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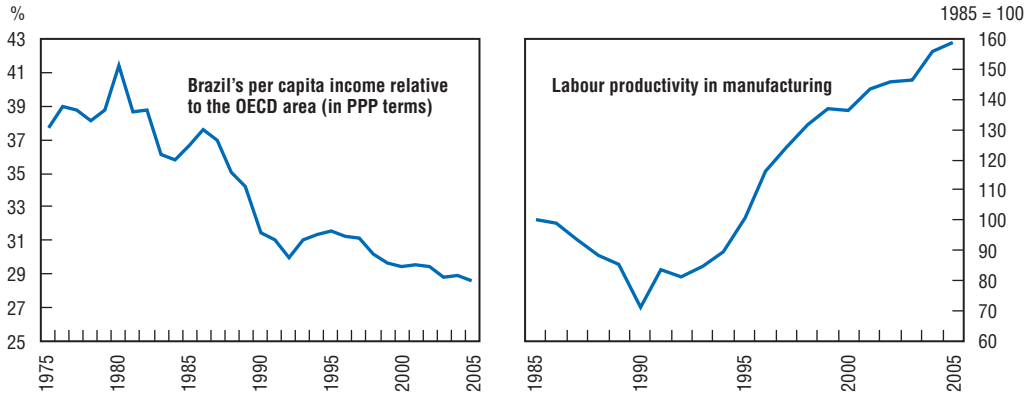
The Survey was discussed at a meeting of the Economic and Development Review Committee on 10 October 2006.

BASIC STATISTICS OF BRAZIL (2005 UNLESS NOTED)

Area (thousands sq. km)	8 515
POPULATION	
Total (million)	184.2
Inhabitants per sq. km	22
Net average annual increase over previous 10 years, per cent	1.5
EMPLOYMENT	
Total employment (thousands, PNAD)	77 159
In %: Agriculture	12.8
Industry (including construction)	23.3
Services and other	63.8
GROSS DOMESTIC PRODUCT (GDP)	
GDP at current prices and current exchange rate (USD billion)	795.7
Per capita GDP at current prices and current exchange rate (USD)	4 320
Average annual volume growth over previous 5 years (in %)	2.2
In % of GDP : Agriculture	8.4
Industry (including construction)	40.0
Services and other	51.6
INVESTMENT	
Gross fixed capital formation (GFCF) as % of GDP	19.9
Average annual growth of ratio over previous 5 years (%)	0.6
CONSOLIDATED PUBLIC SECTOR (as % of GDP)	
Revenue	37.4
Primary balance	4.8
Nominal balance	–3.3
Net debt	51.5
INDICATORS OF LIVING STANDARDS	
Internet users, per 1 000 inhabitants (2004)	119.6
Doctors, per 1 000 inhabitants (2004)	1.6
Infant mortality per 1 000 live births (2004)	26.6
FOREIGN TRADE	
Exports of goods (USD billion)	118.3
As % of GDP	14.9
Average annual growth over previous 5 years (%)	16.5
Imports of goods (USD billion)	73.6
As % of GDP	9.2
Average annual growth over previous 5 years (%)	5.7
Total official reserves (million SDRs)	37 484
As ratio of average monthly imports of goods	8.7

Executive summary

Considerable progress has been made in recent years in achieving macroeconomic stability and restructuring the economy. Productivity has risen since the macroeconomic stabilisation of the mid-1990s and the implementation of a series of structural reforms. But Brazil's GDP growth performance (about 2.5% per year on average since 1995) nevertheless needs to improve to close a widening income gap relative to the OECD area. Reaping the full benefits of stabilisation in terms of faster growth will require consolidating macroeconomic adjustment, boosting innovation in the business sector and stepping up formal labour utilisation.



Consolidating macroeconomic adjustment

Fiscal policy has been on track, and public debt management has been exemplary. Monetary policy is delivering sustained disinflation, anchoring expectations. Brazil's overarching macroeconomic challenge is to continue to reduce the public debt overhang while improving the quality of fiscal adjustment, which has so far been underpinned by revenue hikes, rather than a retrenchment of expenditure commitments. To do so, measures will be needed to arrest the increase in current spending, especially on pensions, paving the way for subsequently reducing the tax burden, once the debt-to-GDP ratio has been reduced in a sustainable manner.

Boosting innovation in the business sector

Innovation performance is improving fast. Innovation policy is beginning to focus on the potential synergies among science and technology promotion, R&D support and trade competitiveness. But R&D intensity is comparatively low by OECD standards and carried out predominantly by the government and public universities. Despite academic excellence in many niche areas, output indicators suggest that there is much scope for improvement. The key policy challenge is to boost innovation in the business sector. *To this end, policies will also need to bolster human capital accumulation and to encourage university-business ventures so as to convert knowledge into productivity gains at the enterprise level.*

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Improving formal labour utilisation

Brazil's labour force participation is comparable to that of the OECD for prime-age males. It is somewhat lower for females and is trending down for youths partly as a result of rising school enrolment, which is welcome. Informality is nevertheless pervasive, especially for the less educated, because the labour market is placing an increasing premium on skills. The main policy challenge is to improve formal labour utilisation. This can be achieved by fostering human capital accumulation on and off the job and mitigating policy disincentives that reduce the opportunity cost of informality.

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Assessment and recommendations

Growth prospects are improving on the back of increased resilience

The *2005 Survey* argued that the foundations for sustained economic growth were by and large in place. This assessment remains valid. The macroeconomic environment continues to improve: fiscal policy has stayed on track; the public debt-to-GDP ratio has trended down since 2003, although it remains comparatively high by emerging-market standards; and inflation has been tame at its lowest level since the adoption of inflation targeting in 1999 and well anchored around the current target of 4.5%. Ongoing external adjustment is making the economy increasingly resilient to external shocks, and asset prices are performing well in the face of the current tightening of global liquidity. Efforts to reduce external vulnerability, particularly with respect to public external indebtedness, are paying off: Brazil's sovereign credit has been upgraded, and interest premia are at historically low levels. The outlook for inflation and growth remains benign. At the same time, income inequality, which is high in Brazil, is coming down as a result of rising earnings and the successful implementation to date of targeted income support initiatives for the poor under the *Bolsa Família* programme. Continuous growth is the key to maintaining progress on this front. But there are some macroeconomic and structural problems, which, unless addressed, will continue to act as a drag on growth, preventing Brazil from reaping the full benefits of macroeconomic stabilisation. Against this background, the overarching medium-term policy objective for Brazil is to raise the economy's growth potential so as to close the gap in income per capita with the OECD area, which has widened since the 1980s.

The agenda for structural reform is far from completed

The authorities remain committed to a broad range of structural reforms, but achieving the goal of faster sustainable growth will require concerted policy action on many fronts. To this end, this *Survey* identifies three main policy weaknesses that will need to be addressed to raise Brazil's growth potential:

- *First, the quality of fiscal adjustment will need to improve* to consolidate the gains obtained to date with macroeconomic stabilisation and to enhance economic resilience further. The additional fiscal effort that will be required to put the public debt-to-GDP ratio on a sustained downward trajectory would need to be based predominantly on a retrenchment of current expenditure, including on pensions, rather than further increases in the tax take, with their negative side-effects.

- *Second, the business sector will need to become more innovative to boost productivity and to enhance the economy's competitiveness*. Increasing R&D spending, which is currently sub-par in comparison with most OECD countries, and is carried out predominantly by government, can do much to boost innovation performance. The fact that Brazil's R&D intensity in the business sector would have to rise by a factor of four merely to reach the OECD average of about 1.6% of GDP illustrates the scope for action in this area.
- *Third, the use of labour inputs will need to improve through human capital accumulation on and off the job and by reducing informality*. Educational attainment has risen over time but not as fast as in Brazil's main trading partners. In addition, the country currently faces the problem of widespread informality, especially among the less educated, for whom labour turnover is also high. Adding this untapped supply of labour to the formal labour market and accumulating human capital would contribute to raising the economy's potential growth.

Macroeconomic management has been sound, but fiscal challenges remain

Fiscal performance remains strong. The consolidated primary budget surplus target – which has been raised repeatedly since 1999 to ensure the sustainability of the public debt dynamics – continues to be met and sometimes exceeded by wide margins. The net public debt has fallen in relation to GDP since the 2003 peak and has now stabilised, albeit at the comparatively high level of around 50% of GDP by emerging-market standards. The government has been able to sustain fiscal adjustment, despite the limited room for manoeuvre caused by a ratcheting-up of current spending over the years and Brazil's notorious budget rigidities. Nevertheless, fiscal adjustment has been achieved at the expense of cutting back on public investment and by increasing the tax burden. The revenue-to-GDP ratio rose by about 5 percentage points during 2000-05 to nearly 37.5% in 2005 – a level that is one of the highest among countries with comparable income levels. *A durable reduction in public indebtedness on the back of a retrenchment of current expenditure, rather than tax hikes, would serve to facilitate a swifter fall in real interest rates and to permit the channelling of domestic saving to finance growth-enhancing investment*. It would also lay the groundwork for removing distortions in the tax system, including by broadening tax bases.

Further pension reform will be essential to arrest the rise in current expenditure

Despite the reforms implemented since 1998, the deficit of the social-security regime for private-sector workers continues to rise. The main culprit is the increase in spending on pensions. This is due not only to an increase in the number of beneficiaries, which is related to the ageing of the population, but especially to the increase in the minimum wage in real terms, to which the value of most social-security benefits are linked. At the same time, widespread informality in the labour market has prevented a faster increase in the number of contributors. Moreover, average earnings have not risen in tandem with the minimum wage, driving a wedge between the system's revenue and expenditure growth. Policy initiatives have focused on encouraging the development of complementary private pension schemes, and more recently on improving the administration of social security, especially in the area of disability and sickness benefits, which have surged recently.

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Responsibility for collecting contributions is now being transferred from the Ministry of Social Security to the Federal Revenue Service. The resulting strengthening of administrative controls certainly helps but does not tackle the root causes of the financial imbalance of the social security system. *Further reform of the regime for private-sector workers, whose pensions account for about one-third of federal primary expenditure, will therefore be unavoidable in the coming years and should be complemented by efforts to curb labour informality so as to broaden the contribution base.*

The main elements of necessary pension reform are well known

The main elements of reform for the regime for private-sector workers are threefold. First, the link between the minimum pension and the minimum wage should be severed, while maintaining the purchasing power of the minimum pension, possibly through its indexation to a price index that best reflects the consumption basket of pensioners. Second, a minimum retirement age should be introduced for both men and women under the length-of-contribution modality. Third, the minimum period of contribution for old-age pensions should be raised gradually from the current 15 years. With regard to the social security regime for public-sector workers, initiatives should focus on creating complementary pension funds for civil servants, preferably of the defined-contribution type, and on standardising entitlements between the private- and public-sector regimes. Further policy action in this area is important, because outlays on pensions to retired civil servants are accounting for an increasing share of spending at the sub-national level of government. At the same time, many provisions of the 2003 reform are in any case yet to be legislated.

A cap on expenditure growth is needed to stem the rise in current expenditure

The authorities are well aware of the need to contain the rise in current expenditure. They are taking steps to address this challenge within the confines of the fiscal rule, enshrined in the Fiscal Responsibility Law of 2000, which is working well. Recent initiatives in this area include the introduction of an expenditure cap in the Budget Guidelines Law (LDO) for 2006-08, which would best be maintained in the LDO for 2007-09 and in the 2007 budget law. This policy initiative is laudable. However, there are options for improvement. *Instead of being set in relation to GDP, the expenditure cap could be re-defined in nominal terms because inflation is now well anchored around the target.* Also, the need to alleviate expenditure rigidity should not be underestimated, as budgetary flexibility is an important pre-requisite for successful expenditure containment. *The gradual dismantling of extant revenue-earmarking requirements and the phasing-out of aggregate spending floors should be key policy objectives in this area.* Greater flexibility in expenditure management would allow for the reprioritisation of budgetary allocation in favour of more cost-effective programmes, such as those focused on improving human and physical capital accumulation.

The focus should eventually shift to the headline budget balance as a benchmark for assessing fiscal performance

The fiscal rule focuses on the primary budget surplus as the key benchmark for assessing fiscal outcomes. This is because the headline budget balance has traditionally been volatile as a result of the composition of Brazil's public debt, characterised by a predominance of securities paying floating interest rates. Under these circumstances, a case can be made for assessing fiscal performance on the basis of a budgetary aggregate that is not affected by short-term changes in monetary stance. However, little attention has been devoted to the consolidated headline deficit, which remains high, at 3% of GDP on average in 2004-05, despite the ongoing fiscal adjustment efforts. *The option of targeting the headline budget balance should therefore be considered, because the composition of the traded domestic debt stock has been improved by eliminating the associated exchange-rate risk and raising the share of fixed-rate and inflation-indexed securities*. Targeting the headline budget balance would have the advantage of highlighting the need for further fiscal action, even when fiscal performance measured by the primary budget surplus has been strong. However, it should be recognised that a change in the target would need to be communicated clearly and transparently to the public to avoid any loss of confidence in the fiscal regime.

Public debt management has been exemplary

The authorities have been working towards reducing the public sector's exposure to exchange-rate risk and have seized the opportunity of favourable global financial conditions to retire external debt. The Treasury began to issue long-dated *real*-denominated bonds abroad in 2005 and has considerably reduced external public indebtedness. International reserve holdings now exceed the government's stock of liabilities denominated in foreign currency or indexed to the exchange rate. This achievement has been instrumental in alleviating debt refinancing risk and trimming rollover costs. Nevertheless, securities paying floating interest rates continue to account for the lion's share of the domestic debt stock. *Therefore, public-debt management should focus on consolidating the achievements to date and on stepping up efforts to reduce further the share of floating-rate securities in the traded debt stock*. Attainment of investment grade for Brazil's sovereign debt placements and the resulting lower borrowing costs will be the ultimate reward for steadfast policy action in this area.

The monetary policy regime is working well, but liberalisation of directed credit and reserve requirements would be welcome

The perception that the authorities are committed to a monetary policy framework combining inflation targeting and a flexible exchange-rate regime appears to be suitably well entrenched. The central bank enjoys *de facto*, but not yet *de jure*, operational autonomy. The policy regime has been working well, delivering continuous disinflation since 2003 and anchoring expectations. Notwithstanding these achievements, which should not be underestimated, the conduct of monetary policy is complicated by cumbersome regulations on the allocation of credit to selected sectors, especially agriculture and

housing, including through mandated saving arrangements. Compulsory reserve requirements on commercial banks are also burdensome for a variety of deposit categories, although most countries that have adopted inflation targeting as the framework for monetary policymaking have now reduced or eliminated such requirements. These restrictions act as an implicit tax on the financial sector, against the backdrop of an already relatively high tax burden on financial transactions, including that of the bank debit tax (CPMF). *Consideration should be given to gradually removing the extant directed credit and reducing compulsory reserve requirements so as to improve the efficiency of the financial sector and adequately reward long-term saving, an aspect of the problem that is often overlooked*. The favourable domestic macroeconomic environment, with falling inflation and improving growth prospects, appears propitious for further liberalisation in this area. At the same time, the consolidation of macroeconomic stability not only creates a need to move forward but also provides an opportunity to go beyond the current policy achievements as a means of eliminating the remaining distortions inherited from the pre-stabilisation period. The payoff from reform in this area can be considerable in terms of reducing Brazil's stubbornly high real rates of interest, which weigh heavily on growth.

The business sector needs to invest more in productivity-enhancing innovation

Fostering productivity-enhancing innovation in the business sector is an important challenge for economic policy. At 1% of GDP, spending on R&D (public and private) – a key input into the innovation process – is not only less than one-half of the OECD average, but it is also carried out predominantly by the government and public universities. Process, rather than product, innovations account for the bulk of innovative activities in the business sector. In addition, output indicators, such as the number of patents filed abroad, suggest a relatively weak performance by international comparison, a fact that reflects to a large extent Brazil's inward-oriented growth strategy until the 1980s, which was based on import substitution. Although Brazil already fulfils a few key framework conditions for innovation, such as reasonably pro-competition product market regulations and an FDI regime that is favourable to investors, average import tariffs are high in comparison with the OECD area. *Therefore, there is scope for reducing tariff barriers to trade to facilitate access by the business sector to imported intermediate inputs and capital goods embodying more modern technologies, which is conducive to sustained productivity growth*. This is important because, according to the Innovation Survey (PINTEC), the acquisition of the latest machinery and equipment is the main source of innovation in the business sector. An important remaining obstacle for improving innovation performance is the cost of capital, which will probably come down with the consolidation of macroeconomic stabilisation and the consequent reduction in real interest rates. *The liberalisation of existing directed credit requirements, discussed above, would contribute to strengthening the market environment for risky ventures, ultimately reducing the cost of capital.*

The policy framework for innovation is well thought out

The current set of policies, which has been in place since late 2003, focuses on the potential policy synergies among science and technology promotion, R&D support in the business

sector and trade competitiveness. Such a framework is a considerable step forward in a country where innovation policies have traditionally been inward-looking and based on the protection of selected industrial sectors from foreign competition, rather than the promotion of trade competitiveness. In addition, a new law, enacted in 2005, facilitates the sharing of intellectual property rights proceeds between businesses and public universities and research institutions. *To be successful in boosting business innovation, these policies will need to be complemented by measures to continue to foster coordination within the National Innovation System, particularly across the different levels of government, and to clarify the assignment of long-term planning functions at the federal level.*

Government support for innovation should give priority to cross-sectoral initiatives

Direct government support is financed predominantly by earmarked revenue allocated to a variety of "sectoral funds". Tax incentives have traditionally benefited the ICT industry, although recent measures have introduced across-the-board incentives for innovation as part of a broader package for reducing the tax burden on the business sector. They also include the exemption of initial public offerings from the bank debit tax (CPMF) and the elimination of taxation on capital gains accruing from venture capital investment. These steps are appropriate. However, reliance on revenue earmarking aggravates budgetary rigidity, while failing to create a stable source of funding. *Ensuring stable financing for innovation support should therefore be pursued through the prioritisation of programmes, rather than increasing budgetary rigidity. The cost-effectiveness of current policies should be strengthened through greater emphasis on cross-sectoral initiatives, including joint ventures between firms and higher-education institutions, especially with counterpart financing by businesses. In addition, the option of diversifying the range of support instruments currently available by introducing alternative modalities, such as risk-sharing, matching grants and loan subsidies, could be considered.*

Low human capital weighs on innovation performance

To improve innovation outcomes, the attainment gap – at all levels of education – in relation to the OECD area will need to be narrowed, particularly at the higher-education level, where the performance shortfall is worsening. To this end, enrolment will need to rise and quality improve. Most of the recent expansion in the supply of higher education is accounted for by private institutions, whose students tend to perform less well on the basis of standardised tests than those enrolled in public universities, controlling for individual characteristics. In addition, private institutions tend to specialise in low-cost career streams in management and humanities, which does little to tackle the skill imbalance that currently exists to the detriment of engineering and science. Enrolment in higher education-level technological institutes is low, and, to remedy this situation, the government intends to open more such establishments in the near term. *Efforts should be stepped up to monitor the quality and market-orientation of the training offered by the technological institutes on a regular basis before new ones are set up. At the same time, increasing the supply of shorter tertiary-education programmes should also be considered as a means of meeting the demand for higher-education qualifications with a more practical, less academic focus.* A related unresolved policy consideration is cost-recovery in tertiary education. *A move from direct public financing for institutions towards the introduction of*

tuition fees could be considered on both equity and efficiency grounds, given that, as discussed in the 2005 Survey, public spending on tertiary education is estimated to be among the most regressive expenditure items in Brazil. This should be complemented by the expansion of student loans and/or means-tested support to ensure that the introduction of tuition fees does not work as an obstacle to the participation of students from disadvantaged backgrounds.

The policy distortions that encourage labour informality should be removed

Reducing widespread informality and the tax evasion that it entails will be essential for improving growth performance through a better use of labour inputs. It may well also contribute to alleviating income disparities. Low human capital is a key determinant of informality, but several features of the existing social protection programmes discourage the formalisation of labour relations. The introduction of a number of old-age and disability-related benefits since the early 1990s has served the purpose of strengthening the social safety net. However, such initiatives reduce the opportunity cost of informality, because eligibility is not conditional on social security coverage, although social assistance benefits are means-tested. This is especially the case for minimum-wage earners, who can apply for an old-age assistance pension (which is equal to the monthly minimum wage) at age 65, instead of receiving an old-age pension on the basis of lifetime contributions. Incentives for formality are weakened further, while undoubtedly serving a valid social objective, by universal access to publicly funded health-care services, which are not conditional on formal labour-market status. There are additional incentives for informality arising from the design of severance insurance (FGTS) in the event of unfair dismissal, which discourages employers from hiring with formal contracts. *Against this background, efforts should focus on correcting these policy distortions, while striking the right balance between adequate, cost-effective social protection and incentives to work in the formal sector.* Another important consideration is the affordability of social insurance coverage for individuals on low incomes. In this regard, *the option of reducing social security contributions for minimum-wage earners should be considered both because it reduces the cost to employers of hiring formally and, since the minimum benefit is fixed, because it would make formal employment relatively more attractive to workers.*

There are options for increasing labour supply…

Brazil already ranks high by international standards in terms of labour force participation for prime-age workers. A gender gap nevertheless remains, especially if account is taken of part-time work, which is more prevalent among females. The share of women working less than 20 hours per week is above the OECD average. In general, mothers with young children may opt for part-time work as a means of reconciling household and work responsibilities. There is nothing wrong with this situation, unless individual choice is distorted by public policy. For example, a number of these part-timers may want to work longer hours and are prevented from doing so by the scarcity of publicly funded pre-school education and formal child care. *Budget conditions permitting, current efforts to tackle the supply bottleneck should be stepped up by extending to pre-school education the financing mechanisms in place for primary and lower-secondary education (i.e. FUNDEF), which are working well.* The potential benefits of this initiative go beyond the labour policy area: international experience suggests that access to early childhood education can improve school

outcomes later in life. Another consideration when designing policies to lift labour supply is that of early retirement, given that Brazil's average effective retirement age is much lower than in most OECD countries. *The introduction of a statutory retirement age for private-sector workers, recommended above, would contribute to improving the use of labour resources, in addition to strengthening the long-term sustainability of the social security system.*

… and for tackling unemployment

The empirical evidence reported in this *Survey* suggests that educational attainment is becoming an increasingly important determinant of employability. Properly designed active labour market policies can therefore be used to boost human capital, especially for those groups with the weakest attachment to the labour force, such as youths, women and the less educated. Activation programmes differ from conventional public employment services because they make participation in, for example, training and job-creation programmes compulsory for targeted groups. Brazil's experience with such programmes is relatively recent, comprising federal training programmes (PLANFOR/PNQ and PNPE) for the unemployed and vulnerable segments of the labour market. *Although the cost-effectiveness of these programmes has yet to be fully assessed, the option of making participation in an activation scheme compulsory for unemployment-benefit recipients should be considered. Also, it is essential that employment services ensure that recipients look for jobs while participating in such schemes.*

Labour training can be improved

Demand for labour training is likely to rise, because the labour market is offering increasing rewards for skills. This phenomenon is closely related to the pro-competition reforms of the 1990s, including trade and investment liberalisation. Labour training will therefore be crucial for the accumulation of human capital by those individuals who are already in the workforce and will not, or cannot, engage in formal education. Labour training is currently provided predominantly at the sectoral level by the so-called "S" system, which is made up of non-governmental organisations financed through para-fiscal levies on enterprise payroll. By contrast, publicly funded vocational education is in short supply, essentially because the Brazilian system does not have separate vocational and general education streams. Efforts to improve the supply of vocational training while integrating it into upper-secondary education, as is planned by the authorities, are therefore commendable. *But labour training can become more cost-effective through increased contestability. This could be achieved by replacing direct transfers to the non-governmental service providers within the "S" system by vouchers that could be granted to individual workers and redeemed against training received from accredited institutions.* For this policy measure to be successful, labour market information and vocational guidance services for potential participants should be expanded to help workers to choose which training to undertake.

A national certification system is essential for making skills marketable

There is no national system of skills certification in Brazil. This prevents the marketability of the human capital acquired through labour training. *A national skills certification system should therefore be introduced.* As a first step in this direction the pilot certification programmes that

are currently in place in the industrial sector in the metropolitan region of São Paulo could be extended to other sectors, such as construction and services, where informality is more widespread, and to the poorer regions of the country. *National standards should be set and compliance monitored regularly and transparently*. To the extent that less educated workers who are currently trapped in the informal sector may acquire marketable skills through labour training, they can compensate for a lack of formal education.

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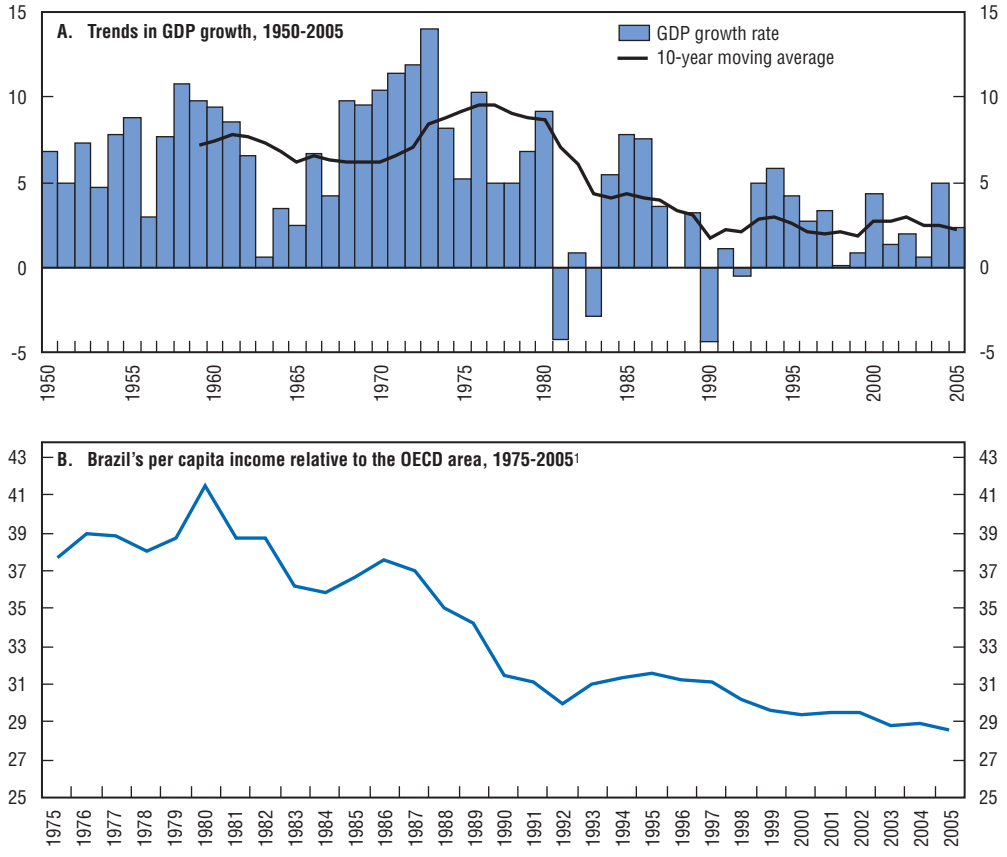
Chapter 1

Fostering long-term growth: the challenges ahead

Brazil's economic growth performance is likely to improve. Productivity has risen since macroeconomic stabilisation in the mid-1990s, underpinned by structural reforms, including trade, investment and product-market liberalisation. But macroeconomic and structural distortions remain, preventing Brazil from reaping the full benefits of stabilisation in terms of higher growth. Additional structural reform will therefore be needed to lift the economy's growth potential over the medium-to-longer term, so as to narrow Brazil's income gap relative to the OECD area, which has widened. Macroeconomic disarray during the 1980s and early 1990s is the main culprit for the fall in relative living standards. Three policy challenges are identified in this Survey: to consolidate macroeconomic adjustment, to boost innovation in the business sector and to improve formal labour utilisation.

Brazil's growth performance deteriorated sharply over the last quarter of a century, following a period of vigorous expansion, known as the "Brazilian miracle", which spanned the mid-1960s to the late-1970s (Figure 1.1). GDP grew on average by nearly 7.5% per year in real terms in the 1960s and 1970s – a pace of expansion which matched those of the "Asian Tigers" since the 1980s. The policies that generated high growth during the "miracle" years were nevertheless unsustainable, and GDP growth slowed down to about 2.5% per year on average during 1980-2005. High-growth spells over this 25-year period were short-lived and infrequent, most often associated with failed macroeconomic stabilisation plans in the 1980s (1985-88) and following macroeconomic adjustment in the mid-1990s (1994-97). The post-1980 growth slump has been protracted, casting doubt over Brazil's ability to put its economy on a sustainable higher-growth trajectory. The result is that the gap in Brazil's

Figure 1.1. **Brazil's long-term growth performance**
In per cent



1. Defined as the ratio of Brazil's income per capita to the average of the OECD countries (excluding Czech Republic, Hungary, Poland and Slovak Republic due to data constraints) in purchasing power parity (PPP) terms.

Source: IPEA, World Bank and OECD calculations.

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per capita income (measured at purchasing power parity) relative to the OECD area has widened from about 60% in 1980 to almost 70% since 2000. To close this gap in a quarter of a century, the economy's rate of growth would need to outpace that of the OECD area by nearly 5 percentage points per year, a tall order to be sure, but one that provides some indication of the magnitude of the efforts needed.

This chapter argues that the consolidation of macroeconomic stability, which has so far been underpinned by continued prudence in fiscal and monetary policymaking, is a key framework condition for sustained, equitable growth. There are nevertheless additional policy challenges to be addressed in the fiscal area, including a durable reduction in public indebtedness and an improvement in the quality of fiscal adjustment, as already recommended in the *2005 Survey*. In addition, further financial liberalisation – combining a gradual removal of restrictions on the allocation of credit in the economy and a reduction of compulsory reserve requirements for commercial banks – would contribute to making monetary policy more efficient over time and to reducing the cost of financial intermediation. Reform in this area is expected to lead to a better channelling of savings to much-needed productivity-enhancing investment. At the same time, efforts to encourage innovation in the business sector and to foster human capital accumulation, on and off the job, are essential for closing Brazil's productivity gap with respect to the OECD area. Policy initiatives in these areas will need to be complemented by measures to improve labour utilisation in the formal sector.

Trends in growth performance

Short-term developments

Activity decelerated markedly in 2005, after having expanded at a robust pace in 2004 (Table 1.1). GDP growth was slower than expected and at odds with the performance of most emerging-market economies. Activity slackened considerably in the third quarter, reflecting a contraction in private investment and in agricultural output, due to adverse weather conditions, but picked up towards year-end and into 2006. Plentiful credit and improving labour market conditions sustained private consumption. Private investment recovered in the first quarter of 2006, aided by a continued compression of sovereign risk and interest spreads, but contracted in the second quarter. The contribution of net exports to growth is diminishing, because imports are picking up, particularly of capital goods and intermediate inputs. The trade surplus nevertheless remains sizeable. Given the composition of Brazil's foreign trade, the global commodity price boom has not resulted in a discernible improvement in the terms of trade. There are limited signs of any supply-demand mismatch, which bodes well for inflation to remain tame in the context of faster growth.

