This important book, prepared under the direction of Nobel Laureate Lawrence R. Klein, shows how economic forecasts are made. It explains how modern developments in information technology have made it possible to forecast frequently – at least monthly but also weekly or bi-weekly – depending upon the perceived needs of potential forecast users but also on the availability of updated material.

The book focuses on forecasts in a diverse range of economies including the United States, China, India, Russia, Germany, Japan, South Korea, and Turkey.

At a time of great economic uncertainty, this book makes an important contribution by showing how new information technology can be used to prepare national economic forecasts.

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Edited by Lawrence R. Klein
3. The economic growth story in India: past, present and prospects for the future

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1. INTRODUCTION

India has certainly become a country of worldwide attention over the past decade or so, mostly because of its high economic growth and outsourcing hub for major US and European corporations. From the man in the street to heads of state, India is now a significant destination not only for their travel to learn yoga and attain Nirvana, but also a key marketplace for business and investment opportunities. India's image has gone beyond that of a country full of snake-charmers and cows on the busy streets. It is now very different, with Indian Bollywood cinema catching the imagination of people from all walks of life with its beauty and colour, while Indian software companies, steelmakers and business personalities show that the sky is the limit for success. Everywhere 'Indianness' is the buzzword that has captured the spirit of democracy, hope and prosperity for the future.

India's economy has undergone many changes over the last six decades. The process of development depends on various aspects, namely socioeconomic linkages, cultural and political ideologies, class-clan structures and climatic conditions. Policies adopted by the government in New Delhi and at the sub-national level vary according to the characteristics and the nature of the political parties operating at that specific point in time, and those of the different stakeholders and interest groups. Hence the evolution of the Indian economy over the decades reflects considerable variety in economic policies and has subsequently prompted differences in the levels of growth and the development process over the years.

Thus, to analyse the growth prospects and to enhance the development dividend of the socioeconomic policies, we ought to look in detail at the variations in these policy phases and responses. This provides policy-makers with the necessary instruments to enhance the usefulness...
of understanding the current socioeconomic phenomenon of growth and development outcomes.

All-round development of the Indian economy requires that the different aspects of society be taken into consideration to make policies harmonious and broadly based. The central government must play a significant role in reducing regional disparities and in bringing about evenness in the development level across the states/regions. The importance of a good monsoon should not be forgotten in the Indian context and in setting the overall growth strategy for the country.

When India gained independence in 1947, the country was handicapped by mass poverty, very low literacy, a stagnating agriculture sector, and an industry with obsolete machines; it faced a very low level of productivity growth and an abysmally low per capita income. The first prime minister of India, Jawaharlal Nehru, initiated the planning model to bring the economy and society into the path of economic progress and development. The planning model emphasized the role of heavy industry for development, which was also known as the Nehru Mahalanobis model. This strategy was aimed at accelerating economic growth to increase India's overall development potential, and thus help to reduce mass poverty. To bring countries out of the low-level equilibrium trap, the leadership believed that the state should take up the 'commanding heights of the economy'. It may be noted that since independence, there have been many tangible changes in every sphere of life. The society has become a highly diversified economy with a well-developed industrial sector and immense potential for sustainable growth and development (see Agarwal and Basu, 2005 for further discussion on development strategy).

The initiation of the First Five-Year Plan in April 1951 was a move to accelerate a process of development aimed at 'raising the standards and opening up new opportunities to the people for a richer and more varied life'. It was sought to achieve this by a set of planning strategies for development, self-reliance, social justice and equality among the people in every sphere of life.

In 1991, Indian economic reform policies were initiated under a severe balance-of-payments problem. This crisis has finally helped India to change her economic system (from an inward-looking to an outward-looking policy), which India had pursued over the last four decades. In the wake of such an event, the Rao Singh government took the initiative of reforming the Indian economy, with support from international organizations, such as the IMF-WB, to open the economy to the world. After the new economic reform strategies of 1991, Indian economic growth picked up significantly and stood at a rate near 9 per cent in 2007.

The present chapter provides an overview of the Indian economic growth story from 1950 to 2007, and then makes an economic growth forecast for 2007-08. Section 2 describes the evolution of economic policies in India since the initiation of the planning process. The trends and patterns of India's economic growth are discussed in Section 3. The current quarter model (CQM) is employed to prepare high frequency quarterly GDP forecasts for the Indian economy in Section 4. The final section describes the challenges for sustainability of the GDP growth rate of the Indian economy.

2. EVOLUTION OF INDIAN ECONOMIC POLICIES SINCE INDEPENDENCE

India started with a Soviet Russian style planning model to eradicate mass poverty and inequality, rural-urban gaps and male-female inequality by giving the state a predominant role in accelerating and continuing the process of economic growth.

Since the initiation of the Indian planning process in 1950, there has been tremendous optimism among its instigators. The economy was depressed, with high rates of poverty, inequality, disease and death. A strong economic upturn was absolutely necessary to overcome these difficulties. The Planning Commission had to devise development strategies to accelerate the growth rate. The planning framework then rested on three legs: (1) generating the additional savings to finance the investments; (2) seeking to make escalated growth credible to private investors so that they could invest in a self-fulfilling prophecy; and (3) expanding social opportunities through land reforms and social programmes and expenditures on health and education, in particular.

Against such a background, the Constitution of India in 1950 had adopted in its Directive Principles for State Policy the objectives of planning for national development. It stated: 'The State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic and political, shall inform all the institutions of the natural life.'

The First Five-Year Plan (1951-56) had initiated the policies to bring in modern technology for raising capital accumulation as one of the key factors in promoting development. The aim to step up the role of capital formation and thereby increase productivity would allow expanding levels of income and employment. The First Five-Year Plan set the overall interventionist framework of Indian economic policy-making, while the Second Five-Year Plan, whose theoretical basis was provided by P.C. Mahalanobis, contained the analytical foundation for a development
strategy that was pursued in its fundamentals until 1991. The Mahalanobis model emphasized the need to achieve self-sufficiency through an increase in the allocation of productive and investible resources to capital goods industries for a subsequent acceleration in the growth of the output of consumer goods and thereby overall economic growth.

