

**UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT**

**NATIONAL INNOVATION SYSTEM AND  
MACROECONOMIC POLICIES: BRAZIL AND INDIA  
IN COMPARATIVE PERSPECTIVE**

No. 184  
May 2007



**UNITED NATIONS**



**NATIONAL INNOVATION SYSTEM AND  
MACROECONOMIC POLICIES: BRAZIL AND INDIA  
IN COMPARATIVE PERSPECTIVE**

*André Nassif\**

No. 184  
May 2007

*\* The author is a senior economist working in the Planning Department of the Brazilian Development Bank (BNDES), Av. República do Chile, 100, sala 1401, Rio de Janeiro, CEP: 20.139-900, Brazil, E-mail: [andrenassif@bndes.gov.br](mailto:andrenassif@bndes.gov.br). This paper was originally prepared for the Globelics Conference on Innovation Systems for Competitiveness and Shared Prosperity in Developing Countries that was held in Trivandrum, Kerala, India, 4–7 October 2006. The views and arguments expressed here are those of the author and are not to be taken as the views of either BNDES or the United Nations. The author would like to thank Claudia Nessi Zonenschain and Mário C. de Carvalho Jr. for encouragement, and Daniel da Silva Grimaldi for the competent research assistance. The final version of the paper benefited from comments and suggestions by Mário Luiz Possas, Richard Kozul-Wright and an UNCTAD anonymous referee. Other comments are appreciated and may be sent by email to the author's email address.*

The opinions expressed in this paper are those of the author and are not to be taken as the official views of the UNCTAD Secretariat or its Member States. The designations and terminology employed are also those of the author.

UNCTAD Discussion Papers are read anonymously by at least one referee, whose comments are taken into account before publication.

Comments on this paper are invited and may be addressed to the author, c/o the Publications Assistant, Macroeconomic and Development Policies, GDS, United Nations Conference on Trade and Development (UNCTAD), Palais des Nations, CH-1211 Geneva 10, Switzerland (Telefax No: (4122) 9170274). Copies of Discussion Papers may also be obtained from this address. New Discussion Papers are available on the website at <http://www.unctad.org>.

*JEL classification: O11; O23; O30; O50*

## Contents

	<i>Page</i>
<i>Abstract</i> .....	1
I. INTRODUCTION.....	1
II. NATIONAL INNOVATION SYSTEM AND MACROECONOMIC POLICIES: THE MAIN CONNECTIONS .....	3
III. NATIONAL INNOVATION SYSTEMS AND MACROECONOMIC POLICIES IN BRAZIL AND INDIA DURING THE IMPORT SUBSTITUTION PERIOD (1950–1990) .....	4
A. The building of a NIS in Brazil and India between 1950 and 1990 .....	4
1. Industrial and trade policies .....	4
2. National Innovation Systems (NIS) .....	6
B. Different macroeconomic environments in Brazil and India during the import substitution period (1950–1990) .....	8
IV. BREAKING WITH THE IMPORT SUBSTITUTION REGIME: ECONOMIC REFORMS IN BRAZIL AND INDIA SINCE THE 1990s .....	12
A. Trade liberalization .....	13
B. Privatization .....	15
C. Financial liberalization and openness of the short term capital account .....	15
V. NATIONAL INNOVATION SYSTEMS AND MACROECONOMIC POLICIES IN BRAZIL AND INDIA SINCE THE EARLY 1990s .....	17
A. National Innovation Systems in Brazil and India following the economic reforms .....	17
B. Macroeconomic policies and economic performance: Brazil and India in comparative perspective since the early 1990s .....	22
VI. CONCLUSION .....	30
REFERENCES .....	33
 <i>Chart</i>	
1 Indian real gross domestic product and stylized facts: annual growth rates in logarithms (1961–2005) .....	11
2 Value-added, employment and labour productivity in the Brazilian manufacturing sector (1996–2004) .....	25
3 Indian total exports: main products, including commercial services .....	26
4 Brazilian and Indian real GDP: annual growth rates in logarithms (1980–2004) .....	27
5 Indices of real effective exchange rates in India (1990–2006) .....	29
 <i>Table</i>	
1 Brazil and India: basic macroeconomic indicators, 1980–2006 .....	2
2 Import tariffs in Brazil and India before the economic reforms .....	5
3 R&D expenditures in 2002: selected countries .....	7
4 Indicators of domestic and external financial fragility in Brazil and India, 1950–1990.....	10
5 Fiscal and current account deficits in India (1980–1990) .....	12
6 The Washington Consensus recommendations .....	13
7 Import tariffs in Brazil and India after the economic reforms .....	14
8 Brazil and India: degree of internalization according to flows and stocks of FDI .....	17
9 Breakdown of Brazilian and Indian exports according to technological intensity – participation (1989–2004) .....	24

## Abbreviations

ABDI	Brazilian Agency for Industrial Development
BEFIEIX	Special Export Programmes (Programas Especiais de Exportação)
BIS	Brazilian Innovation System.
BNDES	Brazilian Development Bank (BNDE, nowadays BNDES),
CACEX	Foreign Trade Department of the Bank of Brazil
CNDI	National Council for Industrial Development
CNPq	National Council for Scientific and Technological Research of Brazil
CTA	Aerospace Research Center of Brazil
FDI	foreign direct investment
FINAME	a fund created in 1964 which specialized in aiding the acquisition of machinery and industrial equipments
FINEP	Agency for Financing Studies and Projects, a public enterprise for financing innovative activities established in 1965
FUNTEC	a special fund for financing the training of personnel involved in basic research in the universities
GDP	gross domestic product
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Statistics and Geography)
ICT	computer technology industries of Brazil
IMF	International Monetary Fund
Inmetro	National Institute of Metrology and Industrial Quality
INPI	National Institute of Industrial Property Rights
IS	import substitution
ISO	International Standards Organization. The ISO aims at harmonizing norms in a worldwide scale and removing the image of non-tariff barrier associated with them.
IT	information technology
LACEA	Latin American and Caribbean Economic Association
LAMES	Latin American Econometric Society
MDIC	Ministry of Development, Industry and Commerce of Brazil
MFAZ	Ministry of Finance of Brazil
MIC	Ministry of Industry and Commerce
MNE	multinational enterprises
MPLAN	Ministry of Planning of Brazil
NIS	National Innovation System
NTB	non-tariff barrier
PAC	Program for Accelerating Growth (Programa de Aceleração do Crescimento)
PBDCT	Basic Plan of Development in Science and Technology of Brazil
PBQP	Brazilian Program of Quality and Productivity
PIA/IBGE	Brazilian Annual Industrial Survey (Pesquisa Industrial Anual)
PICE	Industrial and Foreign Trade Policy (Política Industrial e de Comércio Exterior)
PITCE	Industrial, Technological and Foreign Trade Policy of Brazil
PND	National Development Plans of Brazil
PPI	United States Producer Price Index
PPP	purchasing power parity
R&D	research and development
RBI	Reserve Bank of India
S&T	science and technology
SELIC	Special Settlements and Custody System overnight rate, expressed in annual terms. It is the basic interest rate used as reference by the monetary policy in Brazil.
STI	Secretary of Industrial Technology within the MIC of Brazil
SUMOC	Money and Credit Department of the Bank of Brazil
WTO	World Trade Organization
VSNL	Videsh Sanchar Nigam Ltd (an Indian telecommunications company)

# NATIONAL INNOVATION SYSTEM AND MACROECONOMIC POLICIES: BRAZIL AND INDIA IN COMPARATIVE PERSPECTIVE

*André Nassif*

*(Brazilian Development Bank - BNDES, Brazil)*

## **Abstract**

*Efforts towards economic development in Brazil and India share some common aspects. From the beginning of the 1950s to the end of the 1980s, both countries adopted import substitution policies including high tariffs and non-tariff barriers. Since the beginning of the 1990s, liberalizing economic reforms have been implemented by the respective Governments. If we compare the reach of the Brazilian reform to that of India, one could easily conclude that the former was more extensive and profound than the latter, and in conventional indicators of innovative effort such as research and development expenditures, education coverage, average years of education and literacy rate, Brazil's results are a little bit better than those of India. However, since the beginning of the 1980s, India has been showing better general economic performance than Brazil. This paper argues and gives some empirical evidence to show that India's performance is explained by its institutional capacity for coordinating conventional macroeconomic policies with other policies related to its National Innovation System.*

## **I. INTRODUCTION**

From a neo-Schumpeterian perspective, differences across countries' economic performance are explained, to a great extent, by the complexity of interactions among private and public institutions that make up their National Innovation System (NIS) and the coordination between them. In this context, one can say that since public institutions responsible for conventional macroeconomic policies are part of the NIS, the lack of coordination between their main aims and those of the other national institutions involved in industrial and technological policies can jeopardize national economic performance.

From the beginning of the 1950s to the end of the 1980s, Brazil and India adopted import substitution (IS) policies. India's IS model of development has been characterized by deliberate planning strongly influenced by the Soviet model. In contrast, balance of payments crises have spontaneously stimulated most Latin American countries' IS – including Brazil's. In spite of these differences, Brazil and India implemented similar protectionist instruments such as, among others, high import tariffs, non-tariff barriers (NTB) and import licenses.

Whether by chance or not Brazil and India introduced economic reforms almost at the same time: that is, in 1990 and 1991 respectively. In general terms, both countries abolished import licenses, reduced import tariffs, and, in the case of India, became more open to the inflows of foreign direct investment (FDI). If the reach of Brazilian reform is compared to that of India, one could easily conclude that the former was more extensive than the latter, sticking closely to the economic policies recommended by the so-called Washington Consensus. Nevertheless, since the beginning of the 1980s, apart from the indicator of fiscal fragility, India has shown better general economic performance than Brazil (Table 1).

**Table 1**  
**BRAZIL AND INDIA: BASIC MACROECONOMIC INDICATORS, 1980–2006**

Description	1980–1990		1991–2002		2003		2004		2005		2006	
	Brazil	India	Brazil	India	Brazil	India	Brazil	India	Brazil	India	Brazil	India
Annual average growth rate of the real gross domestic product - GDP (per cent)	2.25	4.77	2.48	4.68	1.15	8.28	5.71	8.53	2.94	8.68 <sup>p</sup>	3.70	8.0 <sup>e</sup>
Inflation rate - consumer price index (per cent)	320.50	8.16	140.10	7.93	9.30	3.73	7.60	4.00	5.70	4.23	3.14	5.50 <sup>e</sup>
Gross fixed investment (per cent of GDP)	22.06	21.70	20.00	24.20	15.28	n.a.	16.10	n.a.	16.27	n.a.	16.81	n.a.
Gross domestic saving (per cent of GDP)	20.03	19.73	18.26	23.44	15.95	n.a.	18.47	n.a.	17.12	n.a.	17.59	n.a.
Fiscal deficit (per cent of GDP) <sup>I</sup>	-9.07	-8.16	-18.44	-8.10	-4.65	-8.49	-2.43	-7.52	-2.96	-7.45 <sup>e</sup>	-3.01	n.a.
Annual average growth rate of exports (per cent)	1.23	3.25	2.77	6.48	18.52	21.10	26.61	30.85	18.30	22.97 <sup>p</sup>	12.66	n.a.
Annual average growth rate of imports (per cent)	-4.08	3.94 <sup>a</sup>	4.04	4.44	-0.10	27.25	25.16	42.70	13.21	27.71 <sup>p</sup>	20.39	n.a.
Export of goods & services (per cent of GDP)	10.41	6.00	9.90	11.33	14.99	16.19	16.43	19.25	15.13	25.42	14.65	n.a.
Import of goods & services (per cent of GDP)	7.94	8.10	10.33	13.66	12.08	18.38	12.55	19.51	11.54	26.79	11.72	n.a.
Current account balance (per cent of GDP)	-1.93	-1.86	-2.32	-0.79	0.75	2.45	1.76	-0.81	1.75	-1.37	1.24	n.a.
International reserves (US\$ million)	8,144	5,480	37,992	31,998	49,296	112,959	52,934	141,514	53,799	151,622	85,839	177,426
External debt (US\$ million) <sup>2</sup>	102,792	45,571	191,733	104,876	214,929	104,958	201,374	111,715	169,450	123,204	172,459	125,181
External debt (per cent of GDP)	37.33	18.12	33.52	26.35	38.80	20.4	30.30	17.80	19.20	17.30	16.20	15.80

**Sources:** Central Bank of Brazil (<http://www.bcb.gov.br>); IPEA data (<http://www.ipea.gov.br>); Reserve Bank of India (<http://www.rbi.org.in>), Handbook of Statistics Economy on Indian Economy (2005); WTO (2005); World Economic Indicators DataBase (World Bank: <http://www.worldbank.org>); World Economic Outlook DataBase (International Monetary Fund: <http://www.imf.org>); Comtrade UNCTAD (<http://www.unctad.org>).

**Notes:** *p*: Provisional; *e*: Estimated; *n.a.*: not available; *a*: Import value for 1982: estimated; *I*: Interest payments included; <sup>2</sup>: From 2003 on, figures refer to end-March.

Most mainstream economists attribute the current accelerated rates of sustainable growth in India almost exclusively to the economic reforms introduced in 1991. My hypothesis, however, is that the greater economic performance in India since the beginning of the 1980s is explained by its capacity for coordinating conventional macroeconomic policies (mainly monetary and exchange rate policies) with the other policies related to India's NIS.<sup>1</sup> By contrast Brazil, in the absence of such capacity, has not been successful in strengthening its technological base and the conventional macroeconomic policies adopted in Brazil from the mid-1990s to the end of 2006 have damaged its NSI (as well as the general innovative performance) and have not worked towards sustained growth.

The paper is divided into 6 Sections, including the Introduction. Section II analyses the connections between the National Innovation System and conventional macroeconomic policies. Section III takes a brief look at the economic policies implemented in Brazil, in comparison to India, before the reforms of the 1990s. Section IV presents the main aspects of the economic reforms of the 1990s in Brazil and India. Section V analyzes the evolution of Brazil's and India's NIS following the economic reforms. This Section shows that, contrary to Brazil's recent experience, Indian macroeconomic policies, by

<sup>1</sup> The term coordination might be understood as a reasonable coherence between the main aims of the conventional macroeconomic policies and the general objectives of the NIS strictu sensu. Whereas the former tends to sustain growth with price stability, the latter aims at promoting innovation in such a way that economic development is accompanied by technical progress, structural change and improvement of the country's social conditions. If, for instance, the Reserve Bank operates in such a manner that real interest is maintained at very high rates and real exchange rates are overvalued for a long time, not only will there be a partial or complete loss of any private or governmental effort towards the improvement of the NIS, but neither export competitiveness nor growth will be preserved in the long run.



being more aligned with the other policies regarding its NSI as a whole, support innovation and growth. In Section VI, the main conclusions of the paper are drawn.

## II. NATIONAL INNOVATION SYSTEM AND MACROECONOMIC POLICIES: THE MAIN CONNECTIONS

Although a lot of definitions for the National Innovation System can be found in the economic literature, in the modern version most authors emphasize that not only institutions per se but mainly the complexity of interactions among them matter for both micro and macroeconomic performance. Johnson, Edquist and Lundvall (2003:4) call attention to the fact that these interactions occur in the context of “laws, rules, regulations, norms and cultural habits”, among institutions. So do Lundvall et al. (2002:214), who recognize that, despite combining ideas taken from different areas such as economic policies, economic interdependence, economic change and so on, the integration of these elements is “much more shaky than the integration of the elements of a technological innovation like the modern computer”.

As Keynes (1930) pointed out a long time ago, money and related macroeconomic policies (especially those influencing exchange rates) act as one of the most important institutions for preserving price stability in the short term and sustainable growth in the long term. However, the NSI approach is largely silent about the interactions between the conventional macroeconomic policies and other institutions that form the innovation and technological system.<sup>2</sup>

This does not mean that those connections are not recognized by the NIS literature. For instance, in the above quotation from Lundvall et al., those interactions are implicitly mentioned. Along the same line, Lastres and Cassiolato (2003:6), in a paper discussing “systems of innovation and development from a South American perspective”, stress “the importance of taking into account the productive, financial, social, institutional and political spheres, as well as **micro**, **meso** and **macro** dimensions” (boldface mine). In a critique to the narrow view with which the World Bank and the International Monetary Fund (IMF) analyze the role of institutions for development, Johnson, et al. (2003:10) argue that the crucial issue is that “the impact on learning and innovation of, for example, labor market institutions, financial institutions, **economic policy regimes** and a host of norms supporting a learning culture are not analyzed” (boldface mine). However, these connections are hardly found – at least with a satisfactory degree of details – either in theoretical or in empirical studies.