Following an uptick in inflation in the second quarter of 2004, generated by higher oil and commodity prices and the removal of slack in the economy, the monetary stance was tightened in September, a cycle that lasted 12 months. Actual and expected inflation began to converge gradually to the end-year targets, prompting the easing of the monetary stance after September 2005 (discussed in Chapter 2). Congruent with the monetary firming and the rising surplus in the external current account on the back of robust export growth, the *real* appreciated considerably in the course of 2005 and until May 2006, contributing to disinflation. As regards fiscal policy, the consolidated primary budget surplus exceeded the targets in both 2004 and 2005 as a result of buoyant revenue collections and in spite of an

Table 1.1. **Basic economic indicators, 2000-05**

	2000	2001	2002	2003	2004	2005
Supply and demand						
GDP (in current BRL billion)	1 101.3	1 198.7	1 346.0	1 556.2	1 766.6	1 937.6
GDP (in current USD billion)	602.2	509.8	459.4	506.8	604.0	796.3
GDP growth rate (real, in per cent)	4.4	1.3	1.9	0.5	4.9	2.3
Supply						
Agriculture	2.1	5.8	5.5	4.5	5.3	0.8
Industry	4.8	–0.5	2.6	0.1	6.2	2.5
Services	3.8	1.8	1.6	0.6	3.3	2.0
Demand						
Private consumption	3.8	0.5	–0.4	–1.5	4.1	3.1
Public consumption	1.3	1.0	1.4	1.3	0.1	1.6
Gross investment	4.5	1.1	–4.2	–5.1	10.9	1.6
Exports	10.6	11.2	7.9	9.0	18.0	11.6
Imports	11.6	1.2	–12.3	–1.7	14.3	9.5
Public finances (consolidated public sector, in per cent of GDP)						
Revenue[1]	32.5	33.9	35.5	34.9	35.9	37.4
Primary balance	3.5	3.6	3.9	4.3	4.6	4.8
Headline (nominal) balance	–3.6	–3.6	–4.6	–5.1	–2.7	–3.3
Net debt[2]	48.8	52.6	55.5	57.2	51.7	51.5
Balance of payments (in USD billion)						
Current account balance	–24.2	–23.2	–7.6	4.2	11.7	14.2
In per cent of GDP	–4.0	–4.6	–1.7	0.8	1.9	1.8
Trade balance	–0.7	2.7	13.1	24.8	33.6	44.8
Exports (goods)	55.1	58.2	60.4	73.1	96.5	118.3
Imports (goods)	55.8	55.6	47.2	48.3	62.8	73.6
International reserves (gross)	33.0	35.9	37.8	49.3	52.9	53.8
FDI (net inflows)	32.8	22.5	16.6	10.1	18.2	15.2
Outstanding external debt	216.9	209.9	210.7	214.9	201.4	168.9
In per cent of GDP	36.0	41.2	45.9	42.5	33.4	21.2
Exchange rate and prices						
Exchange rate (BRL per USD, period average)	1.83	2.35	2.93	3.08	2.93	2.44
CPI inflation (IPCA, in per cent, end-of-period)	6.0	7.7	12.5	9.3	7.6	5.7
GDP deflator (in per cent)	8.4	7.4	10.2	15.0	8.2	7.2
Earnings, inequality and unemployment						
Income inequality (Gini coefficient, labour income)	..	0.57	0.56	0.55	0.55	0.54
Real earnings (average, monthly, labour income)[3]	..	854	833	770	770	805
Unemployment rate (in per cent)[4]	..	..	11.3	11.7	12.3	11.5

1. OECD estimate for 2005.
2. The net debt ratio is conventionally defined in Brazilian statistics in per cent of end-period, rather than average-period, GDP.
3. In September 2005 prices (deflated by the INPC).
4. Based on the Monthly Employment Survey (IBGE/PME), new methodology.

Source: Central Bank of Brazil, Federal Revenue Service (SRF), IBGE and IPEA.

increase in expenditure, particularly on pensions. But, due to the rise in interest payments brought about by the monetary tightening, the headline budget deficit (nominal PSBR) rose relative to 2004, making the policy mix tilted towards monetary restraint.

Social conditions have improved over the recent past. Real earnings are rising on the back of sustained disinflation and improving labour market performance. As a result, income inequality and the incidence of poverty are coming down, a development that also owes much to the continued successful implementation of targeted income-support

initiatives for the poor under the Bolsa Família programme (discussed in the 2005 Survey). The impact is particularly strong in the rural areas, notably in the North-Eastern region, which concentrates a large number of beneficiaries. When launched in 2003, the programme benefited 4 million households and is expected to reach over 11 million families by the end of 2006. Together, labour and non-labour income (linked mainly to social protection) account for more than 80% of the reduction in income inequality over the recent past (Paes de Barros *et al.*, 2006).

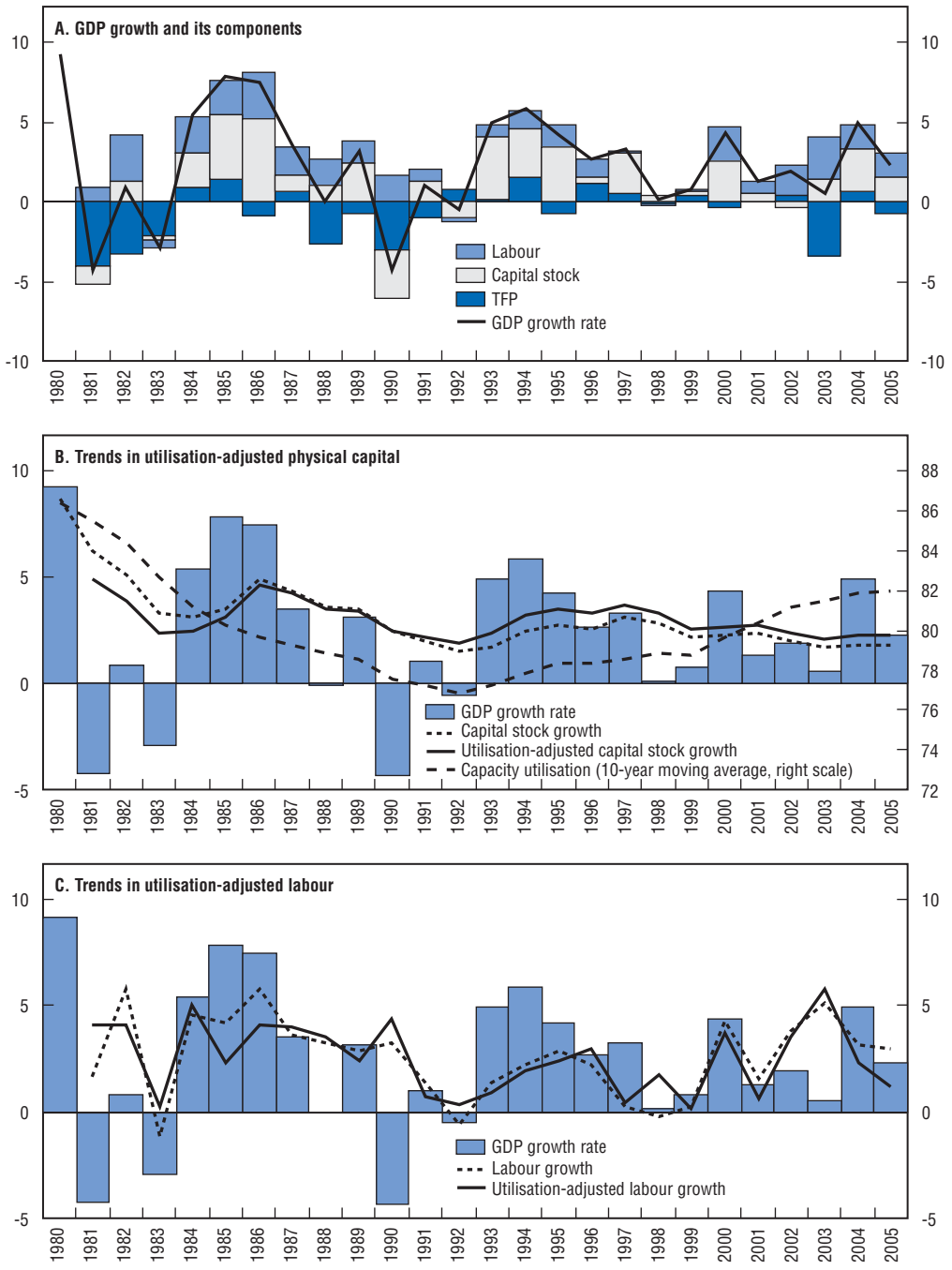
Prospects are good for a broad-based recovery later in 2006. Growth is already rebounding on the back of robust consumer spending and a recovery in private investment. The expansion in consumer credit is likely to benefit from further monetary easing, although rising household indebtedness could begin to put a brake on credit growth. Investment is expected to recover in earnest owing to the compression of sovereign spreads, the upgrading of Brazil's sovereign debt placements by two of the leading credit-rating agencies since February 2006, and continued monetary easing and credit creation, including for residential construction. Inflation is expected to remain well anchored somewhat below the mid-point of the 2.5-6.5% target range. These developments augur well for further improvements in the labour market, with steadily falling unemployment and rising real earnings. The trade and current account surpluses are likely to shrink due to the recovery-driven pick-up in imports, but to remain sizeable. Although export performance is expected to remain strong, the external sector is unlikely to contribute positively to growth.

The engines of growth over time

GDP growth over the last 25 years has been based predominantly on the accumulation of inputs, rather than improvements in total factor productivity (TFP) – the efficiency with which inputs are combined to produce output (Figure 1.2). The accumulation of utilisation-adjusted physical capital accounted for the bulk of the expansion in GDP during the high-growth spells of the mid-1980s and mid-1990s. Labour supply does not seem to have posed a constraint on growth: corrected for cyclical variations in labour force participation and unemployment, labour utilisation has recovered somewhat since 1999, having weakened in the 1990s. As discussed in Chapter 4, the structural changes that have taken place in the economy since the early 1990s, including trade, investment and product-market liberalisation, have placed a premium on skilled labour, suggesting that the quality of utilisation-adjusted labour inputs has since trended upwards. But TFP performance, which is a key engine of sustained growth, accounting for most of the variation in GDP growth across countries in the OECD area (OECD, 2003, Chapter V), has slackened, often acting as a drag on the expansion of output, especially in the 1980s and early 1990s.

The pattern of TFP growth over time calls for a better understanding of the policies that impede the expansion of capital and labour productivity. These interactions are complex, and synergies among different policy areas make it difficult to disentangle the main forces at play. Nevertheless, a case in point is the rise in the relative price of investment. Brazil's capital-output ratio was fairly stable until the late 1970s and during the 1990s, and the fall in the marginal productivity of capital (an increase in the capital-output ratio) in the 1980s owes much to a surge in the price of investment. The capital-output ratio rose in the 1980s, concomitantly with a significant drop in TFP, at least until the early 1990s (Figure 1.3) (Bacha and Bonelli, 2004). This change in relative prices was due to a large extent to the implementation of protectionist industrial policies, including for the ICT

Figure 1.2. **Decomposition of GDP growth, 1980-2005**
In per cent



Source: IPEA and OECD calculations.

industry (discussed in Chapter 3), which sheltered the economy from foreign competition and limited access to imported intermediate inputs and capital goods embodying more modern technologies. In addition, the Debt Crisis, which prevented access by Brazilian investors to international capital markets and, therefore, to foreign sources of finance, also affected the relative price of investment.

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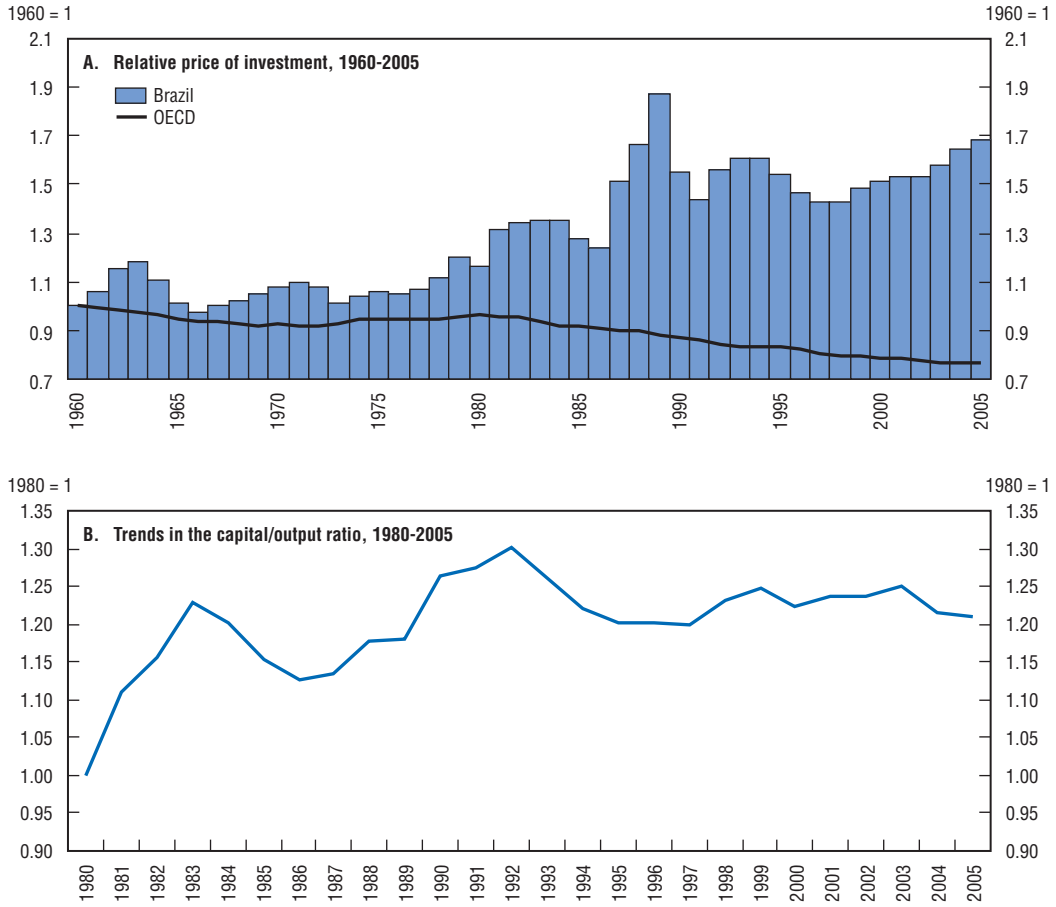
Figure 1.3. **The relative price of investment and capital deepening: Brazil and OECD, 1960-2005**



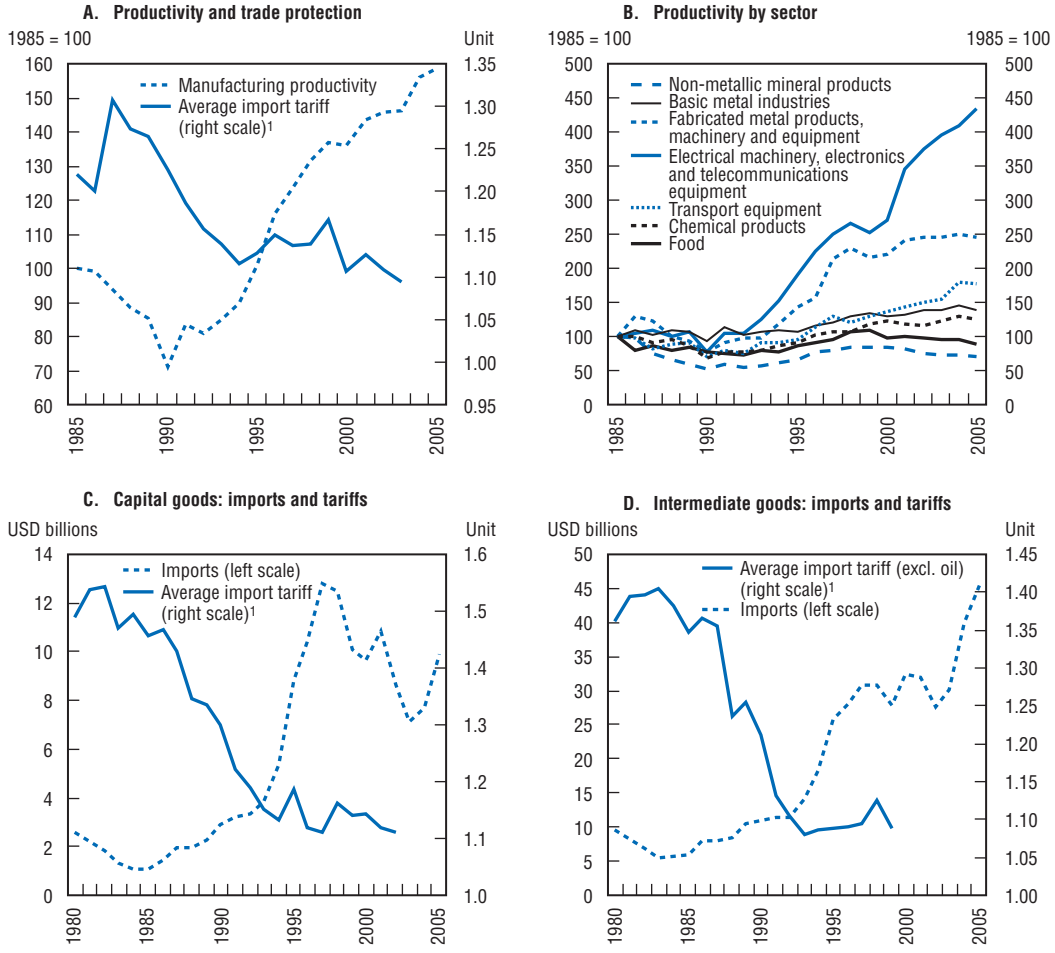
Source: IPEA, OECD (Economic Outlook database) and OECD calculations.

The resumption of TFP growth in the 1990s appears to be closely associated with pro-competition reform. Brazil's product market regulations (PMR) are reasonably pro-competition, and its foreign direct investment (FDI) regime is investor-friendly, as discussed in the *2005 Survey*. Policy effort since the mid-1990s has aimed at withdrawing the public sector from manufacturing, especially in activities that had hitherto been dominated by State-owned enterprises, and to subsequently liberalise entry into those sectors that had until then been treated as State monopolies, especially utilities.[1] In this regard, empirical evidence based on cross-sectoral data in manufacturing confirms the positive effect of entry on sector-level productivity.[2] In the case of the iron ore industry, for example, where Brazil is a world player, privatisation was associated with gains in labour productivity, not only in the privatised firms, as expected, but also in the private companies that were already operating in the sector. This suggests the presence of externality effects, where productivity gains arising from privatisation spill over to other firms operating in the same sector.[3] It should be noted, however, that it is difficult to single out the measures that are most closely associated with an improvement in overall productivity because of the complementarities and synergies that exist among policies in the course of structural reform, as noted above.

The reduction of trade barriers seems to have played a crucial role in boosting productivity. Trade liberalisation took place essentially through the elimination of non-tariff protection towards the end of the 1980s – *via* the liberalisation of protected sectors – and the gradual reduction in import tariffs in the 1990s, especially during 1988-1995.[4] The reduction in trade protection appears to have resulted in labour productivity gains, which have been reasonably widespread across sectors and sustained over time, beyond the initial period in the early 1990s when the rise in productivity could have been associated predominantly with a cyclical recovery in economic activity following the 1989-1990 slump (Figure 1.4).[5] The surge in productivity appears to track closely the pick-up in imports of capital goods and intermediate inputs, which are important conduits for embodied technological progress, on the back of the reduction in tariff protection for these goods.

Empirical evidence suggests that the effect of easing tariff protection on productivity was strongest for low-productivity firms (Schor, 2004). In particular, the strong productivity gains in the sectors producing electrical, electronic and mechanical equipment in the 1990s, for which the reduction in tariff protection was considerable, is illustrative of the link between trade openness and productivity enhancement. The reduction in trade protection for the ICT industry, discussed in Chapter 3, is an important case in point. There is

Figure 1.4. **Trends in labour productivity and import tariffs, 1980-2004**



1. Defined as 1 plus the average statutory tariff.

Source: IBGE (Annual Industrial Survey, PIA), IPEA and OECD calculations.

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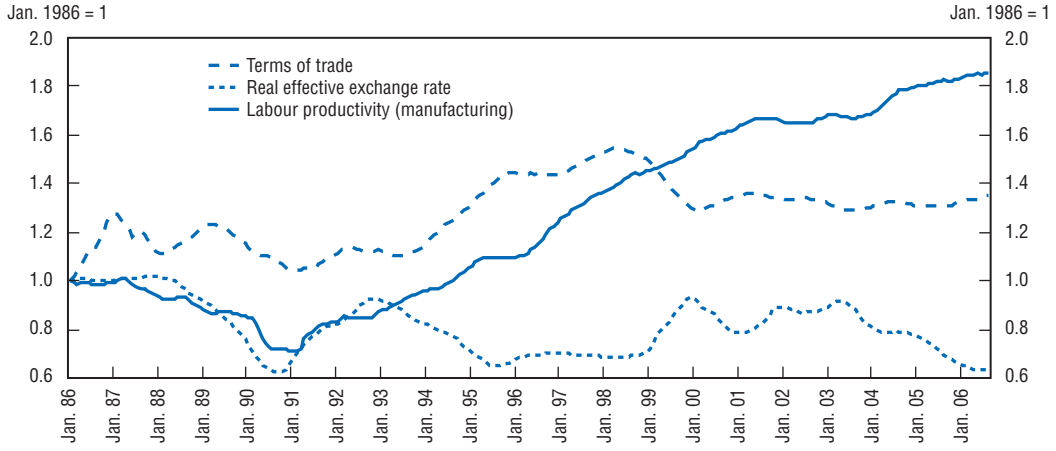
also supportive cross-sectoral empirical evidence that the increase in market penetration by foreign competitors as a result of the liberalisation of Brazil's trade and investment regimes appears to have boosted productivity (Hay, 2001). These trends underscore the scope for boosting productivity through trade liberalisation, especially in those sectors that are furthest from the technological frontier, and are consistent with the fact that the rapid GDP growth that was achieved until the late 1970s on the back of import substitution was essentially due to factor accumulation, rather than productivity gains.

Equally important is the evidence that investment by businesses on innovation has contributed to sector-level productivity gains. As discussed in Chapter 3, the pro-competition reforms that were implemented in the 1990s through trade and investment liberalisation encouraged innovation among Brazilian firms. This is confirmed by cross-sectoral evidence in manufacturing that a higher share of ICT equipment in the physical capital stock is associated not only with a higher level of sectoral productivity, but also faster productivity growth (Pinheiro *et al.*, 2001). Related to this finding is the fact that the quality of the labour force also matters: the empirical evidence available to date suggests that labour productivity grew faster in the sectors that had a higher share of skilled labour in the workforce. As discussed in Chapter 4, the shedding of less skilled labour over the 1990s, when pro-competition pressures intensified, contributed to the increase in measured labour productivity. The upward trend in labour productivity is comparable to that of sector-level TFP growth, especially when the effect of entry of more productive firms is taken into account.

Improvements in the terms of trade and the real effective exchange-rate appreciations seem to be associated with a rise in labour productivity (Figure 1.5), because they make it cheaper for businesses to import capital equipment and intermediate inputs embodying more modern technologies. It is not clear whether fluctuations in the exchange rate after 1999, when the *real* was allowed to float, have had a bearing on productivity or not. This is important because recent empirical evidence suggests that volatility in the exchange rate tends to affect productivity growth adversely in countries with relatively thin financial markets, at least as gauged by the ratio of credit to GDP (Aghion *et al.*, 2006). The argument is that financial development is essential for exchange-rate flexibility to

Figure 1.5. **Trends in labour productivity, real effective exchange rate and terms of trade, 1986-2005**

12-month moving averages



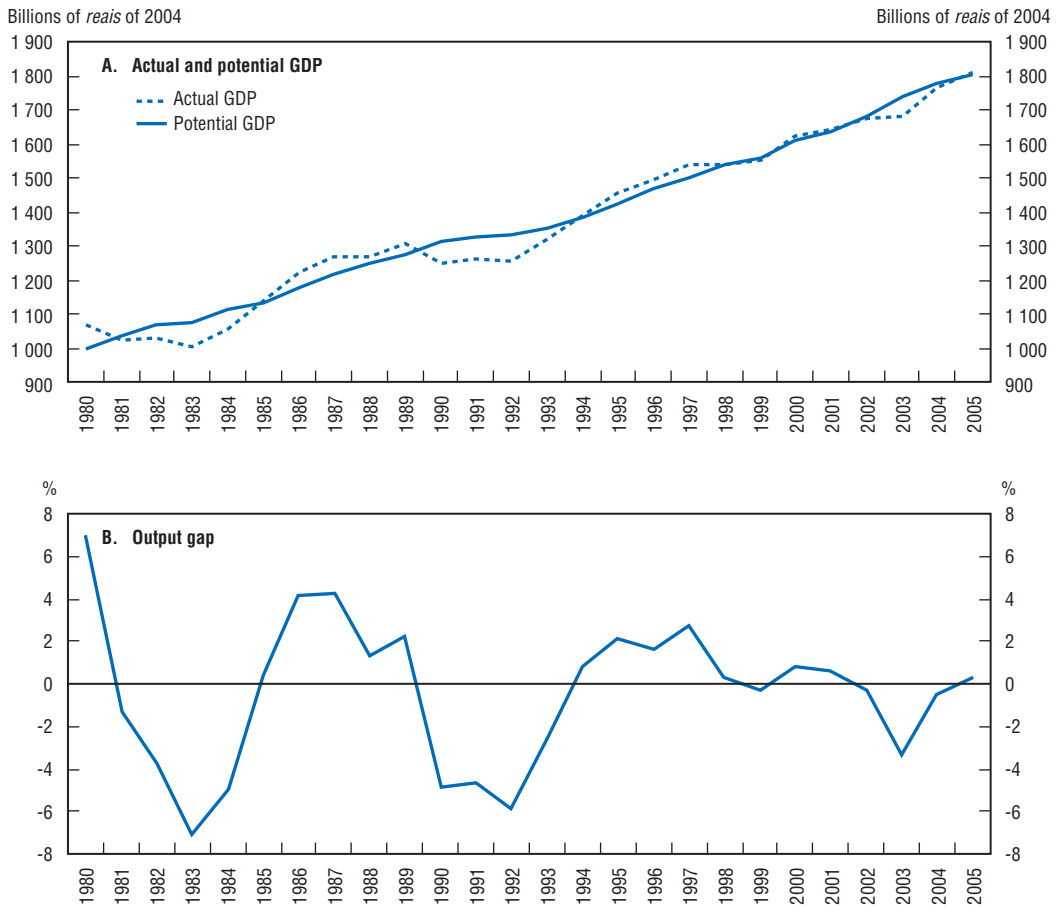
Source: IBGE (Annual Industrial Survey, PIA), Central Bank of Brazil and OECD calculations.

absorb the impact on the economy of terms-of-trade shocks, so that the benefits of a floating exchange-rate regime can be fully exploited (Levine *et al.*, 2000). In this regard, financial deepening through further credit liberalisation (discussed below and in Chapter 2) may contribute to consolidating the productivity gains that are expected to take place in association with greater trade openness in the post-1999 floating exchange-rate regime.

Measuring Brazil's potential output

The economy's potential output growth is currently estimated by the OECD to be rather low and therefore needs to be raised. Estimated trend GDP growth peaked at between 4 and 4.5% in the mid-1980s, following several failed non-orthodox stabilisation attempts, and after stabilisation in the mid-1990s, but ultimately decelerated to about 2.5% per year on average during 2000-05 (Annex 1.A2). Based on conventional growth accounting and assuming that the key parameters remain unchanged, Brazil's potential GDP growth is estimated at 3-3.5% per year in the near term. This is unlikely to exceed the average potential growth of the OECD area, currently estimated at about 2.5% per year, by a significant margin. As noted above, to close the income gap relative to the OECD area in a quarter of a century, Brazil's potential growth rate would need to outpace that of the OECD area by nearly 5 percentage points per year, which poses considerable policy challenges.

Figure 1.6. **Trends in actual and potential output, and the output gap, 1980-2005**



Source: IBGE (Annual Industrial Survey, PIA), Central Bank of Brazil and OECD calculations.

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The stabilisation of potential growth at about 2.5% per year on average over the last five years appears to be due to insufficient factor accumulation coupled with a moderation in TFP growth, which had nevertheless recovered over the 1990s from the productivity slump of the 1980s (Figure 1.6). Investment in physical capital formation has been volatile, reflecting overall macroeconomic volatility, and private investment has failed to compensate for the fall in public investment (Chapter 2). Human capital accumulation is trending up, but it will take time for recent policy efforts to bear fruit and to reduce the performance gap relative to Brazil's more advanced trading partners. The greatest longer-term gains are likely to come from human capital accumulation, since it is the area where Brazil appears to lag the most in relation to the OECD area.

The challenges ahead

Against this background, this *Survey* identifies three main policy challenges that Brazil will need to face to raise its economy's growth potential:

- The *consolidation of macroeconomic adjustment* (Chapter 2) fulfils a framework condition for sustainable growth, reducing the cost of capital and therefore encouraging physical capital investment and strengthening incentives for innovation.
- *Boosting business-sector innovation* (Chapter 3) is a pre-requisite for the diffusion of new technologies, allowing Brazil's academic excellence in several niche areas to find commercial outlets and hence to contribute to productivity growth.
- Increasing labour productivity and formal labour utilisation would make for a *better use of labour inputs* (Chapter 4).

Consolidating macroeconomic adjustment

A sound macroeconomy is a key framework condition for sustained growth. Brazil has made considerable progress since the mid-1990s in achieving and consolidating macroeconomic stability. The perception that the authorities are committed to macroeconomic responsibility appears to be well entrenched. The macroeconomic policy strategy pursued since 1999, when the *real* was allowed to float, has been two-pronged. It has aimed at ensuring the sustainability of the debt dynamics by setting the primary budget surplus targets so as to put the public debt-to-GDP ratio on a downward path over the medium term, and at achieving low, stable inflation by gearing the conduct of monetary policy towards the attainment of pre-announced targets within a floating exchange-rate regime. This strategy is yielding results: the net public debt-to-GDP ratio has fallen since the 2003 peak but nevertheless remains at a comparatively high level by emerging-market standards. Fiscal adjustment has been achieved predominantly on the back of revenue hikes, rather than the retrenchment of expenditure commitments, suggesting much room for improvement. With regard to monetary policy, inflation has been tamed, following the upsurge that peaked in 2003, although it remains higher than the average of the OECD countries. But the remaining restrictions on the allocation of credit in the economy and compulsory reserve requirements on commercial banks are areas where the payoff from reform can be considerable in increasing the efficiency of monetary policy and reducing the cost of financial intermediation.

Fiscal policy: Reducing public indebtedness and improving the quality of fiscal adjustment

As regards fiscal policy, Brazil's main challenge – already stressed in the *2005 Survey* – is to reduce public indebtedness while improving the quality of fiscal adjustment. To do so, the upward trend in current spending will need to be arrested through further policy action, including in the social security system. Despite the reforms put in place since 1998 (Box 1.1), the deficit of the social-security regime for urban private-sector workers has risen steadily (Table 1.2). By contrast, the financial imbalance of the regime for public-sector workers is declining, although it remains at a still relatively high level in relation to GDP. Capping current expenditure growth is a pre-condition for reducing Brazil's tax-to-GDP ratio, which is high by emerging-market standards, over the medium-to-longer term, once the debt-to-GDP ratio has been lowered in a sustained manner. There is widespread agreement that Brazil's tax system is cumbersome and inefficient, due to reliance on taxes on enterprise turnover (rather than value added) and financial transactions, which are detrimental to the formalisation of businesses and labour relations.