At the beginning, the growth-accelerating strategy was placed at the forefront to attack poverty, and to increase the investment rates further in India. India chose a more 'inward-looking' economic strategy, the so-called 'import substitution industrialization' (ISI) strategy, to protect the domestic industries for development, and adopted anti-export-biased policies. In the agricultural sector, the policies emphasized mechanization and R&D. This is often known as the 'Green Revolution' in Indian agriculture, and in 1970 the Nobel Peace Prize was awarded to Norman Ernest Borlaug for his intellectual achievements in world agriculture.

After almost four decades of closed economic policies and planning models, major economic reforms were initiated in 1991 to bring the Indian economy out of a so-called 'Hindu rate of growth' of a modest 3.3-3.5 per cent. The change of economic policies in 1991 is often seen as a significant turning point for the Indian economy. This policy was a direct response to the foreign exchange crisis due to the Gulf War in June 1990, which subsequently worsened the balance-of-payments position through rising oil prices and reduced worker remittances. The then Indian prime minister, Narashima Rao, introduced a whole package of economic reforms, which in effect abolished all kinds of 'licence raj' or red tapism. The new package was known as 'a programme of macroeconomic stabilization and structural adjustment' under the guidance of the IMF and the World Bank. The adoption of economic reforms was believed necessary to achieve the purpose of accelerating the economic growth and development process of national trade and development strategies. Since the early 1990s, the main aim of this reform has been to increase efficient resource allocation, including material distribution, foreign exchange and financial markets, with well-specified attention to reforming the banking sector.

The key element of India's reform strategy initially included 'structural measures', consisting of industrial policy reform, trade and exchange rate reform (i.e., external sector), and reform in the financial sector, public sector reform and measures to streamline tax reforms, among many other series of reform measures. Deregulating private sector investment, trade liberalization and opening the door to foreign direct investment and foreign institutional investment (FDI and FII), and vis-à-vis the financial sectors, are also some of the policy measures. Moreover, some of the important public sector industries were opened up (e.g., iron and steel, heavy plant machinery, telecommunications, air transport services etc.) to the private sector. Series of measures were directed to deregulation of imports and general opening up of the trade and investment regime to outside competition, which also constitutes a step towards India's attempt to integrate with the world economy, easing the quantitative restrictions (QRs) that were used as an instrument to restrict the imports of not only finished consumer goods, but also input of raw material components, and capital goods. In the first phase of the reform, import licensing was dismantled with respect to industrial raw materials, intermediate components and capital goods. However, in keeping with the WTO commitment, the Indian government promised that QRs on all imports would be phased out within a period of six years starting from 1998.

In line with international standards (WTO regulations), India had to reduce the average rate of tariff, as India's import duties were extremely high, at more than 200 per cent on certain items. Exchange rate management is another area where the reform has been implemented with care. There was a strong desire among the reformers to tap foreign investment (both short-term and long-term) in the economy, as public sector investment was no longer feasible and sustainable, given the huge losses and inefficiency in resource mobilization. The law allowed FDI of up to 51 per cent foreign equity in a defined list of 48 industries and up to 74 per cent for nine high-priority industries. The deregulation of the price regime was also a crucial component of the overall structural adjustment policy, along with the setting up of the Disinvestment Commission in 1996, to privatize the chronic loss-making public sector units, and to sell their shares in the market.

Another key issue was that of opening up the market for foreign investors (including short-term investment), by lowering import tariff rates to promote a level playing field for both domestic and foreign entrepreneurs. The channel of foreign investment should attract more FDI and other long-term investment which is regarded as the crucial route to trade openness and integration. To achieve this objective India set up export processing zones (EPZs) and special economic zones (SEZs), as these policies were used to a great extent to the Chinese reform process. The main objective of this sectoral reform was to encourage exports in order to create a substantial foreign exchange reserve, and to support the import of advanced technology and equipment. The non-resident Indians (NRIs) have recently been provided with many incentives for investing heavily in India.

To sum up, India's initiative in agriculture was not encouraging. However, India initiated land tenure and land reform way back in the 1950s, but failed (except in Communist Party ruling states of West Bengal and Kerala) in its land redistribution efforts. The industrial sector was the heart of India's reform process. The economic policies sought to achieve
3. TRENDS AND PATTERNS OF ECONOMIC GROWTH IN INDIA

With the onset of the twenty-first century, the 'India rising' slogan has picked up steadily. Private sector participation in business activities is overwhelming, and multinational corporations have moved in huge numbers to gain from the consumer power of the middle class and the financial market upswing. So, more than 60 years of the development planning process has yielded tremendous opportunities for economic prosperity and welfare for people from all walks of life. Millions of people have been lifted out of poverty since independence. Overall economic well-being has improved significantly, leading to a lowering of social inequality across different income-class and economically backward groups of society. In this section, we briefly describe some of the major achievements.

A snapshot of the overall development performance of the Indian economy since 1950 shows that the population was about 361.10 million in 1950-51 and has skyrocketed to 1.03 billion in 2006; that amounts to an average population growth rate of 2.3 per cent per annum over the last 60 years. There has also been a steady increase in population density from 117 per sq. km in 1950-51 to 368 per sq. km in 2005. Employment in the organized sector has increased from 12.1 million in 1960 to 26.5 million in 2004, while employment in the public sector has also gone up from 10.7 million in 1970 to 18.2 million in 2004. The above results are a strong indication of the substantial improvement in every sphere of India's society and economy since the time of independence over the last five decades.

India has now become a classic case for academicians to show that economic opening up has actually benefited the economy by increasing per capita income level and growth, thereby helping to reduce poverty. The current global decline in the poverty rate has been possible mostly due to the decline in the poverty rates of India and China. The proportion of people living below the national poverty line declined in India from 42 per cent in 1993/94 to about 22 per cent according to the latest Planning Commission statistics.