Financial globalization, by drastically increasing capital flows (inflows and outflows), does not necessarily ensure either monetary or exchange rate stability, and it does reinforce the interdependence between monetary and exchange rate policies. As recently demonstrated by Razin and Loungani (2005), since trade liberalization and financial globalization have allowed households to grow and diversify consumption possibilities, it follows that reduced weight has been given to output gaps relative to inflation. As Central Banks react to these demands rather than growth, monetary policy has given major priority to price stability. The empirical evidence shows that the more a country is exposed to trade and capital account liberalization, the greater will be the loss of output required for reducing inflation and keeping it at stable rates.<sup>3</sup> For a country like Brazil, which has had a long

---

<sup>2</sup> Coriat and Weinstein (2002) complain about the “conceptual vagueness” of the term “institutions” in the NSI literature. They propose to interface the “organizational approach” which conditions firms’ choices in a capitalist system, with the “institution approach” which emphasizes the role of the NS per se for determining countries’ economic performance. Even so, the macroeconomic element does not also appear clearly and with satisfactory detail in their proposed approach.

<sup>3</sup> For more details, see Razin and Loungani (2005).

history of high inflation rates, monetary policy has from the mid-1990s been the main transmission channel to bring inflation down and preserve price stability. In a context of large capital flows, this has required extremely high real interest rates from the Brazilian Central Bank. As Coutinho (2003) appropriately points out, this “macroeconomic regime contains and conditions the microeconomic decisions that form the standards of financing, corporate governance, international trade, competition and technical change.”

### **III. NATIONAL INNOVATION SYSTEMS AND MACROECONOMIC POLICIES IN BRAZIL AND INDIA DURING THE IMPORT SUBSTITUTION PERIOD (1950–1990)**

#### **A. The building of a NIS in Brazil and India between 1950 and 1990**

The building of Brazilian and Indian National Innovation Systems occurred along with the effort of promoting industrialization and economic development through an IS regime. At least until the end of the 1980s, both were built within a relatively closed microeconomic and macroeconomic environment.<sup>4</sup> But in spite of many common characteristics, industrial and trade policies in Brazil and India, and even their respective National Innovation Systems per se have been marked by some different elements.

##### ***1. Industrial and trade policies***

Until 1930, in virtue of the diffused characteristics of the infant industries and their strong dependence on the agricultural sector, there had not been a vigorous industrialization process in Brazil. With an economy that was extremely open to foreign trade, Brazilian productive and export structures had been strongly concentrated on coffee and other primary products which exhibited a low income and price-elasticity of demand. Economic growth in Brazil had been directly influenced by the foreign price fluctuations of its main exports.

In spite of the Great Depression having spontaneously broken with that development model and originated another one based on import substitution, it was not until the decade of the 1950s that industrialization could gain a major impulse, especially under the Second Getúlio Vargas (1950–1954) and the Juscelino Kubistschek (1956–1960) governments, which took the initiative of adopting protectionist policies in favor of infant heavy industries. From this period up to the beginning of the 1980s, industrial and trade policies maintained their essential elements. In each step of the IS process, governments targeted some industries as priorities of the industrial policy and used both import licenses and high tariffs to protect the Brazilian manufacturing sector. In practice, the import license regime was only eliminated with trade liberalization in March 1990.<sup>5</sup> Even taking into account two attempts of trade liberalization in 1966 and 1988, the economy had maintained a very high

---

<sup>4</sup> In the case of Brazil, the National Innovation System has originated in the early 20<sup>th</sup> century. However, it had evolved slowly to the beginning of the 1950s (Dahlman and Frischtak 1993).

<sup>5</sup> Import license as a sine qua non condition for import to be realized has lasted from 1947 to 1970, when the former was replaced by the “guia de importação” (an import document issued by the Foreign Trade Department, Cacex). Although the creation of this document has been justified for fulfilling statistical purposes, in practical terms, it continued to work as an instrument of administrative import control (Nassif 1995). The procedures for obtaining the “guia de importação” in Brazil were, however, more flexible than accessing import license in India.

protectionist structure – even when compared to that adopted by the Asian Tigers in the early phase and apogee of their protection policies<sup>6</sup> – due to the prevalence of non-tariff barriers (NTB).<sup>7</sup>

Another element of the industrial policy in Brazil is related to foreign direct investment (FDI), which has always been more open to multinational enterprises (MNE) than India. But in contrast to some Asian countries traditionally open to FDI such as, for instance, Singapore and, more recently, China, policies for attracting MNEs in Brazil, instead of looking to promote the transfer of technology or technological spillovers to local firms, were mainly driven by the objective of implementing import substitution and, hence, reducing import dependence (balance of payments issues). As a consequence, Brazil was not able to attract the best techniques available in relevant industries of high and even medium technology (Dahlman and Frischtak 1993).

The Indian experience of industrial and trade policies shared some similar mechanisms with the Brazilian one. First of all, like Brazil, Indian industrialization has been guided by Development Plans. Up to the end of the 1970s, Brazilian and Indian governments targeted specific industries; in the case of India, at least up to the mid-1980s. During the IS period, Brazilian and Indian Development Plans have especially prioritized basic and heavy industries, such as capital goods, chemicals and basic infrastructure. Even after the economic reforms of 1991, India has never renounced the adoption of long-term Development Plans. Contrary to the Indian experience, however, Brazilian Development Plans have been characterized by much more discontinuity.

India, in turn, made intense use of classical protectionist instruments, such as high tariffs and import licenses. Also taking into consideration the severe restriction on FDI inflows in India from the mid-1970s to the beginning of the 1990s, their local markets have worked in a much more protected environment than Brazil. India has also extensively applied the so-called industrial license regime, a mechanism through which the creation of a new firm, new plant or an increase of productive capacity required a government permit. As there is no knowledge of an application of this kind of protectionist instrument in the Brazilian experience, it is easy to suspect that businesses in India have generally been much more repressed. This suspicion can be partially confirmed by the comparison between the degrees of protection in both countries. Even when one accepts that the Brazilian protection structure had been heavier than some East Asian countries during the early and intermediate stage of industrialization (Amsden 2001), Table 2 shows that the Indian experience of IS represented one of the most protected economies in the world (Bhagwati 1993).

**Table 2**  
**Import tariffs in Brazil and India**  
**before the economic reforms**

<i>Sectors</i>	<i>Brazil</i> <i>(1988)</i>	<i>India</i> <i>(1990)</i>
Agricultural products	17.0	106.0
Manufacturing products	69.7	128.0
Whole economy	39.6	128.0

*Source:* For Brazil, Kume, Piani e Souza (2003); and for India, Srinivasan (2001:46)

In order to compensate the high cost of protection on Brazilian manufacturing, a number of mechanisms – such as fiscal exemptions and credits, drawbacks and other direct subsidies – were created to increase export competitiveness in the world markets. After 1972 the BEFIEX programme which permitted exporters to import machine and equipments free of any tariff and tax, came into effect. By 1990 the value of

subsidies provided by BEFIEX represented around 50 per cent of total Brazilian exports (Shapiro 1997).

<sup>6</sup> See Amsden (2001).

<sup>7</sup> Nassif (1995).

India introduced similar instruments for stimulating exports during the IS period. Bhagwati and Desai (1970) estimated that, by the late 1960s, between 30 per cent and 70 per cent of Indian exports benefited from subsidies of some kind. Paradoxically, Indian export policies were marked by some contradictions. For instance, based on the argument that domestic consumption should be subsidized, the government imposed quantitative restrictions against export of some manufactured products and even agricultural goods, such as manufactured cotton (until 1955), products made out of jute (until 1958), and tea (until 1970). In addition, when international prices of some Indian exported goods fell, the government imposed a tax against the export of these products, even without any evidence that India had monopoly power in world markets.<sup>8</sup>

As a consequence, India had failed to develop a strong and diversified export base when its import substitution regime and protectionist measures reached an apogee. In 1985, while Brazilian exports totaled US\$25,600 million (representing 1.6 per cent of world exports), India's were only US\$8,900 million (or only 0.5 per cent of world exports), and were strongly concentrated in primary products.<sup>9</sup>

## 2. *National Innovation Systems (NIS)*

During the early IS period (to the mid-1950s), Brazilian governments put their efforts into building a network of institutions involved in scientific, technological and industrial projects. Among others, it is worth mentioning the Aerospace Research Center (CTA), founded in 1947, which had an important role for developing the catching-up in the Brazilian aircraft industry; the National Council for Scientific and Technological Research (CNPq), established in 1951 and originally turned towards atomic technology, is still an important institution for financing public research, especially in the federal universities; and the Brazilian Development Bank (BNDE, nowadays BNDES), which was created in 1953 with funds fed by workers' forced savings, and still considered the most important institution for financing long-term investments in Brazil.

During the military governments (1964–1985), following the stabilization and overcoming the stagnation trends of the Brazilian economy that had emerged at the beginning of the 1960s, large investment projects were implemented through the National Development Plans (I and II PND, from 1972–1974 and 1974–1979 respectively). These projects did have the merit of filling the bottlenecks observed in the infrastructure and basic industries – especially in the production of intermediate goods (Castro and Souza 1985). The preoccupation with scientific and technological development has always been present in the military governments, with the exception of the first military president. Within the BNDES, in 1964 two funds were created for directly or indirectly financing the introduction of new technologies. The first was FUNTEC, a special fund for financing the training of personnel involved in basic research in the universities; the second was FINAME, a fund also created in 1964 which specialized in aiding the acquisition of machinery and industrial equipments. In 1965 the Agency for Financing Studies and Projects (FINEP) was established, and still is an important public enterprise for financing innovative activities.

Throughout the 1970s successive scientific and technological plans appeared. The First Basic Plan of Development in Science and Technology (I PBDCT 1973–1974) was concerned with programming an

---

<sup>8</sup> The “terms of trade” argument has been around since the classical economists (see, for instance, Mill 1844), who recognized that a country with monopoly power in its foreign trade can improve its terms of trade by imposing an optimum tax on its exports (or, alternatively, on its imports, if it has monopsony power). A tax on exports can be passed on the foreign buyer, since the country has monopoly power in international markets. This case for protection was later refined as “the optimum tariff” argument by Johnson (1950).

<sup>9</sup> All figures were extracted from UNCTAD Comtrade (<http://www.unctad.org>)

increase in the financial resources for S&T; the II PBDCT (1975–1979) emphasized financial funds for research and development of new technologies, as well as areas such as new sources of energy, microelectronics and the aerospace industry. In the context of the debt crisis and the beginning of stagflation process, the III PBDCT (1980–1985) set major priorities on the reorientation of horizontal actions of private and public agents (Dahlman and Frischtak 1993:419).

Institutional modernization reached its peak with the creation of the Secretary of Industrial Technology (STI) in 1972. Established within the Ministry of Industry and Commerce (MIC), the STI has acted by coordinating S&T programmes, lending technological development in private and public firms, managing the system of intellectual property rights (patents and trademarks) and regulating the transfer of technology through the National Institute of Industrial Property Rights (INPI) (Dahlman and Frischtak 1993:419).

Notwithstanding the high annual average growth rates of Brazilian real GDP between 1950 and 1980 (7.5 per cent)<sup>10</sup> and the consolidation of a large and diversified industrial base, Brazil has not shown strong results with respect to indicators of technological efforts, especially those related to Research and Development (R&D). By the mid-1980s R&D expenditures was still relatively low (around 0.63 per cent of GDP) in comparison to industrialized countries or even some recently industrializing Asian countries (especially the Republic of Korea); but also most of the R&D expenditures were made by the State (approximately 62.6 per cent of the total). Another characteristic of the low technological effort is that R&D was highly concentrated in a narrow group of firms (Dahlman and Frischtak 1993:435–439).

*Table 3*  
**R&D EXPENDITURES IN 2002: SELECTED COUNTRIES**

<i>Country</i>	<i>R&amp;D expenditures (% of GDP)</i>	<i>Private R&amp;D (% of total R&amp;D)</i>	<i>R&amp;D per capita (PPP US\$)</i>
Republic of Korea	2.9	72.2	492.3
China	1.2	57.6 <sup>a</sup>	56.2
India	0.8	23.0	20.5
Brazil	1.0	38.2	76.9
Japan	3.1	73.9	836.6

*Source:* UNESCO Institute of Statistics.

*Note:* a 2000.

If scientific and technological efforts reached, at least, reasonable results (in spite of having been far from satisfactory, as mentioned above), the same cannot be said with respect to the formation of human capital. In 1985 while the number of tertiary students per 100,000 population totaled 1,140 in Brazil (against only 776 in India), this figure was 3,606 in the Republic of Korea, 2,080 in Taiwan (Province of China) and 1,508 in Mexico (Dahlman and Frischtak 1993:441). In 1985, only 35 per cent of the related age group was enrolled in secondary education in Brazil (the same indicator for India, but against 94 per cent for the Republic of Korea, 91 per cent for Taiwan (Province of China) and 55 per cent for Mexico).

<sup>10</sup> According to database from IBGE (<http://www.ibge.gov.br>).

The indicators of educational efforts directly linked to technical training were also lower in Brazil than other developing countries in the early 1980s. In this respect, by 1980 India had overtaken the Asian Tigers in terms of the number of tertiary students enrolled in natural sciences, mathematics, computer and engineering. As noted by Dahlman and Frischtak (1993) the reasons why the quantitative and qualitative indicators of human capital in Brazil have continued to be unsatisfactory are linked not only to the major concentration (in the case of tertiary education) in social sciences, instead of natural, engineering and other technical sciences, but also to the evidence that the quality of most education schools (from the primary to the tertiary education) is low.<sup>11</sup>

Similar to the industrialization process of most developing countries, industrial growth in India has also been financed preferentially by State Development Banks. The Industrial Development Bank of India dominated preferential lending to both the public and private sectors. The share of all Indian development banks in total manufacturing investment has increased as follows: from 7.6 per cent in 1970 to 26 per cent in 1990 (Amsden 2001:127–130).

A comparative analysis of the effort of building a NIS in India is important, since it is common to attribute the enormous innovative and educational efforts – in addition to the structural reforms of the 1990s – as one of the main causes of its current success in information and computer technology industries (ICT) and even of its sustainable economic growth.<sup>12</sup> In fact, efforts towards the creation of a strong National System of Science, Technology and Innovation go back to India's early industrialization in the immediate post-Independence period. As Krishnan (2003) noted, through the 1950s a network of federal and state level institutions of higher technical education and colleges of engineering spanned almost the entire country. Moreover, contrary to Brazil, most of these institutions have always been of excellent quality.

Another traditional mark of the Indian Innovation System is that, similar to that of Brazil, and despite the permanent preoccupation with boosting scientific research, most of the R&D activities have been dominated by the public sector. It is true that this concentration has yielded remarkable results and capabilities in strategic sectors like defense, atomic energy and space research. However, although by the end of the 1980s “India had perhaps the strongest scientific and technological infrastructure among developing countries” (Krishnan 2003:5), their system of research and development still maintained a notable lack of interlinks and synergies with the industrial sector. This could have contributed, jointly with the above-mentioned high level of protection during the IS, to the narrow base that still characterized the Indian manufacturing sector in the late 1980s.

## **B. Different macroeconomic environments in Brazil and India during the import substitution period (1950–1990)**

The conventional macroeconomic policies adopted in both Brazil and India during the IS period had a close relationship with industrial and trade policies, and also with their own NIS.

The shortage of exchange reserves has been a recurrent issue in Brazil since the Great Depression of the 1930s. Paradoxically, the many balance of payments crises that occurred between 1930 and 1982 gave the government reinforced arguments in favor of renewing the use of protectionist instruments and import substitution. Before 1970, the Brazilian stock market was practically non-existent. Because

---

<sup>11</sup> We can surely affirm that from the early 1980s to 2006 this situation has been practically unchanged.

<sup>12</sup> The role of the structural reforms post-1991 in the positive performance of India's economy is discussed further.

of this bottleneck, Brazilian economic growth had predominantly been financed by the BNDES and other state banks, as well as FDI from multinational corporations. In this period, external debt did not provide an important source of financing for the accumulation of capital in Brazil. This began to change in the early 1970s. With the high international liquidity that followed the first oil crisis in 1973, military governments intensified the strategy of increasing the medium and long term borrowing from private foreign banks. In this context, the governments stimulated private and state-owned firms to finance import substitution in industries selected as a priority for II PND, such as steel, paper and pulp, petrochemicals, non-ferrous materials and capital goods (electrical equipment, telecommunication and aeronautic equipments).

The expanding external debt became a pressing policy issue from 1977, when the previous trend of low international interest rates had been reversed, and became serious after the sudden increase of the United States interest rates in 1979. Despite the evident growth of debt burden, state enterprises continued to renew external debts (Cruz 1983) with increasing signs of external financial fragility: whereas external debt increased from US\$37,900 million to US\$85,500 million between 1977 and 1982 (representing 21.4 per cent and 31.5 per cent of GDP respectively), interests paid in relation to exports increased from 17.2 per cent to 62.2 per cent in the same period. This strategy lasted up to Mexico's external default of 1982.