The surge in government outlays on pensions, which account for about one-third of federal primary expenditure, is the main culprit for the rising deficit of the social security regime for private-sector workers. Not only has the number of beneficiaries increased as a result of population ageing, but also the value of benefits has risen in real terms, essentially due to the link between the minimum pension and the minimum wage (Figure 1.7). The minimum wage rose from about 14% of average earnings in 1995 to over one-quarter of average earnings in 2005. The government is required to set the minimum wage every year at a level that preserves its purchasing power, but has chosen to increase it in real terms, because there is no cap on increases in the minimum wage/pension above inflation. This, coupled with the downward rigidity associated with the requirement to preserve its purchasing power, creates a ratcheting-up effect on outlays on pensions. Spending pressures also mounted because the average retirement age is still relatively low in Brazil in comparison with OECD countries, as discussed in the *2005 Survey*. This is due predominantly to the absence of a minimum age for retirement on the basis of length of contribution, which runs counter to international trends.

At the same time, rising labour informality over the 1990s and a fall in average real earnings, especially in the metropolitan areas, prevented an expansion of the base of contributions to social security in tandem with surging expenditure. An important consideration in this regard is that the design of some existing social assistance programmes creates disincentives for formality in labour relations (Box 1.2). These distortions will need to be removed to ensure that the base of contributions to social security rises at a faster pace in the years to come, thus reducing the burden that the social security system currently poses on the budget. Current official projections suggest that the deficit of the regime for private-sector workers would rise from an estimated 2.2% of GDP in 2006 to about 2.8% of GDP in 2025 (Ministry of Social Security, 2006). These projections assume that the value of pension and social assistance benefits is kept constant in real terms over the planning horizon and that GDP grows on average by 3.5% per year in real terms over the medium term. Needless to say, actuarial projections are sensitive to the macroeconomic parameters used in the analysis, including the rate of growth of real GDP and especially the real value of pension benefits. In the case of social assistance benefits (LOAS), current projections suggest that total outlays would stabilise over the longer term at around the current level of 0.5% of GDP. These projections assume that income

Box 1.1. **Social security reform: A summary**

Brazil's social security system comprises two main regimes: one for private-sector workers (RGPS) and another for the civil service (RPPS), including separate regimes for the federal government (RJU), the states and the municipalities. Reform has so far focused on streamlining the system's "first pillar" (mandatory, pay-as-you-go, publicly-provided pensions) and developing a "third pillar" of voluntary, complementary, personal saving schemes, without nevertheless creating a "second pillar" of mandatory individual saving plans.

The regime for private-sector workers (RGPS)

Currently, private-sector workers can retire with a public pension on the basis of: *i)* old age at 65 years for males and 60 years for females, provided that they have contributed to social security for at least 15 years; *ii)* length of contribution, provided that they have contributed to social security for 35 years (30 years for females), in which case there is no statutory retirement age; and *iii)* disability, which is not constrained by contribution period or age. Pension benefits are capped so as to encourage the development of complementary pension arrangements.

The main parametric change introduced in the RGPS regime in the 1998 reform was the "social security factor" (*fator previdenciário*). Until then, the value of pensions had been calculated as the average of earnings during the 36-month period prior to retirement. Since the reform, pension benefits have been calculated by multiplying the average of 80% of the highest earnings throughout the working life (for current workers the reference period starts in July 1994) by a parameter that depends on the retirement age, the number of years of contribution to social security and life expectancy at retirement. This parametric change in the formula for calculating pension benefits introduced a penalty for early retirement in the case of retirement on the basis of length of contribution, because it made the replacement rate an increasing function of the retirement age.

The regime for civil servants (RPPS)

The 1998 reform set a minimum retirement age for both active employees (53 for men and 48 for women) and new entrants (60 for men and 55 for women). A more comprehensive reform was enacted in 2003, which: *i*) unified the employee's contribution requirement at a minimum rate of 11% on earnings exceeding BRL 2 802 per month for civil servants of all levels of government;[1] *ii*) set a retirement age of 60 years for men and 55 years for women, with a reduction of 5% in the value of pensions for each year of early retirement; *iii*) reduced the portion of survivor's pensions exceeding BRL 2 802 per month by 30%;[2] *iv*) exempted from civil servants who postpone retirement the 11% contribution rate; and *v)* applied the 11% employee's contribution rate to the pension benefits of retired civil servants exceeding BRL 2 802 per month (from August 2004). In 2004, ancillary legislation introduced a 2-to-1 split in contributions between the employer (government) and the civil servants, and a minimum contribution rate for civil servants in the states and municipalities at a level that is equal to that of the federal government.

For new entrants, the reform was more ambitious and called for: *i)* calculation of pension benefits based on average salary over the entire working life, including contributions under RGPS (on a *pro rata* basis); *ii)* indexation of pension benefits to past inflation, rather than wages; and *iii)* introduction of the RGPS ceiling for pension benefits, pending legislation on the implementation of complementary pension funds for civil servants.

1. The option of introducing different exemption thresholds for the federal and regional governments was considered but ruled unconstitutional by the Supreme Court.
2. To reduce resistance to the capping of pension benefits and to raise RGPS revenue in the short run, the option of raising the ceiling under RGPS to match the BRL 2 509 ceiling under RJU was considered. This measure, if implemented, would reduce the RGPS deficit in the short run, while raising it over the long run. It would also discourage investment in complementary pension funds, which is against international trends aiming at encouraging private saving through the development of the complementary pension industry.

Table 1.2. **Social security trends and indicators, 1999-2005**

	1999	2000	2001	2002	2003	2004	2005
Social security balance (in % of GDP)	–4.4	–4.6	–4.0	–4.2	–4.7	–4.5	–4.3
Private-sector regime (RGPS)	–1.0	–0.9	–1.1	–1.3	–1.7	–1.8	–1.9
Urban workers[1]	–1.0	–0.9	0.0	–0.2	–0.6	–0.7	–0.7
Rural workers	..	..	–1.1	–1.1	–1.1	–1.1	–1.2
Public-sector regime (RPPS)[2]	–3.4	–3.7	–2.9	–3.0	–3.0	–2.7	–2.4
Federal	–2.0	–1.9	–1.8	–1.7	–1.7	–1.7	–1.5
State governments	–1.4	–1.8	–1.1	–1.3	–1.2	–1.0	–0.9
Memorandum items:							
Revenue (in % of GDP)	5.8	5.7	6.7	6.9	6.6	6.9	7.3
Private-sector regime (RGPS)	5.0	5.1	5.2	5.3	5.2	5.3	5.6
Public-sector regime (RPPS)[2, 3]	0.8	0.7	1.5	1.6	1.4	1.6	1.7
Federal	0.3	0.3	0.6	0.7	0.6	0.6	0.7
State governments	0.5	0.3	0.9	0.9	0.8	1.0	1.0
Expenditure (in % of GDP)	10.2	10.4	10.7	11.2	11.2	11.4	11.6
Private-sector regime (RGPS)	6.0	6.0	6.3	6.5	6.9	7.1	7.5
Public-sector regime (RPPS)[2, 4]	4.2	4.4	4.4	4.6	4.4	4.3	4.1
Federal	2.4	2.2	2.3	2.4	2.3	2.3	2.2
State governments	1.8	2.2	2.1	2.3	2.0	2.0	1.9
Number of beneficiaries (in millions)	20.1	20.8	21.3	21.7	22.5	23.7	24.4
Private-sector regime (RGPS) pensioners	17.1	17.7	18.1	18.5	19.2	20.1	20.7
Length-of-contribution pensions	3.2	3.3	3.3	3.4	3.5	3.5	3.6
Old-age pensions	5.7	5.9	6.0	5.9	6.2	6.4	6.7
Other	8.3	8.6	8.8	9.2	9.6	10.1	10.4
Social-assistance beneficiaries (RMV, LOAS)	2.1	2.2	2.2	2.2	2.3	2.6	2.8
Public-sector regime[5]	0.9	0.9	0.9	0.9	1.0	1.0	1.0
Average value of benefits (in *reais*)							
Private-sector regime (RGPS) pensions	265.9	288.2	324.3	363.1	436.3	473.3	495.8
Length-of-contribution pensions	569.5	602.6	652.3	717.4	849.1	909.3	925.7
Old-age pensions	163.1	179.2	209.2	232.8	280.7	304.8	332.5
Other	211.9	236.4	272.9	313.7	384.5	424.2	449.2
Social-assistance benefits (RMV, LOAS)	138.0	153.1	182.7	202.5	243.2	262.9	302.7
Average retirement age (in years, RGPS)							
Length-of-contribution pensions	51.7	52.0	52.3	53.1	53.4	53.4	53.3
Old-age pensions	60.2	60.2	60.2	60.2	61.1	61.2	60.7
Complementary pension funds (closed funds)							
Total assets (in % of GDP)	12.9	13.1	14.2	14.0	15.4	15.9	16.6
Share of fixed-income securities in portfolio	36.9	38.3	53.4	54.6	56.0	56.7	57.8

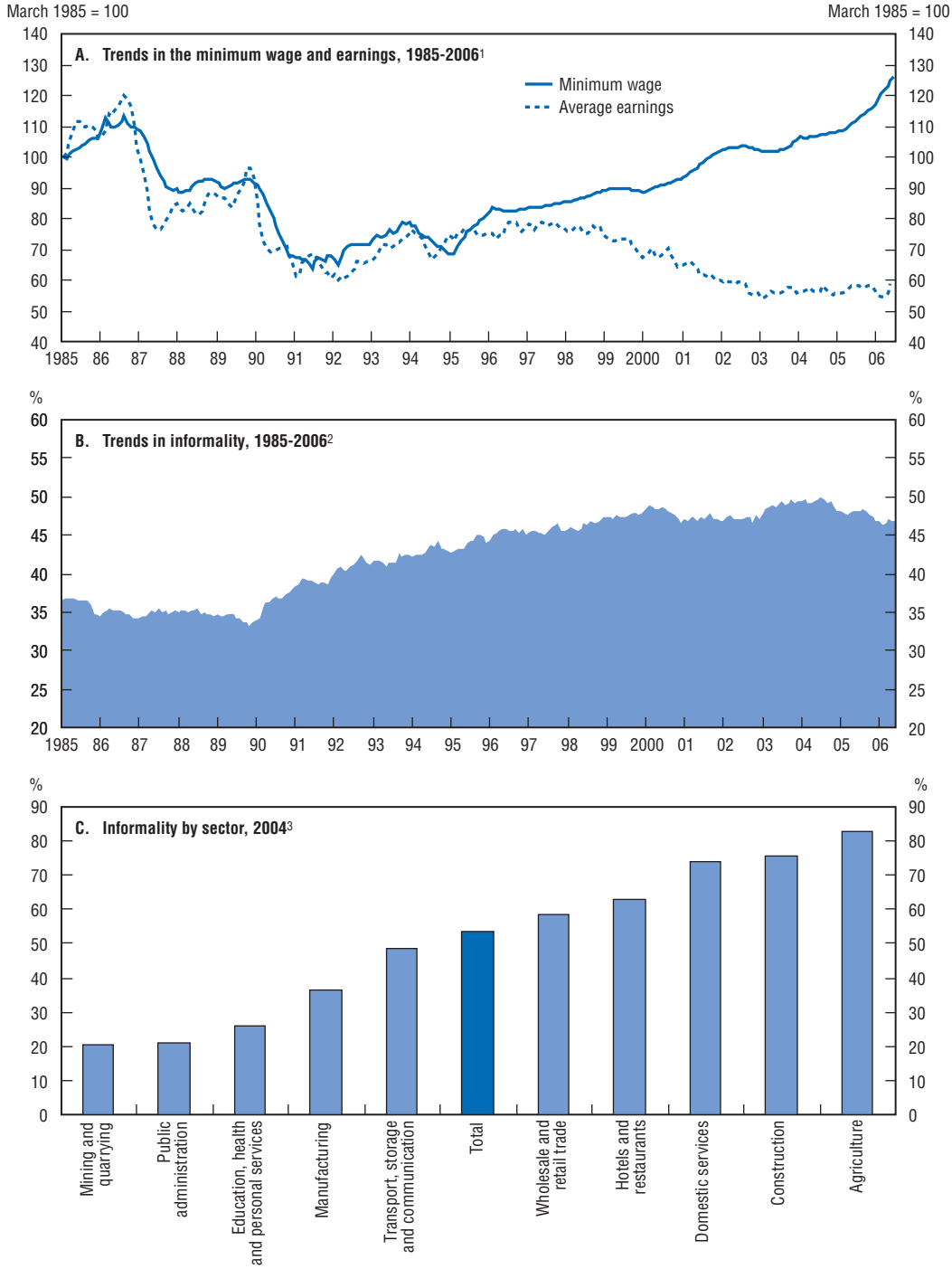
1. Includes rural pensions until 2000.
2. Excludes the municipal civil service.
3. Refers to potential revenue.
4. Refers to expenditure on pension benefits.
5. Refers to the federal government and excludes SOEs, mixed-ownership entities, the central bank and state-level civil servants whose salaries are paid through federal transfers.

Source: Ministry of Social Security and Assistance, Ministry of Planning and National Treasury.

distribution (*i.e.* the share of households with per capita income less than one-quarter of the minimum wage) remains unchanged over the projection horizon.

Brazil's fiscal rule, enshrined in the 2000 Fiscal Responsibility Law, is working well, but there is no institutional constraint on expenditure growth. An initial step towards dealing with expenditure creep within the confines of the fiscal rule was the introduction of a cap on the ratio of federal current expenditure to GDP in the 2005 Budget Guidelines Law (LDO), which covers the period 2006-08, and its maintenance in the draft LDO for the triennium 2007-09. International experience is instructive in this regard. For example, the

Figure 1.7. **Trends in the minimum wage, earnings and labour informality**



1. The minimum wage and average earnings (for wage-earners in the metropolitan region of São Paulo) are defined in real terms as 12-month moving averages.
2. Informality is defined as the ratio of own-account workers and those without social security coverage to the employed population. The series based on the old and new Monthly Employment Survey (IBGE-PME) methodologies (prior to March 2003) were spliced.
3. Based on the 2004 National Household Survey (IBGE-PNAD). Informality is defined as the ratio of own-account workers and those without social security coverage to the employed population, excluding employers and individuals without declared remuneration.

Source: IBGE (Monthly Employment Survey, PME; and National Household Survey, PNAD), IPEA and OECD calculations.

Box 1.2. **Relationship between social security and assistance: Disincentives for labour formality**

The design of some existing social assistance programmes affects the incentives facing workers to obtain social security coverage. The introduction of a number of income-support programmes since the early 1990s, especially for the elderly and the disabled (LOAS), has served the purpose of strengthening safety nets. These benefits are means-tested and equivalent to a minimum wage paid to an elderly person aged at least 65 years living in a household with per capita income below one-quarter of a minimum wage.[1] But eligibility is not conditional on formal employment, thus reducing the opportunity cost of labour informality. This is especially the case for minimum-wage earners, who can apply for an old-age assistance pension (which is equal to the minimum wage) at age 65, instead of contributing to social security for at least 15 years to retire on the basis of old age, or for 35 years (30 years for females) to obtain an old-age pension on the basis of length of contribution. The age at which an elderly person is eligible for this type of social assistance was reduced from 70 years to 65 years over time, which has aggravated the disincentive for formality. Moreover, access to publicly funded health care services is universal, hence unconditional on formal labour market status, which weakens the incentive for formality further, while undoubtedly serving a social objective.

Other social insurance programmes also affect the incentives for labour formality. This is the case of severance insurance paid through FGTS in the case of "unfair" dismissal. As discussed in the *2005 Survey*, FGTS is a privately-run fund of individual accounts for formal-sector workers financed through employers' contributions (8% of employees' monthly earnings, plus a 0.5 percentage-point surcharge introduced in 2001). In the case of unfair dismissal, the balance accumulated during the employment contract is paid to the employee, together with an indemnity equal to 40% of this balance. A 10 percentage-point surcharge was introduced in 2001. Although FGTS insurance is conditional on formal employment, it creates incentives for negotiated separations, resulting in high labour turnover (discussed in Chapter 4) and informality.[2] This is because FGTS balances are remunerated at a below-market interest rate and the indemnity due in the case of unfair dismissal increases the cost of firing to be borne by employers. This indemnity is paid directly and in full by the employer to the employee, who may therefore negotiate with the employer for a voluntary quit to be claimed as an unfair dismissal, while continuing to work informally.

1. A new social assistance law (LOAS, *Lei Orgânica da Assistência Social*) was promulgated in 1993 creating a social protection entitlement (BCP, *Benefício de Prestação Continuada*) for the elderly and the disabled. Until then, social protection for the elderly aged at least 70 years had been provided through RMV (*Renda Mensal Vitalícia*), introduced in 1974, which was conditional on social security coverage during the beneficiary's working life. See the *2005 Survey* for more information.
2. To discourage abuse, a system is now in place to verify whether an individual is re-employed by the same firm within 12 months of a separation.

introduction of spending ceilings in the United States through the Budget Enforcement Act, in place up to 2002, was instrumental in the process of fiscal adjustment that took place in the 1990s.[6] Other countries in the OECD area, such as the Netherlands, New Zealand and Sweden also have expenditure caps, which are working well. In any case, to be effective, an expenditure cap needs to be defined in a comprehensive manner and be applicable to all levels of government so as to reduce the scope for fiscal gimmickry. Compliance with the rule also needs to be monitored in a timely fashion.

More is needed to reduce budget rigidity, allowing for a reprioritisation of spending in favour of more cost-effective programmes. A lack of downward flexibility in the budget is

not uncommon because compensation for civil servants, which is rigid in nominal terms, accounts for the bulk of government spending. But what distinguishes Brazil from most countries in the OECD area is the extent of formal revenue earmarking, coupled with the existence of constitutionally set spending floors for selected programmes, including aggregate outlays on health care, regardless of the cost-efficiency of these outlays. In spite of widespread agreement on the need to remedy this problem, little progress has been made in this area since publication of the *2005 Survey*.

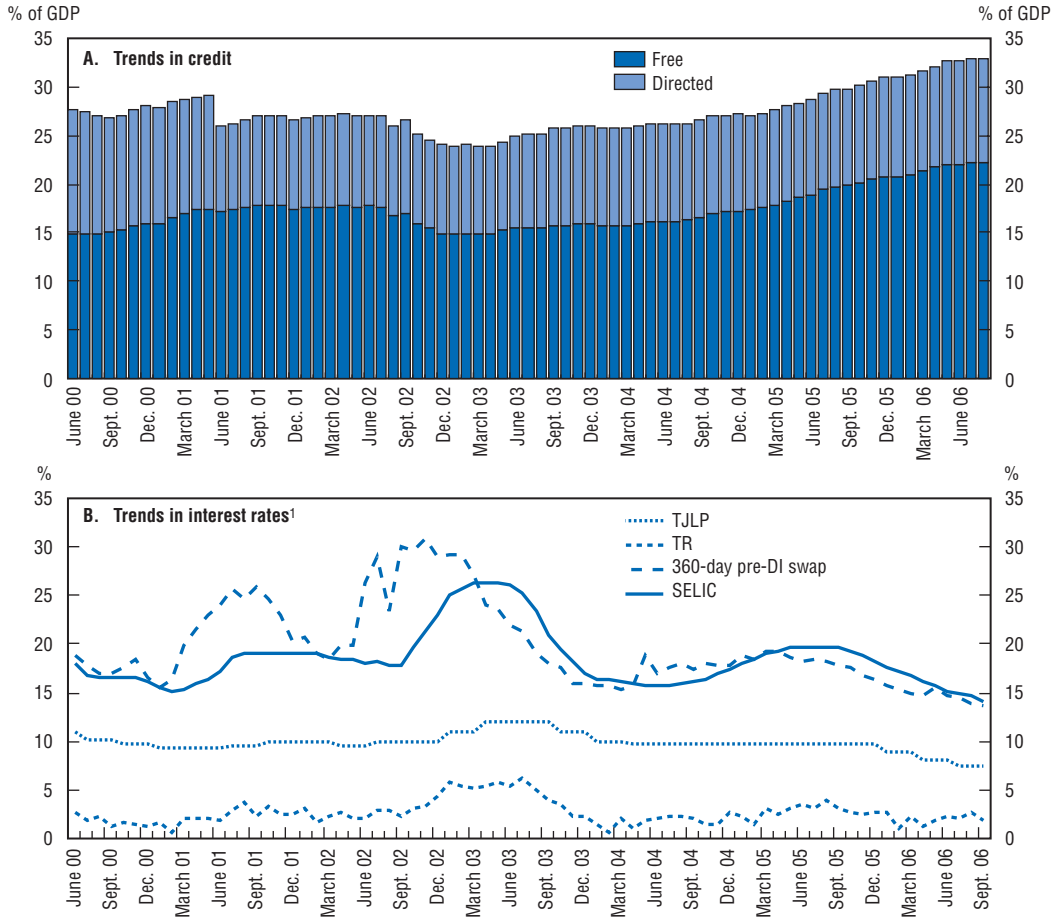
Monetary policy and credit

The institutional framework for the conduct of monetary policy has combined inflation targeting and a floating exchange rate since 1999. The BCB is yet to be granted *de jure* autonomy, although it is perceived as *de facto* independent. Monetary policy has continued to deliver sustained disinflation since 2003. An important achievement in this area is that the policy regime has contributed to anchoring inflation expectations around the pre-announced targets, which is essential under inflation targeting (Annex 1.A3). Deviations of expected inflation from the target have narrowed over time. An important challenge in this area is to enhance the efficiency of monetary policy further, so that a given fall in inflation can be achieved through a lower increase in the policy interest rate.

Although most of the recent expansion in credit has come from the unregulated market segment, which is a positive development, directed credit still accounts for about one-third of total bank credit (Figure 1.8), although it has declined over time. Directed credit can be justified when it addresses a market failure, but it is beginning to be difficult to make this case in Brazil, especially in the areas of housing and industrial financing, to which the bulk of regulated credit is channelled. The extant directed credit requirements are an inheritance from the pre-stabilisation period, when they were introduced as a means of fostering long-term saving in an environment of chronically high inflation. Most directed credit is delivered through government-owned financial institutions, such as *Caixa Econômica Federal* (particularly for housing credit), *Banco do Brasil* (especially for agricultural financing) and BNDES (the National Development Bank), directly to borrowers or through on-lending operations involving private commercial banks, especially in the case of BNDES (Figure 1.9). Directed credit typically takes place through the mandated allocation of savings and sight deposits in commercial banks. In addition, there are compulsory savings programmes, such as the Workers' Fund (FAT), consisting of earmarked revenue from taxes on enterprise payroll and value added, and the severance insurance fund (FGTS), whose assets are channelled to regulated credit operations. Moreover, there are a number of soft-loan programmes financed by the budget through a variety of special-purpose funds, also typically financed through revenue earmarking.

The channelling of savings to selected sectors/activities creates allocative inefficiencies to the extent that it drives a wedge between private and social rates of return. Distortions arise because there is a considerable discrepancy between the interest rates set by the government for directed credit operations, such as the regulated long-term interest rates used by BNDES and *Caixa Econômica Federal* (TLJP and TR, respectively, for example), and those that are market-driven.[7] On the one hand, because the funds used to finance directed credit operations are not remunerated at market rates, as in the case of FAT and FGTS assets, regulated credit discourages long-term saving on a voluntary basis. It also encourages investment in activities where rates of return are comparatively low.[8] Comparable long-term assets are also often remunerated at different rates of return.

Figure 1.8. **Trends in credit and interest rates, 2000-06**



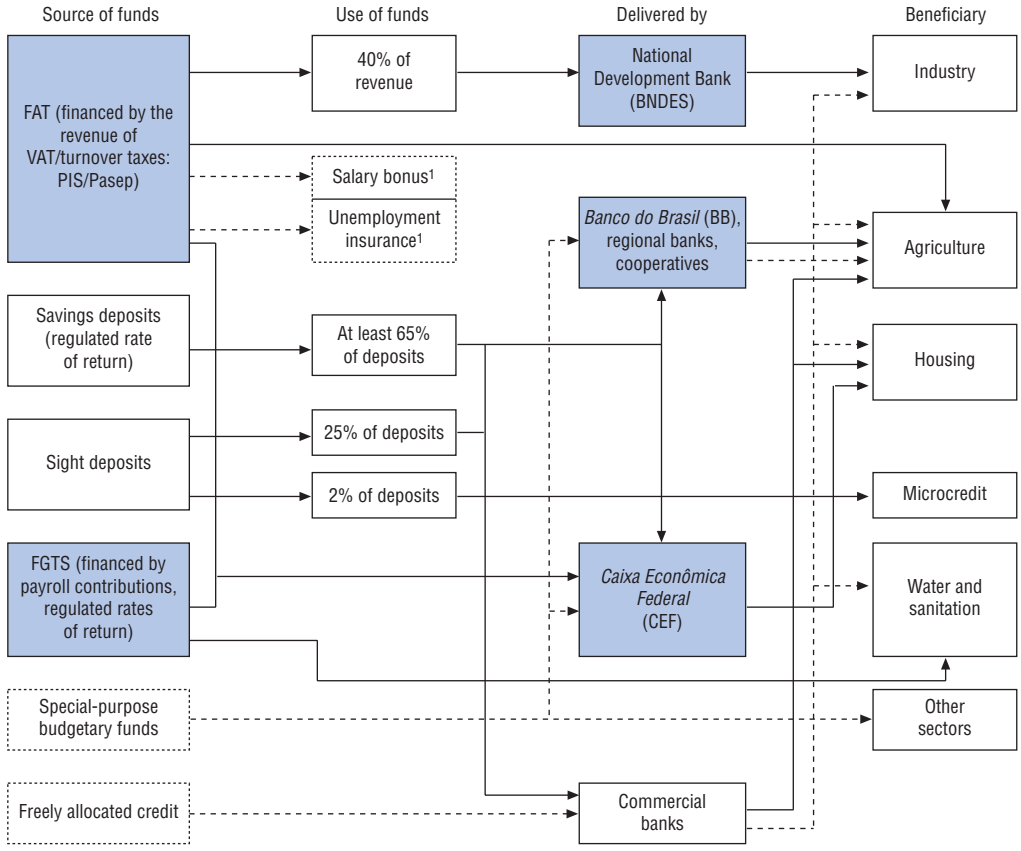
1. The interest rates are annualised. TR and TJLP are long-term interest rates set by the National Monetary Council (CMN) and used in directed credit operations. In the case of TR, the statutory rate excludes the fees and "sectoral spreads" charged by financial institutions in credit operations.

Source: Central Bank of Brazil.

Preserving these distortions runs counter to the policy objective of raising Brazil's potential growth through higher saving and productivity-enhancing investment. Moreover, because the source of funds used to finance directed credit programmes includes levies on enterprise payroll, as in the case of FAT and FGTS, the existence of regulated credit poses an obstacle to the reduction of the high tax burden on enterprises, which is detrimental to formality in the labour market, discussed in Chapter 4, and the competitiveness of Brazilian exports.

Statutory compulsory reserve requirements on bank deposits are very high (Figure 1.10), a fact that is associated with efforts to keep a tight rein on liquidity in the early stage of macroeconomic stabilisation in the mid-1990s. These requirements act as an implicit form of taxation on financial income, which raises the cost of intermediation. This is in addition to an already high explicit tax burden on financial income and transactions, including the bank debit tax (CPMF), which alone yields about 1.5% of GDP in revenue.[9] Compulsory reserve requirements also reduce the efficiency of monetary policy by weakening the credit channel through which monetary impulses are transmitted to the economy. These are important considerations because the 2003 Investment Climate

Figure 1.9. **Directed credit mechanisms: An overview**



Identifies directed credit flows

Identifies freely allocated credit and complementary use of funds or credit mechanisms

1. See the *2005 Survey* for more information on the Salary Bonus and the unemployment insurance financed through FAT.

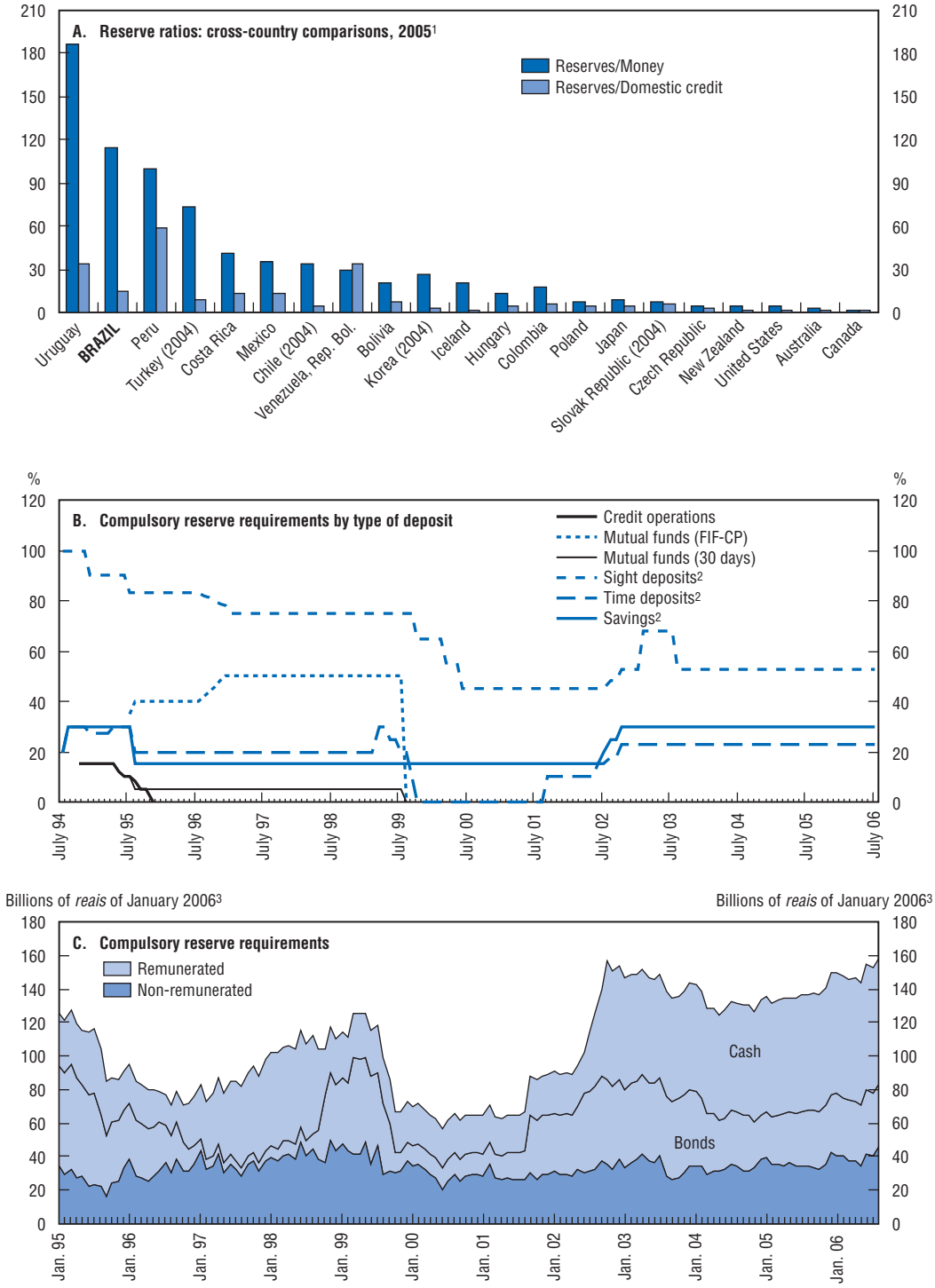
Survey conducted by the World Bank puts tax rates and the cost of financing as the main obstacles to growth in Brazil. It should also be noted that in this regard Brazil is at odds with most countries that have adopted inflation targeting as the framework for monetary policymaking, which have now reduced or eliminated compulsory reserve requirements.

