Brazil: Key innovation challenges*

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Brazil has taken important steps in recent years to modernize its economy and to lay a stable foundation for sustainable growth. Its ranking of 81 in this year's ICI, however, is extremely low, given its level of per capita income—US$10,466 on a PPP-adjusted basis in 2008. India, for instance, has a broadly similar ICI rank, but a much lower income per capita of US$2,780. What are the factors which appear to be preventing Brazil from boosting its innovation capacity? We focus our attention on four, all of them fairly central when assessing a country's ability to create an environment conducive to innovation.

Inefficiencies in resource allocation

Over the past decade and a half, successive Brazilian governments have done much to improve management of the public finances, at least when measured by the size of the government deficit and the magnitude of the public debt. Brazil had a long history of fiscal mismanagement, and improvements made in this area in recent years have, therefore, been extremely welcome. Indeed, it is noteworthy that Brazil's public debt in relation to GDP is now much lower than that of most European countries and of the United States—a remarkable development. However, there are a number of outstanding problems which need to be addressed. Brazil suffers from serious rigidities on the spending side. These take various forms: one is the pervasive earmarking of revenues for assorted purposes, affecting as much as 80 percent of total primary spending (that is, net of interest payments). Another consists of automatic adjustments to expenditures to reflect movements in other variables, of which the most important is the linking of social and pension benefits to the minimum wage. According to the IMF (2005), mandatory revenue transfers to local governments and inflexible labor legislation have also prevented a streamlining of the government payroll, which remains unduly large. A recent survey of the Brazilian economy notes that while only 6 percent of Brazilians are of pensionable age, they take the equivalent of 11.3 percent of GDP in pension payments. In sharp contrast, in the United States, the 12 percent of the population who are pensioners receive the equivalent of 6 percent of GDP in pension payments.32[1] Inevitably, this has led to a situation where Brazil spends far more in providing benefits to its older citizens than it does in educating the young, building a better educational infrastructure, or improving the country's abysmally poor roads and ports infrastructure. A government that is constrained in terms of how it can allocate its resources will, not surprisingly, end up spending less on research and development and higher education. The data for Brazil bear this out. R&D intensity is about 1 percent of GDP, less than half of the OECD average.

But this is not the whole picture. Distortions in the financial system—where the government maintains a heavy presence—continue to drive a large wedge between borrowing and deposit rates, which, in turn, have prevented a quicker expansion of investment and limited the availability of resources to small- and medium-sized enterprises, often the locus of innovation. The benchmark interest rate is currently in the 11–12 percent range, extremely high by international standards, at a time when interest rates are at record lows everywhere, and when the central bank's own inflation target is nearer 4–5 percent, implying a very high real interest rate.

A culture of heavy bureaucracy

One of the functions of government involves the issuing of licenses and permits. From cradle to grave, the average citizen in any country has to enter into transactions with some government office or bureaucrat to obtain a birth certificate, get a passport, pay taxes, open up a new business, drive a car, register property, engage in foreign trade, sell a good or service to the government, hire an employee, use a public health service, build a house, etc. Indeed, red tape had become such a bountiful source of corruption in most countries that a few years ago the World Bank began to publish an entire report that systematically looked at the prevalence of regulation in member countries. As noted earlier, the Doing Business Report (DBR) is now the primary reference tool for assessing the burdens of business regulation in a large number of countries. The data from the DBR for Brazil suggests that the business community labors under a heavy burden of an entrenched culture of bureaucracy and red tape. It takes 120 days and 16 procedures to start a new business in Brazil, 411 days and 18 procedures to obtain a construction permit, 42

days to register property, 616 days to enforce a contract, representing 70 more days than was the case in 2005, at a cost of 16.5 percent of the claim. Indeed, among 183 countries ranked in the DBR, Brazil's ranks are invariably low, sometimes abysmally so.

A number of surveys have shown that businesses allocate considerable time and resources to dealing with the demands of red tape. Often, they may feel that paying a bribe is the surest way to save time and enhance efficiency and, in many countries, possibly the only way to get business done, without undermining the firm's competitive position vis-à-vis those who pay bribes routinely. Obviously, the more dysfunctional the economic and legal system and the more onerous the regulations, the greater the incentives for individuals and businesses to short-circuit it by paying bribes. Since there is a well-established correlation between the prevalence of red tape and corruption, it is not surprising that in Transparency International's *Corruption Perceptions Index* Brazil ranked 75th in 2009, thirty places below its rank in 2002.[33] Excessive bureaucracy and red tape and the corruption they inevitably engender will greatly discourage entrepreneurship and innovation, and may well be one of the most important factors explaining Brazil's low ranking in the ICI, given its level of per capita income.