High fiscal deficits and inflationary pressures were also features of the IS period. For instance, at the end of the Kubitschek government (1956–1960), rapid inflation led to a serious economic crisis during the first half of the 1960s. Given the lack of a developed open market of Treasury bonds and since that inflation was explained by excessive fiscal expenditures over public receipts, the Bank of Brazil had to cover them by printing money.<sup>13</sup> Eventually, these trends led not only to the adoption of tighter monetary policy, but also structural reforms in the fiscal, finance and public areas. Following these economic reforms, the Brazilian economy would experience, between 1967 and 1973, the highest annual average growth rates of real GDP in the post-World War II era.<sup>14</sup> Inflation again increased from the mid-1970s on, and became chronic from the early 1980s to the first half of the 1990s, also linked to fiscal deficit imbalances; but, this time it could be identified as an outcome of the Brazilian debt crisis.<sup>15</sup> In fact, following the Mexican external moratorium of 1982, the Brazilian government's decision to incorporate into the public budget most of the private foreign debt bonds contributed to drastically increasing the financial fragility of the public sector as a whole. Through the second half of the 1980s, with high interest rates and chronic fiscal deficits, it had already given the conditions for turning the stagflation into a vicious cycle.

If Brazilian and Indian industrial, trade and technological policies implemented during the IS period share many common characteristics, their macroeconomic environments and the associated macroeconomic policies were marked by more differences than similarities. First of all, during the first phase of Indian import substitution regime (1950–1965), the governments did not have to face any serious balance of payments crisis. As shown by Bhagwati (1993), that period, which coincided with

---

<sup>13</sup> The Central Bank of Brazil was created in 1964. Before, the Bank of Brazil, through the Money and Credit Department (SUMOC), was responsible for the execution of the monetary and exchange rate policies. Through the Foreign Trade Department (CACEX), in turn, the Bank of Brazil also regulated trade policies. As Oreistein and Sochaczewski (1990) point out, with its double function of commercial and monetary authority, this latter institution could expand money issues without any restriction.

<sup>14</sup> Military governments tried to promote this phase of Brazilian economic history as an economic miracle. A little later, unsuspecting Brazilian economists would show that the "miracle", besides reflecting official marketing, had been responsible for aggravating national income concentration in the country (see Furtado 1974 and Bacha 1978).

<sup>15</sup> According to the Central Bank of Brazil (<http://www.bcb.gov.br>), the Brazilian consumer inflation rate reached 99.7 per cent in 1982.

the American strategic policy of preventing communism from spreading in Asia, India benefited by large amounts of the United States financial support. On the other hand, even once one accepts that India's foreign exchange crises of 1966, 1981 and 1991 were serious (especially the latter one), their dimensions were not so great in comparison with those faced by Brazil, especially because in all those Indian episodes policy makers immediately decided to adjust to the external sector. In fact, as Table 4 shows, comparing some indicators of domestic and external financial fragility shows the greater external vulnerability of the Brazilian economy.

**Table 4**  
**INDICATORS OF DOMESTIC AND EXTERNAL FINANCIAL FRAGILITY IN BRAZIL AND INDIA, 1950–1990**  
(Annual averages)

Description	Brazil				India			
	1950-1960	1960-1970	1970-1980	1980-1990	1950-1960	1960-1970	1970-1980	1980-1990
Fiscal deficit / GDP (per cent) <sup>1</sup>	n.a.	-2.22	-0.24	-9.07	-3.99	-4.48	-4.71	-8.16
Current account / GDP (per cent)	-1.39	-0.94	-3.79	-1.93	-2.39	-1.88	0.23	-1.86
External debt (US\$ million)	n.a.	n.a.	24,659	102,792	0,890	5,528	9,987	45,571
External debt / GDP (per cent)	n.a.	n.a.	15.59	37.33	3.09	12.49	10.75	18.12
International reserves (US\$ million) <sup>2</sup>	0,111	0,338	6,162	7,105	0,432	0,428	3,329	4,782
International reserves (months of imports) <sup>2</sup>	1.12	2.52	7.19	5.39	2.12	2.37	5.98	3.58

*Source:* International Monetary Fund / International Financial Statistics Year Book, 1985 and 1995.

*Notes:* <sup>1</sup> Includes interest payments. <sup>2</sup> Excludes gold.

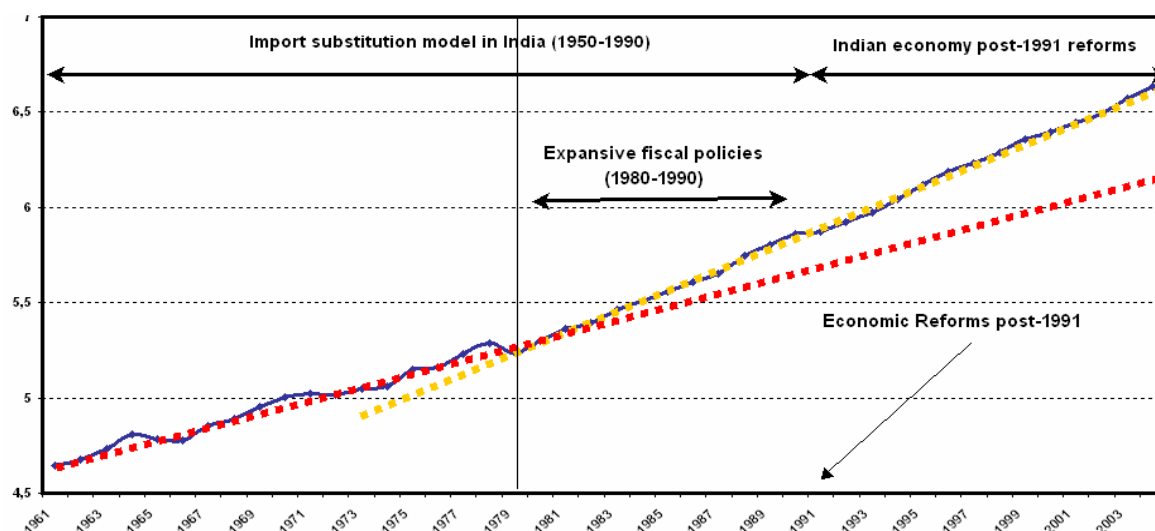
Contrary to the Brazilian experience, in the period 1950–1980, India's macroeconomic environment was characterized by relative fiscal stability, low inflation rates and a moderate tendency to borrow abroad. This latter aspect of the Indian external debt's management explains why, whereas the international financial system remained closed to new capital inflows to Latin American countries throughout the 1980s, India, classified by official and private banks as a country of low risk, could receive a considerable amount of long term foreign lending in the same period (Krueger and Chinoy 2002).

Most mainstream economists have attributed the current accelerated growth of the Indian economy<sup>16</sup> to the positive economic reforms post-1991. However, a simple inspection of India's long term growth, or even a more accurate analysis of the macroeconomic policies adopted in the decade of 1980 does not support that hypothesis. As Chart 1 shows, the only break in Indian growth (in relation to the long-term trend, expressed by dotted line of the Chart) occurred at the beginning of the 1980s, even before Rajiv Gandhi's first liberalization reforms in 1985.

<sup>16</sup> Desai (1999), Srinivasan (2003), DeLong (2003) and Panagariya (2004, 2004a) support this hypothesis, among others.



*Chart 1*  
**INDIAN REAL GROSS DOMESTIC PRODUCT**  
**AND STYLIZED FACTS: ANNUAL GROWTH RATES IN LOGARITHMS (1961–2005)**



Source: World Bank, WDI Online Database

In fact, although trade liberalization implemented under Gandhi's mandate reduced the number of goods subjected to import licenses, 70 per cent of the total imports continued to be controlled by the restrictive commercial regime (Panagariya 2004). Even taking into account the new support to export competitiveness provided by the express undervaluation of the rupee in real terms (around 30 per cent),<sup>17</sup> the truth is that industrial and import controls continued to regulate the majority of Indian industrial output as growth took off.

In contrast to mainstream explanations, a few authors recognize that it was not until the Indian government broke with the relative fiscal conservatism in the early 1980s that the economy would be able to overcome the long term "hindu" economic growth path that had prevailed in the previous period.<sup>18 19</sup> In fact, a more accurate analysis of Indian public accounts allows us to conclude that the rapid expansion of the fiscal deficits was the main source of the greater economic growth of the 1980s. As Table 5 confirms, since the increase of public expenditures was not proportionally accompanied by the augmentation of governmental revenues, the positive impacts of these fiscal deficits on the real side of the economy could not be neglected. These expansionist fiscal mechanisms, combined with the rapid increase of the Indian current account deficits,<sup>20</sup> suggest that the strongest economic growth of the 1980s is explained mainly by the adoption of Keynesian macroeconomic policies.

<sup>17</sup> This figure was estimated by Joshi and Little (1994:184), who referred to this real exchange rate undervaluation as a "reform of Southern Asian style".

<sup>18</sup> See, for instance, Rodrik and Subramanian (2004) and Stiglitz (2002). Krueger and Chinoy (2002) also discussed the role of the increasing fiscal deficits for greater average annual growth rate of real GDP in the 1980s, but they did not recognize any link between the fiscal policies of this latter period and current Indian accelerated economic growth.

<sup>19</sup> Even an unsuspecting Indian neoclassical (but not necessarily "neoliberal") economist like Jagdish Bhagwati (1993:30) attributes the "hindu" economic growth (1950–1980) to the fact that "growth (in those times) was indisputably conceived to be an instrumental variable for reducing poverty, not as an objective *per se*".

<sup>20</sup> As Table 5 shows, the current account deficit as proportion of the Indian GDP increased from –1.3 per cent in 1982 to –2.3 per cent in 1990.

**Table 5**  
**FISCAL AND CURRENT ACCOUNT DEFICITS IN INDIA (1980–1990)**

<i>Year</i>	<i>Government expenditures (Per cent of GDP)</i>	<i>Government revenues (Per cent of GDP)</i>	<i>Fiscal deficit (Per cent of GDP)</i>	<i>Current account deficit (Per cent of GDP)</i>
1980	18.3	11.8	6.5	n.a
1981	17.8	12.3	5.5	n.a
1982	18.6	12.6	6.0	-1.3
1983	18.7	12.3	6.4	-1.0
1984	20.3	12.7	7.6	-1.2
1985	22.3	13.8	8.5	-2.0
1986	23.7	14.4	9.3	-2.0
1987	22.8	14.4	8.4	-2.0
1988	22.2	14.1	8.1	-2.5
1989	22.7	14.8	7.9	-2.4
1990	22.6	13.5	8.1	-2.3

*Source:* Krueger and Chinoy (2002, 15).

*Notes:* Fiscal deficits include interest payments. n.a: not available

Obviously, the above-mentioned expansionist policies could not be sustainable in the long run. In 1991, an adverse macroeconomic environment characterized by a severe fiscal crisis and expressive loss of international reserves, not only forced India's government to sign an agreement for obtaining financial support from the IMF, but also served as justification for the implementation of more profound economic reforms.

Brazil has also embarked on more extensive economic reforms throughout the 1990s. However, as will be discussed in the next sections, differently from India, the new macroeconomic regime adopted in Brazil since 1994 was not able to put the economy on a sustainable growth trajectory.

#### **IV. BREAKING WITH THE IMPORT SUBSTITUTION REGIME: ECONOMIC REFORMS IN BRAZIL AND INDIA SINCE THE 1990S**

Much has been written on the need to implement economic reforms in developing countries, especially trade liberalization. Any historical and economic analysis of the Brazilian and Indian trade policies of the IS period would lead one to conclude that both countries could not have sustained acceptable levels of efficiency and international competitiveness in the world markets if high average tariff to imports had been maintained. In addition, if one takes into consideration the rapid change in technical progress brought about by the microelectronic revolution, it is easy to suspect that generalized protectionist policies, such as those practiced by both countries throughout the 1980s, were inconsistent with requirements for increasing (or even maintaining) static and dynamic efficiency in this new world.

The issue is the way a society chooses to integrate into the international markets. In practice, economic reforms in Brazil and other Latin American countries were much more influenced by the so-called Washington Consensus than in India and, in some sense, other Asian developing countries (Table 6).

**Table 6**  
**THE WASHINGTON CONSENSUS RECOMMENDATIONS**

<b>Original Washington Consensus</b>	<b>"Augmented" Washington Consensus</b>
<ul style="list-style-type: none"> <li>• Fiscal discipline</li> <li>• Reorientation of public expenditures</li> <li>• Tax reform</li> <li>• Financial liberalization</li> <li>• Unified and competitive exchange rates</li> <li>• Trade liberalization</li> <li>• Openness to FDI</li> <li>• Privatization</li> <li>• Deregulation</li> <li>• Secure property rights</li> </ul>	<ul style="list-style-type: none"> <li>• Corporate governance</li> <li>• Anti-corruption</li> <li>• Flexible labour markets</li> <li>• WTO agreements</li> <li>• Financial codes and standards</li> <li>• Capital account opening</li> <li>• Non-intermediate exchange rate regimes</li> <li>• Independent central banks/inflation target</li> <li>• Social safety nets</li> <li>• Targeted poverty reduction</li> </ul>

Source: Adapted from Rodrik (2006)

Our purpose in this section is to show that, compared to India, the much more profound incorporation of the majority of the recommendations of the original Washington Consensus and some of the augmented ones in Brazil have not only been responsible for reducing the efficiency of the coordination of macroeconomic policies with its National Innovation System, but also explain to a great extent the bad general economic performance expressed, notably, by slower economic growth.

A quick look at all recommendations listed in Table 6 allows us to conclude that most of them have been implemented in Brazil since the early 1990s.<sup>21</sup> However, we selected the points that were most relevant to the country's (good or bad) economic performance, as follows: trade liberalization (after 1990); privatization (after 1991); financial liberalization and capital account opening (after 1991); and flexible exchange rates and inflation targets (after 1999). The first two changed the microeconomic environment; the others produced a significant modification of the macroeconomic regime adopted in Brazil.<sup>22</sup>

### **A. Trade liberalization**

Trade liberalization was implemented almost at the same time in Brazil and India (1990 and 1991 respectively). Although both countries immediately dismantled most of the non-trade barriers and programmed a gradual tariff reduction (Brazil 1990–1994; India – an unfulfilled trade reform since 1991), the objectives, extent and intensity of trade liberalization in Brazil was quite different from India.

First of all, before the Brazilian trade reform was announced, the programmed tariff cuts had been designed to redefine the protectionist structure of the economy according to the prevailing pattern of static comparative advantage. In some sense, this target had been followed until the Real Plan of anti-

<sup>21</sup> Paradoxically, in spite of its great importance for improving microeconomic efficiency and income distribution, tax reform has not yet been implemented in Brazil. From 1993 to 2005, there was a drastic increase in the Brazilian tax burden, from 25.3 per cent to 36.5 per cent of GDP, and some of the tax collection mechanisms were extremely inefficient. For details, see Varsano (1997) and Giambiagi (2006).

<sup>22</sup> The latter recommendations (flexible exchange rates and inflation targets) will be discussed in the next section.

inflationary stabilization (Plano Real, June 1994), since the tariff reductions implemented between 1990 and 1994 were conducted as previously planned.<sup>23</sup> In 1994, however, with the Real Plan, tariff reductions were largely used for anti-inflationary purposes. For instance, many products suddenly had their respective import tariff ad valorem reduced to 2 per cent or 0 per cent (Kume, Piani e Souza 2003).

India also eliminated the main restrictions to domestic and foreign competition. The industrial license regime was revoked, in such a way that it only continued to apply for a few activities like services related to public health and security. Yet, the dismantlement of import license was, in practice, much more gradual than might seem at first sight. Although this latter restriction was eliminated for most products, the government maintained a negative list for activities conditioned to some bureaucratic controls, such as agricultural and superfluous products. Although official authorities had alleged that such procedure would not mean any import license, in practical terms, the administrative exam of the negative list continued to preserve aspects of the old regime. This practice would only be dismantled definitively in April 2001 (with the exception of a few activities like public health, security and oil), after panels opened by trade partners at the WTO. On the other hand, comparative to the prevailing tariff structure of late 1980s, there have been significant tariff cuts since 1991. These remain much higher than in Brazil (Table 7).

**Table 7**  
**IMPORT TARIFFS IN BRAZIL AND INDIA AFTER THE ECONOMIC REFORMS**  
(Simple average(per cent))

<i>Description</i>	<i>Brazil</i>		<i>India</i>	
	<i>2000</i>	<i>2004</i>	<i>1998</i>	<i>2002</i>
Applied Tariffs (simple average) <sup>1</sup>	13.7	10.4	35.3	32.3
Agricultural products	12.9	10.4	33.8	41.7
Manufacturing products	13.8	10.4	35.6	30.8
Agricultural products at WTO	12.6	10.2	35.2	40.7
Manufacturing products at WTO	13.8	10.5	35.4	31.0
Textile products and apparel	20.3	17.2	43.7	31.3
Peaks of domestic tariffs <sup>2</sup>	0.0	0.6	0.2	1.3
Peaks of international tariffs <sup>2</sup>	41.3	26.8	90.5	96.8
Standard deviation of applied tariffs	6.7	7.0	14.5	13.0
Duty-free tariff lines <sup>2</sup>	1.5	10.4	1.4	1.1

*Source:* World Trade Organization (WTO).

*Notes:* <sup>1</sup> According to the "Most Favoured Nation"(MFN) clause at WTO in selected periods. <sup>2</sup> Per cent of all tariff lines.

