
Bhutan	0.0694	0.0000	0.0237	0.0020
Bangladesh	0.2200	0.0000	0.0554	0.0000
India	0.3371	0.0000	0.0350	0.0000
Maldives	0.1699	0.0000	0.0605	0.0000
Nepal	0.2823	0.0000	0.0135	0.0000
Pakistan	0.3466	0.0000	0.0742	0.0000
Sri Lanka	base	base	base	base
	N = 8; T = 9	R <sup>2</sup> = 0.99	N = 8; T = 9	R <sup>2</sup> = 0.99
Data source: WBDI, IFS of IMF accessed from DataArchive UK				

Doornik and Hendry (2001, chap. 7-10) provide a procedure on how to estimate coefficients using fixed effect, random effect and the GMM methods including a lagged terms of dependent variable among explanatory variables for a dynamic panel data model:

$$y_{i,t} = \sum_{s=1}^p a_s y_{i,t-s} + \beta^t(L) x_{i,t} + \lambda_t + \alpha_i + e_{i,t} \text{ or in short } y_{i,t} = W_i \delta + \iota_i a_i + e_i.$$

It will be relevant to study process of convergence among states in India and SAARC countries using this type of growth model in coming years (see Brandt, Ma, Rawski (2014) for China).

## 4.2 Dynamic Computable General Equilibrium Model

One sector growth models presented above are analytically tractable but practically they are not designed to answer questions relating to sectoral structure of production, issue of structural transformation and distribution of income as an outcome of the general equilibrium process in the economy. This requires a full dynamic computable general equilibrium (DCGE) model for a decentralised economy. DCGE models contain the relative price system

and intertemporal choices of firms and households as key factors determining the growth of various sectors of the economy and distribution of income among households while studying the long run cycles of model economies (Bhattarai (2010)). The main equations for a typical DCGE model are as follows:

1) Demand side: welfare of households ( $U_0^h$ ) given by consumption ( $C_{i,t}^h$ ) and leisure ( $L_t^h$ ):

$$Max \quad U_0^h = \sum_{t=1}^{\infty} \beta_h^t U_t^h; \quad 0 < \beta_h^t < 1 \quad (6)$$

$$U_t^h = U \left( C_{i,t}^h, L_t^h; \sigma_c \right) \quad (7)$$

Subject to budget constraints:

$$\begin{aligned} I_0^h &= \left[ \sum_{t=0}^{\infty} e^{-\rho t} \sum_{i=1}^N \left\{ P_{i,t} (1 + t_i) C_{i,t}^h \right\} + w_t^h (1 - t_l) L_t^h \right] \\ &= \sum_{t=0}^{\infty} e^{-\rho t} I_t^h = \left[ \sum_{t=0}^{\infty} w_t^h (1 - t_l) \bar{L}_t^h + r_t (1 - t_k) K_t^h \right] \end{aligned} \quad (8)$$

2) Supply: production, finance and accumulation:

$$Y_{i,t} = F_i \left[ K_{i,t} \left( r_{i,t}, w_t^h, p_{i,t} \right), p, L_i \left( w_t^h, p_{i,t} \right), A_i, \sigma_c \right] \quad (9)$$

$$\sum_{t=0}^T P_{i,t} Y_{i,t} = \sum_{t=0}^T \left[ r_t (1 + t_k) K_{i,t} + \sum_{h=i}^H w_t^h (1 + t_l) L_{i,t}^h \right] \quad (10)$$

Savings ( $Y_t - C_t$ ) adds to the accumulation of assets ( $A_t$ ) in the economy:

$$A_t (1 + \hat{r}_t) + Y_t - C_t = A_{t+1} \quad (11)$$

$$A_t r_t + Y_t - C_t - \{A_{t+1} - (1 - \delta) A_t\} = 0 \quad (12)$$

In equilibrium there is equivalence between financial assets ( $A_t$ ) and physical capital ( $K_t$ ); replace  $A_t$  by  $K_t$ :

$$Y_t - C_t - (K_{t+1} - (1 - \delta) K_t) = 0; \quad \implies \implies Y_t = C_t + I_t \quad (13)$$