Lagging higher education

According to de Brito and de Mello (OECD, 2006), "Brazil's poor record in educational attainment is among the key obstacles to the generation and diffusion of innovation" (p. 23). There are several interrelated problems. First, much of the efforts over the past decade have been focused on expanding school enrolment in primary and secondary education—now close to universal—with less emphasis put on the quality of the education actually delivered. As a result, to take one important indicator, Brazil has lagged behind other countries in the region in its scores on the Program for International Student Assessment (PISA). In particular, in science, mathematics, and reading its students' performance has been behind those of Chile, Uruguay, Mexico, and Argentina and, it goes without saying, much further behind students in other higher-income OECD countries, even Spain and Portugal, themselves well behind the OECD average. Second, the tertiary enrolment rate is extremely low by international standards, given Brazil's stage of development. At 30 percent, it is well below that of Chile (49.8 percent) and Uruguay (64.3 percent) and well below that of Argentina (68.1 percent). It is also far below that of Korea (96.1 percent), a country with a per capita income lower than that of Brazil as recently as the 1980s. Perhaps more than any other, this is an extremely troubling indicator, given the increasing complexity of the global economy and the proven success in the area of innovation of countries which have invested heavily in education over the past three decades. Of course, the rigidities in government expenditures alluded to above have sharply limited the authorities' ability to invest more in productivity-enhancing areas, such as the building up of first-class educational institutions. Surveys carried out at Brazilian universities show students complaining about outdated libraries, the structure and content of the curriculum, and the limited availability of computer facilities. Third, spending in education—about 5 percent of GDP on an annual basis—is somewhat above the average for the region, albeit below that of the likes of Finland, New Zealand, Denmark, Iceland, and Sweden, where it is closer to 6–8 percent of GDP. Again, the issue here is one of priorities. Brazil manages to spend vast amounts in generous pensions for its public servants and can find the resources to subsidize the consumption of fuels by the population, but has not invested enough in strengthening its scientific infrastructure. According to the OECD study quoted above (2006, p.24), the stock of engineers graduated per thousand population is 0.08 in Brazil, but it is ten times higher (0.80) in Korea. Fourth, there is limited collaboration between the universities and the business community, reflecting legal impediments to the transfer and sharing of financial proceeds associated with intellectual property rights.

Low penetration of new technologies

There is a general perception in Brazil that the country has kept pace with the adoption of the latest technologies. As with several indicators of education (e.g., enrolment rates at all levels of the educational ladder), the data on the penetration rates for mobile telephones, broadband Internet subscribership, Internet and personal computer use over the past decade shows two things: Brazil has definitely made improvements with respect to its history, but there is a large gap with respect to the top performers, many of which have moved farther, faster, and deeper. Mobile usage rates have perhaps moved up the fastest, with Brazil having penetration of about 78.5 per 100 inhabitants in 2009 compared to 26.4 in 2003—impressive progress, but still well behind Argentina, Chile, Colombia, Ecuador, Guatemala, Jamaica, Paraguay, Uruguay, and Venezuela and, of course, OECD countries. Internet use in Brazil stands at 37.5 per 100 inhabitants in 2008, compared to 76.5 in Korea. Personal

computer penetration rates are 16.1 in Brazil as opposed to 58.1 in Korea. The data for broadband Internet subscribers shows an even larger gap in 2008, with Brazilian coverage around 5.3 per 100 inhabitants, compared to 32.1 in Korea.

In the 1970s, Brazil tried to develop a domestic computer industry by banning imports; the net effect was less to develop native manufacturing capacity, but more to cut Brazil off from new technologies. The trade regime is now more open, but import tariffs for capital goods and intermediate inputs remain high. Much of the spending on R&D is done by the state. To move Brazil's business spending in R&D closer to the OECD average, it would have to rise by a factor of four, which highlights the challenges in creating an environment more conducive to innovation.

Like India, Brazil has great potential to move up the ranks of the ICI in coming years and, more generally, to develop local innovation capacity. But the authorities and the business community will have to join forces in addressing the glaring weaknesses identified above.

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[1] See *The Economist,* 2010b, pp. 45–47.

[2] Although this huge drop in rank is partly explained by the incorporation of new countries to the CPI (102 in 2002 vs. 180 in 2009), it must be noted that Brazil's score in 2002 was 4.0 out of a possible 10, whereas it had dropped to 3.7 by 2009, suggesting a worsening of corruption.

Tables 10 and 11 follow on pages 4–7 below.