It seems clear that tariff cuts in Brazil have been much more rapid than in India. Moreover, recent evolution of the tariff structure in India suggests that, despite the unquestionable trade liberalization, policy makers have dealt with tariffs as an important and flexible instrument of industrial and trade policy. In other words, tariffs have been used as a mechanism of protection of domestic industries, rather than (or, perhaps, instead of) for macroeconomic purposes. A proof of this latter statement is that, in practically all industries, applied tariffs have been very close to consolidated tariffs in the context of multilateral agreements negotiated with the WTO.

<sup>23</sup> One could say that Brazilian trade liberalization began in 1988, when a tariff reform brought a significant reduction in the level of nominal protection. However, this reform turned out to be ineffective given the extensive use of quantitative and administrative barriers against imports (see Nassif 1995).

## **B. Privatization**

Since the early 1990s, Brazil has embarked on an ambitious privatization program. From 1991 to the present, most of the state enterprises – especially those related to industries of basic and intermediate products, infrastructure and telecommunication – have been sold to local or foreign groups. Beginning with sale of the USIMINAS steel mill (1991), privatization accelerated under Fernando Henrique Cardoso's government (1994-2002), who designed and sold the Companhia Vale do Rio Doce (1996), followed by the sale of concession of an infant cellular phone industry (1997) and TELEBRÁS, the state company of conventional telephone services (1998). All those privatizations, in conjunction with the selling of other state firms of minor importance summed up to around US\$27 billion (Palma 2003).

In the case of India, decisions regarding the privatization of state enterprises have been extremely prudent compared to the recent experience of Brazil and other Latin American countries. Desai (1999) and Krueger and Chinoy (2002) argue that political resistance to privatization and shadow regulatory rules in India have contributed towards not attracting private sectors to the production of basic services and, hence, for perpetuating the bad conditions of the infrastructure system, such as electrical energy, railroads, ports, airports, and even telecommunications.<sup>24</sup>

However, given the well-known strategic role of those services for the performance of the economy as a whole, it might be noted that Indian authorities have avoided putting the cart ahead of the horses in this field. In fact, as recurrently suggested by the recent Indian Development Plans, the government intends, in principle, to sell public firms to private sector. But it recognizes that if some strategic activities are considered of low expected real return or of high risk, potential investments of private firms may be less than socially optimal return. Despite government acknowledgement of fiscal restrictions, the Planning Commission has guaranteed that, in all these cases, the Indian State will continue to act directly through its public enterprises to avoid a shortage of essential services.<sup>25</sup>

## **C. Financial liberalization and openness of the short term capital account**

Among all the (augmented) Washington Consensus recommendations, the liberalization of the domestic financial system and the openness of the short term capital account are, perhaps, the most controversial ones. With respect to the theoretical discussion, the proponents of the elimination of domestic and external financial repression argue that this kind of liberalization improves the efficiency in allocation of financial resources in the global economy (McKinnon 1991; Mathieson and Rojas-Suárez 1993). However, as demonstrated by the theoretical literature (see, for instance, Stiglitz and Weiss 1981; Tobin 1984 and Stiglitz 1993), by operating under imperfect competition, financial markets can allocate credit either abundantly or shortly, depending on the general conditions and expectations related to the global capital markets. Moreover, available empirical evidence on the advantages of the full convertibility of the capital account is not conclusive (Kose et al. 2006). As demonstrated by Calvo, Leiderman and Reinhart (1993), most cases of full openness of the short term capital account suggest that, in the context of high international liquidity, large inflows of foreign capital contribute to express overvaluation of the real exchange rates in developing countries. Besides, as monetary crises in Mexico (1994), Asia (1997) and Russia (1998) have shown, large flows of capital tend either to overvalue domestic currencies in real terms during the cycle of abundant

---

<sup>24</sup> Telecommunication is perhaps the only infrastructure service which reached considerable improvements since the beginning of Reforms.

<sup>25</sup> See Planning Commission (2001).

international liquidity, or to provoke sudden stops and, hence, excessive undervaluation of real exchange rates after international financial crashes (see Calvo et al. 2004; Calvo and Talvi 2005).

Among all economic reforms adopted in Brazil, the openness of short term capital account has probably been the most responsible not only for exposing the Brazilian economy to the instability of the world economy but also for reducing the contribution of monetary, fiscal and exchange rate policies to sustaining economic growth. In fact, since the early 1990s governments have been taking measures to diminish domestic financial repression, as well as to liberalize capital movements and bring about greater capital account convertibility.<sup>26</sup> The steps taken for financial openness were taken jointly with trade liberalization and within a macroeconomic environment of fiscal imbalances.<sup>27</sup>

Compared to Brazil, measures towards the liberalization of capital movements in India have been adopted with considerable prudence. In some sense, the respect towards sequencing requirements in the implementation of economic reforms in India has contributed not only to the major freedom with which policy makers can use the conventional macroeconomic policies, but also, *et pour cause*, to relative internal and external economic stability. In other words, India's prudence in relation to openness of short term flows explains, in part, the significant economic growth and price stability in the recent period.

In fact, in order to analyze the gradual process of liberalization of capital movements in India, it is necessary to separate the policies towards the openness to FDI from those related to the liberalization of short term capital flows. In relation to the liberalization of short term capital flows, there was a conciliatory solution between the resistance of the Indian government and private sectors, on the one hand, and the IMF strongly favorable to the capital account convertibility, on the other hand. Thus, the actions adopted have been very prudent, since individual applications of institutional investors were limited to a maximum of 5 per cent (subsequently increased to 10 per cent in 1996) and the total applied by part of these external agents could not exceed 30 per cent of the company's capital. The new policy adopted with regards to FDI is another turning point for the rupture of the "old regime" of protection, traditionally characterized by extreme xenophobia in this matter. Until the beginning of the 1990s, foreign direct investments had only been allowed if they involved some technology transfer, conditioned to an equity participation under 40 per cent of capital. The changes introduced in July 1991 brought liberalization to virtually all sectors of the economy, including services, except for specific cases in which foreign participation continued to be forbidden. In addition, the current law does not impose any restriction to the repatriation of profits and dividends by multinational enterprises operating in the country.<sup>28</sup>

In recent years, the high rates of economic growth in India, combined with the FDI liberalization policy, have been attracting substantial long term foreign investments to the country. Although India only recently became tolerant of FDI inflows, its economy, compared to Brazil's, is far from

---

<sup>26</sup> See Ferrari Filho and de Paula 2006:194; Sicsú 2006.

<sup>27</sup> Even McKinnon (1991), one of the most defenders of the capital account convertibility, has always alerted to the need of respecting the optimum sequencing for the implementation of liberalizing programs. His principal recommendation is that the liberalization of the capital account should be not only the last step of economic reform, but also a step that should occur after fiscal deficits have been eliminated.

<sup>28</sup> The FDI liberalization policy in India may be appraised as relatively successful, not only because it was adopted in a phase in which the country had already been experiencing a process of increasing economic growth, but also for having attracted large multinational companies like Motorola, Hewlett-Packard and Cisco Systems along with part of their respective R&D laboratories. Recently, once Indian authorities recognized that investments in generation, transmission and distribution of electric energy, as well as the building of highways, ports, tunnels and bridges are essential for sustaining the current accelerating economic growth rates, a quicker automatic appreciation of FDI in infrastructure projects was achieved (Business Week 2005:2).

exhibiting a high level of internationalization. As Table 8 shows, in 2003 the share of FDI flows in Indian gross capital formation reached only 4 per cent while the stock of long term foreign capital relatively to GDP was only 5.4 per cent (against 11.4 per cent and 25.8 per cent in Brazil respectively).

**Table 8**  
**BRAZIL AND INDIA: DEGREE OF INTERNALIZATION ACCORDING TO FLOWS AND STOCK OF FDI**  
(Selected years from 1970 to 2003 (per cent))

Description	Brazil					India				
	1970	1980	1990	2000	2003	1970	1980	1990	2000	2003
FDI flows <sup>1</sup> /GFCF <sup>2</sup>	4.9	3.6	1.0	28.2	11.4	0.5	0.2	0.3	2.3	4.0
FDI Stock/GDP	n.a.	7.4	8.0	17.2	25.8	n.a.	0.2	0.5	3.8	5.4

*Source:* UNCTAD(2005).

*Notes:* n.a.: not available. <sup>1</sup> Foreign Direct Investment (FDI). <sup>2</sup> Gross fixed capital formation (GFCF).

The new policy regarding foreign capital flows has not implied, in any way, India's full capital account convertibility. In an official document published by the Planning Commission of India, Mathur and Sachdeva (1999) stress that "while we do not count on an appropriate regulatory instrument and solid macroeconomic fundamentals, we will continue judging it imprudent to liberalize the capital account". The latest Five Year Plan (2002–2007) reaffirms that:

India managed to be immune to the contagious effect arising from the Asian crisis in 1997 due to an efficient management of the economy's external sector. The management combines a system of flexible exchange rates, sustainable deficits in current account, preference to long-term capital inflows that do not generate external debt (that is, preference to FDI), limitations to amount, use and cost of foreign indebtedness and a severe restriction to the generation of short term debts (Planning Commission 2001:98).

Restrictions in short term capital inflows should be characterized as part of India's development strategy. In this sense, it would not be exaggerating to suspect that, by strongly reducing the economy's vulnerability to international shocks, the country's capacity of sustaining high annual average GDP growth rates throughout the last 15 years could in part be credited to that.<sup>29</sup>

## V. NATIONAL INNOVATION SYSTEMS AND MACROECONOMIC POLICIES IN BRAZIL AND INDIA SINCE THE EARLY 1990S

### A. National Innovation Systems in Brazil and India following the economic reforms

In this subsection we will analyze the changes that took place in the Brazilian and Indian NIS in the context of more liberalized economic environments. By comparing some indicators of innovative efforts between both countries, we can draw some conclusions on their relative positions. We will also show that, whereas the Brazilian experience of economic reforms from the Collor (1990–1992) through the Cardoso (1994–2002) governments have practically discarded the adoption of industrial and technological policies as central elements for facing the globalization phenomenon, the Indian experience post-1991 has designed liberalizing strategies, on the one hand, and active industrial and technological policies (including those of vertical targets), on the other hand, as mutually supportive.

<sup>29</sup> Stiglitz (2002). In a debate on the matter, Williamson (2006:1848) himself concluded that "full capital account liberalization (in India) promises no large benefits while it increases the risk of things going badly wrong (...). For the next 10 years at least, many other liberalizing reforms need to take priority over capital account liberalization".

In the case of Brazil, the relatively slow evolution of its NIS, following the economic reforms introduced in early 1990s, might be associated with the afore-mentioned lack of active strategies in the industrial and technological areas, in the face of decreasing productivity growth rates and output stagnation observed in the previous decade. In part, the macroeconomic environment characterized by the debt crisis and stagflation had justified the minor importance given both to industrial and technological policies and to the rebuilding of the Brazilian System of Innovation throughout the “lost decade” of the 1980s. As Suzigan and Furtado (2006:81) have noted, during this latter period, since “federal governments have established macroeconomic stabilization as a priority of general economic policy, a favorable attitude towards industrial and technological policies had been discarded”. However, as protectionist practices in the 1980s coincided with decreasing growth rates of productivity and technological inefficiency in various industries, this adverse performance would be used as an ideological justification for the rise of neoliberal policies in the following decade.<sup>30</sup>

Nobody can deny the effects of trade liberalization and a more stable macroeconomic environment on the reversal of decreasing growth rates of labour productivity and on the improvement of industrial efficiency throughout the 1990s.<sup>31</sup> Most empirical evidence show that labour productivity in the manufacturing sector in Brazil has increased to around 8 per cent per year between 1990 and 1997.<sup>32</sup> Notwithstanding, there is also sound evidence that employment shedding prevailed over technical innovations as the main source that would explain the productivity gains throughout the 1990s.<sup>33</sup> These results suggest that the lack of an industrial policy and the relative backwardness of the Brazilian System of Innovation possibly contributed not only to the strong productive disarticulation of industries, especially those of high technologies such as capital goods, electronics and chemical,<sup>34</sup> but also to a major internationalization of the Brazilian economy.<sup>35</sup>

The modernization in the institutional sphere has been restricted, on the one hand, to the redesign of agencies for managing the new anti-dumping and safeguard laws in the context of the WTO rules, and, on the other hand, to the creation of regulatory agencies for preventing anti-competitive practices in industries that are either strongly concentrated or natural monopolies. Another advance is related to the incorporation of the certification rules of quality patterns for goods according to recognized international standards. The Ministry of Science and Technology has played an active role in this area after the creation of the Brazilian Program of Quality and Productivity (PBQP), and the engagement of

---

<sup>30</sup> In a very discussed (and controversial) article, the former president of the Central Bank of Brazil, Mr. Gustavo Franco (1998) argued that “if the possibility (of active interventions of government) does not exist anymore, priority must be given to policies of “horizontal” nature (in opposing to those of vertical nature), in order to change market structures and the global pattern of Brazilian competitiveness”. In addition, he also suggested “avoiding some clichés of the doctrinarian debate, such as that mysterious entity known as the “neoliberal model” or the so-called “Washington Consensus”.

<sup>31</sup> According to Rossi Jr. and Ferreira (1999), labour productivity in Brazil has shown the following annual average growth rates since the early 1970s: 1971–1973: +5,59 per cent; 1974–1980: +1.00 per cent; 1981–1985: +0.34 per cent; 1986–1989: +0.25 per cent. From its turn Bonelli (2002) estimated a negative growth rate of productivity of -5.00 per cent for 1990.

<sup>32</sup> See, among others Bonelli and Fonseca (1998), Rossi Jr. and Ferreira (1999) and Bonelli (2002).

<sup>33</sup> See, for instance, Carvalho (2000) and Nassif (2005). In a non-published paper, presented at the 2006 Meeting of the Latin American and Caribbean Economic Association (LACEA), Nassif (2006) controlled econometrically the productivity gains observed in the period 1988–1998 for trade and macroeconomic variables. His conclusion was that the major labour efficiency has been explained not only by the impacts of trade liberalization, but also by some changes in relevant macroeconomic variables, such as the real overvaluation of the Brazilian currency against the United States dollar and the minor annual inflation rates observed in the period post-Real Plan (Plano Real of 1994). For more details, see Nassif 2006, available on <http://www.lacea.org>.

<sup>34</sup> See Suzigan and Furtado (2006). According to Nassif (2003), between 1990–1994 and 1995–1998, the annual average trade deficits of machine and equipments, electronics and basic chemical have increased respectively as follows: from -US\$1,165 million to -US\$4,897 million; from -US\$1,313 million to -US\$5,008 million; and from -US\$1,004 million to -US\$1,945 million.

<sup>35</sup> See Bielschowski and Stumpo (1996).



the National Institute of Metrology and Industrial Quality (Inmetro) on the management of the ISO system in Brazil. However, as Hay (1998:7) pointed out, “the number of Brazilian firms that had adhered to the system by the second half of the 1990s still continued to be relatively small”.

During the implementation of economic reforms in the 1990s, Brazil practically abandoned the strategy of designing and implementing National Development Plans. This change could mainly be explained by the liberal vision that dominated economic policy making. In the early 1990s, the Collor Plan, in the context of the first measures towards trade liberalization previously described, also came up with an Industrial and Foreign Trade Policy (Política Industrial e de Comércio Exterior – PICE), whose basic elements would be to redefine long term strategies for boosting technological capacity and competitiveness in high-tech industries. However, that purpose was never achieved in practice.

In the two mandates of President Cardoso, priority was given to the privatization of state enterprises and infrastructure services, and attempts at restoring long term plans (Planos Plurianuais of 1996–1999 and 2000–2003) were designed largely with the aim of introducing new concepts of management such as national geographic integration and balanced budgets. In this sense, horizontal industrial policies predominated, and both Long Term Plans were strongly dependent on large amounts of financial resource for investment in the infrastructure services. The fiscal crisis that characterized Cardoso’s government practically prevented their effective execution.

Under Luiz Inácio Lula da Silva’s government, an effort has been made to restore the industrial and technological policies and overcome the relative backwardness of the Brazilian National Innovation System. The design of a new industrial policy in Brazil resulted from a large academic and governmental debate. In September 2003, the Ministries of Development, Industry and Commerce (MDIC), Fazenda (MFAZ) and Planning (MPLAN) released a joint document entitled “Guideline to a Development Agenda” (Roteiro para uma Agenda de Desenvolvimento), in which three priorities for public policies were established: (i) improvement and expansion of the infrastructure system; (ii) increase in efficiency of the productive sectors, notably of tradeable goods; and (iii) boost the innovative capacity of firms, with major export orientation (see MDIC/MFAZ/MPLAN 2003).

With this new industrial policy, the government recognizes that, instead of building an industrial system, it is necessary on the one hand to establish mechanisms of cooperation with private agents in such a way as they can take innovation and capacity as the main routine of their entrepreneurial strategies, and on the other hand to overcome the relative backwardness of the Brazilian Innovation System. In addition, after thirteen years renouncing measures of vertical industrial policies, the PITCE outwardly chose four industries to target: (i) capital goods; (ii) semiconductors; (iii) software; and (iv) pharmaceutical products. It is interesting to note that most of these industries are characterized by their capacity for generating technological spillovers to the economy as a whole. In other words, despite their apparent verticality, the PITCE aims at translating into social benefits most of the private benefits appropriated by the target industries.