Boosting innovation in the business sector

As in many countries with a relatively low R&D intensity – about 1% in Brazil, against the OECD average of 2.2% of GDP – innovation tends to be carried out predominantly by the government and public universities, rather than the business sector. Low human capital is among the most important constraints to business innovation; policies aimed at improving the access to and quality of formal education and labour training are therefore complementary to those for fostering innovation. This is because technological upgrading through the acquisition of more modern machinery and equipment, as well as licensing, requires adaptive efforts on the part of innovative firms. The low educational level of the population also deters ICT penetration, which contributes to the absorption and diffusion of knowledge, suggesting that firms may be stuck in low-productivity traps.[10] This is

Figure 1.10. **Compulsory reserve requirements**

In per cent of GDP



1. Includes non-compulsory reserves.
2. Includes the "additional requirements".
3. Deflated by IPCA.

Source: IMF (International Finance Statistics, IFS) and Central Bank of Brazil.

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especially the case among the small and medium-sized enterprises (SMEs), which typically do not have as much access to credit and skilled labour as their larger counterparts. A focus on SMEs in the government's policy towards labour training could therefore yield important gains in the area of innovation. This is important, given that SMEs account for about 60% of employment and 30% of GDP and that the Innovation Survey (IBGE/PINTEC) shows that the increase in the innovation rate among smaller enterprises was particularly noticeable in 2000-03 relative to 1998-2000, as discussed in Chapter 3.

Pro-investor trade and investment regimes are among the framework conditions for innovation, as well as pro-competition regulation in product markets. The fact – highlighted in the Innovation Survey – that most firms, regardless of size, consider the acquisition of machinery and equipment the most important source of technology transfer suggests that Brazil has much to gain from further trade liberalisation. As noted above, much was done in the 1990s to reduce effective trade protection: the average import tariff was reduced from 32.2% in 1990 to 10.6% in February 2006. However, Brazil's average import tariff remains high in comparison with the OECD average. As a result, Brazil's score in the component of the OECD PMR restrictiveness indicator quantifying trade barriers in 2004, reported in the *2005 Survey*, was comparatively high and at odds with other indicators of PMR restrictiveness, which otherwise indicate the presence of a reasonable degree of economy-wide competitive pressures. Further reductions in the cost of imports would facilitate the diffusion of embodied technological progress in both capital goods and intermediate inputs. Likewise, the empirical evidence discussed in Chapter 3 suggests that foreign competition encourages innovation, and Brazilian firms that export and have operations abroad also tend to be more innovative.

Innovation also requires improvements in higher-education attainment. Regardless of the industrial sector to which they belong, firms are more likely to engage in innovative activities when they employ trained and certified specialists. This is also important for the diffusion of knowledge through the adaptation of existing technologies and ideas into new products and work practices. Progress in this area has nevertheless been disappointing, as the attainment gap in higher education between Brazil and the OECD area is widening (Chapter 3). There has been an expansion in the private university network, but these institutions have focused on low-cost career streams, rather than on sciences and engineering.

More effort is needed to convert knowledge into productivity gains in the business sector. The diffusion of knowledge through licensing agreements could also be facilitated to encourage productivity enhancement through innovation. Universities and public research institutions account for more than one-half of R&D spending, but technology transfers to the private-sector have so far been difficult, preventing academic excellence in many areas from leading to productivity gains through the commercial use of government-funded research. In this regard, the new legislation reducing red tape and facilitating associations between public research institutions and businesses is a step in the direction of boosting public-private co-operation in R&D. This is important, because the innovation surveys suggest that, when businesses engage in innovation, they tend to do so in-house rather than through associative ventures with research institutions.

A difficult challenge in the design of innovation policy is the balance between direct government support and tax incentives. The current policy framework has begun to focus on the synergies and policy complementarities among trade, innovation and industrial policies, focusing on the promotion of competitiveness, rather than on the protection of

specific sectors. But Brazil's innovation system is complex and lacks formal mechanisms for co-operation among the federal and state-level science and technology (S&T) agencies. The mix of incentives is tilted towards direct support, but the extensive use of revenue earmarking for financing support programmes for innovation makes it more difficult to allocate funds with contestability considerations, which is associated with greater cost-effectiveness, and to channel money to the activities that can maximise cross-sectoral, economy-wide externalities.

Improving the utilisation of labour inputs

Tackling informality

Labour force participation is already high in Brazil for prime-age workers in comparison with the OECD average, although it is somewhat lower for females. However, the informal labour market, defined as comprising own-account workers and those without social security coverage, is sizeable, accounting for about one-half of the employed population aged 15-59 years. Restrictions embodied in employment protection legislation (EPL), assessed in detail in the *2005 Survey*, do not seem to be the main culprits for widespread informality (Box 1.3). At least as far as gauged by the OECD methodology for assessing EPL restrictiveness, Brazil's labour code does not appear to be overly stringent. This is due to a combination of below-average rigidity for regular contracts and above-average rigidity for fixed-term and temporary-work contracts. Informality therefore seems to result predominantly from a heavy tax burden on labour and a shift in labour demand over the years towards skilled workers – especially following the introduction of pro-competition reforms in the 1990s – which has made it more difficult for unskilled workers to find a job in the formal sector. In this regard, the empirical evidence reported in Chapter 4 shows that educational attainment is a powerful determinant of employability, as in the OECD area, including in the informal sector.

Therefore, while low human capital is likely to be the main obstacle to the creation of formal-sector jobs, several features of the existing social protection programmes appear to discourage the formalisation of labour relations and to encourage labour turnover, while undoubtedly serving a social purpose, as noted above. Against this background, policy efforts towards tackling informality will need to remove these perverse incentives, while striking the right balance between adequate, affordable social protection and incentives to work in the formal sector.

Human capital accumulation through formal education and labour training

The shortage of human capital is the single most important obstacle to productivity growth. Congruent with relatively low attainment rates in formal education, the average years of schooling of the workforce is comparatively modest (Figure 1.11). These indicators are improving over time but not at the same clip as in countries with which Brazil competes in the international market. Based on standardised tests, such as PISA, the quality of formal education is also sub-par, as discussed in the *2005 Survey*. Because total public spending on education is by no means low in relation to national income, and in comparison with the OECD average, Brazil's poor education indicators seem to reflect primarily a quality problem, rather than a lack of funding. It should be recognised, nevertheless, that other factors, such as the efficiency of government spending on education and average household income, also shape education outcomes.

Box 1.3. **Labour informality: Causes and consequences**

It is not easy to define, measure and compare informality across countries. In principle, the "shadow", "undeclared", "underground" or "black" economy refers to activities carried out outside the scope of taxation and regulation. Cross-country comparability is particularly challenging because there is no universally accepted definition of informality, even within the OECD area. As noted in the main text, informality is most commonly defined in Brazil in terms of social security coverage, including own-account workers. Based on this definition, the informal sector accounts for about 47% of the employed population in Turkey (2006) and 44% in Mexico (2003). A broader definition used by the International Labour Office (ILO) in an attempt to make measurement comparable across countries treats as informal the employees of small private non-agricultural unregistered unincorporated enterprises with less than 5 paid workers producing at least part of their output for sale or barter. Based on this definition, Brazil's informality rate stood at about 37% in 1999, slightly higher than those of Mexico (2000) and Chile (2000).*

The causes of informality are complex and multi-faceted. A high tax and regulatory burden is often the main culprit (Schneider and Enste, 2000; Schneider and Klinglmair, 2004). If taxes and product/labour market regulations are strict, explicit and implicit costs of compliance tend to be high, encouraging firms and individuals to operate informally. A low level of human capital, making the cost of formality prohibitive for unskilled workers, also fosters informality. In addition, other non-economic factors, such as governance and the quality of government services, play a role: the opportunity cost of informality tends to be lower, the lower the quality of services provided by the government, which affect the perceived return on taxes and social security contributions.

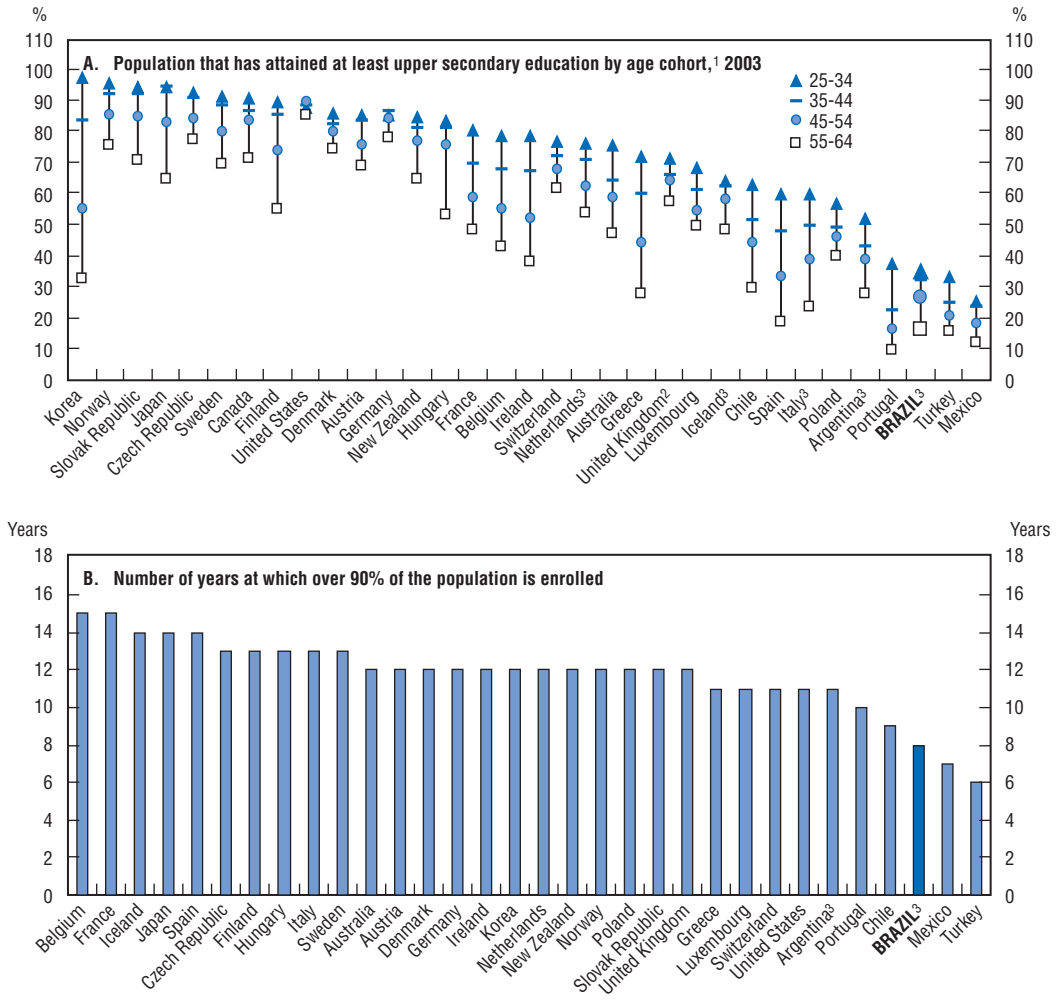
There are important reasons why policymakers should be concerned about the informal sector. *First,* these activities are often well entrenched and affect both informal and formal workers. As discussed in Chapter 4, the informal sector may become a trap for unskilled workers, thus perpetuating a vicious circle of low human capital and low pay in a segmented labour market. *Second,* informality complicates the design of social protection programmes, because it makes it difficult to reach informal workers through social assistance and active labour market policies (ALMPs). *Third,* informality poses challenges for the design of tax policy, because it narrows tax bases, resulting in the shifting of the tax burden onto formal enterprises and individuals. This is also the case, noted in the main text, of social security schemes, for which informality creates a wedge between the rate of growth of the contributory base and that of expenditure on pensions. *Fourth*, labour informality is associated with income inequality, so long as it is related to low educational attainments. *Finally,* a lack of access to the financial sector increases the financing costs facing informal enterprises, which often results in a low level of physical capital used in production and low productivity.

Because it is a multi-dimensional phenomenon, policy action to tackle informality should focus on several areas. International experience suggests that efforts may include interrelated actions such as strengthening social safety nets, facilitating access to education, boosting the enforcement capacity of the tax authorities, reforming and simplifying the tax system and alleviating the burden of social security contributions on low-paid workers (McKinsey and Company, 2004). As suggested by OECD (2004), the overall effectiveness of these policies is not clear-cut. A careful analysis of specific country characteristics and the root causes of informality should therefore be carried out before any economic policy recommendations are made.

* See International Labour Office (2005) for estimates of labour informality in selected Latin American countries.

Figure 1.11. **Educational attainment by cohort**

In per cent



1. Excludes ISCED 3C short programmes.
2. Includes some ISCED 3C short programmes.
3. The reference year is 2002.

Source: OECD (*Education at a Glance*, 2005).

There is widespread agreement that the gains to be made from faster human capital accumulation are enormous. As a result, policy initiatives are now turning to quality enhancement, having thus far focused essentially on expanding the supply of publicly funded services and on removing constraints to private-sector provision, predominantly in tertiary education (discussed in Chapter 3). The coverage of primary and lower-secondary education expanded at a vigorous pace following the introduction of FUNDEF, a fund established in 1998 to reform the financing of formal education across levels of government (de Mello and Hoppe, 2005). The extension of FUNDEF to upper-secondary and pre-school education from 2007 – through the creation of FUNDEB – is a welcome step in the direction of reducing access bottlenecks at the upper-secondary education level and removing constraints on child care for working mothers and pre-school education, making labour force participation easier for prime-age females (discussed in Chapter 4). The focus on the expansion of supply reflects the rise in demand for formal education due to increases in

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returns to skills over time and the gradual shift in labour demand toward skilled workers. The introduction of standardised tests for lower-secondary school leavers is among the recent initiatives to assess the quality of formal education. Such tests are also now in place at the higher-education level.

An increase in the average years of formal education of the labour force remains the ultimate goal of policies aimed at human capital accumulation. But, in the interim, labour training is crucial for developing firm-specific skills and encouraging the accumulation of human capital by those individuals who are already in the workforce and will not, or cannot, engage in continuing education. Labour training is provided at the sectoral level – through the "S" system, discussed in Chapter 4 – financed through para-fiscal levies on enterprise payroll, whose revenue accounted for about 0.3% of GDP during 2000-05. Because of the dominant role of the "S" system in this area, federal involvement in labour training is limited and concentrates on conditional activation schemes for the unemployed and on labour placement. Publicly funded vocational education is in short supply, essentially because the Brazilian system does not have separate vocational and general education streams.

An unresolved policy issue is related to cost-recovery in tertiary education. The fact that private returns are likely to exceed social returns for higher education makes public provision less compelling than in the case of primary and secondary education, for example. A move from direct public financing for institutions towards the introduction of tuition fees could therefore be considered, given that public spending on higher education is estimated to be among the most regressive expenditure items in Brazil. This should be complemented by the expansion of student loans and complemented by means-tested support, to ensure that the introduction of tuition fees does not work as an obstacle to the participation of students from disadvantaged backgrounds. Design options are numerous and could also include loan reimbursement conditional on income after graduation and drop-out risk to be borne by the government. The experience of several countries is instructive. For example, Chile has a long tradition in the use of tuition fees for higher education together with student loan schemes and now has broadened the range of universities in which enrolment is eligible for government support. Australia and the United Kingdom have introduced tuition fees that are not paid at the time of study but subsequently repaid from earned income. These complementary measures are important because the combination of low, comparatively stable attainment across cohorts (Figure 1.11, Panel A) and a high earnings premium for higher education (discussed in Chapter 4) suggests the presence of financial constraints to enrolment in higher education.

Notes

1. Brazil's privatisation programme was large, amounting to over USD 100 billion in receipts since 1992, starting with manufacturing in the early 1990s and followed by utilities in the second half of the decade.
2. See Pinheiro *et al.* (2001) for empirical evidence.
3. Schmitz and Teixeira (2004) show that labour productivity more than doubled in both private firms and former State-owned enterprises (SOEs), which accounted for 60% of output before privatisation began in 1989 with the restructuring of the *Siderbras* system. The privatisation of the two largest companies (CSN, *Companhia Siderúrgica Nacional*; and CVRD, *Companhia Vale do Rio Doce*) was completed in 1993 and 1997, respectively. Productivity gains arose due to changes in work practices as well as the elimination of redundant administration and management.

4. The use of nominal tariffs as a measure of protection would be misleading before 1989 because of the presence of redundant tariffs (*i.e.* those that exceed the difference between world and domestic prices). The 1988 tariff reform eliminated those redundant tariffs. It was not until 1990 that a comprehensive programme was put in place to reduce tariffs in a scheduled manner and that most non-tariff restrictions were removed. See Hay (2001) for more information.
5. See Rossi and Ferreira (1999) for industry-level and cross-sectoral evidence on the link between trade openness and productivity gains.
6. The Budget Enforcement Act of 1990 specified targets for each year's discretionary spending and replaced annual deficit targets with limits on incremental changes in the deficit as estimated to follow from legislation. It should nevertheless be noted that the fiscal rule could sometimes be circumvented by designating funds as emergency spending, or by using advanced appropriations to spread budget authority over a period of more than a year.
7. See Ministry of Finance (2000) for a detailed estimation of the implicit subsidies associated with the use of FAT resources.
8. See Arida (2005) and World Bank (2005) for more information.
9. See Baca-Campodonico *et al.* (2006) for an overview of bank debit taxation in Latin America and empirical evidence on the productivity of those taxes (*i.e.* the ratio of revenue in relation to GDP divided by the tax rate).
10. Brazil ranked 62nd in the World Economic Forum's 2003 Digital Access index, on a par with Mexico in the OECD area, and 52nd in the 2005 Networked Readiness score, similar to that of Poland in the OECD area.

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ANNEX 1.A1

Actions taken in structural reform

This Annex reviews the actions taken in the area of structural reform based on the policy recommendations made in the *2005 Survey*.

***2005 Survey* recommendations**	**Actions taken**
MEASURES TO IMPROVE THE QUALITY OF FISCAL ADJUSTMENT	
Assess the existing revenue earmarking and expenditure rigidities	No action taken.
MEASURES TO BOOST CREDIT	
Ensure the portability of positive information on credit history	A new legal framework is under discussion in Congress.
Reinforce creditor rights	Legislation is under discussion in Congress to: *i)* reform civil execution procedures and to improve collateral recovery, *ii)* facilitate conflict resolution (Mediation Law), *iii)* rationalise appeal procedures in civil and labour law, and *iv)* strengthen corporate accounting standards.
Gradually alleviate the tax burden on financial intermediation	The bank debit tax (CPMF) burden is being reduced through the creation of "investment accounts" and life insurance operations have been exempted from financial operations (IOF) taxation. These measures are complemented by the introduction of PIT exemption for non-resident investment in domestic public debt instruments and venture capital funds, as well as CPMF taxation on IPOs (discussed in Chapters 2 and 3).
Gradually phase out directed credit	Recent initiatives include improvements in agricultural insurance, as well as agribusiness and real-estate credit securitisation to facilitate risk management. Other measures include improvements in the legal framework for real-estate and home financing, as well as PIT exemptions for investment in a variety of instruments, including real-estate receivables.
MEASURES TO IMPROVE REGULATION IN NETWORK INDUSTRIES	
Strengthen the regulation of the gas sector	A new legal framework is under discussion in Congress.
Clarify the assignment of powers across the different levels of government in water and sanitation	A new legal framework is under discussion in Congress.
MEASURES TO BOOST PRO-COMPETITION REGULATION	
Reduce administrative burdens on start-ups	An integrated taxpayers' register (in operation in the states of São Paulo and Bahia) covering federal and sub-national taxes has been created.
Strengthen the regulatory agencies and anti-trust institutions	New legal frameworks are under discussion in Congress for the regulatory agencies in network industries, to streamline the current anti-trust institutions (SEAE, SDE and CADE) and to strengthen anti-trust regulation in the financial sector (Banking Competition Law).
MEASURES TO IMPROVE THE FINANCIAL SUSTAINABILITY OF THE SOCIAL SECURITY SYSTEM	
Pension reform: private-sector regime	
Introduce a minimum retirement age; sever the link between the minimum wage and the minimum pension; abolish exemptions to selected groups; increase the contribution period	Recent measures have focused on improving the administration of the social security system. Social security contributions are now administered by the Federal Revenue Service.

***2005 Survey* recommendations**	**Actions taken**
Pension reform: public-sector regime	
Create defined-contribution complementary pension funds for civil servants; unify the pension regimes for federal, state and municipal civil servants; standardise entitlements for private- and public-sector workers	The creation of complementary pension funds for civil servants is under discussion within government.
MEASURES TO IMPROVE THE EFFICIENCY OF THE TAX SYSTEM	
Reduce the tax burden on the business sector	Conversion of federal levies on enterprise turnover (PIS/Cofins) into value added-type taxes; introduction of tax incentives for the modernisation of ports and for investment by exporting firms; reduction of IPI taxation on capital goods; reduction of PIT on complementary pension funds, and fixed-income and equity investments depending on maturity.

ANNEX 1.A2

Calculating Brazil's potential GDP

This Annex calculates Brazil's potential GDP using a production function approach akin to that used by the OECD Secretariat for member countries.[1]

As a first step, total factor productivity was calculated as follows:

$$\ln(TFP)_t = \ln(Y_t) - 0.49\ln(\overline{K}_t) - 0.51\ln(\overline{L}_t), \quad (1.A2.1)$$

where Y_t denotes real GDP; $\overline{K}_t = \gamma_t K_t$ is the utilisation-adjusted capital stock, where γ_t denotes a coefficient of utilisation of installed capacity, K_t; $\overline{L}_t = (1-u_t)\overline{F}_t$ denotes utilisation-adjusted labour, where $\overline{F}_t$ is the labour force and u_t is the rate of formal unemployment; ln(.)denotes the natural logarithm; and t is a time indicator. The share of capital in GDP is obtained from the national accounts and is in line with previous literature (Silva Filho, 2001; Souza Junior and Jayme Junior, 2004; and Souza Junior, 2005).[2] Due to methodological changes in the unemployment series, the rate of unemployment was calculated as $u_t = (1-E_t)/\overline{F}_t$, where E_t is the employed (formal and informal) population.

Finally, potential GDP was calculated as follows:

$$\ln(Y_t^*) = \ln(TFP_t)^* + 0.49\ln(K_t^*) + 0.51\ln(L_t^*), \quad (1.A2.2)$$

where $\ln(TFP_t)^*$ is the HP-filtered TFP series calculated by Equation 1.A2.1; $K_t^* = \overline{\gamma}_t K_t$, $\overline{\gamma}_t$ is the HP-filtered series computed for γ_t, proxying for the non-accelerating inflation capital utilisation (NAICU); and $L_t^* = (1-\overline{u}_t)\overline{F}_t$, where $\overline{u}_t$ is the HP-filtered series computed for u_t, proxying for the non-accelerating inflation rate of unemployment (NAIRU). Forecasts of $\ln(TFP_t)$, γ_t and u_t using an autoregressive (AR) model were computed for 2006-08 and used to calculate the HP trends in order to minimise the end-point bias associated with HP filtering. Direct estimation of NAIRU and NAICU does not yield stable parameters because of structural breaks in the series.

Annual data are used in the calculations for the period 1980-2005. The labour force and employed population series are available from IPEA for the metropolitan regions, the stock of physical capital is also taken from IPEA in billions of 1999 *reais*, the index of utilisation of installed capacity is available from the *Getúlio Vargas Foundation*, and GDP is available from IBGE.

Based on the methodology above, TFP appears to have trended downward until the early 1990s and subsequently bounced back, especially after 1992. This pattern of TFP growth is consistent with previous calculations using aggregate data (Souza Junior, 2005) and with the industry-level evidence available to date (Pinheiro *et al.*, 2001). The calculations show that potential GDP growth averaged nearly 3% per year during the 1980s.

It fell to about 1% per year at the beginning of the 1990s and then picked up again and stabilised at about 2.5% per year on average during 2000-05.

The calculations are reasonably robust to setting $\overline{u}$ at a constant level of 5.5%, in line with the empirical literature (Silva Filho, 2001; Muinhos and Alves, 2003), given the uncertainty surrounding the estimation of NAIRU in a volatile macroeconomic environment. Nevertheless, growth accounting has obvious limitations. The main caveat is that the measurement of the TFP component of GDP growth is sensitive to measurement errors because it is calculated as a residual (*i.e.* the difference between output growth and a weighted average of the growth rates of the utilisation-adjusted factors of production). A correction is made for factor utilisation, because estimates of TFP growth would be pro-cyclical if the underutilisation of inputs during cyclical downturns were not taken into account. But factor quality is treated as uniform over time. As a result, TFP will be overestimated if improvements in the quality of capital or labour are underestimated: failure to account for improvements in educational attainment tends to overestimate the contribution of TFP to growth.

Based on these estimates of potential GDP growth, and assuming unchanged parameters, potential GDP is projected to grow by between 3.0 and 3.5% per year in the next few years. For a capital ratio of 49% of GDP, labour force growth of less than 2% per year and TFP growth of about 0.8% per year, the Solow-Swan model would predict a potential GDP growth rate of 3.5% per year. Alternatively, following the AK model, based on a saving rate of 20% of GDP, capacity utilisation at about 95%, a ratio of capital to GDP of 34% and a rate of depreciation of 3.5% per year, potential GDP would grow by about 3% per year.

Notes

1. The main advantage of the production function approach over other methodologies for calculating potential output (such as using a linear or HP-filtered trend) is that it considers structural constraints and limitations on production through the availability of factors of production and changes in productivity. See Giorno *et al.* (1995) for more information.
2. It can be argued that a capital share of about 50% is high by international comparison. This is due essentially to the fact that Brazilian national accounts treat the income of own-account and informal-sector workers as capital income. A capital ratio of 40% has been used in recent growth accounting exercises (Gomes *et al.*, 2003).

ANNEX 1.A3

Is the monetary regime anchoring expectations?

This Annex tests the hypothesis that there are at least two long-run relationships (co-integrating vectors) among the policy interest rate, expected inflation and the inflation target. In particular:

- The first co-integrating vector would define the monetary authority's reaction function.[1] If the central bank conducts monetary policy in a forward-looking manner, the policy interest rate should respond positively to changes in expected inflation.
- The second co-integrating vector would define the process whereby inflation expectations are formed. If the central bank is successful in anchoring expectations, expected inflation should respond negatively to changes in the policy interest rate and positively to the inflation target.

The data

Data are available on a monthly basis from the BCB for the period spanning 2001:7-2006:2. The policy interest rate is the nominal annualised SELIC rate. Expected inflation is the average 12-month-ahead CPI inflation rate available from the market surveys conducted by the BCB since July 2001. The inflation target is set by the National Monetary Council (CMN) for end-year CPI inflation.[2]

On the basis of the Phillips-Perron (PP) unit root test, all three variables were found to follow random-walk processes without drift. The Johansen-Juselius test was used to test for co-integration, allowing for an intercept in the co-integrating vector as the only deterministic element.[3] The number of lags included in the vector error-correction model (VECM) was selected by applying two different multivariate lag selection criteria: Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). The optimal lag structure was found to include three lags on the basis of the SBC and seven lags based on the AIC.[4] With regard to the co-integration test, there appears to be two co-integrating relationships among the variables on the basis of both the AIC and SBC criteria, as hypothesised.[5] The results reported in Table 1.A3.1 are based on an optimal structure of seven lags, because with three lags the two co-integrating vectors (not reported) were found to have implausible values for the long-run coefficients.

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Table 1.A3.1. **Co-integration tests**

	ML test			Trace test		
H_0	r = 0	r = 1	r = 2	r = 0	r ≤ 1	r ≤ 2
H_1	r = 1	r = 2	r = 3	r ≥ 1	r ≥ 2	r ≥ 3
Statistics	45.21	16.63	3.81	65.65	20.44	3.81
Critical value (at 10% confidence level)	19.77	13.75	7.52	31.88	17.79	7.50

Source: Data available from the Central Bank of Brazil and OECD calculations.

The co-integration vectors

The two estimated co-integrating vectors are as follows:

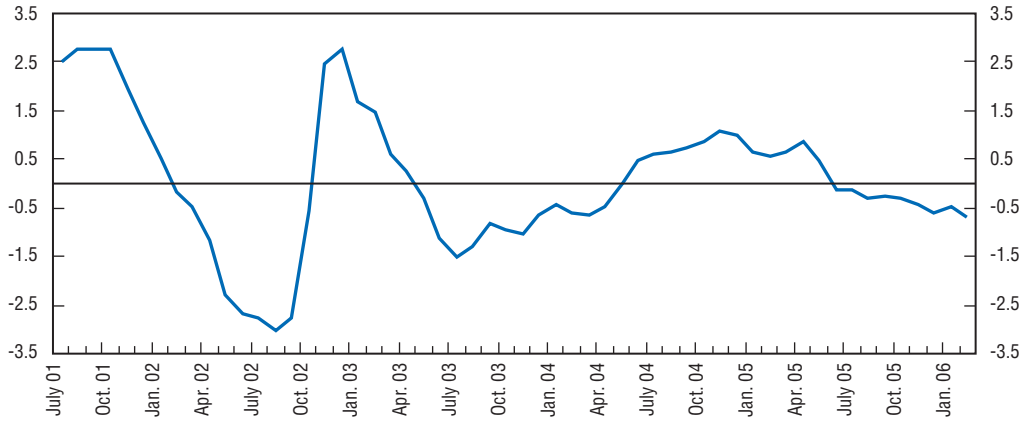
$$r_t = 15.25 + 0.50E_t\pi_{t+12} + 0.10\pi^*_{t+12} + e_{1t}, \quad (1.A3.1)$$

$$E_t\pi_{t+12} = -0.74 - 0.04r_t + 1.50\pi^*_{t+12} + e_{2t}, \quad (1.A3.2)$$

where r_t is the SELIC rate, $E_t\pi_{t+12}$ denotes the 12-month-ahead expected rate of inflation, and π^*_{t+12} is the 12-month-ahead inflation target.

The estimated co-integrating vectors suggest that monetary policy is conducted in a forward-looking manner and that inflation expectations are well anchored around the target. By Equation 1.A3.1, the monetary authorities react to increases in expected inflation by raising the SELIC rate: a one percentage-point increase in expected inflation leads to a 0.5 percentage-point increase in the SELIC rate. Also, the correlation between the SELIC rate and the inflation target is positive. By Equation 1.A3.2, expected inflation responds to both the inflation target and the SELIC rate over the long run. As such, increases in the SELIC rate and a reduction of the target both lead to a contraction in inflation expectations. The reaction of inflation expectations to the target is very strong: a one percentage-point reduction in the target leads to a 1.5 percentage-point reduction in expectations. Finally, the error term for this co-integrating relationship (e_{2t}) is depicted in Figure 1.A3.1. It suggests that the conduct of monetary policy, operating through the SELIC rate and the inflation target, has resulted in a convergence of expected inflation to its long-run determinants over the past three years or so.