Table 3.1 presents some key indicators before and after the adoption of economic reform policies in 1991. The simple statistics show that the GDP growth rate was 3.9 per cent in 1960-61 and declined to 0.9 per cent in the year of economic crisis, 1990-91. However, the situation has changed dramatically, and the GDP growth rate reached 9 per cent in 2006-07. Similarly, real per capita GDP has also gone up significantly, from $176 in 1960 to $588 in 2005.

We also observe that there has been a constant improvement in educational levels and provisioning of health services. The adult literacy rate increased from as low as 18.33 per cent in 1951 to 65.38 per cent in 2001. More importantly, the percentage of girls enrolled in primary school has increased from 28.11 to 43.17 during the same period. We observe that the number of upper primary educational institutions has also increased 13 times, and there is an improvement in the teacher-pupil ratio as well, indicating a considerable development in primary and upper primary educational quality over the last 50 years. Also the number of medical practitioners and beds (all types) has registered an increase during the period. The information in Table 3.1 shows that the mortality rates for infants have been steadily declining, and the life expectancy rates have been steadily increasing, indicating that more resources have been channelled to education and health services. Per capita expenditure on education and health has increased considerably during the period. Now, we look at the most talked-about phenomenon of the Indian economy: the prevalence of poverty. Poverty alleviation programmes have been on the national economic policy agenda since independence, although the proper importance and need to design policies to alleviate poverty made a significant presence only with the Fourth Five-Year Plan. Strategies were designed to attack poverty directly through several rural development and employment-generating programmes. As a consequence of all these strategies, the percentage of the population below the poverty line has declined significantly, from 54.88 in the first half of the 1970s to 35.97 in 1993-94, according to a Planning Commission expert group. The Gini coefficient of inequality of consumption, however, has increased for urban India, and has been more or less stable for the rural population.

In terms of progress in social outcome indicators such as literacy, infant mortality and life expectancy, the information clearly indicates that there has been an immense improvement. The rise in educational achievement is noticeable, with a literacy rate of 24 per cent in 1960 that went up to about
Table 3.1  A profile of India’s economic growth and development

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<tr>
<td>GDP growth (annual %)</td>
<td>3.9</td>
<td>6.7</td>
<td>0.9</td>
<td>9.2</td>
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<td>GDP per capita (constant 2000 US$)</td>
<td>176.3</td>
<td>223.2</td>
<td>313.7</td>
<td>588.4</td>
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<tr>
<td>Literacy rate, adult total (% of people aged 15 and above)</td>
<td>24.0</td>
<td>43.67</td>
<td>52.21</td>
<td>64.84</td>
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<tr>
<td>Mortality rate, infant (per 1000 live births)</td>
<td>146</td>
<td>113</td>
<td>89</td>
<td>56</td>
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<tr>
<td>Life expectancy at birth, total (years)</td>
<td>44.3</td>
<td>54.2</td>
<td>59.1</td>
<td>63.5</td>
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<th>Economic indicators</th>
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<tr>
<td>(a) Savings investment</td>
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<tr>
<td>Gross fixed capital formation (% of GDP)</td>
<td>15.3</td>
<td>18.7</td>
<td>21.9</td>
<td>33.4</td>
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<tr>
<td>Gross domestic savings (% of GDP)</td>
<td>12.6</td>
<td>15.5</td>
<td>21.9</td>
<td>29.7</td>
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<td>(b) Sectors</td>
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<tr>
<td>Agriculture, value-added (% of GDP)</td>
<td>46.5</td>
<td>38.9</td>
<td>31.5</td>
<td>18.3</td>
</tr>
<tr>
<td>Industry, value-added (% of GDP)</td>
<td>19.4</td>
<td>24.5</td>
<td>26.4</td>
<td>23.3</td>
</tr>
<tr>
<td>Manufacturing, value-added (% of GDP)</td>
<td>13.7</td>
<td>16.3</td>
<td>16.1</td>
<td>15.7</td>
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<tr>
<td>Services, etc., value-added (% of GDP)</td>
<td>34.2</td>
<td>36.6</td>
<td>42.1</td>
<td>54.4</td>
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<tr>
<td>(c) External sector</td>
<td></td>
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<tr>
<td>Exports of goods and services (% of GDP)</td>
<td>4.6</td>
<td>6.3</td>
<td>8.6</td>
<td>20.5</td>
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<tr>
<td>Imports of goods and services (% of GDP)</td>
<td>7.3</td>
<td>9.5</td>
<td>8.6</td>
<td>24.2</td>
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<tr>
<td>Manufactures exports (% of merchandise exports)</td>
<td>43.3</td>
<td>58.6</td>
<td>72</td>
<td>70.3</td>
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<tr>
<td>Foreign direct investment, net inflows (% of GDP)</td>
<td>0.1* (1970)</td>
<td>0</td>
<td>0</td>
<td>0.8</td>
</tr>
<tr>
<td>Trade (% of GDP)</td>
<td>11.9</td>
<td>15.7</td>
<td>17.2</td>
<td>44.7</td>
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<tr>
<td>(d) Urbanization</td>
<td></td>
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<tr>
<td>Urban population (% of total)</td>
<td>17.9</td>
<td>23.1</td>
<td>25.7</td>
<td>28.7</td>
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65 per cent in 2005. This improvement in education has been quite instrumental in many areas of economic advancement, including the rising skill content of the labour force (see Basu et al., 2006 for discussion of factors related to welfare improvement in India).

Other economic indicators, such as the savings rate, have increased since the 1960s, together with domestic investment, leading to a higher growth rate in the post-reform period. In terms of sectoral distribution, it is quite obvious that over the years there has been a significant structural transformation of the Indian economy. India started with a favourable contribution from the agricultural sector, but from the beginning of the new millennium, the contribution to GDP from the service sector has increased rapidly. This implies that industrial development was not that favourable for economic growth in India, and there was stagnation for a long period in the 1980s and early 1990s. In terms of external sector performance, the Indian record has been rising with the opening of its economy. Exports of goods and services, as well as imports, have increased significantly over the years. Interestingly, manufacturing exports in total merchandise have increased with India’s integration in the world economy. Urbanization is another key indicator to show the movement of people from rural areas to cities and other metropolitan areas in search of jobs and a better lifestyle.