Another relevant step towards the modernization of Brazilian NIS was taken in 2006 when the government approved the so-called Innovation Law (MDIC 2006).<sup>36</sup> The new aim of this law is to provide major networks of transmission from the knowledge generated in basic research – especially

---

<sup>36</sup> The Innovation Law had been designed in the second mandate of President Cardoso but was approved in the Lula da Silva’s government.

by the public institutions and federal universities – to the applied technologies of firms.<sup>37</sup> It is worth stressing that the Brazilian Government is so worried nowadays about the adoption of innovation as a routine by companies that the BNDES created a special line of lending for firms whose entrepreneurs are willing to increase spending in R&D and to introduce either new productive processes or new products.<sup>38</sup>

Notwithstanding all these efforts, together with the creation of new institutions for providing appropriate coordination between public and private agents,<sup>39</sup> the PITCE has been facing some difficulties in translating the design policies into concrete results, such as: (i) first, some lack of coordination persists between public institutions which design and finance most of the schemes oriented toward innovation, on the one hand, and the private businesses which, in the end, implement and take on the risks; (ii) second, and perhaps the most important, as will be detailed in the next subsection, there has been a lack of coordination between the aims and results of the macroeconomic policies adopted and those pursued by the policies involving Brazilian industry, trade, technology and the National Innovation System itself.

The main striking difference with respect to the recent evolution of India's NIS is that their economic reforms were not as influenced by the Washington Consensus's recommendations as was the case in Brazil. Therefore, in the Indian experience the introduction of liberalizing reforms, aside from breaking with strongly protectionist practices, did not imply significant discontinuity with respect to industrial and technological policies that had been adopted in the country before the early 1990s. In other words, the decision to liberalize trade and implement other important economic reforms, instead of implying the neglect of the industrial and technological policies was accompanied, at the same time, by policies with the aim of improving the Indian Innovation System. In fact, traditional technological programmes oriented towards supporting research and development in the atomic and space areas were maintained or strengthened.<sup>40</sup>

In addition, in order to correct the lack of direct financial support for R&D in the private sector, the Indian government created a multitude of schemes to support the absorption of imported technologies by industry, and develop, implement and commercialize indigenous innovations (Krishnan 2003:7). There are a lot of fiscal incentives for R&D; the exemption from income tax for ten years conceded to businesses whose main aim is research and development is one such incentive that deserves special mention.<sup>41</sup>

Besides the unquestionable conquest in the atomic and space areas, India has reached international prominence in segments of medium and high technologies. Among others, it is worth mentioning the two-wheeler industry, the pharmaceutical and the information technology industries. With regards to the two-wheeler industry, this catching up was made possible by a set of factors such as joint ventures

---

<sup>37</sup> To give an idea, before the Innovation Law, technologies generated by public labs (especially by federal universities' labs) could not be licensed to private enterprises.

<sup>38</sup> Historically, whereas the Agency for Financing Studies and Projects (FINEP) has specialized in lending for innovative activities (notably R&D), the BNDES operations have concentrated on the financing of either creation or expansion of productive capacity.

<sup>39</sup> In 2005 two Agencies were created: the Brazilian Agency for Industrial Development (ABDI) and the National Council for Industrial Development (CNDI). The latter, formed by thirteen Ministers, the President of BNDES and workers' and entrepreneurs' representatives, is responsible for the former agency's supervision and for the general coordination of PITCE.

<sup>40</sup> According to Krishnan (2003:7), Indian recent policies in the atomic and space industry have introduced schemes "to involve industry in developing technologies and products for their programs as well as commercializing spin-offs".

<sup>41</sup> For more details on fiscal incentives for innovation in India, see Krishnan (2003).

with Japanese firms, efforts towards product innovation and exploitation of economies of scale provided by a large domestic market. Nowadays, the Indian two-wheeler industry is one of the largest in the world and has sustained a growth rate of 35–49 per cent in the recent period (Krishnan 2003:11).

The Indian pharmaceutical industry has been gaining international visibility since the mid-1990s. From research and development strongly concentrated on imitation and reverse engineering that had characterized that industry during its infancy, Indian firms are moving their R&D strategies to the creation of active ingredients, new molecules and drug delivery systems. The international status of the Indian pharmaceutical industry can be shown not only by the growing export coefficient – exports corresponding to about 33 per cent of production – but also by the significant number of registered United States patents (Krishnan 2003:11).

Last but not least, the information technology (IT) industries have been one of the most important for generating innovation, for attracting FDI and for explaining the high economic growth in India since the early 1990s. Although IT industries are formed by a set of segments of medium and high technology, the largest part of the value added is produced by the software industry. The software industry's export performance became especially important in the 1990s but the formation and development of this segment goes back to the 1970s. Between the early phase of the industry and the reforms implemented in the 1990s, India witnessed the evolution of an industrial policy that, after having developed efficiency through the liberalization of imports of equipments, was capable of putting into effect an export boom.

Although it is difficult to delineate all the factors that allowed the boom in the exports of IT services in India, there is a certain consensus that two of them were crucial:<sup>42</sup> a much more liberal policy for the import of equipment (hardware) when compared to the earlier protectionism that had characterized the sector; and the creation in 1988 of the Software Technology Parks which had a strong foreign orientation. The export boom occurred mainly after 1993 with the modernization of India's telecommunications system. In fact, with the interconnection via satellite of VSNL (Videsh Sanchar Nigam Ltd – a global Indian telecommunications company) state monopoly to the Intelsat system, technology parks spread to 13 cities in the country, each one of them with its respective satellite station. This facilitated the international communication channels between software producers and clients and thus constituted the final conditions for the export boom.

While State intervention in IT services was stronger in the 1970s, Veloso et al. (2003) attribute the main responsibility for the boom in exports which took place after the 1990s to market mechanisms. Further, as India undoubtedly already held comparative advantage in software production, trade liberalization directly benefited the sector by increasing the volume and diversification of exports. Despite the existence of public incentives for the Indian software industry, nowadays the level of state intervention and the intensity of governmental policies oriented to that sector in India may be classified, respectively, as very soft and moderate.

Most recent data indicate that IT industries employed about 500,000 people in 2002, and the largest companies have up to 10,000 employees. In the last five years, the software segment alone grew at an annual average rate of 50 per cent. Production comes mostly from clusters located in Bangalore, Chennai, Hyderabad, Mumbai and the Delhi region. The fast diversification of IT software and service

---

<sup>42</sup> See Veloso et al. (2003) and O'Connor (2003).

providers to supply clients from other countries (notably from the United States) in real time has been receiving considerable publicity in the international press. Employment at call center services in India practically doubled between 2000 and 2001 (reaching 16,000 people), while for the areas of content development, engineering and design 12,000 jobs were generated in the same period (O'Connor 2003:5).

India is presently at a crossroad since the high growth rates of the service sector (especially the IT segments), compared to manufacture and agriculture sectors, have strongly increased the demand for skilled labour in a country where the relative supply of qualified labour is still low. This aspect is particularly relevant since a significant portion of the labour employed in IT services comes from the higher castes of the population. Therefore, the maintenance of the dynamism in the IT industries is partially conditioned to the challenge of extending the appropriate technical education and training to other social groups (O'Connor 2003:13). In the case of India, as Bhagwati (1993:46–49) pointed out, they still face the challenge of extending primary education to the highest possible percentage of the population since the high illiteracy rate continues to be one of the great failures of the “old regime”. Similarly, Sen (1999:9) reminds us that “the importance of basic education has been continuously neglected in India, making it difficult to take advantage of the opportunities offered by global trading, since a significant part of the population is prevented from participating in the productive process”.

In addition, there is no strong evidence to indicate that the IT industries, despite showing the highest growth rates of the economy, are generating economic and technological spillovers to the economy as a whole. Although O'Connor (2003:17) argues that “this challenge may be overcome, provided that a deeper trade liberalization presses the traditional sectors’ suppliers to adopt new technologies”, this is not a trivial task.

## **B. Macroeconomic policies and economic performance: Brazil and India in comparative perspective since the early 1990s**

A common element of Brazilian and Indian economic policies in the early 1990s was that both countries introduced liberalizing economic reforms in conjunction with the challenge of stabilizing increasing inflation rates as well as adjusting the external sector. In the case of Brazil, this challenge was still greater in virtue of the risk of higher inflation rates driving the economy towards a hyperinflation process. The Brazilian macroeconomic environment can be divided into three phases which were characterized by the following main characteristics: (i) from 1990 to 1994 when the economy was disorganized and on the border of hyperinflation while foreign capital inflows were returning to the country after the renegotiation of the external debt under the umbrella of the Brady Plan; (ii) from 1994 to 1998 when, despite the fact that the successful stabilization program (the “Plano Real”) had reduced annual inflation rates from 916 to 1.65 per cent,<sup>43</sup> the combination of high real interest rates with significant real overvaluation of the Brazilian currency against the principal trade partners’ currencies produced increasing twin deficits; and (iii) from 1999 to the present when, notwithstanding a floating exchange rate regime, the still high real interest rates and its collateral effect of appreciating the Brazilian currency in real terms (since 2003) have prevented the economy from breaking with the process of semi-stagnation.

---

<sup>43</sup> Inflation rates according to Consumer Price Index calculated by IBGE (<http://www.ibge.gov.br>) were reduced to 22.41 per cent in 1995 and reached only 1.65 per cent in 1998. This rapid disinflation can be explained by very high real interest rates and real exchange rate overvaluation in the period.

Faria's (2003:46) following comment is suitable for analyzing the dilemma of Brazil's current economic policy:

Central Bank autonomy in the process of setting its key interest rate is more theoretical than real. A sharp increase in interest rates to fight an undesirable inflationary trend or a process of exchange rate overshooting may be counterproductive. When a substantial part of the public debt rises, it can spread alarm on investors about the government's capacity to fulfill its financial obligation. Moreover, the net impact of interest rate hikes on aggregate demand in an environment where the bulk of bonds and bills of very small duration is uncertain. The demand for investment is reduced but bondholders enjoy a wealth effect, presumably with positive impact on consumption. In other words, a tight monetary policy may result in an expansionary fiscal policy.

We could add that the monetary policy implemented during the first mandate of Lula da Silva's government, by having implied very real high interest rates, was neither able to promote an effective fiscal adjustment nor did it put the Brazilian economy on to a higher growth path.

Between 1999 and 2006, Brazilian economic growth has been characterized by "stop and go", since the increase of real GDP was 0.2 per cent in 1999, 4.3 per cent in 2000, 1.3 per cent in 2001, 2.7 per cent in 2002, 1.1 per cent in 2003, 5.7 per cent in 2004, 2.9 per cent in 2005 and 3.7 per cent in 2006. To make matters worse, as the main route pursued by the policy makers to reduce the rate of the net debt of the public sector to GDP has been through high primary fiscal surplus (around 4 per cent of GDP on average in the same period), most of the attempted, but not necessarily successful, fiscal adjustment has been tax revenue-based, and with strong cuts in public investments.<sup>44 45</sup> In short, the combination of high real interest rates, real exchange overvaluation and exaggerated fiscal conservatism has prevented the Brazilian economy from breaking the vicious cycle of semi-stagnation.

The attempt of Lula da Silva's government in his first mandate (2003–2006) at either restoring an agenda of industrial and technological policy or boosting the innovative capacity of Brazilian firms (as analyzed in the previous subsection) was greatly damaged by the lack of coordination and coherence between the general policies related to the NIS *strictu sensu* and the above-mentioned macroeconomic policies (especially the monetary and exchange rate policies, but also to some degree the fiscal policy).

In fact, since most innovation decisions involve investment which in turn is strongly conditioned by entrepreneurs' expectations in the long-term, very high real interest rates as practiced recently in Brazil (by increasing the cost of capital and the opportunity cost of investment and innovation) have not only prevented Brazilian firms from adopting more challenging innovative strategies but have also contributed to sustain the stagnant path of the Brazilian economy. Within a hostile macroeconomic environment, firms have to find ways of surviving. Attempts at improving productivity have been predominantly reactive rather than active.

---

<sup>44</sup> In spite of the large primary fiscal surplus, the net total debt of the public sector (domestic and external debt) as proportion of the GDP, after having increased from 45.5 per cent to 56.1 per cent between December 2000 and September 2002, was again reduced to 45.0 per cent in March 2007. Figures extracted from the Central Bank of Brazil (<http://www.bcb.gov.br>) and IPEA data (<http://www.ipea.gov.br>).

<sup>45</sup> Blanco and Herrera (2006:19) show strong empirical evidence that the recent Brazilian fiscal policy has been procyclical in the short run; that is, output contractions are associated with higher primary fiscal surplus. Their econometric analyses indicate "positive and strong growth effects of public physical capital stock and public investments".

Chart 2 shows the labour productivity performance of the Brazilian manufacturing sector in the period 1996–2004.<sup>46</sup> Between 1996 and 1999, labour productivity has shown very low annual average growth rates. The evidence that this mediocre performance tended to be accompanied by a decrease in employment in the manufacturing sector suggests that firms looked to increase productivity in a reactive way in an environment of high real interest rates and overvalued real exchange rates.<sup>47</sup> Throughout the whole period, the annual average growth rate of labour productivity was negative (-2.6 per cent). A sign of reversal of this trend only occurred in 2004 when the same indicator increased by only 1 per cent. However, since labour productivity tends to correlate with investment and growth, one can guess that the low increasing rates of the former indicator was not overcome in 2005 and 2006, given the low growth performance of the Brazilian economy.

Table 9 breaks down the Brazilian and Indian exports of goods according to technological intensity. A simple inspection of the Brazilian export performance is enough to conclude that Brazil has not taken full advantage of technological changes and innovation opportunities since the late 1980s. Contrary to the East Asian export performance, in the period 1989–2004, the significant reduction of the participation of Brazilian labour intensive manufacturing exports in the total of exports was not accompanied by a very significant increase in the relative participation of the manufacturing of medium and high technology in the same period. Although these two latter categories of exports have shown a small increase in their relative participation, contrary to East Asian recent performance, a rise in the Brazilian participation of primary products and manufacturing based on natural resources has been observed. Moreover, in the period 1994–1999 the annual average growth rates (in real terms) of Brazilian exports were much lower than that of the world. Brazilian exports only boomed following the real depreciation of the Brazilian currency in 1999.<sup>48</sup>

**Table 9**  
**BREAKDOWN OF BRAZILIAN AND INDIAN EXPORTS ACCORDING**  
**TO TECHNOLOGICAL INTENSITY – PARTICIPATION (1989–2004)**  
(Per cent)

Description	Brazil				India			
	1989	1994	1999	2004	1989	1994	1999	2004
<b>Primary Products</b>	<b>11.16</b>	<b>10.78</b>	<b>11.07</b>	<b>13.77</b>	<b>6.72</b>	<b>5.20</b>	<b>5.05</b>	<b>4.43</b>
<b>Manufactured Products</b>	<b>87.89</b>	<b>88.08</b>	<b>88.73</b>	<b>85.31</b>	<b>93.14</b>	<b>94.66</b>	<b>94.78</b>	<b>95.37</b>
Resource-based	32.78	34.61	36.05	34.65	19.54	17.82	13.93	21.72
Low Technology	28.05	25.22	20.84	19.29	57.41	59.33	61.77	49.71
Medium Technology	21.61	23.72	22.81	24.07	11.68	13.83	14.24	18.61
High Tecnology	5.45	4.53	9.03	7.30	4.51	3.68	4.84	5.33
<b>Other transactions</b>	<b>0.95</b>	<b>1.14</b>	<b>0.20</b>	<b>0.92</b>	<b>0.14</b>	<b>0.14</b>	<b>0.17</b>	<b>0.20</b>
<b>Total Exports</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

*Source:* Comtrade, Unctad - United Nations ([www.unctad.org](http://www.unctad.org)).

*Note:* Calculated by author according to the original classification proposed by Lall (2000). For more details, see the Appendix of Lall (2000).

<sup>46</sup> The Brazilian Annual Industrial Survey (Pesquisa Industrial Annual – PIA/IBGE) only provides data for estimating productivity up to 2004. Since the characteristics of the PIA surveys up to end-1995 were not compatible with the following PIA surveys, the time series related to Chart 2 begins in 1996.