Figure 1.A3.1. **Deviation of expected inflation from its long-run determinants**



Source: OECD's calculations based on Equation (1.A3.2).

Notes

1. Other variables can be included in the monetary reaction function, such as the output gap and the exchange rate (Chapter 2).
2. The 12-month-ahead inflation target was calculated in three steps. As the CMN sets end-year targets, the observed indices up to the introduction of the policy regime and the inflation targets were used to construct an end-year index. Then, as in Minella *et al.* (2003), a linear interpolation method was applied to obtain the indices for the remainder of the year. Finally, the 12-month-ahead target was calculated on the basis of this index.
3. The intercept was included because the variables behave as random walks without drifts; as such, no constant should be included in the model for the differenced variables. The hypothesis that the constant can be included in the co-integrating vector was not rejected by the data, once the number of co-integrating vectors was determined.
4. With monthly data, the maximum number of lags was originally set at 12, but all variables were found to be stationary in levels, which is inconsistent with the results of the unit root tests. The same was true for the models with a maximum number of lags ranging from 8 to 11.
5. In both cases, a likelihood-ratio test does not reject the null hypothesis that the constant may be included in the co-integrating vector (the *p*-values obtained were 0.18 and 0.69 for 3 and 7 lags, respectively).

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Chapter 2

Consolidating macroeconomic adjustment

Brazil has made considerable progress in recent years towards consolidating macroeconomic stability, which is a key framework condition for sustained growth. Monetary policy continues to respond swiftly to changes in the inflation outlook, anchoring expectations. Fiscal policy has been guided by debt sustainability considerations, delivering primary budget surpluses that have often exceeded the end-year targets. Nevertheless, while the public debt-to-GDP has been reduced, it remains high, especially in comparison with other emerging-market economies. Brazil's overarching macroeconomic challenge is therefore to continue to reduce the public debt overhang while improving the quality of fiscal adjustment, which has so far been underpinned by revenue hikes, rather than a retrenchment of expenditure commitments. To do so, measures will need to be taken to arrest the increase in current spending, especially on pensions, paving the way for subsequently removing distortions and reducing the tax burden over the medium to longer term, once the debt-to-GDP ratio has been reduced in a sustainable manner. The favourable domestic macroeconomic environment, with falling inflation and improving growth prospects, appears propitious for reform towards the gradual phasing-out of directed credit and a reduction in compulsory reserve requirements.

Macroeconomic management has been sound. Guided by debt sustainability considerations, the end-year consolidated primary budget surplus targets continue to be met, and even exceeded, allowing most of the revenue windfalls to be saved. Monetary policy continues to be conducted in a forward-looking manner, responding swiftly to the emergence of inflationary pressures (Annex 1.A3, Chapter 1). The central bank (BCB) remains *de facto* independent, although it is yet to be granted *de jure* autonomy, and the monetary policy regime in place since 1999 – combining inflation targeting with a floating exchange rate – is working well. At the same time, favourable global financial-market conditions and an impressive external adjustment since 1999 on the back of solid foreign trade and external current account surpluses have made the economy more resilient to adverse shocks. External vulnerability indicators, including those related to external public indebtedness, have improved markedly. These developments are welcome, and expectations appear well anchored due to the authorities' commitment to macroeconomic discipline. Nevertheless, further reform should be pursued by the next administration so as to consolidate and move beyond the achievements made to date.

This chapter argues that Brazil's overarching macroeconomic challenge is to reduce the public debt overhang. In doing so, it underscores the urgency to improve the quality of the fiscal adjustment that will be required over the medium-to-longer term by containing the increase in current spending, including on pensions, and subsequently removing distortions and reducing the tax burden, once the debt-to-GDP ratio has been reduced in a sustained manner. The consolidated tax-to-GDP ratio reached nearly 37.5% of GDP in 2005, a historical high. To improve the quality of fiscal adjustment, further reform of the social security system will be unavoidable. On monetary policy, efforts to expand credit are welcome, especially to the extent that it benefits the underserved population, such as low-income individuals and small and medium-sized enterprises (SMEs), and are likely to make the credit channel of the monetary transmission mechanism more potent over time. But further structural reform will be needed to gradually liberalise the credit market and to reduce compulsory reserve requirements – an implicit form of taxation – which are onerous in Brazil. Liberalisation in this area, as well as continued commitment to fiscal discipline, is likely to contribute to reducing Brazil's high real interest rates and intermediation costs, which have long acted as a drag on growth. The favourable economic outlook, domestic and external, as well as the on-going monetary easing, appears propitious for making headway on these policy initiatives.

Trends in fiscal policy

Recent fiscal performance

Brazil has maintained its strong track record in meeting the end-year consolidated primary budget surplus targets (Table 2.1). As discussed in the *2005 Survey*, the targets have been raised since 1999 to ensure the sustainability of the public debt dynamics. These were exceeded by wide margins in both 2004, benefiting from strong GDP growth, and 2005,

Table 2.1. **Macroeconomic targets and outturns, 1999-2006**

	Fiscal policy (% of GDP)		Monetary policy (%)			
	Consolidated primary surplus target[1]	Outturn	Inflation target (current year)			Outturn (IPCA)
			Lower bound	Central target	Upper bound	
1999	3.1	3.2	6.0	8.0	10.0	8.9
2000	3.4	3.5	4.0	6.0	8.0	6.0
2001	3.35	3.6	2.0	4.0	6.0	7.7
2002	3.75	3.9	1.5	3.5	5.5	12.5
2003	4.25	4.3	…	8.5[2]	…	9.3
2004	4.5	4.6	3.0	5.5[3]	8.0	7.6
2005	4.25	4.8	2.0	4.5	7.0	5.7
2006	4.25	4.5 (August)[4]	2.5	4.5	6.5	3.8 (August)

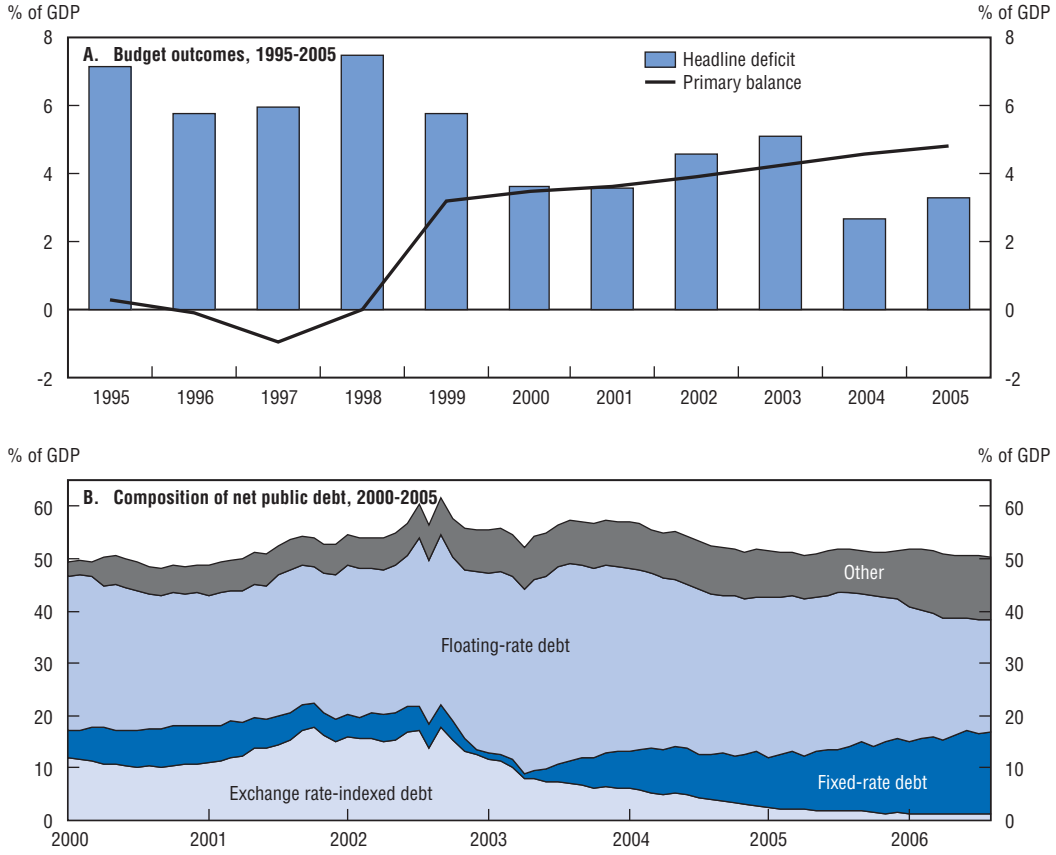
1. The targets refer to those set for the central government and its public enterprises in the Budget Guidelines Laws (LDOs) since 1999, together with the expected outturn for the regional governments (states and municipalities) and their public enterprises, and used as performance 7criteria under the arrangements with the IMF. When targets have been changed during the year, the latest target is considered.
2. Refers to the adjusted target set in January 2003. The 2003 target was set at 3.25% in 2001 with the confidence bands at ± 2 percentage points and then raised to 4% in 2002 with the confidence bands at ± 2.5 percentage points.
3. The target for 2004 was set in 2002 at 3.75% with the confidence bands at ± 2.5 percentage points.
4. Cumulative 12-month flow.

Source: National Treasury and Central Bank of Brazil.

given the impact of strong growth in the previous year on revenue and the timing of tax collections. As a result, revenue windfalls have been saved and the debt-to-GDP ratio fell sharply in 2004, also aided by favourable financial market conditions, before stabilising in 2005 at 51.5% of GDP. Attainment of a higher primary budget surplus was necessary to achieve stability in the debt-to-GDP ratio in 2005 in view of the monetary tightening that took place over the year through September (which resulted in an increase in interest payments, given the high share of floating-rate securities in the traded debt stock). Consonant with this preponderance of floating-rate instruments, the headline budget deficit remains volatile, although it has fallen over time in tandem with the rising primary surpluses (Figure 2.1). Further reductions in the headline budget deficit will ultimately be needed to achieve a sustained fall in the debt-to-GDP ratio.

However, the strong fiscal performance – measured by the consolidated primary budget surplus outturns – continues to be based on revenue hikes, rather than a containment of current expenditure commitments. Revenue performance remains solid, and the tax take rose by about 5% of GDP during 2000-05 – a period of volatile, lacklustre growth – to nearly 37.5% of GDP in 2005, a historical peak. At the same time, there are structural impediments to further expenditure restraint, including the surge in spending on pensions over the years (discussed in Chapter 1 and below). These trends underscore the need for improving the quality of the fiscal adjustment that will be required over the medium-to-longer term to put the public debt-to-GDP ratio on a sustained downward trajectory and to break the spend-and-tax cycle that has characterised fiscal adjustment to date (Figure 2.2), which is detrimental to long-term growth. Empirical evidence suggests that about two-thirds of changes in federal primary spending are offset by higher revenue over the longer term (de Mello, 2006). While federal spending on pensions has trended upwards, outlays on personnel appear to be contained, although pressures for raising civil servants' compensation are emerging. Expenditure on non-mandatory programmes, including

Figure 2.1. **Fiscal performance indicators**



Source: Central Bank of Brazil, National Treasury and OECD calculations.

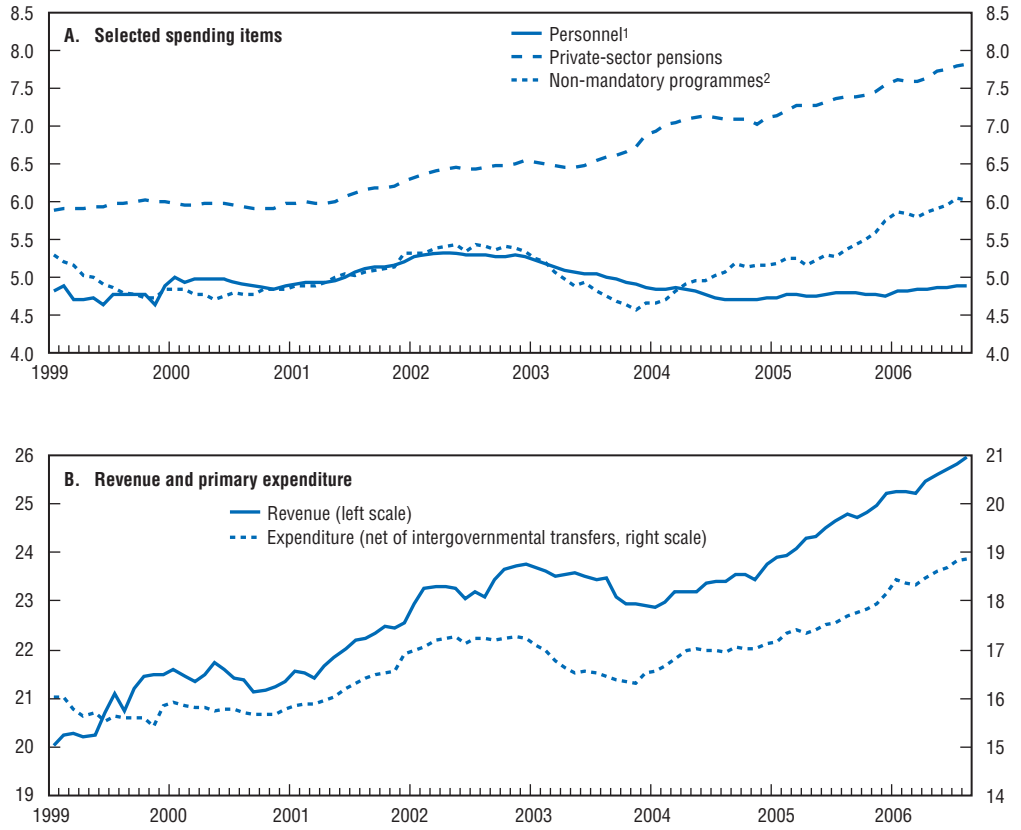
capital outlays, has risen recently, but remains volatile. Of particular concern is the decline in public investment over the years (Figure 2.3).

An important source of fiscal vulnerability is the sensitivity of public finances, especially spending on pensions, to minimum-wage policy. As noted in Chapter 1, this is because the government is required to set the minimum wage, to which the minimum pension is linked, every year at a level that preserves its purchasing power, but has chosen to increase it in real terms. There is no cap on increases in the minimum wage/pension above inflation, which, coupled with the downward rigidity associated with the requirement to preserve its purchasing power, puts upward pressure on spending. This is important because private-sector pensions account for approximately one-third of central government primary expenditure.

Fiscal stance over the business cycle

The fiscal stance has been predominantly countercyclical since 1999. The sensitivity of public finances to the business cycle depends on the size of government, the progressivity of the direct tax system and the comprehensiveness of unemployment insurance, among other factors. Brazil's budget balance is less sensitive to the business cycle than most OECD countries', essentially because of a lower primary spending-to-GDP ratio, although some taxes are fairly responsive to fluctuations in economic activity (Box 2.1). In addition, a comparatively low elasticity of the unemployment rate to business-cycle fluctuations makes

Figure 2.2. **Trends in federal spending and revenue, 1999-2006**
Cumulative 12-month flows, in per cent of GDP



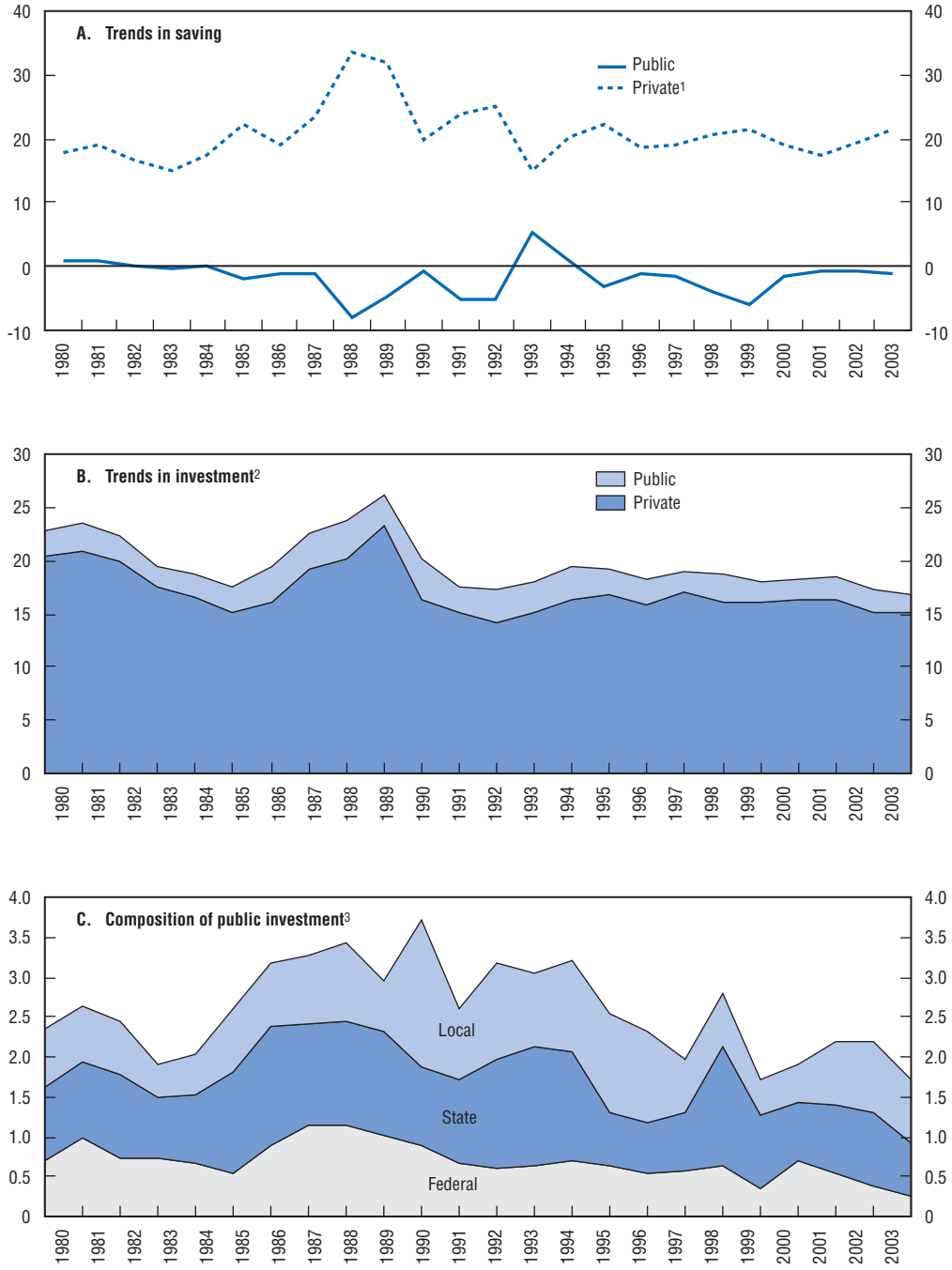
1. Includes pensions to retired civil servants.
2. Refers to "Other OCCs" in Brazilian budget documentation and includes selected mandatory spending on means-tested social assistance transfers to the elderly and the disabled (RMV and LOAS).

Source: National Treasury and OECD calculations.

government spending relatively less cyclical in Brazil than the OECD average.[1] In any case, when the effect of the business cycle on public finances is taken into account, given the size of the stabilisers built into the tax code, the social security system and unemployment insurance, Brazil's actual primary budget surplus exceeded its cyclically-adjusted level slightly during 2000-01, but fell short of it modestly in 1999 and again in 2002-04 (Figure 2.4). This is consistent with a counter-cyclical fiscal stance, given that the output gap is estimated to have been positive during 2000-01 and negative in 1999 and 2002-04. The increase in the primary surplus target by 0.25 percentage point to 4.5% of GDP in mid-2004, in line with better-than-expected growth towards year-end and the closing of the output gap, is illustrative of efforts towards greater policy counter-cyclicality when the economic outlook is auspicious.

Trends in government spending over the business cycle have been guided predominantly by debt sustainability considerations. Discretionary policy action (*i.e.* changes in the fiscal stance that are not associated with the business cycle through built-in stabilisers) may amplify or thwart the effect of automatic stabilisers on public finances, making the fiscal stance pro-cyclical when expenditure is cut (raised) during a cyclical downturn (upturn). Pro-cyclicality in downturns is consistent with the fact that, when the public debt-to-GDP ratio is high, or perceived to be unsustainable, there is little scope for counter-cyclical

Figure 2.3. **Trends in saving and investment, 1980-2003**
In per cent of GDP



1. Calculated as the difference between gross domestic saving and government saving.
2. Refers to buildings and machinery and equipment. Public investment excludes State-owned enterprises.
3. Excludes State-owned enterprises.

Source: IBGE.

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Box 2.1. **Calculating Brazil's fiscal stance over the business cycle**

The improvement in Brazil's budget balance since the floating of the *real* in 1999 has been impressive, even in periods of slow growth. It is therefore important to assess the evolution of Brazil's fiscal stance by distinguishing changes in the budget balance that are due to discretionary policy action from those that are associated with the automatic stabilisers built into the tax code, the social security system and unemployment insurance. The main budget aggregates therefore need to be re-calculated on a cyclically-adjusted basis; that is, controlling for the impact of business cycle-related fluctuations in economic activity on public finances based on unchanged policies. To do so, the methodology used by the OECD for cyclically adjusting the budget aggregates of its Member countries was applied to Brazil.*

The results of the exercise suggest that, although the sensitivity of Brazil's budget balance to changes in the business cycle is relatively low compared to the OECD average (Table 2.2), it is likely to be high for an emerging-market economy. This is because, at about 31% in 2004, against 40% on average in the OECD area, Brazil's primary general government spending accounts for an already high, and rising, share of GDP by emerging-market standards. It is known that the budget's sensitivity to the business cycle increases with the size of government (OECD, 1999). At the same time, although the share in total revenue of business cycle-sensitive tax bases, such as income and consumption, is lower than in the OECD area on average, the personal income tax is fairly progressive. The high personal income tax elasticity is essentially due to a relatively high exemption threshold, as discussed in the *2005 Survey*.

Table 2.2. **Revenue and expenditure elasticities: Brazil and OECD countries**

	Revenue				Expenditure (current primary expenditure)	Total[1]
	Corporate income tax	Personal income tax	Indirect taxes	Social security contributions		
Brazil	**1.17**	**2.70**	**1.00**	**0.67**	**–0.06**	**0.32**
United States	1.53	1.30	1.00	0.64	–0.09	0.34
Japan	1.65	1.17	1.00	0.55	–0.05	0.33
Germany	1.53	1.61	1.00	0.57	–0.18	0.51
France	1.59	1.18	1.00	0.79	–0.11	0.53
Italy	1.12	1.79	1.00	0.86	–0.04	0.53
United Kingdom	1.66	1.18	1.00	0.91	–0.05	0.45
Canada	1.55	1.10	1.00	0.56	–0.12	0.38
Australia	1.45	1.04	1.00	0.00	–0.16	0.39
Austria	1.69	1.31	1.00	0.58	–0.08	0.47
Belgium	1.57	1.09	1.00	0.80	–0.14	0.52
Czech Republic	1.39	1.19	1.00	0.80	–0.02	0.39
Denmark	1.65	0.96	1.00	0.72	–0.21	0.59
Finland	1.64	0.91	1.00	0.62	–0.18	0.48
Greece	1.08	1.80	1.00	0.85	–0.04	0.47
Hungary	1.44	1.70	1.00	0.63	–0.03	0.47
Iceland	2.08	0.86	1.00	0.60	–0.02	0.37
Ireland	1.30	1.44	1.00	0.88	–0.11	0.38
Korea	1.52	1.40	1.00	0.51	–0.04	0.22
Luxembourg	1.75	1.50	1.00	0.76	–0.02	0.47

* See de Mello and Moccero (2006) for more information on the methodology and the calculation of the cyclically-adjusted series.

Box 2.1. **Calculating Brazil's fiscal stance over the business cycle** *(cont.)*

Table 2.2. **Revenue and expenditure elasticities: Brazil and OECD countries** *(cont.)*

	Revenue				Expenditure (current primary expenditure)	Total[1]
	Corporate income tax	Personal income tax	Indirect taxes	Social security contributions		
Netherlands	1.52	1.69	1.00	0.56	–0.23	0.53
New Zealand	1.37	0.92	1.00	0.00	–0.15	0.37
Norway (mainland)	1.42	1.02	1.00	0.80	–0.05	0.53
Poland	1.39	1.00	1.00	0.69	–0.14	0.44
Portugal	1.17	1.53	1.00	0.92	–0.05	0.46
Slovak Republic	1.32	0.70	1.00	0.70	–0.06	0.37
Spain	1.15	1.92	1.00	0.68	–0.15	0.44
Sweden	1.78	0.92	1.00	0.72	–0.15	0.55
Switzerland	1.78	1.10	1.00	0.69	–0.19	0.37
Memorandum item						
OECD average	1.50	1.26	1.00	0.71	–0.10	0.44

1. Refers to the elasticity of the budget balance to changes in the business cycle and is calculated as the difference between the sensitivity of the four revenue items and that of expenditure, weighted by their respective 2003 shares in GDP.

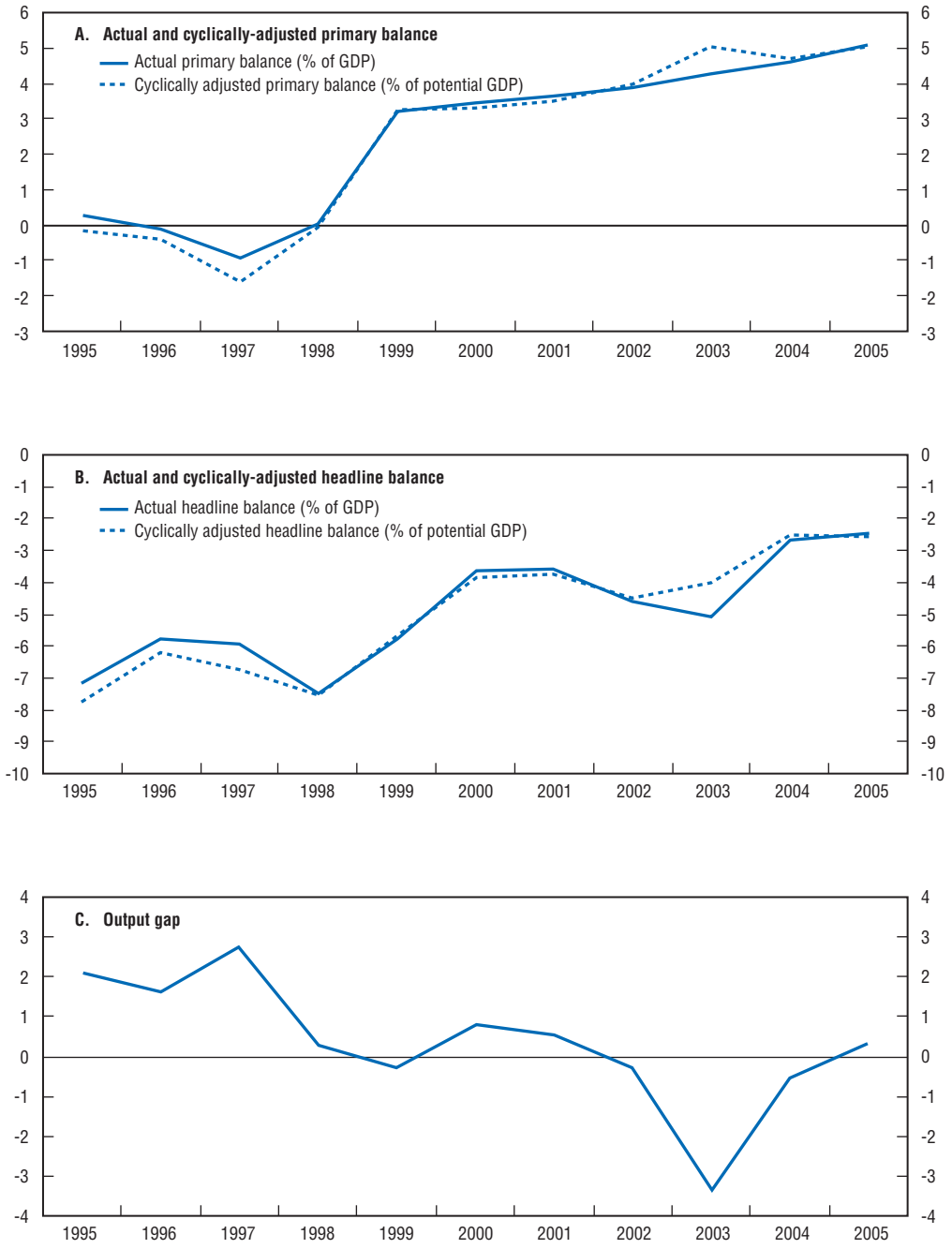
Source: de Mello and Moccero (2006) for Brazil and Girouard and Andre (2005) for the OECD countries.

policymaking. The empirical evidence reported in Annex 2.A1 suggests that federal spending on mandatory items, such as personnel, was pro-cyclical in downturns during 1997-2005 and, to a lesser extent, in upturns too. In the case of non-mandatory programmes, federal spending was estimated to have been pro-cyclical, but only in downturns. This underscores the federal government's use of policy discretion in support of its fiscal retrenchment efforts, even in bad times. This was clearly the case in 2003, when the primary budget surplus target was raised amid unfavourable economic conditions.

Nevertheless, in line with the experience of the OECD countries that have engaged in successful fiscal consolidation, the Brazilian case suggests that retrenchment in a downturn need not be destabilising, so long as it restores confidence in the policy framework by putting the debt dynamics back on a sustainable path.[2] There is now ample empirical evidence that fiscal contractions may be expansionary in heavily indebted OECD countries and that the composition of adjustment, *via* tax increases and/or expenditure cuts, affects the expansionary potential of fiscal retrenchment.[3] In this respect, the experience of OECD countries suggests that public indebtedness is a key determinant of the fiscal stance over the business cycle, with the need to rein in the rise in indebtedness often calling for pro-cyclical remedial action, even when growth is below potential (OECD, 2003, Chapter IV). This makes fiscal consolidation, rather than short-term demand management, the overriding objective of fiscal policymaking in countries, such as Brazil, where public indebtedness is considered to be a source of macroeconomic vulnerability.

Figure 2.4. **Fiscal stance over the business cycle, 1995-2005**

In per cent



Source: de Mello and Moccero (2006).

Public debt management

The reduction in the public debt's exposure to foreign exchange risk has considerably curtailed the economy's vulnerability to external and domestic confidence shocks. The share of government securities indexed to the exchange rate (including foreign exchange swaps) fell from a peak of nearly 40% of the net debt stock at the height of the confidence crisis that preceded the presidential election in 2002 to about 1% at end-2005. Over this

Box 2.2. **Developments in public debt management**

Public debt management continues to aim at reducing debt refinancing risk and costs over the longer term. To this end, it seeks: *i*) to lengthen the average maturity of the traded debt stock through a reduction of the share of short-term instruments (*i.e.* debt falling due in less than 12 months) and *ii*) to reduce interest-rate risk by reducing the share of securities paying floating interest rates (Table 2.3). Based on stress tests for the real exchange and the policy interest rates, the improvement in the composition of the traded debt stock since 2002 has significantly reduced refinancing risk. The stress tests suggest that an increase in the real interest rate and in the real exchange rate by three standard deviations for a period of one year would increase the debt stock by 5.6% of GDP in 2006, against 18.6% of GDP in 2002.