This the optimal financial deepening at the sectoral and aggregate levels:

$$F_t = \frac{K_t}{Y_t}; \quad F_{i,t} = \frac{K_{i,t}}{Y_{i,t}}; \quad F_t = \sum_{i=1}^N F_{i,t}; \quad K_t = \sum_{i=1}^N K_{i,t}; \quad Y_t = \sum_{i=1}^N Y_{i,t} \quad (14)$$

3) Intertemporal balance:

$$\sum_{t=0}^T \sum_{i=1}^N P_{i,t} (1 + t_{ci}^h) C_{i,t}^h = \sum_{t=0}^T \left[ r_t (1 - t_k) K_t^h + R_t^h + w_t^h (1 - t_l) L S_t^h \right] \quad (15)$$

$$\sum_{t=0}^T P_{i,t} Y_{i,t} = \sum_{t=0}^T \left[ r_t (1 - t_k) K_{i,t} + \sum_{h=i}^H w_t^h L_{i,t}^h \right] \quad (16)$$

$$\sum_{t=1}^T G_t \leq \sum_{t=1}^T \left( R V_t + \sum_{h=1}^H R_t^h \right) \quad (17)$$

4) Trade and finance:

$$\sum_{t=0}^T \sum_{i=1}^N P E_{i,t} E_{i,t} = \sum_{t=0}^T \sum_{i=1}^N P M_{i,t} M_{i,t} \quad (18)$$

$$\sum_{i=1}^N P E_{i,t} E_{i,t} - \sum_{i=1}^N P M_{i,t} M_{i,t} = \pm F L_t \quad (19)$$

5) Public sector and financial deepening:

$$\sum_{t=0}^{\infty} e^{-\rho t} R V_t \leq \sum_{t=0}^{\infty} e^{-\rho t} (G_t + R_t^h) \quad (20)$$

$$R V_t = \sum_{h=1}^H \sum_{i=1}^N P_{i,t} t_{ci}^h C_{i,t}^h + \sum_{i=1}^N \sum_{h=i}^H (w_t^h t_l L_{i,t}^h + r_t (1 + t_k) K_{i,t})$$

The general equilibrium is achieved when the excess demand are zero in each market for each period representing balance between demand and supply in each market. Households and producers optimise given their budget constraints. Relative price adjustment mechanisms guarantee the most efficient outcome in these markets. The existence of the general equilibrium is guaranteed by fixed point theorems and solved using the dynamic routines in the GAMS/MPSGE software. Given the properties of demand and supply functions equilibrium is stable and unique and gives the evolution of the model economies from 2006 to 2101(see Bhattarai (2007) and Bhattarai (2011)).

This model has been applied to China, India to study optimal and actual capital deepening ratios (OFDR and AFDR) and the results are summarised in Table 15. These show

that the optimal capital intensity in China at 0.81 is much lower than in India's 1.54. This implies India economy being more capital intensive than the Chinese economy in production technology. However the ratio of actual stocks of the financial assets to GDP is much higher in China at 1.88 compared to 0.78 in India. Thus China is over-financed with over financing ratio (OFR) at 2.3 and India is under-financed with the OFR at 0.49. This result implies speedy growth in India requires a rapid growth of its financial sector (see Dougas and Rajan (2008) and Kawai (2011)).

Table 15: Optimal and actual financial deepening ratios and Growth Rates for 2008-12				
Countries	OFDR	AFDR	OFR	GR 2008-12
China	0.81	1.88	2.3	9.30
India	1.54	0.78	0.49	6.50
Note: OFDR and AFDR are optimal and actual financial deepening ratios; OFR over financing ratio				
Based on Bhattarai (2014); More details available upon request.				