India has many natural resources, and at the beginning of the planning process the bulk of the population was basin agriculture. So, when the development model was initiated, it was thought wise to set up a modern domestic industrial sector to produce industrial goods, and intermediate capital goods, so as to protect infant industries from competition by foreign industries. Then the state initially imposed a high level of tariffs and non-tariff barriers under an anti-export-bias economic strategy. The import-substituting industrialization or closed-door economic policy was encouraged to raise the role of capital-intensive production, with less emphasis on labour-intensive industries. This had actually hurt the growth process, and failed to reduce poverty incidence in the pre-reform era.

The basic argument for reform was then to open the economy to the rest of the world and reap the benefit of trade and exchange of information technology. The policies were redirected to boost industry and attract foreign investment. With trade liberalization, India reduced high tariff levels on imported goods and eliminated quota restrictions. This immediately helped to attract significant foreign resources and investment in the domestic economy. The policies were designed to boost exports and build efficiency of resource allocation in line with comparative advantage, as advocated by neoclassical trade theory.

Trade expansion and industrial development have been strong, attracting FDI inflow with export growth. Recent economic information clearly shows that with trade expansion, service sector development has gone up, but industrial development has not been that impressive. The other crucial effect of economic reform can be seen in the manufacturing sector, in industrial development and increased FDI. The manufacturing sector now
needs a contribution to overall economic growth that generates employment in labour surplus countries such as India. Industrial expansion helps export diversification, leading to a rise in manufacturing output, and, in turn, increases employment. Another significant aspect of the economic reform is enhancement of technical change in the economy, leading to a rise in the productivity rate, which, in turn, increases real wage rates in the manufacturing sector. The higher wages help the economy to reduce the poverty rate, and induce a higher rate of growth. Experience shows that Indian labour productivity, measured by GDP per person employed, has been increasing over time, in step with the wage rate. This has helped India to reduce the poverty rate significantly during the reform period.

One of the reasons is that supply-side factors such as public spending on human capital, through provision of basic health and education, are key to sustaining a higher level of growth and poverty reduction (see Basu and Krishnakumar, 2005 for detailed results of the status of poverty and inequality across socioeconomic groups in India). The figure (average of 1990s) from the World Bank shows that total public spending as a percentage of GDP is 15.88. The health and education expenditures are 5.01 per cent and 3.26 per cent. Also per capita primary student expenditure as a percentage of per capita GDP is 8.44 per cent. However, such investments can work only if the infrastructure development takes place and institutional arrangements are effective so as to translate social programmes (such as poverty alleviation, employment guarantee and a mid-day meal for school children) into successful implementation (see Nagar and Basu, 2002 for the relationship between infrastructure development and economic growth, and Basu, 2002 for the interlinkages between governance arrangements and economic well-being).

Latest Developments in the Indian Economy, 2007

In the year 2007, India witnessed record-breaking economic performances. This section presents some recent trends of the Indian economy. India's GDP exceeded US$1 trillion for the first time in history. India is now the twelfth country in the list of those that have passed this mark. This elite group consists of the following countries: the USA, Japan, Germany, China, the UK, France, Italy, Spain, Canada, Brazil and Russia. This has led to an increase in real per capita income from Rs 20,734 (about US$500 at the current exchange rate) for the year 2005-06 to Rs 22,483 (about US$550) for the year 2006-07 at 1999-2000 prices.

The Indian economy has continued to grow at an impressive rate. Indian GDP grew by 9.4 per cent in the financial year 2006-07 as compared to the year 2005-06 at constant 1999-2000 prices. According to the latest estimates released by the Central Statistical Organization (CSO) of the Government of India and other institutions, real GDP at factor cost is about 8.5 per cent to 9.0 per cent per year on year. The current Asian Development Outlook 2007 update report of the Asian Development Bank projects India's real GDP to grow by 8.5 per cent year on year in 2007 and 2008. The report also noted that India's GDP grew by 9.4 per cent in the fiscal year 2006-07, the fastest expansion in the last 18 years. The Reserve Bank of India (RBI) projected the Indian economy to grow at 8.5 per cent in 2007-08 against an expected 9.2 per cent for 2006-07. GDP growth continues to be robust due to a good monsoon season, rising investment (both domestic and foreign), and an expansion in service sector activities.

Furthermore, the continuing real GDP growth is possible as a result of the growth of the overall industrial and service sectors. This industrial production was mainly driven by good performance of the manufacturing subsectors as well as the growth of six core infrastructure industries. The construction, housing and infrastructure industries all over India are experiencing a boom. The majority of core manufacturing sectors have recorded higher growth rates compared to a year earlier.

The index of industrial production (IIP) expanded by 11.8 per cent year on year in October 2007-08. The IIP for the manufacturing sectors for October grew at 13.3 per cent from a year earlier. Output of consumer goods grew 12.5 per cent. Output of capital goods and intermediate goods grew 20.5 per cent and 14.2 per cent, respectively. This trend is expected to continue in the near future. The index for the mining, manufacturing and electricity sectors grew by 8.1 per cent, 8.3 per cent and 7.1 per cent, respectively, in 2007-08Q2 as compared to the growth rates of 2.6 per cent, 13.0 per cent, and 8.9 per cent, respectively, in 2006-07Q2. The boom in real-estate activity has led to growth in production of cement and finished steel of 9.9 per cent and 9.6 per cent, respectively, in 2007-08Q2. The rising purchasing power of 500 million Indian middle-class people enables them to demand more and more consumption and capital goods.

Another key sector in India's manufacturing growth figures is the automotive industry, which constitutes about 5 per cent of total GDP in dollar terms, and the Government of India expects the industry to contribute about 10 per cent by 2016. Passenger car sales stand at 842,000 for the period January-July 2007.