Foreign investors held only less than 1% of the stock of domestic public debt at end-2005. However, access by non-residents to domestic equity and fixed-income markets has been facilitated on the premise that it would reduce budget financing and debt roll-over costs and could therefore contribute to a faster reduction in real interest rates.* Legislation introduced in February 2006 exempted foreign investors from the withholding tax on capital gains on fixed-income investments in local markets (except for repo operations), regardless of the investment's maturity and duration. If the investment is carried out through a local mutual fund, government securities must account for at least 98% of the fund's assets under management. The withholding tax rate used to be 15% for non-residents and has remained unchanged for residents at 15-22.5%. The bank debit tax (CPMF) will continue to be levied on fixed-income operations, but IPOs and venture capital transactions have been exempted from CPMF taxation, as discussed in Chapter 3. The share of domestic public debt held by non-residents rose following the introduction of this legislation to nearly 2.2% at end-June 2006.

Over the longer term, the short-term losses incurred by foregoing tax revenue are expected to be more than offset by higher revenue accruing from a larger base for other taxes on fixed-income transactions and by the savings on debt service associated with a reduction in long-term interest rates and the second-round price effects on the domestic bond market. The possibility that foreign investors may swap sovereign debt for domestic instruments denominated in *reais* would also reduce exposure to exchange rate, and hence sovereign credit risk.

Table 2.3. **Traded public debt indicators, 2005-06**

	2005	2006 targets	
		Lower bound	Upper bound
Traded debt stock (in billions of *reais*)	1 157.1	1 280	1 360
Average maturity (in months)	32.9	35	41
Average duration (in months)	56.3	60	70
Share of debt falling due in less than 12 months (in per cent)	38.2	28	33
Composition (in per cent):			
Fixed-rate securities	23.6	25	33
Inflation-indexed securities	13.1	16	22
Floating-rate securities	43.9	35	43
Exchange rate-indexed securities	17.6	11	15
Other	1.8	1	3

Source: National Treasury (2006a).

* See National Treasury (2006b) for more information.

period, foreign exchange-indexed debt was replaced by securities paying floating interest rates, which accounted for nearly 44% of the stock of outstanding liabilities at end-2005, and increasingly by inflation-indexed instruments. The increase in the share of fixed-rate securities has also been noticeable since end-2004, in line with the authorities' debt management strategy for 2006-07 (Box 2.2).

The gradual reduction in the public debt's exposure to exchange-rate risk, particularly in the course of 2005, coupled with a marked contraction in external public indebtedness, have laid the foundations for greater resilience in the run-up to the 2006 election. This has made the debt dynamics less vulnerable to short-term changes in market sentiment, including the concomitant withdrawal of monetary stimulus in the world economy. Public debt management has benefited from favourable external financial conditions, and the National Treasury began to issue *real*-denominated bonds abroad in 2005. External public debt, particularly that with shorter-term maturities, is being repaid, including through the buyback of the remaining stock of Brady bonds and the early repayment of outstanding liabilities to the International Monetary Fund and the Paris Club. In addition, Brazil continues to fare well in relation to other emerging-market economies in the transparency with which information on public finances and indebtedness is communicated to markets. Nevertheless, despite the maintenance of high and rising primary budget surpluses and the reduction in external public indebtedness, the debt-to-GDP ratio remains comparatively high by emerging-market standards, underscoring the need for greater policy effort towards reducing the overhang.

Trends in monetary policy

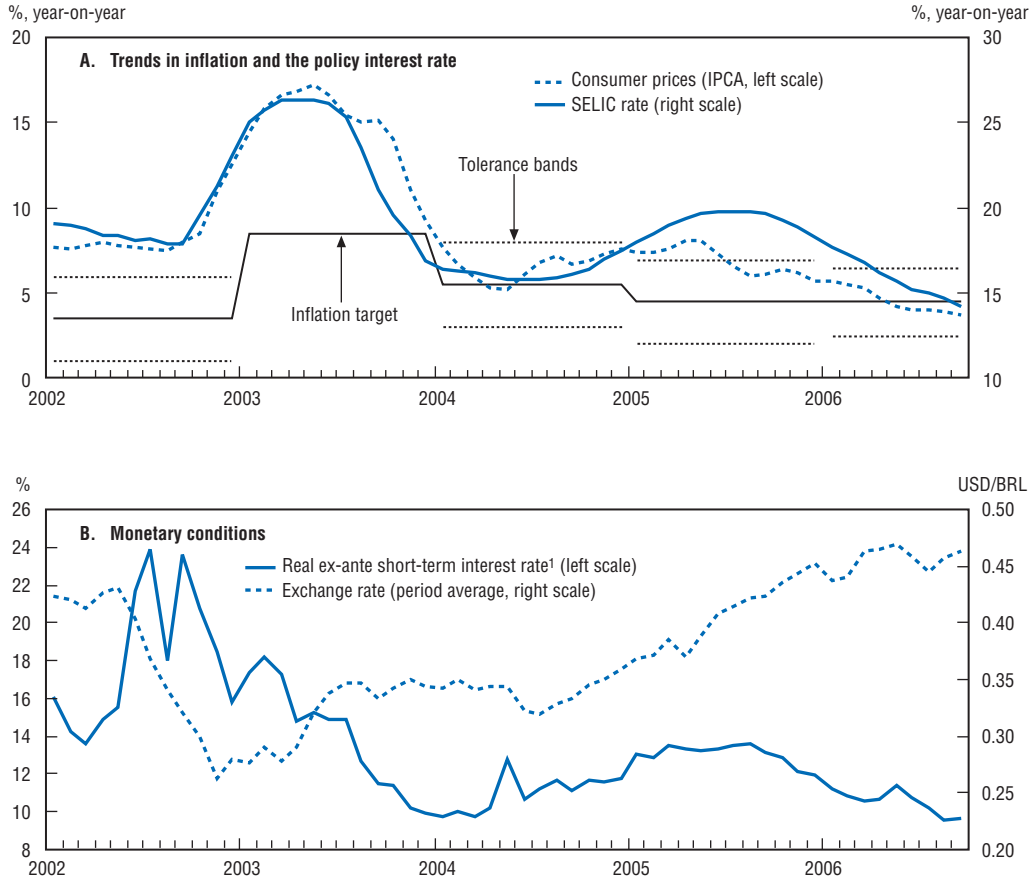
Monetary conditions and trends in credit

Monetary policy continues to be conducted within a framework combining inflation targeting and a flexible exchange-rate regime. The cycle of monetary tightening, which had lasted one year, came to an end in September 2005 (Figure 2.5). Actual and expected consumer price inflation have trended down – and wholesale price disinflation has been particularly pronounced – laying the groundwork for attaining the 4.5% target in 2006. Monetary conditions nevertheless remained tight from 2005 to mid-2006. The real *ex ante* interest rate began to fall in mid-2005, but the appreciation of the *real* in the course of 2005 and through May 2006 – which owes much to the robust trade surpluses and foreign direct investment inflows, as well as monetary restraint – tightened monetary conditions.

The monetary tightening cycle coincided with a rapid expansion in consumer credit. The ongoing credit boom is desirable over the longer term, given the policy objective of tackling financial exclusion for individuals and businesses alike, especially small enterprises, which often operate in the informal sector, and Brazil's comparatively low credit-to-GDP ratio (discussed in the *2005 Survey*). Nevertheless, it weakens the effect of monetary policy on activity in the short term. At the same time, the composition of the stock of outstanding credit is changing. The expansion in consumer credit has outpaced that of credit to enterprises – a process that has been facilitated by financial innovation, including through the introduction of new credit types, which has led to the surge in payroll-backed operations (*crédito consignado*) (Figure 2.6).

Interest rates are also coming down for personal credit, especially for the payroll-backed modality. Directed credit to enterprises is likely to expand as a result of the announcement in February 2006 of new credit lines by BNDES, which are targeting selected

Figure 2.5. **Monetary stance, 2002-06**

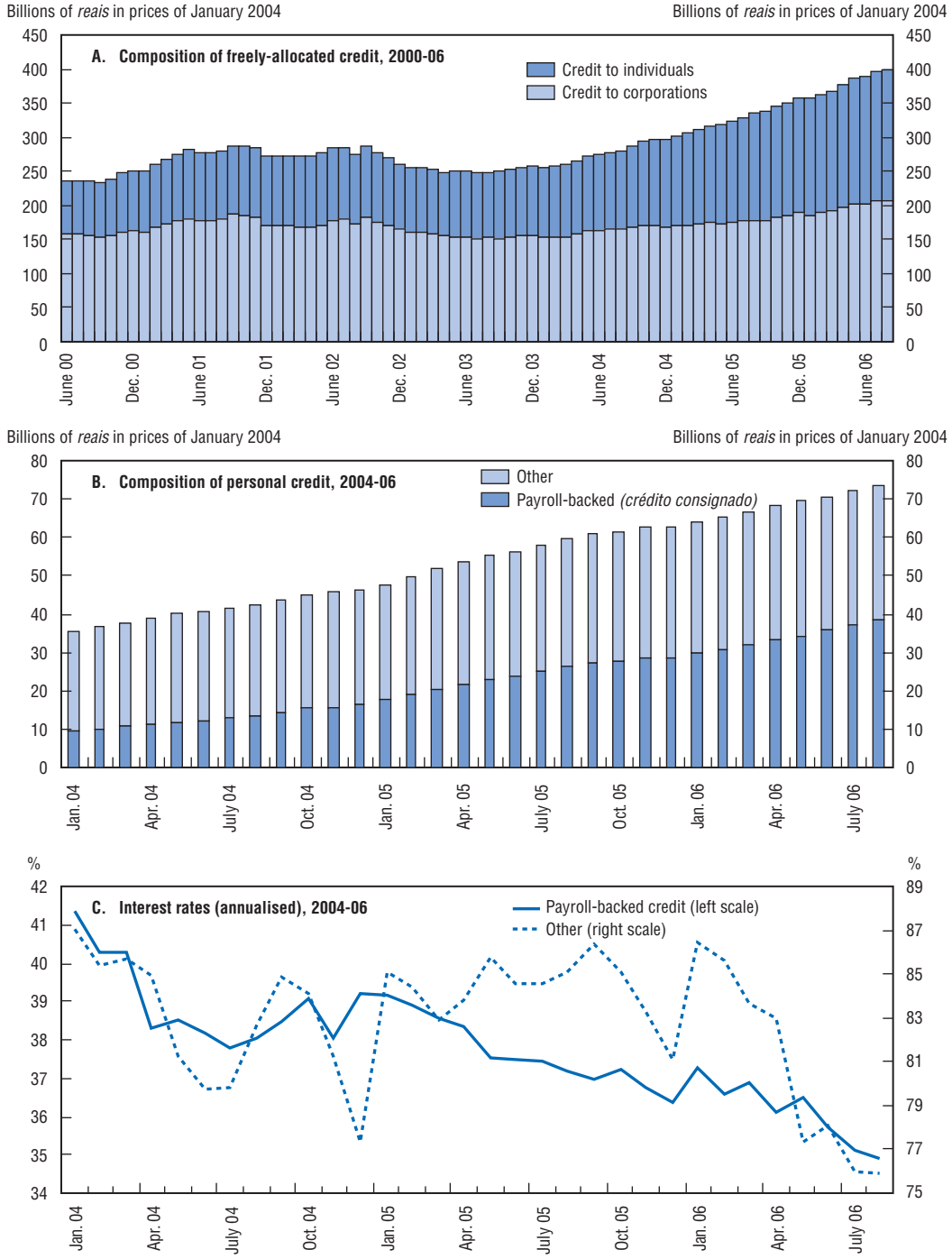


1. Defined as the difference between the 360-day Pre-DI swap rate and 12-month-ahead expected inflation.
Source: Central Bank of Brazil and OECD calculations.

activities, including innovation (as discussed in Chapter 3), and the reduction of intermediation fees. These trends, coupled with the magnitude of the swings in Brazil's monetary stance since 2003, call for continued assessment of the monetary transmission mechanism's speed of adjustment and lag structure – a challenge that has been acknowledged by the authorities.

Compulsory reserve requirements have remained high and unchanged throughout the latest monetary easing cycle. Currently, these requirements include 53% of sight deposits (to be held in cash, of which 45% is unremunerated and 8% is remunerated at the SELIC rate), 23% of time deposits (to be held in government bonds, of which 8% is remunerated at the SELIC rate) and 30% of savings deposits (to be held in cash, of which 20% is remunerated at a long-term regulated (TR) rate and 10% at the SELIC rate). These statutory rates, which have not changed since 2003, overestimate the effective level of compulsory reserve requirements, because there are nominal deductions to the deposit base used for calculating compulsory reserves, as well as exemption thresholds based on the level of deposits. The average effective rate, which takes account of these deductions and thresholds, is in the neighbourhood of 30% of deposits. In any case, total compulsory reserves held at the central bank amounted to nearly 8% of GDP at end-2005, including about 2.2% of GDP in unremunerated reserves.

Figure 2.6. **Trends in personal credit and interest rates**



Source: Central Bank of Brazil.

Although they are not used as a short-run monetary policy instrument in Brazil, the extant reserve requirements are operationally complex and stringent by international comparison, including among emerging-market economies. Most countries that now use short-term interest rates as the main instrument for monetary policymaking have reduced or eliminated compulsory reserve requirements. As discussed in Chapter 1, unremunerated

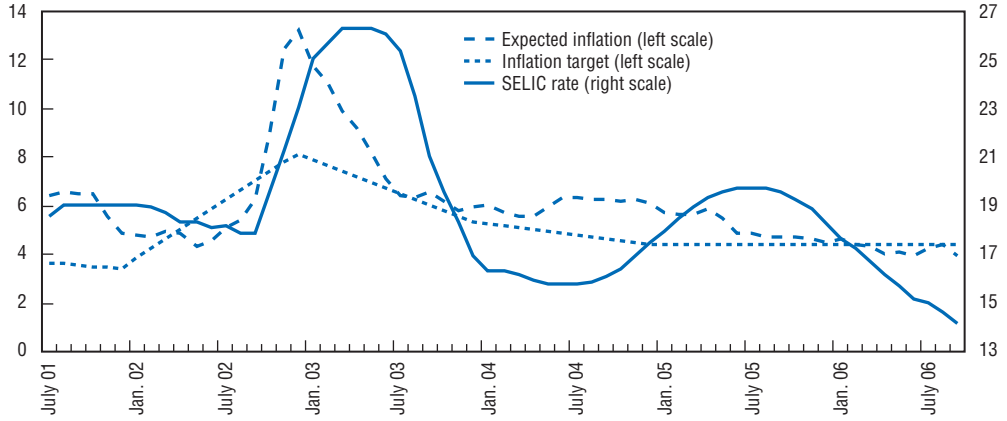
reserve requirements act as an implicit tax on income and financial intermediation, against a background of an already relatively high tax burden on financial transactions, including that of the bank debit tax (CPMF).

Monetary policy and macroeconomic volatility

A more pro-active monetary policy stance contributes to anchoring expectations at low, stable levels of inflation (Figure 2.7). This achievement has been associated with the adoption of inflation targeting in many countries. The empirical evidence reported in Chapter 1 (Annex 1.A3) suggests that this is also the case in Brazil. In addition, the post-June 1999 policy regime, which combines inflation targeting with a floating exchange rate, has been associated with a more stable, forward-looking monetary stance, at least as gauged by the fact that the policy interest rate has become less volatile and monetary policy increasingly responsive to inflation expectations (Annex 2.A2). This is not surprising because of the abandonment of the exchange rate peg, which allows monetary policy to pursue price stability unencumbered by the need to defend a pre-announced target for the nominal exchange rate.

Figure 2.7. **Monetary stance and trends in expected inflation, 2001-06**[1]

In per cent



1. The definition of 12-month-ahead expected inflation and the derivation of the corresponding 12-month-ahead implicit inflation targets are provided in Annex 1.A3.

Source: Central Bank of Brazil and OECD calculations.

However, a less volatile monetary stance appears to be associated with lower volatility in expectations, which is crucial under inflation targeting.[4] On the basis of the empirical evidence reported in Annex 2.A3, interest-rate smoothing, whereby the monetary authority avoids sudden changes in the policy interest rate, is associated with less volatile inflation expectations. In sum, the post-1999 monetary regime has been characterised by greater interest-rate smoothing and, in turn, lower volatility in the monetary stance seems to be associated with less volatile expected inflation. The current policy regime is therefore facilitating the anchoring of expectations around the pre-announced targets.

Policy recommendations

Brazil's progress in strengthening the institutional foundations for macroeconomic policymaking since the mid-1990s is unquestionable, delivering historically low – and falling – rates of inflation and entrenching fiscal responsibility. Nevertheless, the public

debt-to-GDP ratio remains high, and fiscal adjustment has been achieved predominantly through revenue hikes, rather than a retrenchment of current expenditure commitments. The main policy challenge in the macroeconomic area is therefore to improve the quality of the fiscal adjustment that will be needed to further reduce the public debt overhang, paving the way for alleviating the tax burden over the longer term, which is high by emerging-market standards. In doing so, the authorities will be taking the necessary steps to fulfil an important framework condition for sustained growth, while at the same time freeing monetary policy from the constraints that currently impede a faster reduction in real interest rates. Given the composition and average maturity of the traded public debt stock, despite recent improvements, only a sustained reduction in indebtedness will make the economy more resilient to shocks and permit the channelling of domestic saving to finance growth-enhancing investment in the private sector. At the same time, fiscal policy is likely to be more stabilising in a low-debt environment, allowing the automatic stabilisers to work unimpeded over the business cycle, leading to lower macroeconomic volatility.

Improving the quality of fiscal adjustment

A sustained reduction in public indebtedness depends on the containment of current expenditure commitments. This is particularly important in the case of social security, given Brazil's already high level of public spending on pensions against the background of a relatively young population, as noted in the *2005 Survey* and in Chapter 1. Because outlays on pensions paid to private-sector workers account for about one-third of federal primary spending, there is much to gain from further parametric changes in the social security system, while recognising that most benefits of reform will materialise only over the longer term. Nevertheless, little progress has been made in this area since publication of the *2005 Survey*. Of particular importance from the point of view of fiscal management is the link between the minimum pension and the minimum wage, which should be severed. Reform options should include introduction of a minimum retirement age in the regime for private-sector workers, preferably the same for males and females; and an increase in the period of contribution for old-age pensions (Box 2.3).

The containment of current expenditure growth, which is essential for raising government saving, would benefit from the introduction of an expenditure cap in the fiscal rule. The inclusion of a ceiling on federal primary current expenditure in relation to GDP in the 2006-08 Budget Guidelines Law (LDO) was a considerable step forward. It signalled the authorities' commitment to tackling this problem. The ceiling was maintained in the draft 2007-09 LDO, submitted to Congress in May 2006, which calls for a small reduction of 0.1% of GDP in federal current spending in 2007 relative to 2006 to 17.6% of GDP. A cap on non-wage benefits paid to civil servants and restrictions on the creation of new careers in the civil service were also included in the draft 2007-09 LDO. It would be advisable to keep these ceilings in the 2007-09 and in the 2007 budget law, when approved by Congress, because these measures reflect an on-going effort on the part of the authorities to arrest the rise in this category of spending, which has accounted for most of the increase in primary expenditure in recent years. In this regard, the option of re-defining the expenditure cap in nominal terms, rather than in relation to GDP, could be considered, because inflation is now well anchored around the target. In any case, the introduction of an expenditure ceiling consistent with a more ambitious, yet attainable, retrenchment of current outlays would be advisable in the draft 2008-10 LDO, to be submitted to Congress in mid-2007.

Box 2.3. **Further pension reform: Summary of recommendations***

The *2005 Survey* proposed a number of elements that should be taken into account in further pension reform. Nevertheless, little progress has been made in this policy area. Important elements in future reform of the regime for private-sector workers would include measures to:

- Sever the link between the minimum pension and the minimum wage, while maintaining the purchasing power of pensions, preferably through the indexation of pension benefits to a price index that best reflects the consumption basket of pensioners. In doing so, the government would be able to set minimum wage policy independently of its short-term budgetary constraints and in line with labour market developments and demands.
- Introduce a minimum retirement age in the regime for private-sector workers, preferably equal for males and females. The effective retirement age has increased since the 1998 reform, but remains low, whereas life expectancy at retirement is comparable in Brazil to the OECD average.
- Increase in a phased manner the period of minimum contribution required for old-age pensions for male private-sector urban workers aged 65 (60 for females) from the current level of 15 years.
- Phase out the remaining special pension entitlements, including for teachers, who have lower retirement age and years of contributions requirements. The special regime for teachers affects public finances more adversely at the sub-national than the federal level, given that teachers account for a major share of the sub-national, especially municipal, civil service.

With regard to the social-security regime for public-sector workers, further reform should focus on the creation of complementary pension funds for civil servants, preferably of the defined-contribution type, and on standardising entitlements between the private- and public-sector regimes. Reform in this area is important because outlays on pensions to retired civil servants are accounting for an increasing share of spending at the sub-national levels of government.

* See Giambiagi and de Mello (2006) for more information.

At the same time, the need for alleviating expenditure rigidity, which is noticeable in Brazil, should not be underestimated. Budgetary flexibility is essential for durable retrenchment. Also, it may allow for a reprioritisation of budgetary allocation in favour more cost-effective programmes, such as those focused on improving human and physical capital accumulation. Ideally, policy should be focused on the gradual reduction of revenue earmarking and the elimination of aggregate minimum spending floors, a task that would require a considerable legislative effort, including through amendments to the Constitution. As recommended in the *2005 Survey*, a comprehensive assessment of existing revenue earmarking and mandated spending requirements against the achievement of their intended policy objectives would be an important first step. In the interim, the mechanism for withholding part of the earmarked spending at the federal level (DRU), should be extended beyond 2007, when it is due to expire, preferably for at least another four years. The withholding coefficient, currently at 20%, could be raised to 30% and subsequently reduced as the policy effort to reduce expenditure rigidity yields results. It should be recognised that this measure would not tackle the root causes of budget rigidity, but would

be instrumental in facilitating fiscal management until further structural reform comes to fruition.

A reduction in the tax burden would be appropriate, but only once the public debt-to-GDP ratio has been lowered in a sustained manner and the ratio of current expenditure to GDP has been stabilised. Brazil has a high tax-to-GDP ratio for a country of its income level, and a sustained alleviation of the tax burden, which has risen over time, would render fiscal policy more growth-enhancing. In the interim, tax policy could be geared towards minimising the existing distortions in the tax code. The experience of gradually converting the cascading federal taxes on enterprise turnover – PIS and Cofins – into value added taxes since 2002 has yielded positive results (Annex 1.A1, Chapter 1). The exemption of initial public offerings from bank debit (CPMF) taxation, announced in February 2006, is another step in the right direction and can contribute to fostering innovation in the business sector, as discussed in Chapter 3, coupled with the elimination of taxation on capital gains on venture capital investment. Further policy effort could focus on the gradual lowering of the statutory rate of the CPMF, currently at 0.38%, over the medium term. It has been argued that maintenance of the tax at a symbolic rate of 0.01-0.05% would be useful as a collection enforcement tool, allowing the cross-checking of CPMF and income tax liabilities for the purpose of tackling tax evasion. In addition, efforts to make the state-level VAT (ICMS) legislation homogeneous across the states, with uniform rates and bases, would be essential to reduce predatory tax competition among the states, which has arisen from the use of the ICMS as an industrial policy instrument by the states. The option of subsequently replacing the ICMS and the federal VATs (PIS/Cofins and IPI) by a single VAT could be considered in future tax reform.

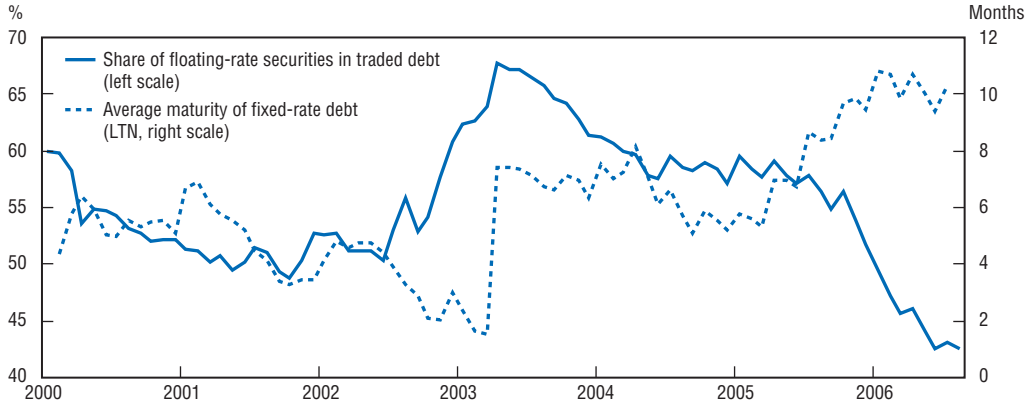
Strengthening public debt management

Considerable progress has been made to date to reduce the public debt's exposure to exchange-rate risk. Favourable international financial conditions have facilitated this task, coupled with Brazil's impressive external adjustment in recent years, which has been buttressed by sustained high foreign trade and current-account surpluses. Public debt management should now focus on consolidating these gains, while working towards increasing the share of fixed-rate and inflation-indexed securities in the public debt stock. It should be recognised that an increase in the share of fixed-rate securities when the policy interest rate is coming down could raise future debt service costs. However, these costs are likely to be outweighed by the longer-term benefit of improving the composition of the outstanding domestic debt.

Recent efforts to reduce the tax burden on foreign investment in the domestic fixed-income and equity markets is laudable. It can make for a reduction in the cost of debt re-financing and an increase in the average maturity of the debt stock. This is important because previous attempts to reduce reliance on floating-rate securities have been constrained by a composition-maturity trade-off: demand for fixed-rate instruments tends to be strongest for relatively shorter maturities (Figure 2.8). Acceptance of long-dated, fixed-rate instruments denominated in *reais*, rather than indexed to the exchange and the policy interest rates, is the ultimate test of confidence in the policy framework. Steps should also be taken to create a yield curve for *real*-denominated bonds in foreign markets, financial conditions permitting, and to foster the development of hedge instruments for investment in long-dated securities as a means of facilitating risk management and boosting liquidity in this market segment.

On external public debt management, the authorities should continue to unwind their outstanding liabilities. The announcement in February 2006 of the intended buyback of up to USD 20 billion of sovereign liabilities coming due by 2010, including the Brady bonds, was welcome, as well as the early repayment of debt to the International Monetary Fund (December 2005) and the Paris Club (January 2006). As a result of these operations, the stock of net external public debt (taking international reserves into account) declined from 7.5% of GDP at end-2004 to 2.6% of GDP at end-2005 and to about 0.5% of GDP at end-April 2006. Consistent with this strategy, the National Treasury announced in early June its intention to buy back up to USD 4 billion of sovereign bonds denominated in USD and EUR maturing during 2007-30, while setting a maximum clearing spread as a means of improving confidence in their ability to maintain a liquid market for those bonds. This debt-reduction strategy is a sensible use of Brazil's large external current account surpluses and is complementary to the on-going effort to reduce the exposure of the public sector's debt to exchange-rate risk, including through the retirement of domestic debt indexed to the exchange rate. At the same time, greater access by foreign investors to the domestic fixed-income market, as discussed above, should facilitate the exchange of external bonds for a range of domestic fixed-rate securities, which should contribute to lengthening maturities and reducing refinancing costs. The authorities would be advised to increase the debt buyback programme, should market conditions improve further.

Figure 2.8. **Public debt management: Composition-maturity trade-off, 2000-06**



Source: Central Bank of Brazil.

A durable reduction in public indebtedness would serve to facilitate a swifter fall in real interest rates and to permit the channelling of domestic saving to finance growth-enhancing investment. It would lay the groundwork for removing distortions in the tax system, including by broadening tax bases, and is likely to result in better credit ratings for the sovereign and a reduction in country risk. An event analysis of Brazil's latest sovereign credit upgrades and downgrades suggests that the authorities' efforts to reduce external vulnerability, benefiting from the still auspicious global financial environment, are warranted (Box 2.4). But further progress is needed in fiscal consolidation because Brazil's public debt-to-GDP ratio remains above-average in comparison with the other sovereigns in Brazil's credit class. Attainment of investment grade for Brazil's sovereign debt placements will therefore be the ultimate reward for fiscal consolidation.

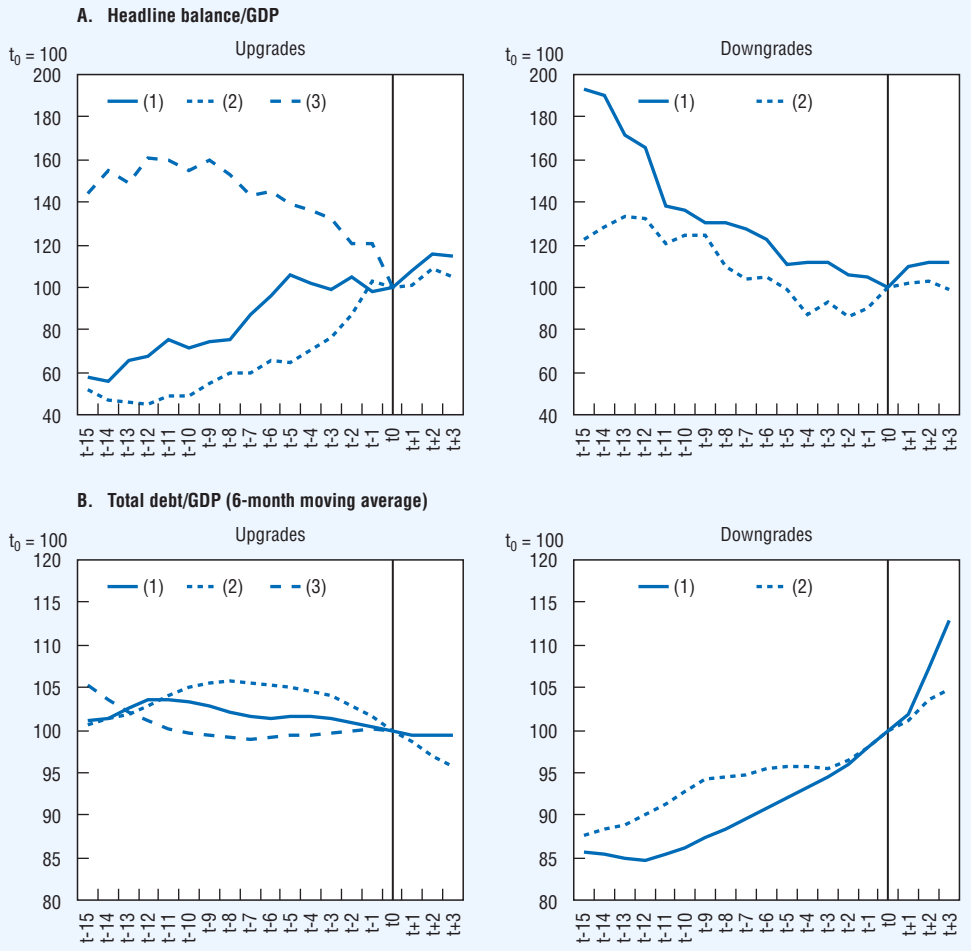
Box 2.4. **Sovereign credit risk: An event analysis of recent upgrades and downgrades**

Upgrades and downgrades of a country's sovereign credit rating are closely associated with changes in sovereign risk premia, which in turn have a bearing on macroeconomic outcomes, particularly private investment and the monetary stance.[1] Because causality in the relationship between credit rating and risk premia goes both ways, changes in these indicators tend to be mutually reinforcing. For example, Brazil's latest upgrades have been associated with a reduction in risk premia, which came down by about 200 basis points between October 2004 (15 months prior to the latest upgrade) and May 2006 (3 months after the latest upgrade).