Main focus of this DCGE model is to study the long run growth in output and employment across sectors given endogenous or exogenous changes in the rate of taxes and tariffs. Comparative static features of Parikh, Narayana, Panda and Kumar (1995) could be put in such dynamic frameworks to study the evolution of Indian economy in coming decades. GTAP and GTAPinGAMS models also could be applied for empirical investigation on equilibrium relations among all South Asian economies to test theories of Bhagwati and Srinivasan (2002), Panagaria (2006), Neary (1998) for assessing how these countries benefit from inter and intra regional trade. Various arrangements for creating free trade area (FTA) under the SAPTA or other bilateral agreements can be studied constructing small open economy or multicountry trade models. Opening economies for trade with specialisation based on comparative advantages are essential features of the growth competition. A free trade association (FTA) under the South Asia Free Trade Association (SAFTA) can open such opportunities of cross boarder production and trade. India can sell skill, technology and manufacturing goods to its neighbors; it can buy cheaper hydro electricity from Nepal and Bhutan and agricultural products from Pakistan. Gains from cooperative rather than discriminatory approach with respect to the rest of the world could be used for the development of the region. Given the development of the GTAP/Unido/STAN databases it is possible now to analyse the significance of bilateral and multilateral trade relations among these countries. As opening intra-regional FDI could increase productivities, it is essential to remove limited product coverage, existence of negative lists and restrictive rules of origin that are becoming obstacle in such settings (Taneja and Sawhney (2007)).

### 4.3 Macroeconomic simulation models of South Asia

With time series on major components of aggregate demand, price levels, interest rate and exchange rates presented above it is possible to construct a macroeconometric model to forecast macro variables of India and South Asian economies. Essentially these models

are helpful in studying trends and forecasts in the short run specially useful for annual projection of macro quantities such as consumption, investment, imports or exports or public spending and prices in the private and public sectors given projections of the public finance or the BOP conditions of the economy. Each South Asian economy have some sorts of open economy IS-LM model underlying their policy decisions and assessing the macroeconomic fluctuations. These basically Keynesian demand driven models are popular as they are easier to compute and implement because of recent innovations in econometric techniques (Hendry and Doornik (1994), Bhattarai (2008) and Bhattarai and Mallick (2013)). We estimate simultaneous equations models of India, China and SAARC countries to study how inflation, current account balance and growth rates relate to fiscal and monetart policy variables represented by the size of the government ( $g\_y$ ) ad liquidity ratio ( $M2\_y$ ) and structural facture ( $a\_g$ ). Again results presented in tables 16 to 19 below show significance ( $t\_prob$ ) and sign of coefficients ( $\beta$ ) on them vary tremendously across these countries. This means markets and policies are very different among these countries.

	India						Nepal					
	Inflation		CA balance		Growth		Inflation		CA balance		Growth	
	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$
$g\_y$	0.084	0.223	-0.007	0.985	0.007	0.904	-0.494	0.017	0.017	0.192	-0.111	0.463
$a\_g$	1.417	0.001	-6.275	0.008	-0.138	0.667	0.258	0.049	-0.002	0.812	-0.038	0.693
$M2\_y$	0.455	0.002	-3.337	0.000	-0.002	0.985	0.251	0.030	0.003	0.672	0.032	0.714
const	-0.53	0.005	321.9	0.003	9.626	0.518	-10.44	0.229	-0.164	0.780	5.377	0.441
	$R^2=0.66$ ; N =36; F(9,65) = 5.99 [0.0000] **						$R^2=0.59$ ; N =36; F(9,65) = 3.29517 [0.0023] **					

	Bangladesh						China					
	Inflation		CA balance		Growth		Inflation		CA balance		Growth	
	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$
$g\_y$	1.713	0.003	-0.006	0.962	-0.436	0.003	-0.066	0.689	3.058	0.247	0.178	0.031
$a\_g$	0.925	0.003	-0.050	0.568	-0.213	0.021	-1.357	0.057	-13.24	0.232	-0.775	0.026
$M2\_y$	0.133	0.189	0.013	0.595	0.018	0.489	-0.210	0.075	-0.603	0.739	-0.127	0.027
const	-44.46	0.004	0.655	0.858	15.66	0.000	54.49	0.036	339.31	0.349	35.93	0.005
	$R^2=0.87$ ; N =36; F(9,65) = 9.93091 [0.0000] **						$R^2=0.66$ ; N =36;F(9,65) = 4.07898 [0.0003] **					