The service sector continued to grow rapidly in this period. The sector 'trade, hotels, transport, and communication', with a growth rate of 11.4 per cent for 2006Q2 to 2008Q2 over 2006Q2 to 2007Q2, was strengthened by 'finance, insurance, real estate and business services' at 10.6 per cent, and 'community, social and personal services' at 7.8 per cent.

In recent years, the telecommunications industry has shown robust...
growth. The total telephone subscription numbers have exceeded 200 million, while the total number of mobile phone subscriptions rose to 162.5 million in February 2007. Also the total stock of telephone connections (including WLL – wireless local loop – and cellular) grew by 46.3 per cent in 2007Q2 to 2008Q2 over 2006Q2 to 2007Q2.

The growing number of worldwide mergers and acquisitions (M&A) activities has attracted a rise of Indian companies’ acquisitions of foreign companies. A recent study shows that during the first nine months of 2006, Indian companies announced 115 foreign acquisitions worth $7.4 billion, a seven-fold increase since 2000. The Government of India estimates indicate that India could capture around 15 per cent of the knowledge process outsourcing (KPO) industry worldwide by 2010.

Apart from outsourcing boom, the IT sector has given India an impressive edge in the service sector as compared to other developing countries. The recent boom in the IT market is likely to continue in the next few years. Some estimates predict that the service sector will grow to $10.73 billion by 2011. Rising domestic demand and increasing reliance on foreign firms have been instrumental in expanding market opportunities. In recent years the earnings from IT services can be seen as a real economic ‘stabilizer’ to help India overcome any short-run global and/or national economic crisis.

A recent report shows that India is the fastest-growing healthcare IT market in Asia and is expected to grow at an average of 22 per cent year on year, followed by China and Vietnam. The total market value for IT in the healthcare industry in Asia was $2.95 billion in 2006, and is expected to reach $4.83 billion by 2010. The healthcare industry has opened up new business opportunities for Indian companies and professionals, and attracts foreign visitors with favourable pricing of personal services.

The agriculture, forestry and fishing sector registered a modest increase. The growth rate here registered a 3.6 per cent increase in 2007Q2 to 2008Q2. There is some indication that inflation is coming under control, as the Reserve Bank of India has tightened fiscal and monetary policies, and prices of food items have stabilized over the past few months. The RBI set the tolerance threshold of the inflation rate, based on the wholesale price index (WPI) of all commodities, at 4.0-4.5 per cent. Indian annual average inflation based on the WPI was 3.50 per cent in the week ended 22 December 2007, while the annual rate of inflation stood at 5.78 per cent in 2006-07. So, over the past several months, the inflationary pressure on the Indian economy has continued to show a downward trend.

The latest A.T. Kearney’s annual Global Retail Development Index (GRDI), a measure of retail investment attractiveness among 30 emerging markets, ranked India as the most attractive market for retail investment, followed by Russia and China. India continues to be one of the most attractive destinations for foreign investors. The share of FDI in India’s GDP has gone up and accounts for 2.31 per cent in the latest available statistics.

The Indian economy continues to attract a large amount of foreign investments. For the first time the net investments by foreign institutional investors (FIIs) crossed the $10 billion mark during the months of January to July 2007, which is significantly higher than $7.99 billion for the 2006 calendar year. Furthermore, with a reduction of the US Federal Reserve interest rate, there has been an impressive rise of foreign institutional investment (FII) in India, reaching $1.5 billion. Similarly, total foreign investment flows now stand at US$5.9 billion, while foreign direct investment rose to US$2.7 billion from 1.0 billion a year ago.

India is also pushing for a growth model based on attracting foreign investments through operating SEZs. The latest statistics show that there are 133 approved SEZs, which have attracted investment worth about $10 billion. The SEZs have absorbed directly more than 35,000 people and provided double the number indirectly through different chain operations. The government estimates that the employment opportunity will reach 100,000 people and investment will increase to about $23 billion by the end of 2007. It is envisaged that SEZs will create about 3-5 million jobs by 2009.

India has gradually emerged as a global player in international trade. According to the United Nations, India’s total merchandise trade stood at $295 billion, while services trade reached $140 billion in 2006. Hence India’s overall trade in merchandise and services has risen from $126 billion in 2000 to $435 billion in 2006. Moreover, India’s share in world merchandise and services trade stood at 1.5 per cent in 2006.

4. HIGH-FREQUENCY CURRENT QUARTER MODEL FOR FORECASTING QUARTERLY GDP FOR THE INDIAN ECONOMY

4.1 The Prelude to the Forecasting Model

The major change in the Indian economy over the past decade has prompted policy-makers and market experts to look carefully at the evolution of economic prospects. The statistical modelling technique of principal components (see Stone, 1947; Nagar and Basu, 2002) has been used to explore prospects for the Indian economy. Furthermore, the Indian high-frequency forecasting methodology is based on the COM of the US economy developed at the University of Pennsylvania (see Klein and Young, 1980; Klein and Park, 1993; and Klein and Ozmancir, 2002-03). Although a structural model could have been an appropriate option for
building a full model of economic growth, instead we make use of a CQM to prepare short-run forecasts.

The availability of consistent high-frequency information on economic activities has provided opportunities to prepare short-term forecasts. It is now believed that a high-frequency model can be used to set up correctly preliminary groundwork for the structural equation model over a longer horizon, without any subjectivity. Many of the indicators of economic activity are now available on a daily, weekly or monthly basis.

Monthly economic indicators are used in this chapter to forecast the quarterly GDP of the Indian economy from a principal components analysis. This forecast can be made similarly from the production side and the expenditure side. The principal components methodology primarily uses a set of strategic monthly indicators that are closely linked to GDP to estimate the main independent sources of variation. The forecast values of the set of monthly indicators are obtained with use of ARIMA (autoregressive integrated moving average) equations over the future horizon.