A conventional event analysis can be used to shed more light on the relationship between changes in sovereign credit rating and in the macroeconomic indicators that are most likely to affect creditworthiness. The dating of sovereign (foreign currency) credit upgrades and downgrades was set as the mid-point of the period spanned by changes in ratings (excluding changes in outlook) by Standard and Poor's and Moody's.[2] The selection of the macroeconomic indicators used in the analysis was guided by the empirical literature, based on the sovereign's ability and willingness to repay debt obligations on time and in full. The analysis focuses on the 15-month period leading

Figure 2.9. **Event analysis: Sovereign credit rating and fiscal outcomes**

Upgrades: t_0 = October 2000, for event 1; September 2004, for event 2; and February 2006, for event 3.
Downgrades: t_0 = November 1998, for event 1; and July 2002, for event 2.



Source: Standard and Poor's, Moody's, Central Bank of Brazil and OECD calculations.

Box 2.4. **Sovereign credit risk: An event analysis of recent upgrades and downgrades** *(cont.)*

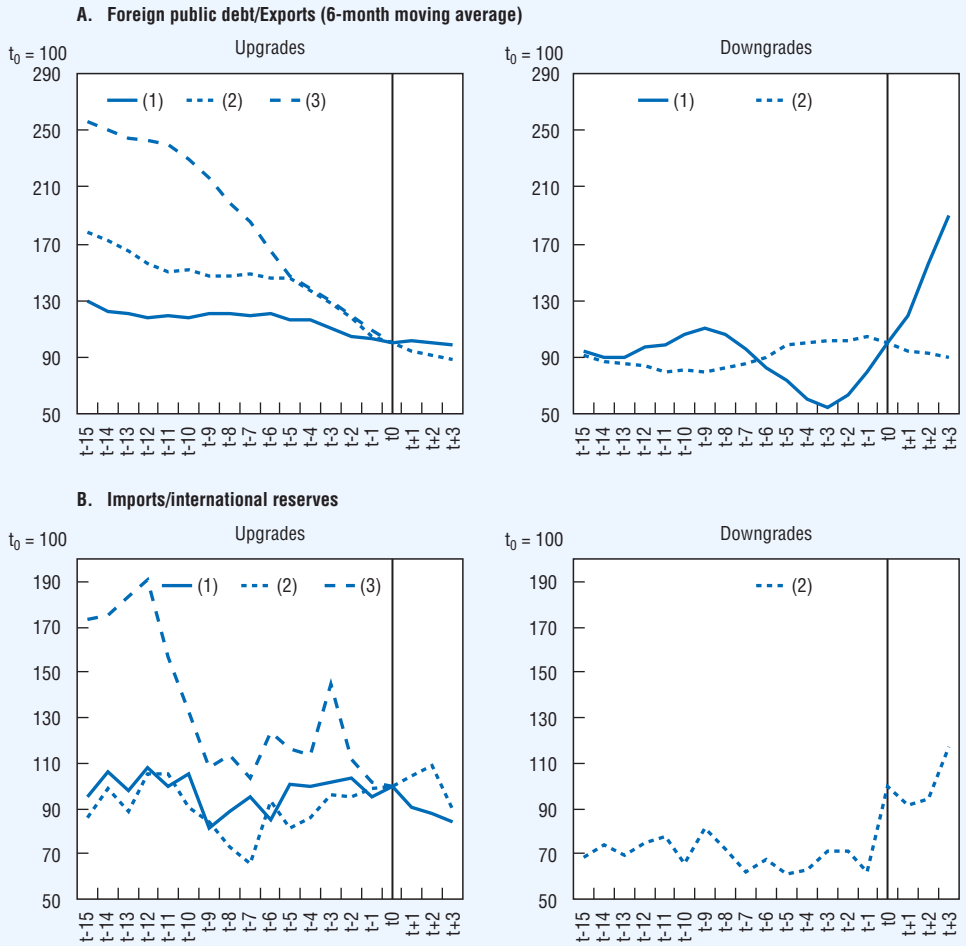
to an upgrade/downgrade and also presents the evolution of the main indicators in the three-month period following changes in ratings.

The event analysis for Brazil suggests that sovereign credit upgrades are becoming more closely associated with improvements in external solvency indicators than in fiscal outcomes. Previous upgrades followed more sizeable reductions in the debt-to-GDP ratio and improvements in the budget balance than the latest one (Figure 2.9). This probably reflects greater confidence in the conduct of fiscal policy, given the government's commitment to fiscal responsibility and strong track record in meeting its fiscal targets.

But credit downgrades seem to be strongly associated with deteriorating public finances. As already mentioned, policy effort to improve external solvency indicators in recent years, through the reduction in external public indebtedness in relation to exports and that of imports in relation to international reserves, has been rewarded (Figure 2.10). In the post-1999 floating exchange-rate regime, upgrades/downgrades have been closely associated with real exchange rate appreciations/depreciations.[3]

Figure 2.10. **Event analysis: Sovereign credit rating and external vulnerability**

Upgrades: t_0 = October 2000, for event 1; September 2004, for event 2; and February 2006, for event 3.
Downgrades: t_0 = November 1998, for event 1; and July 2002, for event 2.



Source: Standard and Poor's, Moody's, Central Bank of Brazil and OECD calculations.

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Box 2.4. **Sovereign credit risk: An event analysis of recent upgrades and downgrades** *(cont.)*

In comparison with the other countries in the same credit-rating class (based on the Standard and Poor's classification and Moody's), Brazil has a lower headline budget deficit but a higher gross debt-to-GDP ratio (Table 2.4). The level of the gross public debt in relation to GDP is also high in comparison with the countries that have a credit rating one notch above that of Brazil, suggesting again that the benefits of reducing public indebtedness are likely to be large. It should be acknowledged that Brazil's gross debt includes securities held in the central bank's portfolio, accounting for 14% of GDP (July 2006). These securities are used for the conduct of monetary policy purposes, given that the BCB is not allowed to issue securities in the domestic market in accordance with the Fiscal Responsibility Law.

Table 2.4. **Indebtedness and external solvency indicators: Brazil and emerging-market economies**

Unweighted averages, most recent end-year observations during 2002-05

	Number of countries	Headline balance (% of GDP)	Gross public debt[1] (% of GDP)	Foreign public debt/exports	Imports/ international reserves
Brazil	1	–3.3	74.7	0.3	1.6
Countries with the same credit rating as Brazil[2]					
Standard and Poor's (BB)	5	–4.4	64.2	1.9	2.3
Moody's (B1)	5	–3.5	71.9	1.0	3.1
Countries with credit rating one notch above that of Brazil[3]					
Standard and Poor's (BB+)	5	–4.5	69.4	1.4	1.8
Moody's (Ba3)	3	–3.9	43.1	1.1	2.6

1. Brazil's gross debt includes securities held in the central bank's portfolio, which amounts to about 14% of GDP (July 2006).
2. Includes Colombia, Costa Rica, Jordan, Panama and Peru (Standard and Poor's) and Jamaica, Papua New Guinea, Philippines, Surinam and Ukraine (Moody's).
3. Includes Egypt, El Salvador, India, F.Y.R. of Macedonia and Morocco (Standard and Poor's) and Peru, Turkey and Vietnam (Moody's).

Source: Standard and Poor's, Moody's, Central Bank of Brazil, IMF (Article IV Reports, various issues) and OECD calculations.

1. See Reisen and von Maltzan (1999) and Reisen (2002) for more information.
2. The exception is the latest change in rating in which only Standard and Poor's upgraded Brazil's sovereign credit in February 2006.
3. No distinctive pattern between upgrades and downgrades was found for other macroeconomic variables which have been identified as important determinants of sovereign credit ratings in the empirical literature, such as economic activity (measured by seasonally-adjusted industrial production), consumer price inflation, external current account balance (measured as a share of GDP), consolidated primary budget balance (measured as a share of GDP) and rate of growth of monetary aggregates. While it is not closely associated with changes in credit ratings in this event analysis, the current account balance correlates strongly with the EMBI+ spread. See Ferreira (2005) for more information.

Once the composition of the traded domestic debt stock has improved further and the share of floating-rate securities has been reduced, the option of targeting the headline budget balance, instead of the primary budget surplus, should be considered. Despite progress in recent years, fiscal policy remains overly sensitive to the monetary stance and short-term developments in financial markets because floating-rate securities account for the lion's share of the traded debt stock. Under these circumstances, a fiscal rule that targets the primary budget surplus excludes from the assessment of fiscal performance the short-term impact of monetary policy on public finances. But the public debt dynamics depends ultimately on trends in the *headline* budget balance over time. As a result, a fiscal rule that targets the headline balance would allow for a more direct link between fiscal performance and debt sustainability. To make this policy option operational, a target for

the nominal budget balance could be set and the corresponding primary surplus could be calculated (and enshrined in the three-year LDO and the annual budget laws) on the basis of market projections for GDP growth, inflation and monetary policy parameters. The use of market, rather than government, projections to set these key macroeconomic parameters would strengthen credibility in the policy regime. However, it should be recognised that a change in the target would need to be communicated clearly and transparently to the public to avoid any loss of confidence in the fiscal regime.

Meanwhile, the primary budget surplus target could be re-defined as a floor, at least for the central government. This would allow higher-than-targeted primary surpluses to be saved and used to retire debt, when economic conditions permit, instead of financing further increases in expenditure. Another consideration is that the accumulation of primary budget surpluses has traditionally been frontloaded within fiscal years. This is essentially due to prudence in financial management as a means of ensuring that unforeseen circumstances towards year-end, including revenue shortfalls and weaker-than-expected fiscal performance at the sub-national government level, for example, do not put the achievement of the consolidated fiscal target in jeopardy. As a result, when these contingencies do not materialise, attainment of the fiscal target leads to sometimes undesirable fiscal expansions towards the end of the year. The possibility of saving these above-target balances would therefore facilitate financial management within the year.

Making monetary policy more effective

Brazil has a good track record among inflation targeters. This is despite the fact that since inflation targeting was introduced in 1999 the targets have been missed in three years (2001-03), when adverse supply shocks led to sizeable exchange-rate depreciations. Attainment of the targets in those years would have entailed significant output losses. Nevertheless, transparency and effective communication underscoring the monetary authority's commitment to price stability in a forward-looking manner – by tackling the secondary effects of price shocks while absorbing their first-round inflationary pressures – contributed to boosting credibility in the policy regime, despite the breach of the targets. Although it does not enjoy *de jure* operational autonomy, the BCB is perceived as being *de facto* independent, an achievement that should not be underestimated. Moreover, the swift convergence of inflation expectations to the targets in 2004-06 suggests that the conduct of monetary policy within the inflation-targeting framework has contributed to reducing inflation inertia.

Notwithstanding these achievements, the effectiveness of monetary policy in short-term demand management can be improved. Further fiscal adjustment would be essential. A sustained reduction in public indebtedness would lighten the burden of debt service on the domestic fixed-income market, reducing re-financing risk and allowing for an improvement in the composition of the traded public debt, with further reductions in the share of instruments paying floating interest rates and a lengthening of maturities. The fiscal stance would become less vulnerable to short-term financial developments, reducing the scope for "fiscal dominance" in the conduct of monetary policy, which is a pre-requisite for effective inflation targeting. Central to the idea of fiscal dominance is the hypothesis that monetary policy may have perverse effects in a situation of financial stress when the public debt-to-GDP ratio is high and the debt dynamics are perceived as unsustainable. Accordingly, an increase in the policy interest rate to prevent a depreciation of the exchange rate in response to a negative external shock or confidence crisis would weaken the currency further, instead of strengthening it, because it would aggravate the debt overhang.

Also, liberalisation of directed credit requirements would probably strengthen the credit channel of the monetary transmission mechanism. The authorities are committed to an expansion of credit targeted to the underserved population, predominantly low-income individuals and SMEs. Financial innovation, with the introduction of new credit modalities, including payroll-backed credit (*crédito consignado*) is a case in point, as noted above. This can do much to tackle financial exclusion – a policy area which was discussed in detail in the *2005 Survey* – but also thwarts the short-term effect of monetary tightening on activity, as during the 2004-05 episode. It can be argued that the magnitude of the monetary tightening required for disinflation could have been lower had domestic credit not risen concomitantly, as was the case at the time. Nevertheless, over the longer term, a more potent credit channel will likely make monetary policy more effective, delivering inflation stability with lower volatility in the policy stance and leading to a fall in the equilibrium real rate of interest. Against this background, a careful analysis of the effectiveness of existing directed credit, also discussed in Chapter 1, against its policy objectives would pave the way for reform in this area. It will be easier to carry out reform in this area once monetary conditions have eased further, because the gap between the policy rate and the regulated interest rates is likely to have narrowed.

At the same time, this measure is likely to contribute to a fall in the cost of capital and interest spreads.[5] There is a link – which is nevertheless difficult to validate empirically – between the extent of directed credit and the cost of capital because a high share of such operations in total credit reduces the resource pool for extending loans to the unregulated market segments. This has a bearing on investment and hence long-term growth. For example, based on the World Bank's Investment Climate Survey of 2003 (World Bank, 2003), cost-related factors, including high interest rates, are among the main obstacles to the extension of credit, especially for small firms. Application procedures and collateral requirements are next in importance. Because any sudden elimination of directed credit requirements would probably reduce the amount of credit currently available for activities such as housing and agriculture financing, a gradual reform would be advisable, preferably by raising the rates of interest on the programmes that are more heavily subsidised, so as to close the gap between the rates of return on saving and market interest rates. In the case of housing credit, for example, which accounts for approximately 15% of the stock of directed credit outstanding, the option of further liberalisation could be considered, especially in view of the effort since the late 1990s to restructure previously unrecorded liabilities and removing non-performing loans from the relevant federal banks' balance sheets.[6]

Compulsory reserve requirements could be simplified and reduced in line with international trends. The current process of monetary easing could pave the way for a gradual reduction in compulsory reserve requirements, possibly starting with the phasing out of the "additional requirements" (*i.e.* those compulsory reserves on sight and time deposits, as well as savings accounts, that are currently remunerated by the SELIC rate). This would facilitate the conduct of monetary policy during the process of reduction of reserve requirements. At a later stage, the compulsory holdings of reserves that are currently unremunerated could be eliminated, once the effects of the elimination of the additional requirements on the economy have been assessed.

These measures are likely to also entail a reduction of financial intermediation costs, which are exceedingly high in Brazil, by reducing the implicit tax burden on financial income. Although the relationship between interest spreads and the level of compulsory reserves is empirically weak – depending on how the implicit tax burden is shared between lenders and

borrowers – an increase in the supply of free credit is likely to follow the reduction in compulsory reserve requirements, leading to a compression of interest spreads. To the extent that financial liberalisation – through the gradual elimination of directed credit and the reduction in reserve requirements – results in lower real interest rates, it will have a bearing on fiscal management, reducing the cost of debt service. It would also probably generate substantial allocative efficiency gains in the economy, as the subsidy that is currently extended to the sectors/activities that benefit from directed credit would gradually be reduced.

An additional important policy question concerns the level of the inflation rate to be targeted by the central bank over the medium term. The current target of 4.5% was maintained for 2007-08 by the National Monetary Council (CMN), as well as the ±2 percentage-point tolerance band. It can be argued that stability of the inflation target over the next two years, following a path of targeted disinflation since 2003, could contribute to lower volatility in the monetary stance and to consolidating the disinflation achieved to date. However, although the 4.5% mid-point of the inflation target is not too high by emerging-market standards, this is not the case of the ceiling of the tolerance band, currently at 6.5%. Over time, once actual and expected inflation has been safely anchored at the current level, the monetary authority could pursue a narrower band around a lower mid-point.

Summary of recommendations

This chapter's main policy recommendations are presented in Box 2.5.

Box 2.5. **Summary of policy recommendations: Macroeconomic area**

Improve the quality of fiscal adjustment

- Implement further parametric changes in the social security system (see Box 2.3).
- Redefine the expenditure cap in nominal growth terms, rather than in relation to GDP.
- Increase budget flexibility by gradually reducing revenue earmarking and eliminating aggregate spending floors.
- Extend the extant revenue withholding mechanism (DRU) beyond 2007, when it is due to expire, preferably for another four years, and consider the option of raising the withholding coefficient to 30% of shared revenue.
- Make the rates and bases of the state-level VAT (ICMS) uniform across the states.

Strengthen public debt management

- Foster the development of hedge instruments for investment in long-dated securities as a means of facilitating risk management and boosting liquidity in this market segment.
- Continue to reduce external public indebtedness when market conditions permit.
- Consider the option of targeting the nominal budget balance. The corresponding primary surplus could be calculated (and enshrined in the three-year LDO and the annual budget laws) on the basis of market projections for GDP growth, inflation and monetary policy parameters.

Make monetary policy more effective

- Pursue further financial liberalisation by gradually removing the existing directed credit and compulsory reserve requirements.
- Over time, reduce the inflation target and the width of the tolerance band.

Notes

1. This is due to low coverage, given the extent of labour informality, and the fact that the data used in the analysis includes expenditure on the Salary Bonus, which is not sensitive to the business cycle. See de Mello and Moccero (2006) for more information.
2. In addition, the results reported by de Mello and Moccero (2006) suggest that the floating of the *real* was followed by greater fiscal prudence, as evidenced by a higher responsiveness of discretionary fiscal action to changes in indebtedness after February 1999 than before.
3. See de Mello, Kongsrud and Price (2004) for more information and evidence for OECD countries.
4. The empirical analysis carried out to date for Brazil has focused on how expected inflation enters the central bank's policy reaction function and on how inflation expectations are formed (Minella *et al.*, 2003). There has been relatively little emphasis on testing for the existence of volatility spillovers between the monetary stance and inflation expectations.
5. See Central Bank of Brazil (2006), Chapter 3, for more information and empirical evidence in the case of directed credit to agriculture and housing.
6. See the *2005 Survey*, Chapter 2, for more information on housing and agriculture financing.

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ANNEX 2.A1

Fiscal activism over the business cycle

This Annex assesses the sensitivity to the business cycle of primary federal spending on personnel and on non-mandatory spending (identified in budget documentation as "other current and capital outlays", "other OCCs"). These spending items may be sensitive to short-term fluctuations in economic activity, not through built-in stabilisers, but as a result of fiscal activism.[1]

The methodology

The estimations use monthly data for the period 1997:1 to 2005:10 as follows:

$$\log\left(\frac{G_i}{G_i^{HP}}\right)_t = a_0 + \sum_{j=1}^{11} a_{1j} Dum_j + \sum_{j=1}^{12} a_{2j} \log\left(\frac{G_i}{G_i^{HP}}\right)_{t-j} + \sum_{j=0}^{12} a_{3j} \log\left(\frac{IPI}{IPI^{HP}}\right)_{t-j}, \quad \text{(2.A1.1)}$$

where G_i denotes real federal spending on personnel (*PW*) and on non-mandatory programmes (*NMS*), and IPI is the industrial production index. The *HP* superscript identifies the HP-filtered series.

Estimation of Equation (2.A1.1), reported in Table 2.A1.1, yields a long-term elasticity of 2.3 for PW and 1.6 for NMS (Columns A and C), suggesting that both spending categories are pro-cyclical. In addition, fiscal activism may be asymmetrical over the business cycle. The estimated closed-form elasticities may therefore differ between upturns and downturns, a hypothesis that can be tested as follows:

$$\log\left(\frac{G_i}{G_i^{HP}}\right)_t = a_0 + \sum_{j=1}^{11} a_{1j} Dum_j + \sum_{j=1}^{12} a_{2j} \log\left(\frac{G_i}{G_i^{HP}}\right)_{t-j} + \sum_{j=0}^{12} a_{3j} \log\left(\frac{IPI}{IPI^{HP}}\right)_{t-j} + \sum_{j=0}^{12} a_{4j} D_{t-j} * \log\left(\frac{IPI}{IPI^{HP}}\right)_{t-j} \quad \text{(2.A1.2)}$$

where *D* is a dummy variable which takes the value of 1 for positive changes in the 6-month moving average of $\log\left(\frac{IPI}{IPI^{HP}}\right)$ relative to the previous period, and zero otherwise.

Estimation of Equation (2.A1.2), also reported in Table 2.A1.1, suggests that discretionary policy action was more pro-cyclical in downturns over the period of analysis. This is the case for both expenditure categories – PW and NMS – for which the implied long-term elasticities are higher for downturns than for upturns (Columns B and D).[2]

The case of non-mandatory spending is particularly interesting, because it was found to be pro-cyclical in downturns while exhibiting no sensitivity to the business cycle during upturns. This suggests that the government was able to resist pressure for destabilising activism in good times, while retrenching non-mandatory programmes in bad times as a

Table 2.A1.1. **Elasticity of PW and NMS with respect to the business cycle**[1]

	PW		NMS	
	No asymmetry	Asymmetric responses	No asymmetry	Asymmetric responses
	A	B	C	D
Sum of lagged values of $\log\left(\frac{PW}{PW^{HP}}\right)$	–0.01	–0.21		
Sum of lagged values of $\log\left(\frac{NMS}{NMS^{HP}}\right)$			0.52	0.55
Sum of contemporaneous and lagged values of $\log\left(\frac{IPI}{IPI^{HP}}\right)$	2.34	3.55	0.77	1.42
Sum of contemporaneous and lagged values of $D*\log\left(\frac{IPI}{IPI^{HP}}\right)$		–1.72		0.00
Implied long-term elasticities	2.31	..	1.60	..
In upturns		1.51		0.00
In downturns	..	2.93	..	3.18
R^2	0.75	0.74	0.83	0.85
F Test	9.74***	10.96***	28.53***	24.03***
LB(6)	2.29	3.00	6.43	4.87
ARCH(6)	7.51	15.6**	2.6652	0.964

1. All variables are statistically significant at the 10% level. The *F* statistic tests the overall significance of the model; LB(*X*) is the Ljung-Box test of the absence of autocorrelation of order *X*; ARCH(*X*) is the LM test of the absence of ARCH disturbances of order *X*. (***), (**) and (*) denote significance at the 1%, 5% and 10% levels, respectively. Seasonal dummies are included in the regressions but not reported. The sample spans the period 1997:1 to 2005:10.

Source: de Mello and Moccero (2006).

result of the need to ensure debt sustainability. By contrast, outlays on personnel were found to be pro-cyclical, albeit by a smaller amount, during upturns too, which may be due to the government's inability to resist pressure for more generous wage increases in good years (Talvi and Vegh, 2000; Lane, 2003). Unlike pensions, the government is under no obligation to preserve the purchasing power of civil servants' compensation, which probably explains to a large extent greater pro-cyclicality in downturns than in upturns.

In this regard, the experience of Brazil is at odds with that of the OECD countries, where fiscal tightening during downturns is somewhat less likely to occur in the presence of expenditure rigidities (OECD, 2003, Chapter IV). This is the case when, for example, outlays on personnel, which are harder to retrench than capital spending, account for a large share of government spending and when the government is a sizeable employer relative to the private sector. In any case, OECD experience also suggests that the benefits for short-term stability that arise from expenditure being inflexible in a downward direction have to be set against the fact that there is no evidence of corresponding counter-cyclicality in upturns in the OECD area. Pro-cyclicality in the upturn may lead to the "ratcheting up" of aggregate public spending over the longer term, an issue that is of relevance to the Brazilian experience of stabilisation based on revenue hikes against a background of rising current expenditure over the years. This is consistent with recent empirical evidence suggesting that the federal government has followed a spend-and-tax policy to ensure the sustainability of public indebtedness since the late 1990s (de Mello, 2006).

Notes

1. This Annex is based on de Mello and Moccero (2006).
2. The results are reasonably robust to alternative definitions of upturns other than the 6-month moving average. The estimated elasticity remains lower in upturns than in downturns when 3- and 12-month moving averages are used in the case of PW outlays but not when the level of $\log\left(\frac{IPI}{IPI^{HP}}\right)$ is used. For discretionary spending, however, the asymmetry is reversed with 3- and 12-month moving averages, but remains unchanged with the level of $\log\left(\frac{IPI}{IPI^{HP}}\right)$.

ANNEX 2.A2

Monetary policy and macroeconomic volatility

This Annex reports the results of the estimation of a simple structural macroeconomic model for Brazil to assess changes in the central bank's monetary reaction function across monetary regimes, including the period prior to 1999, when the *real* was allowed to float in January, and after the adoption of inflation targeting in June 1999.

The structural model

The new Keynesian framework has become the conventional framework for analysing the relationship between inflation, monetary policy and the business cycle (Clarida, Gali and Gertler, 1999; Boivin and Giannoni, 2002). In its simplest form, it consists of three equations:

$$\pi_t = \delta E_t \pi_{t+1} + (1-\delta)\pi_{t-1} + \lambda y_t + u_{\pi_t}, \quad \text{(2.A2.1)}$$

$$y_t = \mu E_t y_{t+1} + (1-\mu) y_{t-1} - \phi(r_t - E_t \pi_{t+1}) + u_{y_t}, \quad \text{(2.A2.2)}$$

$$r_t = \rho r_{t-1} + (1-\rho)(\beta E_t \pi_{t+1} + \gamma y_t) + \tau e_t + u_{r_t}, \quad \text{(2.A2.3)}$$

where π_t, y_t, r_t and e_t denote, respectively, inflation, the output gap, the nominal interest rate and the nominal exchange rate at time t; E_t is the expectations operator conditional on information available at time t; and u_{π_t}, u_{y_t} and u_{r_t} are structural errors.

Equation (2.A2.1) is a Phillips curve, including price stickiness, Equation (2.A2.2) is an aggregate demand function, and Equation (2.A2.3) is an exchange rate-augmented Taylor-type monetary reaction function.

The estimation results

System (2.A2.1)-(2.A2.3) is estimated jointly by FIML using monthly data for the period prior to the 1999 foreign-exchange regime change (1996:1-1998:12) and after inflation targeting was formally adopted (1999:7-2006:2). The dating of the monetary regime change therefore excludes the transition period between January-June 1999. Inflation is measured by the IPCA (cumulative 12-month rates), the interest rate is the nominal annualised SELIC rate, and the output gap is computed as the per cent difference between the seasonally-adjusted industrial production index and its HP-filtered trend. The exchange rate is the period-average rate defined as *reais* per US dollar. Expected inflation/output gap is measured as actual inflation/output gap one period ahead. All series are available from the Central Bank of Brazil. On the basis of unit root tests, both the inflation and the interest rate series appear to have unit roots when the variables are defined in levels. They

therefore enter the model in first differences. The output gap was nevertheless found to be stationary in levels.

The results of the estimation of the structural model, reported in Table 2.A2.1, suggest a relative stability across monetary regimes in the parameters of the Phillips curve and of the aggregate demand equations. Estimation of the Phillips curve suggests that agents seem to put equal weight on past and expected inflation in both monetary regimes. Estimation of the aggregate demand curve shows that agents tend to put slightly more weight on past than expected future output gaps, a finding that did not change significantly across monetary regimes. The coefficients of the real interest rate in the aggregate demand curve (ϕ) and that of the output gap in the Phillips curve (λ) are not statistically significant, a finding that is consistent with the estimation of a similar structural model for the United States for the period 1957-2001 (Moreno, 2004).

Monetary policy appears to have become increasingly persistent and forward-looking over time, given that the coefficients of the lagged interest rate (ρ) and inflation expectations (β) became statistically significant in the current (post-June 1999) policy regime. Moreover, there is increasing evidence of counter-cyclicality in the monetary stance, as evidenced by a statistically significant coefficient of the output gap (γ) in the current policy regime. These findings are consistent with the results reported by Minella *et al.* (2003) for a reduced-form monetary reaction function for Brazil over the period 1999-2002. Those authors nevertheless find a stronger reaction by the monetary authority to deviations of expected inflation from the target and to the exchange rate.

Table 2.A2.1. **Structural model estimations**[1]

Parameters	Monetary regime 1	Monetary regime 2
δ	0.49 **	0.54 ***
	(0.235)	(0.083)
λ	0.00	0.00
	(0.008)	(0.004)
μ	0.44 ***	0.46 ***
	(0.122)	(0.066)
ϕ	1.85	1.20
	(5.960)	(2.168)
ρ	0.03	0.61 ***
	(0.299)	(0.057)
β	0.54	0.19 **
	(1.883)	(0.088)
γ	0.01	0.01 **
	(0.031)	(0.003)
τ	5.08	0.02
	(22.921)	(0.080)

1. The sample is 1996:1-2006:2. Monetary regime 1 refers to the sub-sample 1996:1-1998:12 and monetary regime 2 spans the period 1999:7-2006:2. (***) and (**) denote, respectively, statistical significance at the 1 and 5% levels.

Source: Data available from the Central Bank of Brazil and OECD estimations.

ANNEX 2.A3

Monetary policy and inflation expectations: are there volatility spillovers?

This Annex tests for the presence of volatility spillovers between the policy interest rate and inflation expectations using monthly data over the period after 2001:7, when data on inflation expectations began to be collected by the BCB.[1]

The model

Previous empirical literature on Brazil has focused on the determinants of inflation expectations and the estimation of Taylor rule-type monetary reaction functions (Minella *et al.*, 2003; Schmidt-Hebbel and Werner, 2002), while ignoring the possibility of volatility spillovers between the interest rate and inflation expectations. A change in the policy interest rate may affect expected inflation and *vice versa*, but the hypothesis that greater volatility in the monetary stance may lead to greater volatility in expected inflation (and *vice versa*) has not yet been tested empirically for Brazil.

The presence of volatility spillovers can be tested in a system defined as follows:

$$r_t = a_{10} + a_{11} r_{t-1} + a_{12}(E_t \pi_{t+12} - \pi^*_{t+12})_{t-1} + a_{13} e_{t-1} + a_{14} y_{t-1} + \varepsilon_{1t}, \qquad \text{(2.A3.1)}$$

$$(E_t \pi_{t+12} - \pi^*_{t+12})_t = a_{20} + a_{21} r_{t-1} + a_{22}(E_t \pi_{t+12} - \pi^*_{t+12})_{t-1} + a_{23} e_{t-1} + a_{24} y_{t-1} + \varepsilon_{2t}, \qquad \text{(2.A3.2)}$$

where r_t is the SELIC rate, $(E_t\pi_{t+12} - \pi^*_{t+12})$ denotes deviations of 12 month-ahead expected inflation from the target, e_t is the exchange rate, y_t is the output gap, and μ_{it} (i=1,2) are error terms.

The exchange rate and the output gap enter the system in lagged form to deal with potential endogeneity problems. The SELIC rate and inflation deviations are treated as endogenous, while the other variables are predetermined.