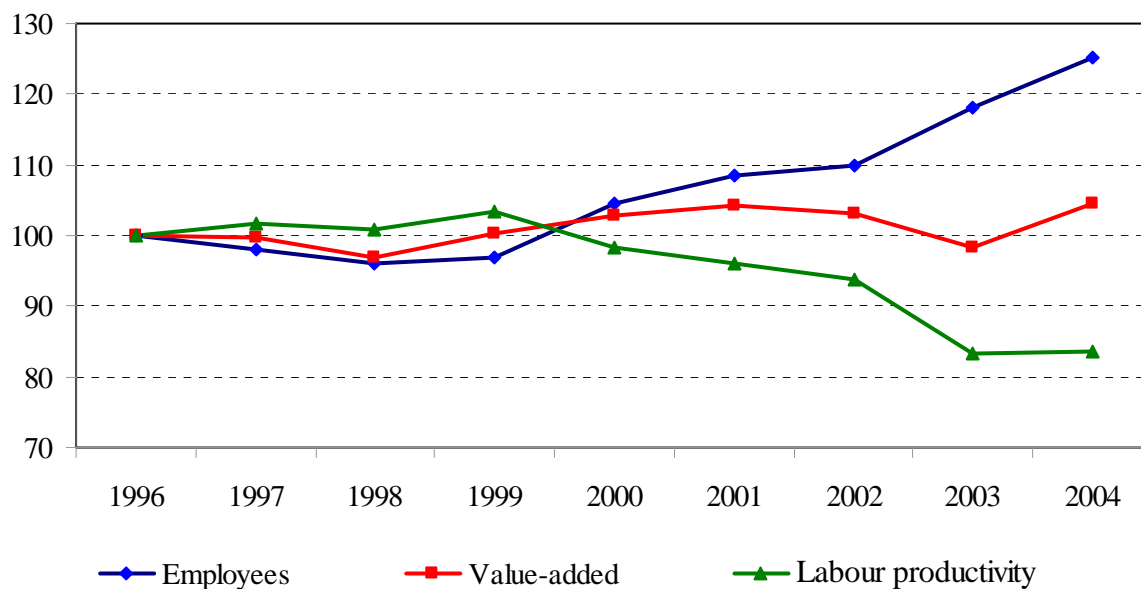
<sup>47</sup> The real overvaluation of the Brazilian currency was abruptly eliminated in 1999. However, the strong macroeconomic instability of the period 2001–2003 prevented firms from recovering and sustaining positive growth rates of labour productivity.

<sup>48</sup> Nassif (2007) showed that the Brazilian export structure in 2005 remained very similar to that of 2004. In the period 1989–2005, Brazilian exports have grown by an annual average rate of 5.77 per cent in real terms (this same figure for India in the period 1990–2005 was 10.76 per cent - see ahead). Whereas between 1994 and 1999, the annual average growth rates of the Brazilian exports were of only 1.14 per cent in real terms, this figure was of 11.44 per cent for the period 1999–2004. Exports were deflated by the United States Producer Price Index-Wholesale (PPI-Wholesale), at constant prices of 1994.

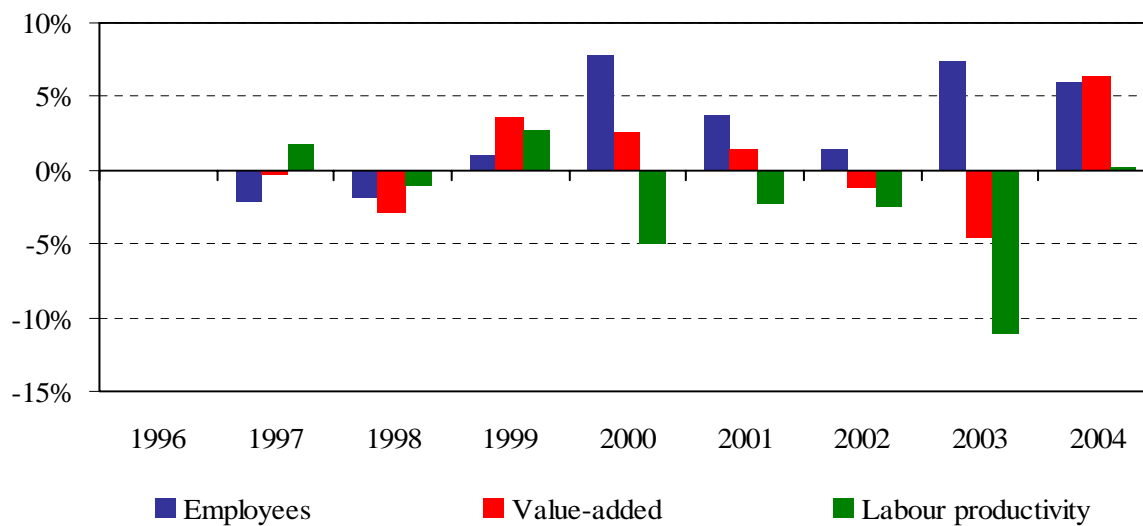
Chart 2

VALUE-ADDED, EMPLOYMENT AND LABOUR PRODUCTIVITY IN THE BRAZILIAN MANUFACTURING SECTOR  
(1996–2004)

1996 = 100



Annual growth rates



Source: Brazilian Annual Industrial Survey (PIA), IBGE.

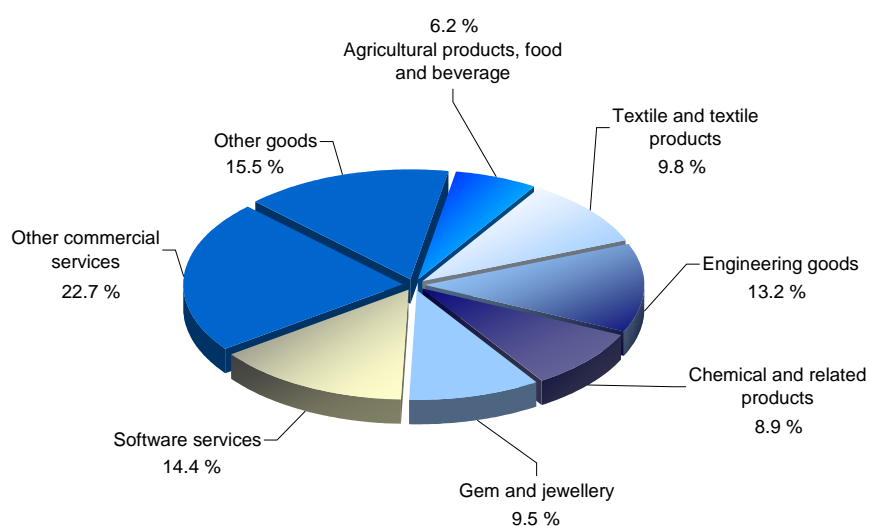
Notes: <sup>1</sup> Labour productivity is defined as value-added per employee. <sup>2</sup> The value added was deflated by the Brazilian Wholesale Price Index (IPA-DI), at constant prices of June 1996.

A first glance at India's exports might lead one to draw the false conclusion that its export performance was not much better than Brazil's in the same period. In fact, as Table 9 confirms, the increase of the participation of manufactured goods of high technology in India was less than in Brazil (in percentage points). The best performance in India occurred with the manufactured products of medium technology which grew from 11.7 per cent in 1989 to 18.6 per cent in 2004.

Much more impressive however was the growth performance of Indian exports of goods since the early 1990s, as well as the rapid increase in the export of commercial services, especially software. According to more recent data provided by the Reserve Bank of India, in the period 1990–2005, its exports of goods have had annual average growth rates of 10.76 per cent in real terms.<sup>49</sup> Throughout this period, the Indian export base increased from US\$16,612 million to US\$102,725 million. If we add to the latter value the export of commercial services, Indian exports reached US\$163,335 million.<sup>50</sup>

*Chart 3*

**INDIAN TOTAL EXPORTS: MAIN PRODUCTS, INCLUDING COMMERCIAL SERVICES**



Source: Reserve Bank of India, Handbook of Statistics on Indian economy (2006).

As Chart 3 shows, the importance of the software industry in the Indian export structure of goods and services is remarkable. In 2005, exports of software services already had a major presence in the Indian export structure. It is also important to note that the group of other conventional commercial services corresponds to 22.7 per cent of India's total exports of goods and services. This group includes travel, transportation, insurance and miscellaneous services. This latter item, whose exports amounted to US\$45,197 million in 2006, appears as the most representative of the group as a whole. The importance of the miscellaneous services item must be stressed because, besides the software industry, it also includes other IT services. Since IT and software services are usually classified as being of either medium or high technological intensity, one can easily conclude that the technological sophistication of the Indian total export structure is much greater than that shown by Table 9.

<sup>49</sup> Available on the website of the Reserve Bank of India (<http://www.rbi.org.in>). Exports were deflated by the United States Producer Price Index-Wholesale (PPI-Wholesale), at constant prices of 1990.

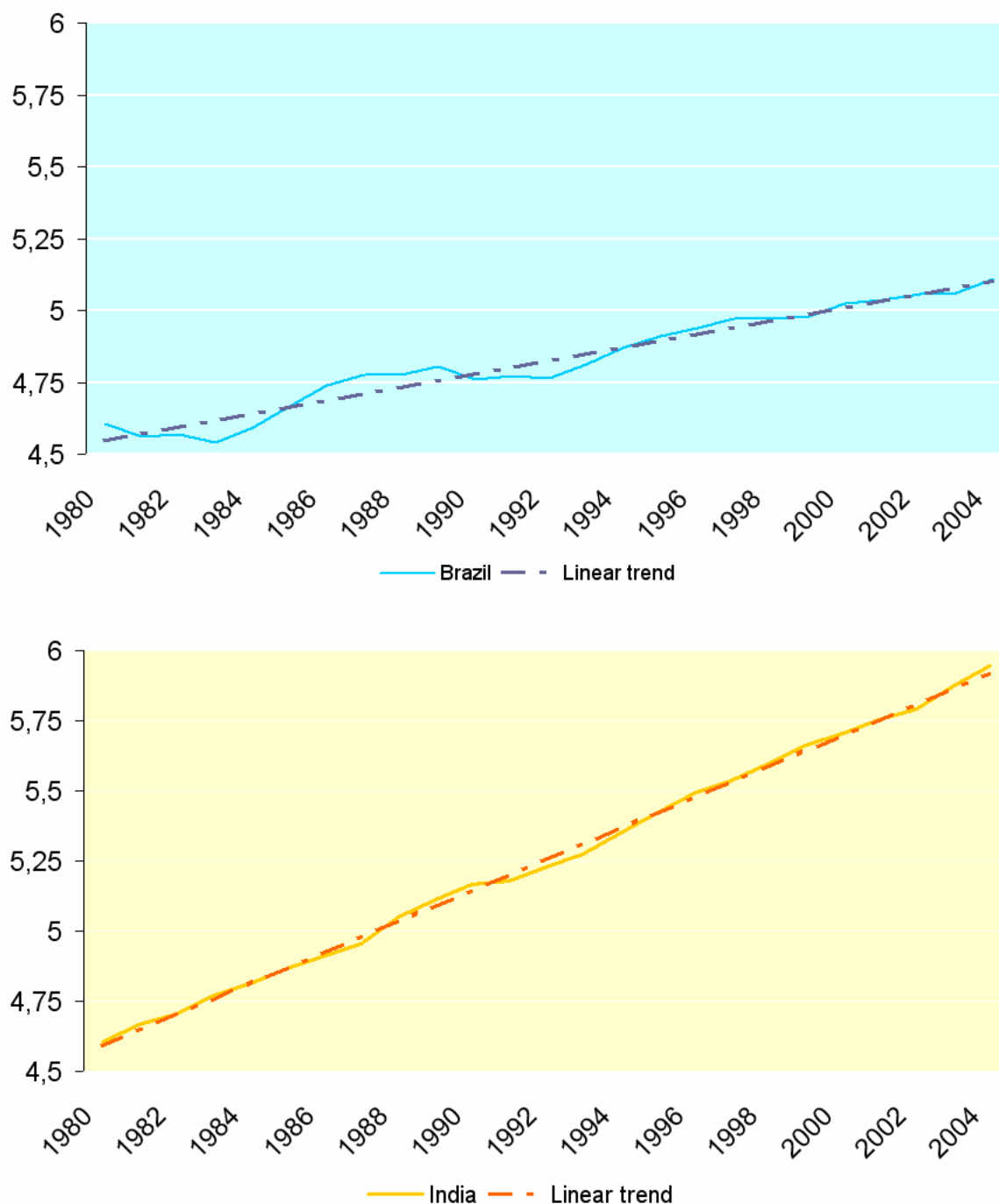
<sup>50</sup> Indian exports of commercial services reached US\$60,610 million in 2005, of which US\$23,600 million (38.9 per cent) were related to software services.



After overcoming the fiscal and balance of payment crises of 1990–1991, the management of conventional economic policies in India has been quite different from Brazil's. In this respect, as Chart 4 shows, contrary to the Brazilian experience of the last 26 years, Indian economic policies have been very successful in assuring higher and sustainable economic growth.

*Chart 4*

**BRAZILIAN AND INDIAN REAL GDP: ANNUAL GROWTH RATES IN LOGARITHMS (1980–2004)**



Source: Central Bank of Brazil (<http://www.bcb.gov.br>) and Reserve Bank of India (<http://www.rbi.org.in>).

Contrary to the Brazilian experience, Indian institutions have revealed a notable capacity of coordinating and managing a reasonable coherence between the macroeconomic policies (monetary, fiscal and exchange rate policies) and the set of measures towards the modernization of its National Innovation System *strictu sensu*. Since Indian macroeconomic policies have given priority to economic growth, they reinforce all other measures related to its NIS (such as policies related to industry, trade, science and technology, education, and so on) and, therefore, are able to reap one of the best economic performances in the world. According to the front page of the Reserve Bank of India's website (<http://www.rbi.org.in>), among other responsibilities, RBI “controls monetary policy with the aim of maintaining low inflation and an **ample supply of credit to business; and performs a wide range of roles to support Indian economic development**” (boldface mine). In other words, the role of the monetary policy in India is not only to control inflation, but also to boost economic growth. A recent Annual Policy Statement of the Reserve Bank of India (2006) supports the previous conclusion by emphasizing that the main aims of the RBI have been to provide a “strong complementarity between macroeconomic and financial stability” and noting that “separate coverage of monetary, and developmental and regulatory policies enhances clarity and transparency in communication.”

Some reasons to explain why Indian policy makers have had more room for handling the conventional instruments of economic policy have already been implicitly discussed in Section IV. In mid-1991, faced with a serious fiscal and current account deficits as well as growing inflation rates, the new government of Narasimha Rao and Manmohan Singh as Minister of Finance immediately implemented a stabilization policy, after obtaining a financial agreement with the IMF. With respect to the external sector adjustment and price stabilization, the conventional measures supervised by the IMF were quite sufficient for restoring a more stable macroeconomic environment. Between 1991 and 1993, the current account deficit/GDP was reduced from -2.3 per cent to around -0.7 per cent, while inflation rates decreased from 13.5 per cent to 7.5 per cent (Krueger and Chinoy 2002).<sup>51</sup>

In contrast to the Brazilian experience with exchange rate regimes, the transition towards a floating exchange rate in India was characterized by gradualism. Between the mega devaluation of 47 per cent of the rupee against the dollar in 1991, and the adoption of a unified system of floating exchange rates in 1993, the Reserve Bank of India (RBI) had operated with a dual exchange rate market, composed of a market with exchange rates established by the RBI, and another determined by the supply and demand of foreign currencies.

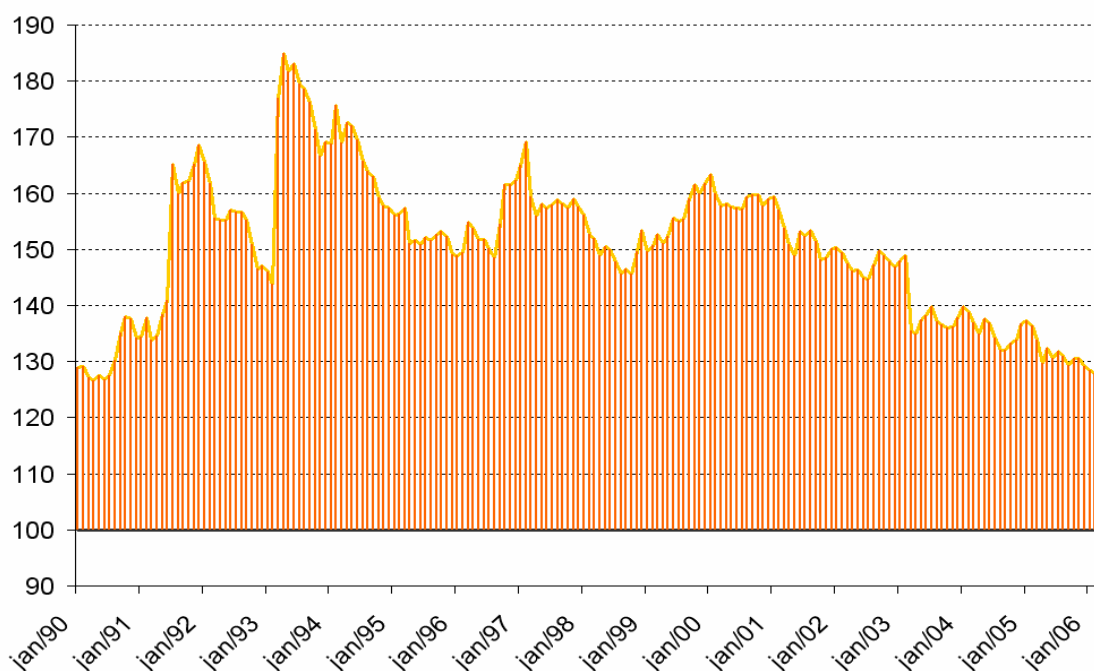
As Chart 5 suggests, Indian exchange rate policies have been guided by the Asian model, that is, a floating regime with active intervention of the RBI either for preventing high volatility of the nominal exchange rates or for avoiding a tendency of real overvaluation of the rupee against the currencies of India's main trade partners. Since the early 1990s, the real effective exchange rates in India have alternated between periods of depreciation and appreciation. The Indian rupee remains undervalued in real terms compared to the 1985 level.<sup>52</sup>

---

<sup>51</sup> It should be stressed that, contrary to Brazil's historical experience in the post-war period, India never had a tradition of high inflation rates (over 10 per cent a year). On this, Krueger and Chinoy (2002:21) noted that “the political reaction in India to inflation seems stronger than in many countries (...). It is likely that there would have been a strong political imperative to reduce excess demand and bring down the rate of inflation in 1991 even if there had not been balance of payments difficulties”.