The expenditure-side model is based on the aggregation of final purchases for a country detailed in the national income accounts. The demand-side components are the following: consumption (private and public), investment (private and public), and the difference between exports and imports. The estimation of all demand components will provide the final estimate of the GDP. The production-side model is based on the summation of value added across the three sectors of production: primary, secondary and tertiary. The aggregated estimation of three sectors will provide the final estimates of GDP.

The principal components methodology avoids the problem of multicollinearity among the strategically selected monthly indicators. The principal components are a set of mutually uncorrelated variables that explain variation of the strategic monthly indicators. GDP is then regressed on the principal components to obtain the forecast equations for extrapolations.

### 4.2 Forecasting Quarterly GDP by Principal Components Methodology

The principal components technique is used here to make forecasts of India's real GDP on the basis of a set of strategic monthly indicators. The principal components are normalized linear functions of the monthly indicators that represent the economy as a whole, and they are mutually orthogonal. These components can be considered as a canonical form. These mutually uncorrelated principal components provide the main sources of the joint variation, but some particular external variables, such as major primary prices like the world crude oil price, are used as regressors in addition to principal components values.

The first step is to select a set of strategic monthly indicators such as industrial production, interest rate, investment, trade, remittances and software earnings. We replace the set of monthly indicators by an equal or smaller number of their principal components. The monthly principal components are converted to three-month averages to yield quarterly series. Quarterly GDP is then regressed on some or all principal components. The quarterly regression equation is then used to extrapolate GDP and related macroeconomic variables.

The main purpose of this approach is to select a set of strategic monthly indicators from the set of economic indicators that are highly correlated with real GDP. These indicators are obtained from industrial production, interest rates, trade and other indicators. These indicators are critical for representing the short-term variation of real GDP, which is forecasted on a quarterly basis. However, most of the strategic indicators are reported on a monthly frequency from respective official sources.

The selection of strategic monthly indicators is carried out by taking into account the supply side and demand side of the economy. We have also included a set of market-clearing indicators. Moreover, some of the indicators are chosen to identify the future potential of the economy. On the other hand, some indicators are chosen by investigating their historical importance and established trends.

Indian monthly data for a large number of indicators are available only from 1997. The CQM is based on monthly strategic indicators starting in 1997–98. So, this time span allows us to extrapolate estimates for as long as two quarters in advance. The forecast of GDP is a function of 39 monthly indicators (see Table 3.2 for the list of monthly indicators).

For the purpose of estimating and forecasting real GDP, we have added three independent indicators. We have included only those indicators that have a common starting point. So, we specify a semi-reduced-form model for the Indian economy by using the principal components (PC) methodology. The PCs are estimated from quarterly data for 26 indicators and three independent variables to account for estimation of GDP. The first ten components account for 79.3 per cent of the overall variation of the whole set. Moreover, the first component accounts for 27.1 per cent, and has a large coefficient for the export of manufactured goods in the corresponding eigenvector. We have finally selected 15 PCs for the estimation of GDP that account for 91.1 per cent of the total variation of the sample. We exclude the rest because they represent a small proportion of total variance of the original set of 26 strategic indicators.

The regression estimate of the logarithm of quarterly GDP shows the following result in equation (3.1). All the monthly indicators are converted to a logarithm of quarterly average PCs, PC/PC, where the coefficients
The making of national economic forecasts

Table 3.2 List of 29 monthly indicators used in forecasting GDP

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Unit</th>
<th>Indicators</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Money supply (M2)</td>
<td>Rs crore</td>
<td>18 Leather &amp; leather</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>manufactures export</td>
<td></td>
</tr>
<tr>
<td>2 Bank credit to commercial</td>
<td>Rs crore</td>
<td>19 Chemicals &amp; related</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>products export</td>
<td></td>
</tr>
<tr>
<td>3 Bank rate</td>
<td>Per cent</td>
<td>20 Textiles (excluding</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ready-made garments export</td>
<td></td>
</tr>
<tr>
<td>4 Sugar production</td>
<td>0'000 tonnes</td>
<td>21 Ready-made garments</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>export</td>
<td></td>
</tr>
<tr>
<td>5 Rubber production</td>
<td>0'000 tonnes</td>
<td>22 Other manufactured</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>goods export</td>
<td></td>
</tr>
<tr>
<td>6 Jute goods production</td>
<td>0'000 tonnes</td>
<td>23 Market rate of rupee</td>
<td>Rs/US$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to drive USD</td>
<td></td>
</tr>
<tr>
<td>7 Fertilizer</td>
<td>Tonnes</td>
<td>24 Foreign direct investments</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(including acquisition of</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>share)</td>
<td></td>
</tr>
<tr>
<td>8 Aluminium production</td>
<td>Numbers</td>
<td>25 Software services</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>earnings; gross</td>
<td></td>
</tr>
<tr>
<td>9 Passenger car sales</td>
<td>Numbers</td>
<td>26 Private transfers</td>
<td>US$ million</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(remittances); gross</td>
<td></td>
</tr>
<tr>
<td>10 Railway earnings</td>
<td>Rs crore</td>
<td>27 Actual rainfall in</td>
<td>Millimetres</td>
</tr>
<tr>
<td>from goods traffic</td>
<td></td>
<td>India</td>
<td></td>
</tr>
<tr>
<td>11 Food &amp; related item</td>
<td>US$ million</td>
<td>28 Crude oil (petroleum);</td>
<td>US$ per barrel</td>
</tr>
<tr>
<td>imports</td>
<td></td>
<td>dated Brent</td>
<td></td>
</tr>
<tr>
<td>12 Chemicals and</td>
<td>US$ million</td>
<td>29 Rice; 5 per cent</td>
<td>US$ per tonne</td>
</tr>
<tr>
<td>related products import</td>
<td></td>
<td>imported white</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 Rice, Thai</td>
<td></td>
</tr>
<tr>
<td>13 Capital goods imports</td>
<td>US$ million</td>
<td>31 Nominal price quote</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Other commodities imports</td>
<td>US$ million</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15 Tea export</td>
<td>US$ million</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Iron ore export</td>
<td>US$ million</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Manufactured goods export</td>
<td>US$ million</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

obtained from the regression estimates indicate the elasticity, meaning that if there is a 1 per cent increase in quarterly PCs or three independent variables (price of Thai rice, price of Brent oil and rainfall), the quarterly GDP will increase by an estimated coefficient in percentage points.