Table 10. The Innovation Capacity Index 2010–2011: Brazil and Latin America

	Selected variables								
	Innovation Capacity Index			Government effectiveness			Rule of law		
	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)
Chile	58.3	31	1	68.3	26	1	82.0	23	1
Uruguay	52.8	56	2	49.9	45	2	63.2	45	2
Costa Rica	51.3	59	3	47.7	49	3	61.7	49	3
Mexico	50.2	62	4	42.4	58	5	34.5	92	13
Colombia	49.4	66	5	41.2	60	7	38.0	83	9
Panama	49.4	66	5	42.1	59	6	45.5	65	4
Argentina	49.3	68	7	33.6	76	12	35.2	89	11
Peru	48.7	70	8	30.6	80	13	32.0	98	14
El Salvador	48.0	71	9	34.4	75	11	34.8	91	12
Trinidad and Tobago	47.7	72	10	45.4	53	4	44.3	67	5
Dominican Republic	45.5	79	11	28.4	85	14	35.5	87	10
Jamaica	45.5	79	11	40.3	64	8	38.2	81	8
Brazil	**45.3**	**81**	**13**	**37.8**	**68**	**10**	**43.0**	**70**	**6**
Guatemala	44.7	83	14	26.0	90	15	22.9	117	18
Ecuador	44.6	84	15	14.2	117	21	19.7	121	20
Paraguay	44.2	88	16	19.1	107	17	24.8	115	17
Honduras	43.4	92	17	24.0	94	16	28.1	106	16
Bolivia	41.9	98	18	18.3	113	18	22.4	118	19
Nicaragua	41.5	100	19	14.5	116	20	28.9	105	15
Venezuela	40.4	104	20	17.3	115	19	10.7	127	22
Suriname	38.4	112	21	38.1	66	9	42.2	73	7
Haiti	28.3	129	22	6.5	122	22	16.7	123	21
Memorandum items:									
Finland	76.1	4	-	85.8	5	-	97.5	6	-
New Zealand	71.3	14	-	81.1	11	-	97.2	8	-
Ireland	69.1	18	-	77.5	17	-	94.4	13	-
Spain	58.8	29	-	62.4	32	-	79.7	24	-
Portugal	56.7	36	-	63.7	31	-	76.3	27	-

* Ranks after rounding to one decimal point.

Table 10. The Innovation Capacity Index 2010–2011: Brazil and Latin America (cont'd.)

	Selected variables								
	Corruption Perceptions Index			Gender equity			Inequality		
	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)
Chile	67.0	23	1	52.6	75	16	59.6	96	8
Uruguay	67.0	23	1	55.1	63	12	66.0	89	4
Costa Rica	53.0	37	3	68.5	30	3	65.0	92	6
Mexico	33.0	73	12	62.9	41	5	56.4	98	10
Colombia	37.0	62	4	50.8	81	20	15.3	113	22
Panama	34.0	68	9	60.4	48	7	27.2	110	19
Argentina	29.0	84	15	69.9	25	2	56.6	97	9
Peru	37.0	62	4	64.0	39	4	54.1	101	12
El Salvador	34.0	68	9	53.9	69	15	65.4	91	5
Trinidad and Tobago	36.0	66	8	80.1	14	1	78.9	64	1
Dominican Republic	30.0	78	13	55.0	64	13	65.0	92	6
Jamaica	30.0	78	13	56.4	56	10	73.3	84	2
Brazil	**37.0**	**62**	**4**	**50.4**	**83**	**21**	**40.1**	**106**	**17**
Guatemala	34.0	68	9	51.5	76	17	49.3	102	13
Ecuador	22.0	110	19	62.2	43	6	47.9	104	15
Paraguay	21.0	116	20	51.0	80	19	49.0	103	14
Honduras	25.0	98	17	58.9	52	8	24.7	111	20
Bolivia	27.0	92	16	51.1	79	18	29.8	109	18
Nicaragua	25.0	98	17	54.2	67	14	55.6	99	11
Venezuela	19.0	122	21	58.1	53	9	72.9	85	3
Suriname	37.0	62	4	56.0	57	11	43.1	105	16
Haiti	18.0	125	22	ND	ND	ND	21.1	112	21
Memorandum items:									
Finland	89.0	6	-	90.2	3	-	94.6	4	-
New Zealand	94.0	1	-	84.1	10	-	84.2	47	-
Ireland	80.0	14	-	72.2	23	-	88.2	30	-
Spain	61.0	29	-	83.5	11	-	86.9	34	-
Portugal	58.0	31	-	75.3	19	-	80.1	60	-

* Ranks after rounding to one decimal point.

Table 10. The Innovation Capacity Index 2010–2011: Brazil and Latin America (cont'd.)