<sup>52</sup> Note that the indices of real effective exchange rates in Chart 5 are expressed as the ratio of Indian rupee to foreign money.

**Chart 5**  
**INDICES OF REAL EFFECTIVE EXCHANGE RATES IN INDIA (1990–2006)**  
*(1985=100)*



Note: Real effective exchange rate is calculated through the weighted average of the index of purchasing power parity of the 36 main Indian trade partners.  
 Source: Reserve Bank of India (<http://www.rbi.org.in>)

Hence, except during the period that followed the immediate impacts of the Asian crisis, when the nominal exchange rates of the Indian rupee were more volatile, one suspects that the controls of the short term capital flows gave the RBI a wide room for preserving both the exchange rate and monetary stability. Even taking into account that the RBI authorities still maintain their tradition of relative monetary conservatism, the fact is that since the early 1990s, they had operated the instruments of monetary policy with the aim of reducing inflation rates in a gradualist strategy. Contrary to the Central Bank of Brazil's strategy throughout the 2000s of rapidly reducing inflation rates after an internal or external shock, the gradualist strategy of the RBI can be confirmed by the annual average inflation rates in India since the 1980s, as follows: 1980–1990: 8.16 per cent; 1991–2002: 7.93 per cent; 2003: 3.73 per cent; 2004: 4.00 per cent; 2005: 4.23 per cent; and 2006: 5.50 (see Table 1).<sup>53</sup>

Indian policy makers will have to deal with two issues to assure the continuity of sustainable economic growth. First, as an issue of conventional nature, they will have to face the challenges of reducing the fiscal imbalances in a country where a strong presence of the State is necessary for solving chronic social problems. Although the accelerated growth rates of real GDP give Indian authorities more room for dealing with high fiscal deficits (including interest payments) than the Brazilian authorities, there is a limit to increasing the latter.

Second, as an issue of structural nature, the great challenge for economic policies in India in the next years will be to extend the growth of productivity generated in the service and industrial sectors –

<sup>53</sup> Needless to say that a gradualist strategy for bringing inflation to low rates gives monetary policy makers a wider room to permit higher rates of real GDP.

which accounted for around 60 per cent and 25 per cent of the growth of real GDP in the period 1991–2001 respectively – to the agricultural sector. In fact, although this latter sector has been responsible for only 14.6 per cent of the growth of real GDP in the same period, it still employs around 60 per cent of total labour force in India.<sup>54</sup>

## VI. CONCLUSION

In *The New Global Economy and Developing Countries: Making Openness Work*, Rodrik (1999) compares the main engine of growth in countries that have or have not implemented economic reforms. His evidence supports the conclusion according to which a boom of investment precedes higher and sustainable growth rates of the real GDP for the majority of successful countries. India's recent experience seems to validate the statement also proposed by Rodrik (1999:13) according to which "openness by itself is not a reliable mechanism to generate sustained economic growth. The fundamental determinants of economic growth are the accumulation of physical and human capital and technological development".

Based on this evidence, what lessons for economic development could Brazil and India extract from each other? First, India's experience demonstrates that heavy and continuous investments in education and training (human capital), the coexistence of a competitive environment with State coordination and the consolidation of solid institutions are important for the success of knowledge-intensive sectors, as has been the case of its success with IT industries. As Rodrik and Subramanian (2004:14) remind us, "the boom of IT sectors in India in recent years shows that the black period (1950–1990) was not so black," since there had been a formation and accumulation of human capital in the country.

Second, as shown by the Indian episode of economic reform, although unilateral trade liberalization is important for boosting labour productivity and technical efficiency, it does not assure economic growth on sustainable base per se. However, differently from India, which uses tariff peaks consolidated at the WTO, Brazil should keep the low average import tariffs already applied, with a low degree of dispersion. The Indian experience of trade liberalization reveals that the imposition of import tariffs, by reducing the access of country's entrepreneurs to foreign machines, equipments and industrial intermediate goods at international prices, may impact negatively on the international competitiveness of domestic goods.

Even so, unilateral trade liberalization has its limits, especially for developing countries like Brazil and India, which have no guarantee of reciprocity from their actual and potential trade partners – notably from the developed countries – within the multilateral trade system. The current impasses in the Doha Round is a concrete example of the risks associated with a unilateral liberalization of industrial goods and services, without a major disposition from the industrialized world to eliminate the applied subsidies on agricultural products. Therefore, an important lesson from India to Brazil is the prudence with which the reduction of the consolidated import tariffs should be conducted at the World Trade Organization. This could give it more flexibility to increase or reduce **applied** import tariffs in relation to the **consolidated** import tariffs at WTO, in such a way as the handling of the import duties would work more efficiently as an instrument of industrial policy and of promotion of economic development. Arguably, it is this kind of attitude that has given India's government a greater leadership role at WTO multilateral forums.

---

<sup>54</sup> See Babu (2005), and for more details see Nassif (2006a).

Third, India's episode of economic reforms has proved that prudence with respect to capital account convertibility, especially with respect to the openness of short term capital account, may be important for preventing exchange rates turbulence and, everything being equal, for preserving macroeconomic stability. Taking into account that since the early 1990s Brazil has operated with openness in the short term account, it is no longer recommendable to prohibit this kind of capital flow. However, as the current real overvaluation of the Brazilian currency suggests, at least partially, appropriate mechanisms need to be found to weaken the speculative bias of short term capital flows such as either a tax on the value of the internalized amount for application in bonds up to 180 days of maturation – similar to the tax imposed on all foreign exchange operations proposed by Tobin (1978) a long-time ago<sup>55</sup> – or a minimum compulsory deposit on international lending internalized by the bank system, as was the case in the successful Chilean experience in the recent past.<sup>56</sup>

Fourth, long term policies related to industry, education, infrastructure, science and technology, and those linked to the National Innovation System as a whole tend to improve economic performance when consistent macroeconomic policies are adopted to ratify the forces towards long-term economic growth. Brazil has virtually all of the necessary conditions for restoring and boosting economic growth on a sustainable basis. Among others, in December 2006, current account was in surplus, external debt was reduced relative to the prevailing level of 2003, and the actual consumer inflation rate (3.14 per cent) was, for the first time, below the inflation target (see Table 1). In addition, some important mechanisms for weighing the Brazilian NIS were restored in Lula da Silva's government, e.g. the Innovation Law (Lei de Inovação) and even the implementation of the Industrial, Technological and Foreign Trade Policy (PITCE). However, these conditions are not sufficient for restoring and sustaining growth.

Brazil needs to consider a number of alternatives to boost its growth performance. First of all, within the agenda of economic reform, it is necessary to include a tax reform, which aims at changing the current structure of tax collection and abolishing a set of inefficient taxes still in Brazil.<sup>57</sup> Second, it is necessary to increase the ratio of public investment to GDP, through an efficient reallocation from current expenditures to strategic public investments, especially in infrastructure.<sup>58</sup> President Lula da Silva already made a sign towards a more anti-cyclical fiscal policy as soon as it was declared that he had been elected for a second mandate (2007–2010) in end-2006. He asked his economic team to come up with a responsible Program for Accelerating Growth (Programa de Aceleração do Crescimento – PAC). This Program, which was officially detailed and announced in 22 January 2007,

---

<sup>55</sup> Note that capital controls do not represent a left-hand purpose, as declared by the Brazilian economist and former president of the Central Bank of Brazil Mr. A. C. Pastore, in a press interview in 2005 (quoted in Modenesi and Modenesi 2006).

<sup>56</sup> In practical terms, despite the liberalization of short term capital flows described earlier, Brazil has as yet no full capital account convertibility due to current administrative restrictions. However, since the former president of the Central Bank of Brazil, Mr. Pécio Arida proposed full capital account convertibility in Brazil (in an academic article (Arida 2003 and Arida, Bacha and Lara-Resende 2004)) there has been intense debate on the subject. For critical arguments on this purpose see Belluzzo and Carneiro 2004; Oreiro, de Paula e Silva 2004; Ferrari Filho et al. 2005 and Ono et al. 2006.

<sup>57</sup> On the Brazilian tax structure in historical perspective, see Varsano (1977) . On a discussion suggesting some points for a tax reform in Brazil, see Afonso et al. (2000).

<sup>58</sup> From 1992 to 2003, the rate of public investment (general government, excluding state-controlled companies) was reduced from 3.5 per cent to 1.7 per cent of GDP; in 2005 it rose to 2.5 per cent. From 1992 to 2005, the rate of investment of state-controlled companies decreased from 2.21 per cent to 1.32 per cent. See Giambiagi (2006:31, 35).

basically involves a considerable increase in public investments in infrastructure as well as supports selected sectors such as digital TV equipments and semiconductors.<sup>59</sup> The last, and perhaps most important requirement is linked to the room for manoeuvre with which the Central Bank of Brazil will be able to reduce the nominal (and real, given the low expectations of growing inflation) interest rates. If all these conditions are fulfilled, and considering everything remains equal, since the current real overvaluation of the Brazilian currency could be simultaneously dissipated, the conventional economic policies would act to reinforce the other instruments of the industrial and technological policies, as well as the National Innovation System itself in such a way that the Brazilian economy could sustain a virtuous growth cycle. But whether or not these fiscal and monetary measures are actually implemented – with the proper level to awaken the entrepreneurs’ “animal spirits” and therefore boost innovation and sustain growth – there still remains an issue of improving capacity for planning, coordination and political decision rather than religiously pursuing some dogmas of economic theory.

---

<sup>59</sup> The PAC will not necessarily imply the renunciation to fiscal responsibility and primary fiscal surplus. It was designed through the Priority Investments in Infrastructure (Projeto Piloto de Investimentos – PPI), a mechanism negotiated with the International Monetary Fund in 2005 to free infrastructure investment of up to 0.15 per cent of GDP from the primary surplus target of 4.25 per cent. Under the PAC, the PPI budgets annual additional investments around 0.5 per cent of GDP for 2007 (compared to 0.2 per cent in 2006). These expenditures will be discounted from the current target of primary surplus (4.25 per cent of GDP). In practice, this latter may be reduced to 3.75 per cent in 2007, in case the actual financial resources do not correspond to what had been planned in the PPI. For more details on the PAC, see the Official Newspaper of the Federal Government (*Diário Oficial da União*, edição extra, 22 January 2007); *The Wall Street Journal*, 23 January 2007 and *The Economist*, 24 January 2007.

## REFERENCES

- Afonso JR and Malheiro PCF (1996). Um diagnóstico (breve e preliminar) do atual padrão de financiamento e gasto com educação no Brasil. September, unpublished. Centro de Estudos de Políticas Públicas, Rio de Janeiro.
- Afonso JR, Araújo, EA, Rezende, F and Varsano, R. (2000). A tributação brasileira e o novo ambiente econômico: a reforma tributária inevitável e urgente. *Revista do BNDES*, Vol.7, n.13: 137-170 (<http://www.bndes.gov.br>).
- Amsden A (2001). *The Rise of the Rest. Challenges to the West from Late-Industrializing Economies*. Oxford University Press, New York.
- Arida P (2003). Por uma moeda plenamente conversível. *Revista de Economia Política*, 23(3/91):151–154.
- Arida P, Bacha E and Lara-Resende A (2004). High interest rates in Brazil: conjectures on the jurisdictional uncertainty. Unpublished. Casa das Garças, Rio de Janeiro.
- Babu S (2005). India's recent economic growth: some limits and limitations. *Economic and Political Weekly*, 23 July.
- Bacha E (1978). *Os Mitos de uma Década*. Paz e Terra, São Paulo.
- Belluzzo LG and Carneiro R (2004). O Mito da Conversibilidade. *Revista de Economia Política*, 24(2):218–222.
- Bhagwati J (1993). *India in Transition. Freeing the Economy*. Clarendon Press, Oxford.
- Bhagwati J (1998). Why free capital mobility may be hazardous to your healthy: lessons from the latest financial crisis. Paper prepared for the NBER Conference on Capital Controls. Cambridge, MA, 7 November.
- Bhagwati J and Desai P (1970). *India Planning for Industrialization. Industrialization and Trade Policies since 1951*. Oxford University Press, London.
- Bielschowski R and Stumpo G (1996). A Internacionalização da Indústria Brasileira: Números e Reflexões depois de alguns anos de Abertura In: Renato Bauman, ed., *O Brasil e a Economia Global*. Ed. Campus, Rio de Janeiro.
- Blanco F and Herrera S (2006). The quality of fiscal adjustment and the long-run growth impact of fiscal policy in Brazil. Paper presented at the 34<sup>th</sup> National Meeting of Economics of the Brazilian Economic Association. Salvador, Bahia, Brazil (<http://www.anpec.org.br>).
- Bonelli, R. (2002). Labor Productivity in Brazil during the 1990s. *Texto para Discussão*, No. 906. Instituto de Pesquisa Econômica Aplicada (IPEA), Rio de Janeiro (<http://www.ipea.gov.br>).
- Bonelli R and Fonseca R (1998). Ganhos de produtividade e de eficiência: novos resultados para a economia Brasileira. *Pesquisa e Planejamento Econômico*, 28(2):273–314, Agosto.
- Bruno M (1991). High inflation and the nominal anchors of an open economy. *Essays in International Finance*, No. 183. Princeton University, New Jersey, June.
- Business Week (2005). A new world economy. Business Week On-line. 22 August 2005.
- Calvo GA, Leiderman L and Reinhart C (1993). Capital inflows and real exchange rate appreciation in Latin America: the role of external factors. *IMF Staff Papers*, 40(1), March.
- Calvo G and Talvi E (2005). Sudden-stop, financial factors, and economic collapse in Latin America: learning from Argentina and Chile. *NBER Working Paper*, 11(153). National Bureau of Economic Research, Cambridge, MA.
- Calvo G, Izquierdo A, and Mejía L (2004). On the empirics of sudden-stops: the relevance of balance-sheet effects". *Proceedings of the Federal Reserve Bank of San Francisco*.
- Carvalho PGM (2000). As causas do aumento da produtividade da indústria Brasileira nos anos 90. PhD. Dissertation. Instituto de Economia, Universidade Federal do Rio de Janeiro, Brazil.
- Castro AB and Souza FEP (1985). *A Economia Brasileira em Marcha Forçada*. Paz e Terra, Rio de Janeiro.
- Cerisola M and Gelos RG (2005). What drives inflation expectations in Brazil? An empirical analysis. *IMF Working Paper*, WP/05/109. International Monetary Fund, Washington DC.
- Coriat B and Weinstein O (2002). Organizations, firms and institutions in the generation of innovation. *Research Policy*, 31:273–290.
- Coutinho L (2003). Macroeconomic regimes and business strategies: an alternative industrial policy for Brazil in the wake of the 21st century. In: Cassiolato JE, Lastres HMM and Maciel ML, eds. *Systems of Innovation and Development*. Elgar, Cheltenham.
- Cruz PD (1983). Notas sobre o endividamento externo Brasileiro nos anos 70. In: Coutinho L and Coutinho R, eds. *Desenvolvimento Capitalista no Brasil*. Ed. Brasiliense, São Paulo.
- Dalman CJ and Frischtak CR (1993). National systems supporting technical advance in industry: the Brazilian experience. In: Nelson RR, ed. *National Innovation Systems: A Comparative Analysis*. Oxford University Press, New York and Oxford.
- DeLong JB (2003). India since independence. An analytic growth narrative. In: Rodrik D, ed. *In Search of Prosperity: Analytic Narratives of Economic Growth*. Princeton University Press, Princeton, NJ.