The regression results strongly reflect the general situation of the Indian economy. The principal components generally represent the movement of 26 broad-based economic indicators. The regression estimate is based on 36 observations from 1998Q2 to 2007Q3. We initially include the first 15 indicators as possible regressors. We dropped the PCs that are insignificant, and kept the significant PCs to estimate real GDP. The final regression is obtained by including nine PCs and three independent indicators, as well as a moving-average process of residuals.

So, the equation for year-over-year growth in quarterly GDP and the regression period covers 1998Q2 to 2007Q4 (i.e. 1998Q2–2007Q4). The regression is estimated by using ordinary least squares (OLS) and is given as:

\[
D\log \frac{GDP_t}{GDP_{t-4}} = 4.8847 + 0.006D\log \frac{PC1_t}{PC1_{t-4}} - 0.003D\log \frac{PC2_t}{PC2_{t-4}}
\]

\[
+ 0.002D\log \frac{PC4_t}{PC4_{t-4}} - 0.007D\log \frac{PC5_t}{PC5_{t-4}}
\]

\[
+ 0.009D\log \frac{PC6_t}{PC6_{t-4}} - 0.0137D\log \frac{PC12_t}{PC12_{t-4}} + 0.004D\log \frac{PC14_t}{PC14_{t-4}}
\]

\[
+ 0.015D\log \frac{PC15_t}{PC15_{t-4}} - 0.015D\log \frac{RAIN_t}{RAIN_{t-4}}
\]

\[
- 0.032D\log \frac{RICETHAI_t}{RICETHAI_{t-4}} - 0.03D\log \frac{OILBRENT_t}{OILBRENT_{t-4}}
\]

\[
- 0.997MA1(1)
\]

Adjusted \(R^2 = 0.932, DW = 2.554, F = 38.012, LM (2) = 0.000, ARCH (0.435), n = 36\).

The adjusted \(R^2\) indicates that these nine PCs and three independent variables account for 93.2 per cent of the variation of real GDP. We find that all the regression coefficients are significant at least at the 1 per cent level. Interestingly, the results clearly indicate the importance of three independent indicators that we have included in the estimation of quarterly GDP. The positive and significant coefficient for \(RAIN\) indicates the importance of the monsoon in India. While increases in the price of rice and oil have a negative impact on GDP. This implies that the Indian economy is now closely related to international prices of commodities, and the higher price of these commodities can restrain the growth rate of the economy.

The equation has serially uncorrelated errors (according to Durbin-Watson and Breusch-Godfrey LM tests). Furthermore, there is no autoregressive conditional heteroscedasticity (ARCH) of residuals. This regression has therefore been able to reproduce the historically quarterly real GDP.
growth rates with a significant degree of precision. Figure 3.1 presents clearly the observed and fitted real quarterly GDP growth rates. The use of these principal components and three extra variables is consistent with the movements of the government's official estimates of the real GDP growth rate.

The CQM for quarterly real GDP is estimated in order to make forecasts and validate the official releases. The model allows us to make two-quarter-ahead estimates. Table 3.3 shows the forecast results of real GDP. The first column is the year and quarter for which the forecast is made, the second column is the log GDP and the third column is the real GDP year-over-year percentage change. The last two rows of the second and third columns are the forecasts for the third and fourth quarters of 2007. The fourth column indicates if the number represents official release or the CQM high-frequency forecast (see also Figure 3.2 for the two forecasted quarters of 2007–08).

We expect that the Indian economy will continue to experience strong growth momentum in the first half of 2008. For the third quarter, CQM forecasts 9.03 per cent real GDP growth, which should be followed by a slightly slower rate of increase (7.92 per cent) in the fourth quarter (on the basis of year-over-year percentage change).

The coefficients of the regressions and of the corresponding eigenvectors together produce the partial elasticities of the strategic indicators that are included in the estimation to make forecasts of real quarterly GDP (see Table 3.4). The manufacturing sectors of the economy are positively related to GDP growth rate at the margin, while some indicators such as software earnings, FDI and fertilizer production have a small impact on GDP growth rates. These indicators have been growing in recent years; therefore we need a few more years to realize their impact on overall economic activities.

5. SUSTAINABILITY OF INDIA'S ECONOMIC GROWTH

This sustainability of high economic growth of the Indian economy has become a subject of intense debate among policy-makers. To keep the economy moving requires balanced policies on many fronts of the planning process, given the fast-changing economic developments in India. India recorded an average growth rate of around 9 per cent in 2007. But at the same time, there have been some factors that have posed risks of reducing overall GDP growth, such as rising international crude oil prices, increasing domestic fiscal deficits and emerging environmental challenges.
including uncertainty about monsoon rainfall. Furthermore, some possibilities of an upward trend in inflation could be fuelled by three major components, such as increases in commodity prices (oil and metal prices in international markets), money supply and public expenditure.

Yet there are growing business and investor expectations and confidence in strong industrial and service sector activities. IT-enabled service sector growth, from both export earnings and growing employment opportunities, and optimism centred around the concept of 'India rising' are likely to continue to make their positive impact on GDP growth rate and overall development.
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Of course, Indian policy-makers need to focus on some key factors to bring about equitable growth phenomena in their national development framework. The planning process should aim at challenges that could derail India’s march towards becoming an economic superpower:

- a growing rich poor divide creates the notion of socioeconomic inequality;
- regional polarization, with some regions outperforming others and thereby increasing regional socioeconomic differences;
- rural urban migration, bringing a rising level of economic prosperity in cities setting up new industrial and service sector activities. People are now leaving their low-wage work in primary sectors;
- an increasing role of regional political parties that may retard the economic process. The regional political leaders are becoming more interested in preparing their local industrial and service sector hubs by wooing investors from abroad with attractive incentives;
- environmental degradation, causing pollution, and other industrial activities that also contribute negatively to the environment and other human activities;
- politicization of caste and religion creates social tensions among some economically backward groups and raises major challenges in different government institutions and regions.