	Selected variables								
	Time for starting a business			Total fixed broadband subscribers per 100 inhabitants			E-government readiness index		
	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)	Score	Rank* (131)	Region Rank* (22)
Chile	81.4	78	8	20.6	45	1	60.1	33	2
Uruguay	54.3	118	18	17.7	49	3	58.5	35	3
Costa Rica	57.9	113	16	5.8	68	12	47.5	62	10
Mexico	91.4	43	3	17.0	51	4	51.5	52	5
Colombia	86.4	65	7	10.3	61	9	61.3	29	1
Panama	92.1	39	2	14.0	54	5	46.2	69	12
Argentina	81.4	78	8	19.4	47	2	54.7	46	4
Peru	71.4	103	13	6.1	67	11	49.2	57	7
El Salvador	88.6	56	5	4.9	74	14	47.0	63	11
Trinidad and Tobago	70.0	105	14	11.1	60	8	48.1	59	8
Dominican Republic	87.1	62	6	5.5	70	13	45.6	72	13
Jamaica	95.0	26	1	8.7	64	10	44.7	74	14
Brazil	**15.0**	**127**	**19**	**12.8**	**55**	**6**	**50.1**	**55**	**6**
Guatemala	80.0	82	10	1.4	88	19	39.4	86	19
Ecuador	55.0	117	17	0.6	94	20	43.2	77	15
Paraguay	75.7	94	11	3.5	76	15	42.4	81	17
Honduras	90.7	47	4	0.0	115	21	40.7	83	18
Bolivia	65.0	109	15	1.6	86	17	42.8	79	16
Nicaragua	72.9	100	12	1.5	87	18	36.3	88	20
Venezuela	0.0	128	20	11.5	59	7	47.7	61	9
Suriname	0.0	128	20	2.7	82	16	32.8	94	21
Haiti	0.0	128	20	0.0	115	21	20.7	123	22
Memorandum items:									
Finland	90.7	47	-	74.1	8	-	69.7	19	-
New Zealand	100.0	1	-	52.5	24	-	73.1	14	-
Ireland	91.4	43	-	48.8	28	-	68.7	21	-
Spain	67.1	108	-	49.1	27	-	75.2	9	-
Portugal	96.4	12	-	37.2	34	-	57.9	38	-

* Ranks after rounding to one decimal point.

Table 11. The Innovation Capacity Index and PISA scores

	PISA (Program for International Student Assessment)*								
	Innovation Capacity Index			Science		Reading		Mathematics	
	Score	Rank** (131)	Group Rank** (27)	Score	Upper and Lower Ranks*** (57)	Score	Upper and Lower Ranks*** (57)	Score	Upper and Lower Ranks*** (57)
Sweden	80.3	1	1	503	20-23	507	7-13	502	17-23
Switzerland	78.1	2	2	512	13-20	499	11-19	530	5-9
Finland	76.1	4	3	563	1-1	547	2-2	548	1-4
United States	74.8	5	4	489	24-35	ND	ND	474	32-36
Canada	73.6	7	5	534	3-6	527	4-5	527	5-10
Netherlands	72.8	8	6	525	6-11	507	8-13	531	5-8
Taiwan	72.5	9	7	532	3-8	496	12-22	549	1-4
Korea	72.1	11	8	522	7-13	556	1-1	547	1-4
New Zealand	71.3	14	9	530	3-9	521	4-6	522	8-13
United Kingdom	71.3	14	9	515	12-18	495	14-22	495	22-27
Japan	70.2	16	11	531	3-9	498	11-21	523	6-13
Germany	68.9	20	12	516	10-19	495	12-23	504	16-23
Israel	67.5	21	13	454	39-39	439	38-40	442	40-41
France	65.3	24	14	495	22-29	488	18-28	496	21-28
Spain	58.8	29	15	488	26-34	461	34-36	480	31-34
Chile	58.3	31	16	438	40-42	442	37-40	411	44-48
Italy	56.7	36	17	475	35-38	469	31-34	462	37-39
Portugal	56.7	36	17	474	35-38	472	29-34	466	35-38
Qatar	55.9	41	19	349	56-56	312	55-55	318	56-56
Thailand	54.8	45	20	421	44-47	417	41-42	417	43-46
Russia	52.8	56	21	479	33-38	440	37-40	476	32-36
Mexico	50.2	62	22	410	48-49	410	41-44	406	46-48
Turkey	50.2	62	22	424	43-47	447	37-39	424	41-45
Greece	49.9	64	24	473	35-38	460	34-36	459	38-39
Argentina	49.3	68	25	391	50-55	374	51-53	381	50-53
Indonesia	46.0	77	26	393	50-54	393	44-51	391	49-52
Brazil	45.3	81	27	390	50-54	393	46-51	370	53-55

* *PISA 2006: Science Competencies for Tomorrow's World*. Executive Summary. OECD, 2007.

** Ranks after rounding to one decimal point.

*** Rankings for all participating countries. On the basis of the samples of students assessed by PISA, it is not always possible to say with confidence which of two countries with similar performance has a higher mean score for the whole population. However, it is possible to give a range of possible rankings within which each country falls.