	Pakistan						Sri Lanka					
	Inflation		CA balance		Growth		Inflation		CA balance		Growth	
	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$
g_y	0.187	0.055	-0.129	0.145	-0.180	0.000	0.023	0.812	0.007	0.696	0.035	0.409
a_g	0.321	0.368	0.064	0.844	-0.131	0.416	-0.074	0.772	0.058	0.003	-0.131	0.288
M2_y	-0.284	0.178	0.077	0.612	0.238	0.016	-0.582	0.184	0.031	0.094	-0.154	0.422
const	10.184	0.478	-6.446	0.624	0.051	0.969	32.929	0.103	-8.940	0.015	12.560	0.152
	$R^2=0.56$ ; $N=36$ ; $F(9,65) = 2.9261 [0.0057] **$						$R^2=0.42$ ; $N=36$ ; $F(9,65) = 1.86883 [0.0726]$					

	Bhutan						Maldives					
	Inflation		CA balance		Growth		Inflation		CA balance		Growth	
	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$	$\beta$	$t\_prob$
g_y	-0.088	0.157	-0.002	0.324	0.185	0.053	0.116	0.203	-0.004	0.008	-0.164	0.039
a_g	-0.167	0.206	0.007	0.073	-0.270	0.177	-0.996	0.009	0.008	0.146	0.260	0.399
M2_y	-0.157	0.020	0.001	0.452	-0.118	0.233	0.047	0.713	-0.009	0.000	0.009	0.932
const	22.34	0.001	-0.265	0.161	12.81	0.171	6.073	0.169	0.318	0.000	10.385	0.009
	$R^2=0.55$ ; $N=33$ ; $F(9,65) = 2.89281 [0.0061] **$						$R^2=0.79$ ; $N=33$ ; $F(9,65) = 6.78843 [0.0000] **$					

The business cycle analyses in DSGE models constrain micro-foundations, dynamics and rational expectations, stochastic shocks to preferences, technologies and policies along with the nominal and real rigidities than present in above models. Analysis of short or long run multipliers, variance decompositions and impulse responses to changes in policies and shocks on the deviations of model variables from the steady state are often the focus of such analysis. Computations have become easier for such models after development of Sim's BVAR algorithm in the MATLAB and dynare. However we skip this model here as the growth and redistribution analysis in the DCGE model presented above is better suited for analysis of structural features of the South Asian economies than these DSGE models.

#### 4.4 Strategic policy coordination models of South Asia

Interdependence among these economies and interactions could be studied using bargaining, signalling and mechanism designing concepts. Cooperative and non-cooperative games with complete and incomplete information among nations, households and firms could be used to conceptualize the issues and solutions to the problems of growth and development in these economies. There are three generations of literature in the policy coordination. First generation models include studies such as Kydland and Prescott (1977), Driffil (1988), Currie and Levine (1986) and Obstfeld and Rogoff (2000). These had found gains from coordination to be small. Cooper (1969) and Hamada (1976) and Kydland (1975) showed inferiority of the non-cooperative Nash equilibrium compared to a cooperative solution. Lucas (1976), and Kydland and Prescott (1977) used rational expectations and argued