Against this background, the high-frequency CQF of national income and product accounts provides key indicators to the direction of movement of the Indian economy. Future studies will be carried out to prepare regular forecasts for the consumer price index, the producer price index, and the trade balance of the Indian economy.

NOTES

1. I would like to express my sincere thanks to Lawrence R. Klein for his insightful comments and suggestions at all stages of preparation of this book. I am grateful to S. E. A. J. Strang for useful comments on the technical part. Thanks are also due to G. Y. Gupta for giving me useful research suggestions. The views expressed in this chapter are those of the author and do not necessarily reflect the views of the United Nations Secretariat or any of its members. Any errors in this chapter are the responsibility of the author.
2. According to Bhargava (1998, p. 29), this growth rate was an 'instrumental variable', a policy outcome that would in turn reduce poverty.
3. First Five Year Plan, Planning Commission, 1951-56.
4. The annual inflation rate reached nearly 14 per cent, gross fiscal deficit of the central government reached 8 per cent of GDP, central government debt reached 51 per cent of GDP, the current account deficit peaked at nearly 3 per cent of GDP, and external debt went up to more than 26 per cent (of GDP) in 1980. World Development Indicators 2001, World Bank. See also Agarwal (1997) for further discussion.
5. There was a tremendous pressure on India's foreign exchange reserve, as it stood at US $ 193.0 billion in 1989, and went to US $ 1.05 billion in 1990 according to the International Monetary Fund, and could sustain only two weeks of import coverage. See Bhargava (1998) for a detailed discussion of the Indian planning process.
6. The Green Revolution started in India in 1966, mostly in the states of Punjab, Haryana and West Bengal, and consisted of three basic elements: continued expansion of farming areas; double cropping existing farmland; and using seeds with improved genetics—high-yielding varieties (HYVs), of which the Kalyan variety is wheat is most important.
7. The Committee on Tax Reform was set up in 1992: its proposal that the share of customs duties in total taxes should be reduced and the share of direct taxes should be raised. More revenue needed to be mobilized via excise duties by transforming them into value-added taxes. Maximum rates of personal and corporate income taxes were reduced.
8. The production of certain items in the small-scale sector has been maintained to keep the interest of the small-scale units.
9. The central government in New Delhi under the 'Unified Front' coalition government introduced this phasing out of QRs in 1998. After that the BIF government took over power and endorsed phasing out of QRs. As a first step it removed QRs from 350 items in April 1998, which still leaves 2100 items subject to QRs (Alivahab, 1999).
10. In 1993, foreign institutional investors (FIIs) were allowed for the first time to invest in Indian equity once they fulfilled certain minimum standards, and further policies were simplified to enable them to trade in debt instruments through secondary market purchases in the stock market. Another channel for portfolio investment was provided by allowing Indian companies to issue fresh equity abroad through the new mechanism called global depository receipts (GDRs).
11. The Committee was set up by the United Front government to restructure public sector undertakings (PSUs), either by privatizing them or offloading shares in favour of workers. The objective of the plan is to divert the revenues generated from such disinvestment to be utilized for allocations for education and health, and to create a fund to strengthen public sector enterprises in the future.
12. For further discussion on SEZs policies, visit http://www.indiainfo.com/HTML/About.htm and http://www.indiainfo.com/HTML/SEZs/SEZs_notified_under_SEZ_Act_2005.pdf. See also Sachde (2002) for discussion on such new trade promotion policies in India.
13. The UNDP Human Development Report (2003) finding is that the first of these global targets (Millennium Development Goal 8), reducing by half the proportion of people living on less than US $ 1 a day, is likely to be reached, due in large part to sustained economic growth in China and India.
14. Total plans in 2003, an outlay on health, family welfare, and water supply and sanitation (Central and States with UTs—union territories) has increased from 3.9 per cent in the First Five-Year Plan to 7 per cent in the Eight-Five-Year Plan. Source: Ministry of Family Welfare and Planning Commission.
15. In 1983, Jawaharlal Nehru declared that the social objective should be 'to ensure an adequate standard of living for the masses, in other words, to get rid of the appalling poverty of the people.'

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4. High-frequency forecasting model for the Russian economy

Vladimir Eskin and Mikhail Gusev

1. RUSSIAN ECONOMIC DEVELOPMENT AND DATABASE ANALYSIS

Comprehensive analysis, econometric modeling and forecasting require reliable and comparable data sets for a long enough historical period to establish dynamic properties. Econometric modeling and forecasting in modern Russia still face a lack of adequate and consistent historical statistics, which makes modeling the national economy complicated.

Only 13 observations (1993–2006) are available for the development of the macroeconomic models with yearly frequency. Additionally, the instability of time series during the period 1993–98 makes econometric modeling and forecasting even more difficult. The instability of time series during 1993–98 is the result of two economic crises for the Russian economy in the 1990s. The first crisis was the collapse of the Soviet Union in 1991. During 1991–96, Russian GDP decreased more than 40 percent.

The main economic changes that took place during that period were liberalization of foreign trade, liberalization of domestic prices and general development of the market economy. The first two resulted in mutual comparability of domestic and world prices, especially for crude oil, gas and primary metals. Increases in the domestic prices of crude oil and other basic commodities increased production costs for domestic manufacturing industries. The poor quality of domestically produced commodities, the increase of production costs and severe competition with imports resulted in a decline of manufacturing production, unemployment growth, and producer and consumer price inflation.

Reduced output in all Russian industries, hyperinflation, unemployment growth and income decreases during 1991–96 reflected the instability of statistical information for that period. It should be mentioned that all major demand-side components of Russian GDP fell during the first seven years after the collapse of the USSR (see Table 4.1).

Russian economists note that the economic recession in the 1990s