- Desai A (1999). The economics and politics of transition to an open market economy: Índia. *OECD Working Papers*, V. VII(100).
- Faria LV (2003). Financial markets, external shocks and policy responses: the case of Brazil 2001. *Revista de Economia Política* (Brazilian Journal of Political Economy), 23(4/92), October–December.
- Ferrari Filho F and de Paula LF (2006). Regime cambial, conversibilidade da conta de capital e performance econômica: a experiência recente de Brasil, Rússia, Índia e China. In: Sicsú J and Filho FF, eds. *Câmbio e Controle de Capitais: Avaliando a Eficiência de Modelos Macroeconômicos*. Ed. Campus, Rio de Janeiro.
- Ferrari Filho F, Jayme FG, Lima GT, Oreiro JL and de Paula LF. (2005). Uma avaliação crítica à proposta de conversibilidade plena do real. *Revista de Economia Política* (Brazilian Journal of Political Economy), 25(1):133–151.
- Financial Times* (2006). Caution over call to ease controls on Indian rupee. 4 September.
- Franco G (1998). A inserção externa e o desenvolvimento. *Revista de Economia Política* (Brazilian Journal of Political Economy), 18(3), July–September.
- Freeman C (1987). *Technologic Policy and Economic Performance: Lessons from Japan*. Pinter, London.
- Furtado C (1974). *Análise do “Modelo” Brasileiro*. Civilização Brasileira, Rio de Janeiro.
- Giambiagi F (2006). A política fiscal do governo Lula em perspectiva histórica: qual é o limite para o aumento do gasto público? *Texto para Discussão*, No. 1169. IPEA, Rio de Janeiro.
- Handbook of Statistics on Indian Economy (2005). Reserve Bank of India, Mumbai (<http://www.rbi.org.in>).
- Handbook of Statistics on Indian Economy (2006). Reserve Bank of India, Mumbai (<http://www.rbi.org.in>).
- Hay D (1998). Industrial policy in Brazil: a framework. *Texto para Discussão*, No.551. IPEA, Rio de Janeiro, Março ([www.ipea.gov.br](http://www.ipea.gov.br)).
- IPEA/PNUD (1996). *Relatório sobre o Desenvolvimento Humano no Brasil – 1996*. Report in Portuguese language prepared for the PNUD/United Nations, Brasília DF, Brazil.
- Johnson B, Edquist C and Lundvall B (2003). Economic development and the National System of Innovation approach”. Unpublished paper presented at Globelics Brazil, 2003.
- Johnson HG (1950). Optimum welfare and maximum revenue tariffs. *Review of Economic Studies*, XIX(1):28–35.
- Joshi V and Little IMD (1994). *India: Macroeconomic and Political Economy 1964–1991*. World Bank, Washington DC.
- Keynes JM (1930). *A Treatise on Money, Volume 1: The Pure Theory of Money*. Republished in: *The Collected Writings of John Maynard Keynes, Volume 5*. Macmillan (1971), London.
- Kose M, Prasad E, Rogoff K and Wei S (2006). Financial globalization: a reappraisal. *IMF Working Paper*, WP/06/189. International Monetary Fund, Washington DC.
- Krishnan RT (2003). The evolution of a developing country innovation system during economic liberalization: the case of India. Paper presented at The First Globelics Conference, Rio de Janeiro (<http://www.globelics.org>).
- Krueger AO and Chinoy S (2002). The Indian economy in global context. In: Krueger AO, ed. *Economic Policy Reforms and the Indian Economy*. The University of Chicago Press, Chicago and London.
- Kume H, Piani G and Souza C (2003). A política Brasileira de importação no período 1987-98: descrição e avaliação. In: Corseuil CH and Kume H, eds. *A Abertura Comercial Brasileira nos Anos 1990: Impactos sobre Emprego e Salário*. IPEA, Rio de Janeiro.
- Lall S (2000). The technological structure and performance of developing countries manufactured exports, 1985–1998. *Oxford Development Studies*, 28(3):337–369.
- Lastres HMM and Cassiolato JE (2003). Systems of innovation and development from a South American perspective: a contribution to Globelics. Unpublished paper presented at the First Globelics Workshop on Innovation Systems. Aalborg University, Aalborg, Denmark, 4–6 November.
- Lundvall B, Johnson B, Andersen ES and Dalum B (2002). National systems of production, innovation and competence building. *Research Policy*, 31:213–231.
- Mani S (2004). Government, innovation and technology policy: an international comparative analysis. *International Journal of Technology and Globalisation*, 1(1):29–44.
- Mathieson D and Rojas-Suárez L (1993). Liberalization of the capital account. *Ocasional Papers*, 103. International Monetary Fund, Washington DC, March.
- Mathur A and Sachdeva AS (1999). External situation in India. Unpublished. Planning Commission, Government of India.
- McKinnon R (1991). *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*. The John Hopkins University Press, Baltimore and London.
- MDIC (2006). *Acompanhamento da Política Industrial, Tecnológica e de Comércio Exterior*. Ministry of Development, Industry and Commerce of Brazil, Brasília DF, Brazil (<http://www.mdic.gov.br>).



- MDIC/MFAZ/MPLAN (2003). Roteiro para Agenda de Desenvolvimento. Brasília DF, Brazil (<http://www.mdic.gov.br>).
- Mill JS (1844). *Essays on Some Unsettled Questions of Political Economy*. John W. Parker, London.
- Modenesi AM and Modenesi RL (2006). Controle de capitais: uma proposta da esquerda? In: Sicsú J and Ferrari Filho F, eds. *Câmbio e Controle de Capitais: Avaliando a Eficiência de Modelos Macroeconômicos*. Ed. Campus, Rio de Janeiro.
- Mohanty MS and Scatigna M (2005). “Has globalisation reduced monetary policy independence?” *BIS Working Paper*, No. 29. Bank for International Settlements, Basel.
- Nassif A (1995). Política industrial e proteção no Brasil: o papel da CACEX. MPhil. Dissertation. Niterói: Universidade Federal Fluminense, Brazil.
- Nassif A (2003). Liberalização comercial e eficiência econômica: a experiência Brasileira. PhD Dissertation. Instituto de Economia, Universidade Federal do Rio de Janeiro, Brazil.
- Nassif A (2005). As fontes de mudança da eficiência Técnica da indústria Brasileira após a liberalização comercial: uma estimação econométrica por dados de plantas. *Revista de Economia Aplicada*, 9(2):301–324, Abril–Junho.
- Nassif A (2006). Measuring the sources of labour productivity change in the Brazilian manufacturing plants: the role of trade liberalization and the macroeconomic environment. Paper presented at the 2006 Meetings of the Latin American and Caribbean Economic Association (LACEA) and the Latin American Econometric Society (LAMES). ITAM, México City, 2–4 November (<http://www.lacea.org>).
- Nassif, A. (2006a). A Economia Indiana no Período 1950–2004 – da Estagnação ao Crescimento Acelerado: Lições para o Brasil? Textos para Discussão, No. 107. BNDES, Rio de Janeiro (<http://www.bndes.gov.br>).
- Nassif A (2007). Há evidências de desindustrialização no Brasil? *Revista de Economia Política* (Brazilian Journal of Political Economy). Forthcoming.
- Negri B (1996). O financiamento da educação no Brasil”. Unpublished. Brasília DF, Brazil.
- O’Connor D. (2003). Of flying geese and O-rings: locating software and its services in India’s economic development”. *OECD Working Paper*, No. 224. OECD Development Centre, Paris.
- Ono FH, Silva GJC, Oreiro JL and de Paula LF (2006). Uma avaliação empírica da proposta de conversibilidade do Real. In: Sicsú J and Ferrari Filho F, eds. *Câmbio e Controle de Capitais: Avaliando a Eficiência de Modelos Macroeconômicos*. Ed. Campus, Rio de Janeiro.
- Oreiro JL, de Paula LF and Silva GJ (2004). Por uma moeda parcialmente conversível: uma crítica a Arida e Bacha. *Revista de Economia Política* (Brazilian Journal of Political Economy), 24(2):223–237.
- Oreistein L and Sochaczewski AC (1990). Democracia com desenvolvimento: 1956–1961. In: Abreu MP, ed. *A Ordem do Progresso: Cem Anos de Política Econômica Republicana: 1889–1989*. Ed. Campus, Rio de Janeiro.
- Palma JG (2003). The 1999 Brazilian financial crisis: how to create a financial crisis by trying to avoid one. Unpublished. Cambridge University, United Kingdom, October
- Panagariya A (2004). India in the 1980 and 1990s: a triumph of reforms. Unpublished. Department of Economics, University of Maryland.
- Panagariya A (2004a). India’s trade reform: progress, impact and future strategy. Unpublished. Economics Department, Columbia University.
- Panagariya A and Mukerji P (2006). Don’t rush into full convertibility. *Economic Times*, 26 July.
- Planning Commission (2001). *Indian Planning Experience: A Statistical Profile*. Government of India.
- Razin A and Loungani P (2005). Globalization and inflation-output tradeoffs. *NBER Working Paper Series*, No. 11.641. NBER, Cambridge, MA.
- Reserve Bank of India (2006). *Annual Policy Statement*. April 2006. (<http://www.rbi.org.in>).
- Reserve Bank of India (2006a). *Mid-term Review of Annual Policy for the Year 2006–2007*. 31 October 2006. (<http://www.rbi.org.in>).
- Rodrik D (1999). *The New Global Economy and Developing Countries: Making Openness Work*. John Hopkins University Press for the Overseas Development Council, Washington DC.
- Rodrik D (2006). Goodbye Washington Consensus, Hello Washington Confusion? Paper prepared for the *Journal of Economic Literature* (forthcoming). Harvard University, Cambridge, MA, January.
- Rodrik D and Subramanian A (2004). Why India can grow at 7 percent a year or more: projections and reflections. *IMF Working Paper*, 04/118. IMF, Washington DC.
- Rossi Jr. JL and Ferreira PC (1999). Evolução da produtividade industrial Brasileira e abertura comercial. *Pesquisa e Planejamento Econômico*, 29(1):1–36, Agosto.
- Sen A (1999). Beyond the crisis: development strategies in Asia. Unpublished. Institute of South East Asian Studies.
- Shapiro H (1997). Review of export promotion policies in Brazil. Unpublished. Integration, Trade and Hemispheric Issues Division, Inter-American Development Bank, Washington DC.

- Sicsú J (2006). A liberalização financeira Brasileira no período 1988–2002”. In: Sicsú J and Ferrari Filho F, eds. *Câmbio e Controles de Capitais: Avaliando a Eficiência de Modelos Macroeconômicos*. Ed. Campus, Rio de Janeiro.
- Singh A (2006). Macroeconomic volatility. The policy lessons from Latin America. *IMF Working Paper*, WP/06/166. IMF, Washington DC, July
- Srinivasan TN (2001). Integrating India with the world economy: progress, problems and prospects. Unpublished. Economic Growth Center, Yale University.
- Srinivasan TN (2002). India’s fiscal situation: Is a crisis ahead? In: Krueger AO, ed. *Economic Policy Reforms and the Indian Economy*. The University Chicago Press, Chicago and London.
- Srinivasan TN (2003). Indian economic reforms: a stocktaking. *Working Paper*, No. 190. Stanford Center for International Development, Stanford University, Stanford, CA.
- Stiglitz J (1993). *The Role of State in Financial Markets. Proceedings of the World Bank Annual Conference on Development Economics*, Volume 2. World Bank, Washington DC.
- Stiglitz J (2002). An exchange with Mr. Kenneth Rogoff. *Wall Street Journal Europe*, 18 October.
- Stiglitz J and Weiss A (1981). Credit rationing in markets with imperfect competition. *American Economic Review*, 71(5):393–410, June.
- Suzigan W and Furtado J (2006). Política industrial y desarrollo. *Revista de la Cepal*, 89, Agosto.
- Tobin J (1978). A proposal for international monetary reform. *Eastern Economic Journal*, V.4:153–159.
- Tobin J (1984). On the efficiency of the financial system. *Lloyds Bank Review*, 153, July.
- UNCTAD (2005). *Trade and Development Report*. United Nations publication. New York and Geneva.
- Varsano R (1997). A evolução do sistema tributário Brasileiro ao longo do século: anotações e reflexões para futura reforma. *Pesquisa e Planejamento Econômico*, Volume 27, No. 1, Rio de Janeiro.
- Veloso F, Botelho AJJ, Tschang T, and Amsden A (2003). Slicing the knowledge-based economy in Brazil, China and India: a tale of 3 software industries. Unpublished, September.
- Vianna SB (1990). Duas tentativas de estabilização: 1951–1954. In: Abreu MP, ed. *Ordem do Progresso: Cem Anos de Política Econômica Republicana: 1889–1989*. Ed. Campus, Rio de Janeiro.
- Williamson J (1990). What Washington means by policy reform? In: Williamson J. *Latin American Adjustment: How much has happened?* Institute for International Economics, Washington DC.
- Williamson J (2006). Why capital account convertibility in India is premature? *Economic and Political Weekly*, 13 May.
- WTO (2005). *International Trade Statistics*. World Trade Organization, Geneva.

## UNCTAD DISCUSSION PAPERS

<i>No.</i>	<i>Date</i>	<i>Author(s)</i>	<i>Title</i>
183	April 2007	Irfan ul Haque	Rethinking industrial policy
182	October 2006	Robert Rowthorn	The renaissance of China and India: implications for the advanced economies
181	October 2005	Dr. Michael Sakbani	A re-examination of the architecture of the international economic system in a global setting_ issues and proposals
180	October 2005	Jörg Mayer and Pilar Fajarnes	Tripling Africa's Primary Exports: What? How? Where?
179	April 2005	S.M. Shafaeddin	Trade liberalization and economic reform in developing countries: structural change or de-industrialization?
178	April 2005	Andrew Cornford	Basel II: The revised framework of June 2004
177	April 2005	Benu Schneider	Do global standards and codes prevent financial crises? Some proposals on modifying the standards-based approach
176	December 2004	Jörg Mayer	Not totally naked: textiles and clothing trade in a quota free environment
175	August 2004	S.M. Shafaeddin	Who is the master? Who is the servant? Market or Government?
174	August 2004	Jörg Mayer	Industrialization in developing countries: some evidence from a new economic geography perspective
173	June 2004	Irfan ul Haque	Globalization, neoliberalism and labour
172	June 2004	Andrew J. Cornford	The WTO negotiations on financial services: current issues and future directions
171	May 2004	Andrew J. Cornford	Variable geometry for the WTO: concepts and precedents
170	May 2004	Robert Rowthorn and Ken Coutts	De-industrialization and the balance of payments in advanced economies
169	April 2004	Shigehisa Kasahara	The flying geese paradigm: a critical study of its application to East Asian regional development
168	February 2004	Alberto Gabriele	Policy alternatives in reforming power utilities in developing countries: a critical survey
167	January 2004	Richard Kozul-Wright and Paul Rayment	Globalization reloaded: an UNCTAD Perspective
166	February 2003	Jörg Mayer	The fallacy of composition: a review of the literature
165	November 2002	Yuefen Li	China's accession to WTO: exaggerated fears?
164	November 2002	Lucas Assuncao and ZhongXiang Zhang	Domestic climate change policies and the WTO
163	November 2002	A.S. Bhalla and S. Qiu	China's WTO accession. Its impact on Chinese employment
162	July 2002	Peter Nolan and Jin Zhang	The challenge of globalization for large Chinese firms

<i>No.</i>	<i>Date</i>	<i>Author(s)</i>	<i>Title</i>
161	June 2002	Zheng Zhihai and Zhao Yumin	China's terms of trade in manufactures, 1993–2000
160	June 2002	S.M. Shafaeddin	The impact of China's accession to WTO on exports of developing countries
159	May 2002	Jörg Mayer, Arunas Butkevicius and Ali Kadri	Dynamic products in world exports
158	April 2002	Yılmaz Akyüz and Korkut Boratav	The making of the Turkish financial crisis
157	September 2001	Heiner Flassbeck	The exchange rate: Economic policy tool or market price?
156	August 2001	Andrew J. Cornford	The Basel Committee's proposals for revised capital standards: Mark 2 and the state of play
155	August 2001	Alberto Gabriele	Science and technology policies, industrial reform and technical progress in China: Can socialist property rights be compatible with technological catching up?
154	June 2001	Jörg Mayer	Technology diffusion, human capital and economic growth in developing countries
153	December 2000	Mehdi Shafaeddin	Free trade or fair trade? Fallacies surrounding the theories of trade liberalization and protection and contradictions in international trade rules
152	December 2000	Dilip K. Das	Asian crisis: distilling critical lessons
151	October 2000	Bernard Shull	Financial modernization legislation in the United States – Background and implications
150	August 2000	Jörg Mayer	Globalization, technology transfer and skill accumulation in low-income countries
149	July 2000	Mehdi Shafaeddin	What did Frederick List actually say? Some clarifications on the infant industry argument
148	April 2000	Yılmaz Akyüz	The debate on the international financial architecture: Reforming the reformers
146	February 2000	Manuel R. Agosin and Ricardo Mayer	Foreign investment in developing countries: Does it crowd in domestic investment?
145	January 2000	B. Andersen, Z. Kozul-Wright and R. Kozul-Wright	Copyrights, competition and development: The case of the music industry
144	December 1999	Wei Ge	The dynamics of export-processing zones
143	November 1999	Yılmaz Akyüz and Andrew Cornford	Capital flows to developing countries and the reform of the international financial system
142	November 1999	Jean-François Outreville	Financial development, human capital and political stability
141	May 1999	Lorenza Jachia and Ethél Teljeur	Free trade between South Africa and the European Union – a quantitative analysis
140	February 1999	M. Branchi, A. Gabriele and V. Spiezia	Traditional agricultural exports, external dependency and domestic prices policies: African coffee exports in a comparative perspective