for the advantage of rule-based policies to create rational expectations equilibrium solution. Petit (1989) used differential games as did the studies of Obstfeld (1994), Sutherland (1996), Senay (1998), Martin and Rey (2000). Obstfeld (2001) and Rogoff (2002) provide an excellent review of some of the models used for policy coordination with Mundell-Fleming-Dornbush type models with little gains from coordination. Second generation models of policy coordination in Pappa (2004), Canzoneri, Cumby and Diba (2005), Clerc, Dellas and Loisel (2011), Juillard and Villemot (2011) and Goyal (2007) find pay off from monetary and fiscal policy coordination to be bigger. Supply and strategic modelling has much improved in recent literature on the policy coordination showing more gains from coordination as stated by Canzoneri et. al.(2005), Evans and Hnatkovska (2007), Douglas and Laxton in dynare. Aarle et.al. (2002) examine the coalition formation in EMU. Recent models such as Kempf and von Thadden (2013), Dedola et al. (2013) add asymmetric information and commitment where the welfare gains can be bigger as the number of countries increase in such deals. Given this literature let us consider three countries aiming for a policy coordination with the Nash utility frontier:

$$N_t = U_{1,t}U_{2,t}U_{3,t} \quad (21)$$

Each receive utility from consuming products produced in each country:

$$U_{i,t} = F(y_{1,t}, y_{2,t}, y_{3,t}) \quad (22)$$

Goods supply process is determined simultaneously as:

$$y_{1,t} = \alpha_{1,0} + \alpha_{1,2}y_{2,t} + \alpha_{1,3}y_{3,t} + \beta_{1,1}y_{1,t-1} + \beta_{1,2}y_{2,t-1} + \beta_{1,3}y_{3,t-1} + e_{1,t} \quad (23)$$

$$y_{2,t} = \alpha_{2,0} + \alpha_{2,1}y_{1,t} + \alpha_{2,3}y_{3,t} + \beta_{2,1}y_{1,t-1} + \beta_{2,2}y_{2,t-1} + \beta_{2,3}y_{3,t-1} + e_{2,t} \quad (24)$$

$$y_{3,t} = \alpha_{3,0} + \alpha_{3,1}y_{1,t} + \alpha_{3,2}y_{2,t} + \beta_{3,1}y_{1,t-1} + \beta_{3,2}y_{2,t-1} + \beta_{3,3}y_{3,t-1} + e_{3,t} \quad (25)$$

Coefficient of a VAR model estimated from the time series data provides information on interactions among model economies as:

$$\begin{aligned} & \begin{pmatrix} 1 & -\alpha_{1,2} & -\alpha_{1,3} \\ -\alpha_{2,1} & 1 & -\alpha_{2,3} \\ -\alpha_{3,1} & -\alpha_{3,2} & 1 \end{pmatrix} \begin{pmatrix} y_{1,t} \\ y_{2,t} \\ y_{3,t} \end{pmatrix} \\ & = \begin{pmatrix} \alpha_{1,0} \\ \alpha_{2,0} \\ \alpha_{3,0} \end{pmatrix} + \begin{pmatrix} \beta_{1,1} & \beta_{1,2} & \beta_{1,3} \\ \beta_{2,1} & \beta_{2,2} & \beta_{2,3} \\ \beta_{3,1} & \beta_{3,2} & \beta_{3,3} \end{pmatrix} \begin{pmatrix} y_{1,t-1} \\ y_{2,t-2} \\ y_{3,t-3} \end{pmatrix} + \begin{pmatrix} e_{1,t} \\ e_{2,t} \\ e_{3,t} \end{pmatrix} \end{aligned} \quad (26)$$

$$\begin{aligned}
& \begin{pmatrix} y_{1,t} \\ y_{2,t} \\ y_{3,t} \end{pmatrix} \\
&= \begin{pmatrix} 1 & -\alpha_{1,2} & -\alpha_{1,3} \\ -\alpha_{2,1} & 1 & -\alpha_{2,3} \\ -\alpha_{3,1} & -\alpha_{3,2} & 1 \end{pmatrix}^{-1} \begin{pmatrix} \alpha_{1,0} \\ \alpha_{2,0} \\ \alpha_{3,0} \end{pmatrix} + \\
& \begin{pmatrix} 1 & -\alpha_{1,2} & -\alpha_{1,3} \\ -\alpha_{2,1} & 1 & -\alpha_{2,3} \\ -\alpha_{3,1} & -\alpha_{3,2} & 1 \end{pmatrix}^{-1} \begin{pmatrix} \beta_{1,1} & \beta_{1,2} & \beta_{1,3} \\ \beta_{2,1} & \beta_{2,2} & \beta_{2,3} \\ \beta_{3,1} & \beta_{3,2} & \beta_{3,3} \end{pmatrix} \begin{pmatrix} y_{1,t-1} \\ y_{2,t-1} \\ y_{3,t-1} \end{pmatrix} \\
&+ \begin{pmatrix} 1 & -\alpha_{1,2} & -\alpha_{1,3} \\ -\alpha_{2,1} & 1 & -\alpha_{2,3} \\ -\alpha_{3,1} & -\alpha_{3,2} & 1 \end{pmatrix}^{-1} \begin{pmatrix} e_{1,t} \\ e_{2,t} \\ e_{3,t} \end{pmatrix} \tag{27}
\end{aligned}$$

Parameters of VAR could be interpreted in the context of Nash Policy Game as: 1) In common meetings or summits they decide policies given by  $\alpha_{1,0}, \alpha_{2,0}, \alpha_{3,0}$  but each of them face idiosyncratic shocks  $e_{1,t}, e_{2,t}, e_{3,t}$ ; 2) Then each country determines its action  $y_{i,t}$  taking account of actions taken by others  $y_{j,t}$  and such response patterns are given by parameters  $\alpha_{1,2}, \alpha_{1,3}, \alpha_{2,1}, \alpha_{2,3}, \alpha_{3,1}, \alpha_{3,2}, \beta_{1,2}, \beta_{1,3}, \beta_{2,1}, \beta_{2,3}, \beta_{3,1}, \beta_{3,2}$  and shocks  $e_{1,t}, e_{2,t}, e_{3,t}$ ; 3) Each would like to get more utility and this opens the bargain; 4) The optimal solution of this game should fulfill four properties of Nash bargaining game; 5) This must be symmetric, efficient, linear invariance and IIA. Extension of this model for the seven country case is very obvious.

## 5 Conclusion

Momentum of economic growth in the South Asian economies is analysed based on stylized facts of these economies along with trends of their fiscal, monetary, trade, education and income distribution policies. Macroeconomic, general equilibrium, trade and game theoretic models have been identified that could be applied to analyse micro, macro and sectoral issues of economic growth. Achieving higher rates of economic growth requires more systematic and scientific analysis of potentials, existing strengths and comparative advantages of these economies so that they can march ahead in the growth competition in the global economy. Policies should be consistent and comprehensive to link various sectors, regions and nations in the path for long run growth. A strong pro-growth government in India with a good vision for the regional integration and development is instrumental in turning this region into another example of economic miracles in the global economy within the next few decades.

Several strategic points for growth emerge from the analysis of facts in this paper: 1) given its size of population this region should push for growth and increase its share of

global GDP up to 20 percent from roughly 6.5 percent in 2014; 2) such growth requires increasing the ratio of saving and investment about 10 percent above the current averages around 35 percent; 3) process of structural transformation should continue till both the output and employment in the agriculture sector are less than 5 percent from around 17 and 50 percent; 4) such transformation will occur as this region moves towards urbanisation so that about 90 percent of the population live in urban area with facilities leaving rural areas for meaningful economic uses; 5) it is important to reduce the student teacher ratios from 40 to around 16 to raise the cognitive skill of children to create human capital in science and technology; 6) the trade ratio should increase to around 100 percent from the 50 percent at this time; free trade enhances both the supply and demand sides of these economies; 7) the liquidity of the financial system need at least to treble to have a smooth flow of credits required for new and existing enterprises; 8) free convertibility of currency is essential to protect this region from international shocks; 9) a high 8 percent growth strategy is consistent with all above and requires firm commitment, efficient and strong public administration but the fruits of growth should be distributed more equally so that the gini coefficient remain under 35 percent.

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