The volatility spillover hypotheses can be tested using a multivariate model (M-GARCH) with different specifications for the conditional variances and co-variances of the random errors $\mu_t = (\mu_{1t}, \mu_{2t})$. In particular, the BEKK model, which is a generalisation of univariate GARCH models, will be used.[2] It is defined as follows:

$$\varepsilon_t / F(t-1) \sim \mathrm{N}(0, \mathrm{H}_t),$$

where F (t–1) is the information set up to period t-1, and H_t denotes the conditional covariance matrix associated with the bivariate vector of random errors $\mu_t = (\mu_{1t}, \mu_{2t})$. This matrix is defined as $H_t = c_0^{/} c_0 + B^{/} \varepsilon_{t-1} \varepsilon_{t-1}^{/} B$, where C_0 and B are parameter matrices of the

form: $c_0 = \begin{bmatrix} C_{11} & C_{12} \\ 0 & C_{22} \end{bmatrix}$ and $B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}$. The elements of H_t can be represented in univariate form as:[3]

$$h_{11,t} = c_1 + b_{11}^2 \varepsilon_{1,t-1}^2 + 2b_{11}b_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b_{21}^2 \varepsilon_{2,t-1}^2 \quad (2.A3.3)$$

$$h_{12,t} = h_{21,t} = c_2 + b_{11}b_{21}\varepsilon_{1,t-1}^2 + (b_{12}b_{21} + b_{11}b_{22})\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b_{12}b_{22}\varepsilon_{2,t-1}^2 \quad (2.A3.4)$$

$$h_{22,t} = c_3 + b_{12}^2 \varepsilon_{1,t-1}^2 + 2b_{12}b_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + b_{22}^2 \varepsilon_{2,t-1}^2 \quad (2.A3.5)$$

Spillover effects exist if b_{21} and/or b_{12} are estimated to be different from zero.

The data

The expected inflation gap is calculated as the difference between the 12 month-ahead inflation expectation, available from the market surveys conducted by the BCB since July 2001, and the end-year inflation target, defined in Annex 1.A3 (Chapter 1). The exchange rate is defined as the 12-month percentage change in the nominal exchange rate. The output gap is computed as log difference between the actual and the HP-filtered seasonally-adjusted industrial production index.[4] Data are available from the Central Bank of Brazil for the period spanning 2001:7-2006:1.

The series were first tested for unit roots. The Phillips-Perron test was applied in the case of the SELIC rate, expected inflation and the output gap, which exhibit no trend, and the Schmidt-Phillips test was used for the exchange rate, which exhibits a trend. All variables were found to have unit roots over the period of analysis, except for the expected inflation gap, which seems to be stationary in levels. As one endogenous variable (the SELIC rate) has a unit root but the other (expected inflation gap) does not, there is no need to test for co-integration between these variables.

The results

The results of the estimation of Equations (2.A3.1)-(2.A3.2) using the BEKK specification are presented in Table 2.A3.1, and suggest that both the SELIC rate and expected inflation exhibit a relatively high degree of persistence. Over the period of analysis, the SELIC rate was estimated to respond positively to the lagged changes in both the exchange rate and the output gap, but not to expected inflation. This is not surprising, because expected inflation enters the SELIC rate equation in lagged, rather than contemporaneous, values, while monetary policy should be conducted in a forward-looking basis. With regard to the expected inflation equation, the SELIC rate was found to be negatively signed, and the exchange rate and the output gap seem to be positively signed, as expected.

The estimated coefficients of Equations (2.A3.3)-(2.A3.5), allowing for the analysis of volatility spillover effects, are reported in the lower panel of Table 2.A3.1. The estimation results suggest that volatility spillovers are unidirectional, running from the SELIC rate to expected inflation. This implies that volatility in the monetary stance is conducive to volatility in inflation expectations. By implication, interest-rate smoothing is likely to reduce volatility in inflation expectations. This seems to be the case in Brazil, where the reduction in volatility in the SELIC rate has been associated with lower volatility in expected inflation, particularly since the beginning of 2004 (Figure 2.A3.1).

Table 2.A3.1. **Monetary reaction function: M-GARCH analysis of volatility spillover effects**[1]

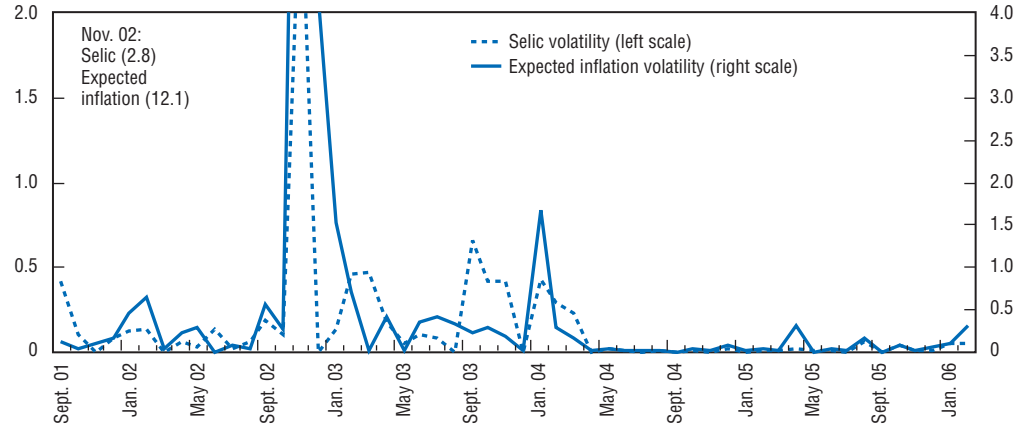
	Dependent variables	
	SELIC rate	Expected inflation
Lagged SELIC rate	0.79	–0.43
	(24.12) ***	(–6.19) ***
Lagged expected inflation	–0.03	0.86
	(–1.1)	(33.6) ***
Lagged exchange rate	0.01	0.03
	(2.81) ***	(6.21) ***
Lagged output gap	0.07	0.16
	(4.04) ***	(6.15) ***
Variance equations		
C_{11}	0.41	
	(4.15) ***	
C_{12}	0.48	
	(9.37) ***	
C_{22}	0.10	
	(0.35)	
B_{11}	0.48	
	(1.43)	
B_{21}	0.07	
	(0.54)	
B_{12}	–1.28	
	(–5.33) ***	
B_{22}	–0.59	
	(–2.32) ***	
Diagnostic tests		
Log-likelihood	–42.83	
AIC	–3.04	
SBC	–2.74	

1. The numbers in parentheses are *t* statistics. (*), (**) and (***) denote statistical significance at the 10%, 5% and 1% levels, respectively. AIC and SBC are the Akaike and Schwarz Bayesian information criteria, respectively. LB (12) is the multivariate Ljung-Box (white noise) test for 12 lags. The sample spans the period 2001:7-2006:1.

Source: Data available from the Central Bank of Brazil and OECD estimations.

Figure 2.A3.1. **Volatility spillovers**

In per cent



Source: OECD calculations based on Equations (2.A2.3) and (2.A2.5).

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Notes

1. For tests of volatility spillovers, see the financial econometric literature linking co-movements in asset returns and volatilities over time and across assets and markets (Kim *et al.*, 2005; Ng, 2000; Savva *et al.*, 2005, among others).
2. See Bauwens *et al.* (2006) for more information.
3. Note that c_i (i = 1, 2, 3) are combinations of the elements in C_0. Also note that only the ARCH specification is retained in order to save degrees of freedom.
4. All percentage changes were multiplied by 100 to facilitate convergence in the estimation algorithms.

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Chapter 3

Boosting innovation performance

Brazil's main challenge in innovation policy is to encourage the business sector to engage in productivity-enhancing innovative activities. At 1% of GDP, R&D spending (both public and private) is comparatively low by OECD standards and is carried out predominantly by the government. Most scientists work in public universities and research institutions, rather than in the business sector. Output indicators, such as the number of patents held abroad, suggest that there is much scope for improvement. Academic patenting effort is being stepped up and should be facilitated by the easing of restrictions on the transfer and sharing of proceeds of intellectual property rights between businesses and public universities and research institutions. Innovation policy is beginning to focus on the potential synergies among science and technology promotion, R&D support and trade competitiveness. To be successful in boosting business innovation, these policies will need to be complemented by measures aimed at tackling the shortage of skills in the labour force; this shortage is among the most important deterrents to innovation in Brazil, particularly against the backdrop of a widening gap in tertiary educational attainment with respect to the OECD area.

Brazil's innovation performance is improving fast, but R&D intensity still lags far behind the OECD area. Brazilian scientists published 15 777 articles in indexed scientific journals in 2005 – about 1.7% of world production – almost three times as many as in the early 1990s, making the country the 17th largest producer of science in the world. Despite academic excellence in many niche areas, including photonics, materials science, biotechnology and tropical agriculture, other indicators point to the need for improvement, particularly in terms of converting knowledge into productivity gains in the business sector. At about 1% of GDP, total R&D intensity (public and private) is much lower than the OECD average of 2.2% of GDP. The number of triadic patents (*i.e.* patents filed in the world's three main patent offices) is comparatively low, as are payments of royalties and license fees to foreigners, partly reflecting the economy's relative inward-orientation and closedness to trade. Most published scientific research continues to be generated in public university laboratories, and the use of ICT technologies is somewhat less widespread than in countries with comparable income levels. Process, rather than product, innovations account for the bulk of innovative activities in the business sector. Some of the framework conditions for innovation are yet to be fulfilled, despite macroeconomic stabilisation since the mid-1990s: the cost of capital is high, GDP growth has been volatile, and some aspects of financial markets need to be liberalised further (discussed in Chapters 1 and 2).

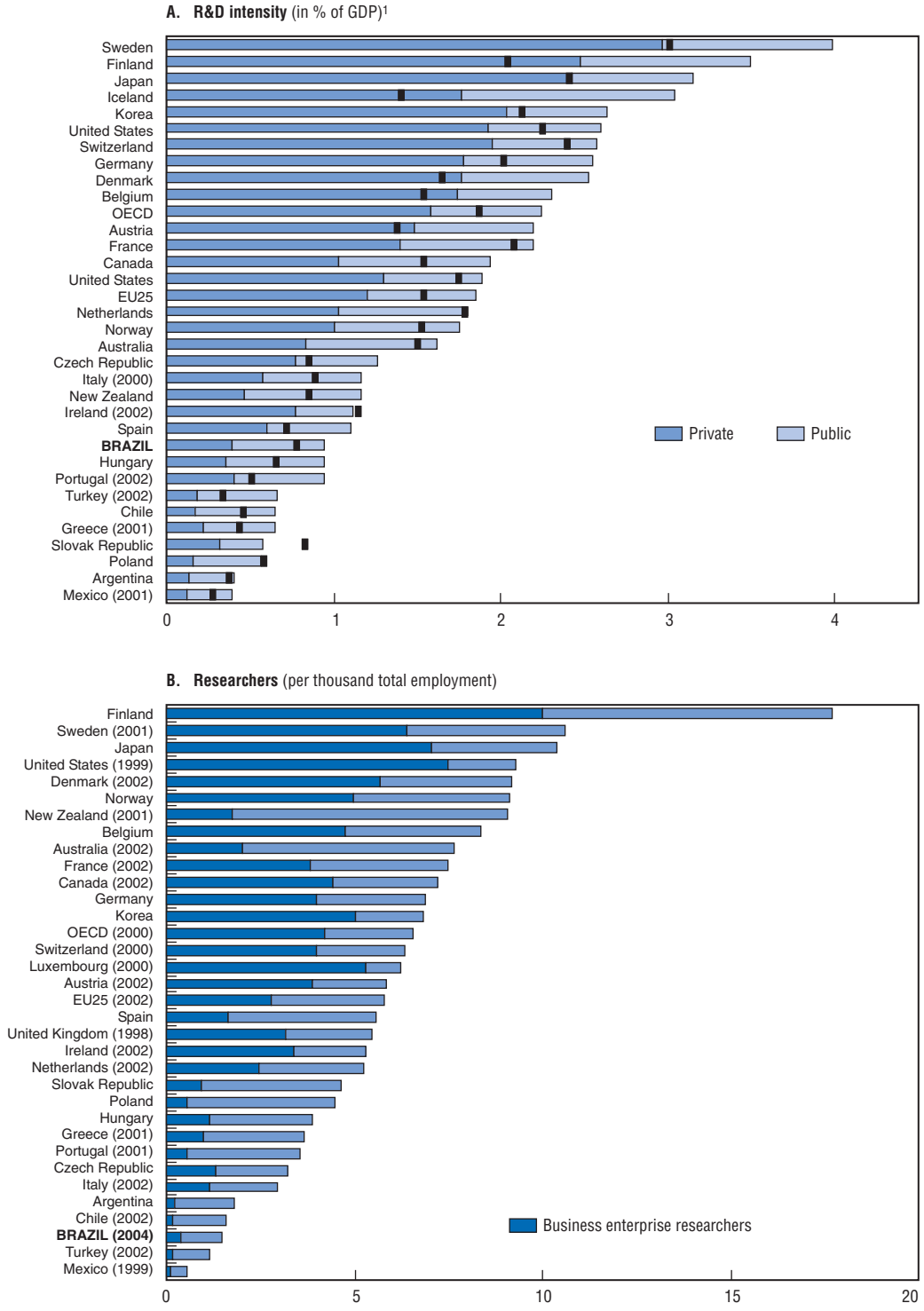
The key elements of Brazil's innovation policy are spelled out in the 2002 *White Book on Innovation*. The current policy framework, known as PITCE (*Política Industrial, Tecnológica e de Comércio Exterior*), launched in late 2003, focuses on the promotion of R&D activities in the business sector, aiming at better integrating innovation into the government's industrial and foreign trade policies. Recent legislation, enacted in 2005, introduced new tax incentives for innovation as part of a broader package for reducing the tax burden on the business sector and facilitated the sharing of intellectual property rights (IPR) proceeds between businesses and public universities and research institutions. But, more generally, the current policy framework will need to be complemented by measures aimed at tackling the shortage of skills in the labour force, which is among the most important deterrents to innovation in Brazil, particularly against the background of a widening gap in tertiary educational attainment with respect to the OECD area and a still considerable differential in quality-adjusted upper-secondary education attainment.

Background and main issues

An overview of input indicators

R&D intensity is comparatively low by OECD standards and overly reliant on government, as is common in countries with relatively low R&D intensity. At about 1% of GDP since 2002, total (public and private) spending on R&D lags well behind the OECD average of about 2.2% of GDP, although it is the highest in Latin America (Figure 3.1). About 60% of R&D activity is carried out and financed by the government. The lion's share of government support (almost two-thirds of government spending on R&D) is directed to public universities

Figure 3.1. **R&D intensity and number of researchers: Argentina, Brazil, Chile and OECD countries, 2003**



1. The dots identify the R&D intensity levels in 1995.

Source: Ministry of Science and Technology, Conicyt (for Chile), Ricyt (for Argentina and Mexico), OECD and STI database.

and research institutions, rather than businesses (Table 3.1). At the same time, joint ventures between universities and businesses are rare. By contrast, about 5% of funding for R&D carried out by universities and research institutions comes from the business sector in the OECD area on average (about 7.5% in the United States) (OECD, 2005). Consistent with relatively low government-oriented R&D intensity, the number of scientists working in the business sector is below par in comparison with the OECD area. In addition, the use of ICT technologies – a pre-requisite for the development of a knowledge-based economy – is somewhat less widespread than in countries with comparable income levels (Figure 3.2).

Table 3.1. **R&D intensity: Sources and use of funds, 2004**

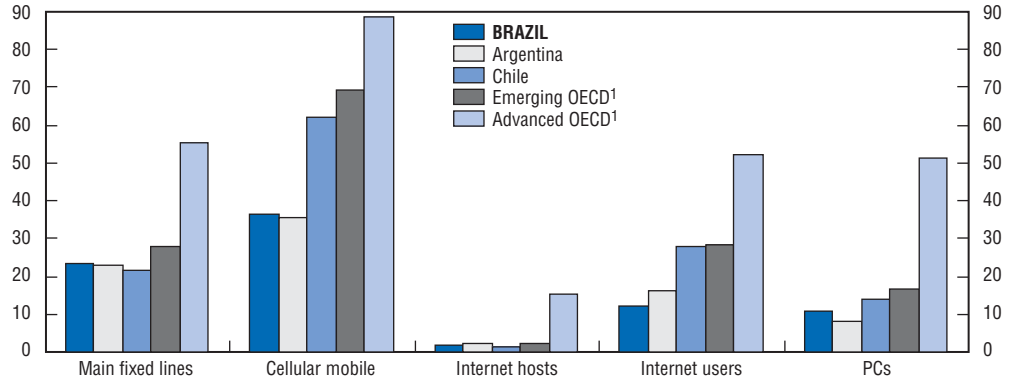
In billions of BRL

Destination	Source			Total
	Government	Business	Universities	
Total	9.3	6.4	0.4	16.1
Government	3.4	..	..	3.4
Business	0.0	6.4	..	6.4
Universities	5.8	..	0.4	6.2

Source: Ministry of Science and Technology (*Indicadores Nacionais de Ciência e Tecnologia*).

Figure 3.2. **Penetration of information and communication technologies (ICT): Argentina, Brazil, Chile and OECD countries, 2004**

Units per 100 inhabitants



1. Unweighted averages. Emerging OECD refers to Czech Republic, Hungary, Mexico, Poland, Slovak Republic and Turkey. Advanced OECD refers to the remaining member countries.

Source: International Telecommunications Union.

In a decentralised federation such as Brazil, the states play an important role in financing R&D, although most support comes from the federal government, and in the design of science and technology (S&T) policies. Programmes aimed at fostering human capital accumulation and academic research accounted for over two-thirds of federal spending on R&D in 2002 (Table 3.2), including funding for the 52 federal higher-education institutions, CNPq and CAPES (the two federal post-graduate research support agencies), followed by transfers to EMBRAPA, the Brazilian Agricultural Research Corporation (Box 3.1). The states enjoy full autonomy to set their own S&T policies, and several have their own support agencies, as well as higher-education and research institutions. The Ministry of Science and Technology estimates that about 35% of government spending on S&T in 2003 was funded by the states.

Table 3.2. **Federal R&D expenditure, 2002**[1]

In millions of *reais*

Programmes	Total	Share of spending (per cent)	Ministry
Total outlays	4 549.1	100.0	
Higher education R&D	1 556.7	34.2	Education
EMBRAPA	600.9	13.2	Agriculture
CNPq	525.5	11.6	Science and Technology
CAPES	460.7	10.1	Education
Ministry of Science and Technology	331.8	7.3	Science and Technology
FIOCRUZ	331.0	7.3	Health
FNDCT	326.7	7.2	Science and Technology
National Foundation for Health	164.5	3.6	Health
National Health Fund	164.4	3.6	Health
Ministry of Education	20.6	0.5	Education
Navy	16.2	0.4	Defence
Air force	14.9	0.3	Defence
Nuclear Energy Commission (CNEN)	13.4	0.3	Science and Technology
Brazilian Space Agency (AEB)	11.0	0.2	Science and Technology
Ministry of Environmental Affairs	10.8	0.2	Environment

1. Compiled from *www.mct.gov.br/estat/ascavpp/portugues/2_Recursos_Aplicados/tabelas/tab2_5_2.htm* and *www.mct.gov.br/estat/ascavpp/portugues/2_Recursos_Aplicados/tabelas/tab2_5_2.htm* (for higher education).

Source: Ministry of Science and Technology.

Box 3.1. **EMBRAPA: The Brazilian Agricultural Research Corporation**

EMBRAPA was created in 1973 to "develop solutions for the sustainable development of the country's rural areas, focusing on agribusiness through the generation, adaptation and transfer of knowledge and technologies to benefit Brazilian society". It has 37 research centres (including 3 service units and 11 central divisions) and 2 221 researchers, 53% of whom hold a PhD or other doctoral degree.

Most research centres carry out commodity-specific research, while others are involved in thematic research (*e.g.* environment, genetic resources and biotechnology, agro-biology, among others) and/or regional issues. The corporation also has two overseas laboratories, in France and the United States. EMBRAPA focuses on technological upgrading in farming by developing techniques for biological and integrated control of harmful biological agents. It also coordinates the National System of Agricultural R&D, including federal and state-level R&D institutions, universities and businesses, which, in a co-operative manner, develop R&D projects relevant to different regions of the country.

EMBRAPA and its sister institutions at the state level are reputed to play a key role in agricultural R&D, which has helped Brazil to become one of the world's largest agricultural producers and a competitive, low-cost exporter of such commodities as soybeans, sugar, coffee, oranges and meat. Agricultural exports totalled around USD 30 billion in 2004, or almost one-third of Brazil's total merchandise export revenue.

The largest state-level R&D support system is that of the state of São Paulo, which is also the largest recipient of federal funds. Nevertheless, about two-thirds of public funding for R&D in the state of São Paulo comes from state sources, including funding for three state universities, 19 research institutions and FAPESP, the state's S&T support agency (FAPESP, 2004). The strong support by the state government makes the state of São Paulo

the second largest investor in R&D in Latin America, ahead of Mexico and Argentina. But other states are also active in this area, including Rio de Janeiro, Minas Gerais and Rio Grande do Sul, although their S&T budgets are much smaller.

An overview of output indicators

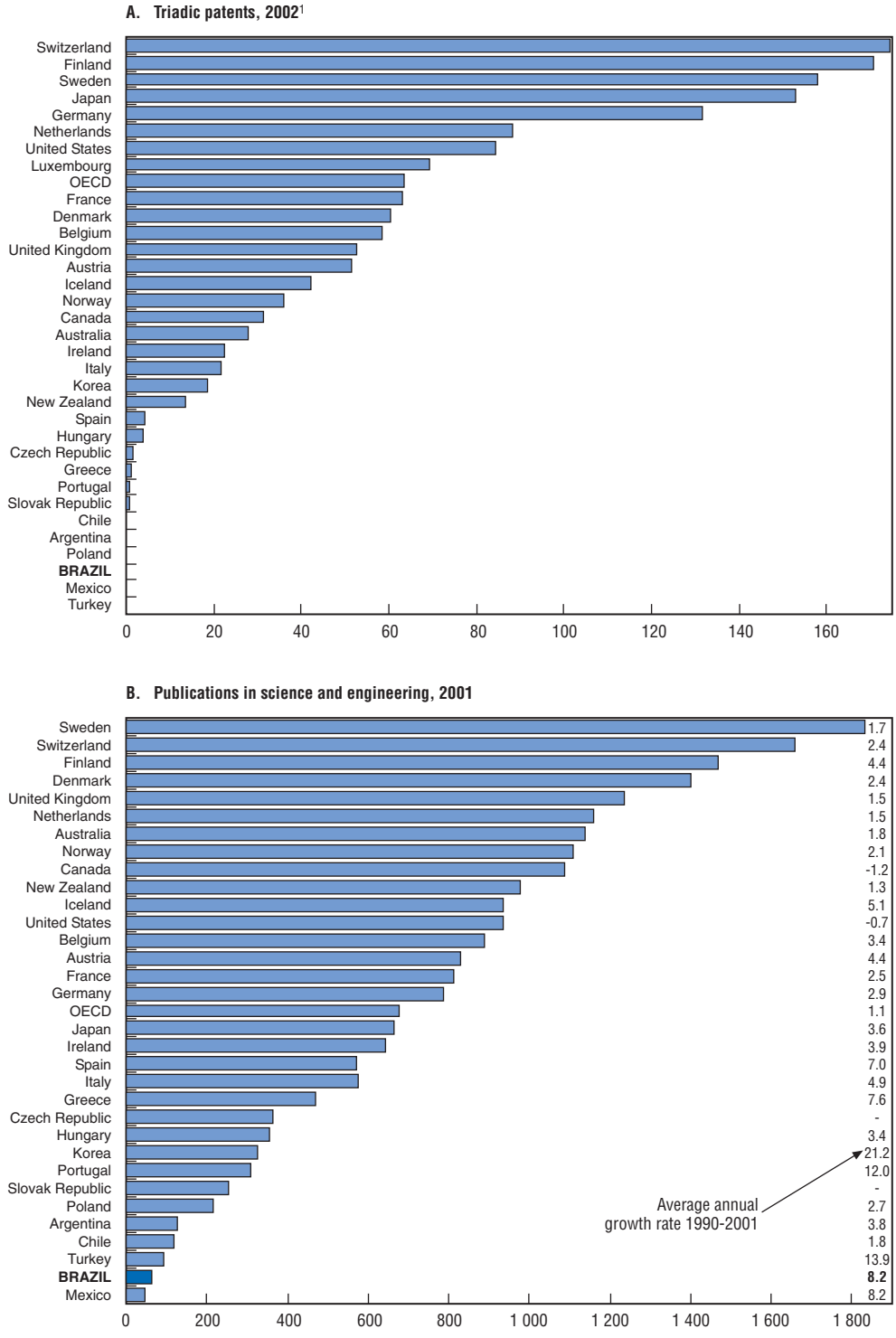
The number of scientific publications originated in Brazil – a usual indicator of R&D output – has been growing steadily over time (Figure 3.3), reaching 1.7% of the world total in 2004, against 0.4% in 1981. Publication performance is higher than average in the fields of agronomy and veterinary medicine (3.1%), physics (2.0%), astronomy and space science (1.9%), microbiology (1.9%), and plant and animal sciences (1.8%). Information for 2000 shows that 50% of the academic articles published then were in the field of life sciences, 33% in physical sciences, 13% in engineering, technology and mathematics, and 3% in social and behavioural sciences. This distribution is similar to the OECD average (OECD, 2003). The number of citations of Brazilian scientific publications also rose over time, from 1 056 per article published in 1981 to 1 862 per article published in 1998 (Leta and Brito Cruz, 2003).[1] As expected, the increase in the number of scientific publications follows closely the rise in the number of PhDs awarded every year, from 554 in 1981 to 8 856 in 2004. Notwithstanding this trend, the country still faces a shortage of higher-education graduates, especially in engineering and science. As discussed below, attainment in higher education is also below the OECD average, and the gap is widening.

A growing scientific community has allowed for the development of collaborative research programmes that require a large number of researchers. Recent experience in this area is promising and has the potential for engaging the business sector in commercially-oriented research. For example, the Genome Project, set up in São Paulo in partnership with the Citrus Producers' Association (Fundecitrus), resulted in the DNA sequencing of a phyto-pathogenic bacterium, the *Xylella Fastidiosa*, which allowed Fundecitrus researchers to devise ways to protect orange trees from a disease (*citrus variegated clorosis*, CVC) that had been associated with considerable economic loss in the past. The joint venture also generated at least two spin-off companies in the field of genomics and bioinformatics. Another example is the Biota Research Programme, a conservation and sustainable development-oriented biodiversity research effort to study and map biodiversity in the state of São Paulo (Box 3.2).

Notwithstanding these achievements, and considering the size of the Brazilian economy and its scientific production, the number of triadic patents held by residents is comparatively low. This relatively poor performance certainly arises from the low R&D intensity in the business sector, which reflects at least in part the dearth of scientists working in private enterprises. In Korea and the United States, for example, close to 80% of scientists work in the business sector, against only 26% in Brazil. Other countries have a much stronger patenting performance with a comparable number of researchers. For instance, Spain has approximately the same number of researchers working in the business sector as Brazil (roughly 20 thousand) and holds almost three times more patents. This discrepancy might follow from a gap between the two countries in skills, given that only 8.7% of the scientists working in the business sector (including non-profit enterprises) in Brazil hold at least a post-graduate degree (according to IBGE/PINTEC), as well as in the quality of inputs, such as machinery and equipment. But it also reflects the fact that the Brazilian economy is more closed to foreign trade. Brazilian enterprises are therefore relatively less exposed to competition in foreign markets and invest less abroad, which weakens the incentives for having their IPR protected in foreign markets. As an attempt to

Figure 3.3. **Triadic patents and scientific publications: Argentina, Brazil, Chile and OECD countries**

Per million of working-age population



1. Patents are reported by inventor's country of residence and priority date, using fractional counting procedures.

Source: OECD (Patent Database, January 2006), Institute for Scientific Information, Science Citation Index and Social Science Citation Index: CHI Research, Inc., Science Indicators database and National Science Foundation.

Box 3.2. **The Biota Research Programme: Innovation and sustainable development**

BIOTA, a "Virtual Institute of Biodiversity", has been studying and mapping the biodiversity of the state of São Paulo since 1999, aiming at conservation and sustainable development. Participating researchers, including approximately 400 PhDs and 500 graduate students, are affiliated with 16 research institutions. Participation is open, subject to the approval of research projects in a peer-review process carried out by FAPESP. There are 80 collaborators from other Brazilian states and approximately 50 from abroad.

With an annual budget of approximately USD 2.5 million, the Biota/FAPESP programme has sponsored 75 major research projects since its creation in 1999. It has trained 150 MSc and 90 PhD students, produced/stored information about approximately 10 000 species and made data available from 35 major biological collections. This research effort is summarised in 464 articles published in 161 scientific journals. The programme has published 16 books and 2 atlases.

An open-access electronic peer-reviewed journal, *Biota Neotropica* (*www.biotaneotropica.org.br*), was launched in 2001 to disseminate original research on biodiversity in neotropical regions. The journal is becoming an international reference in its area. A new venture called BIO*prospec*TA (*www.bioprospecta.org.br*) was launched in 2002 to search for new compounds for pharmaceutical or cosmetic use. As a result of this initiative, patent applications have been filed for three new drugs.

The international scientific advisory board that evaluates the Biota/FAPESP programme considered that "science in most BIOTA projects is of high quality equivalent to, or exceeding, that in other countries; in several projects, it is of outstanding quality at the cutting edge of international efforts. In many respects the BIOTA program provides an example and sets standards that many countries would be happy to follow".

tackle this problem, in 2005 the authorities introduced a deductibility of 50% of spending on salaries paid to scientists from the corporate income tax. Because this measure is recent, it is too early to assess its cost-effectiveness.

Another consideration is that patenting activity is dominated by the government. Petrobras, the government-controlled oil company, is Brazil's most important holder of triadic patents. Nevertheless, academic patenting is gaining momentum, which is a positive development. Successful examples include the University of Campinas (Unicamp) and the Federal University of Minas Gerais (UFMG), in addition to FAPESP in the state of São Paulo. Unicamp has a long tradition in patenting in Brazil and is the nation's largest holder of domestic patents, followed by Petrobras. The university created an innovation agency, *Inova*, in 2002, which has focused on licensing and is generating revenue for the university from its IPR proceeds (Box 3.3). Most of the licenses are exclusive, since the licensee takes part in the development of intellectual property through co-operative R&D agreements with the university. In any case, it is important to note that, although it is widely used, the number of patent holdings is an imperfect measure of innovation output, because, among other reasons, it fails to gauge the outcome of innovation in firms that prefer to exercise property rights through trademarks and copyrights. Firms may also prefer to keep commercially sensitive information secret for fear of having their intellectual property leaked to competitors in the process of patent registration.

Box 3.3. **Academic patenting: The case of *Inova***

The University of Campinas's Agency for Innovation – *Inova* – was created in 2002 to foster university-industry co-operative ventures in R&D, consulting and intellectual property licensing.* With a staff of 49, *Inova* has already filed 40 patents and 3 non-proprietary technologies in 21 contracts. Prior to *Inova*'s foundation, Unicamp, one of the country's most renowned centres for science and technology, held only 8 filed patents. Unicamp also created a Technology Transfer Office in 2002 in support of its patenting effort.

During 2004-05, *Inova* intermediated 87 licensing contracts with businesses, which increased Unicamp's revenue from intellectual property licensing by 60% and the number of patent applications submitted to INPI (*Instituto Nacional de Propriedade Industrial*) by one-third to 66 applications in 2005. Licensing contracts included mainly pharmaceuticals and phyto-therapeutic agents, food processing and nanotechnology-incorporated products. The first product to be licensed (May 2004) was *Aglycon Soy*, a soy-derived phyto-therapeutic agent to be used in hormone replacement therapy, launched commercially in March 2006. *Inova* executives estimate the product will generate BRL 12 million per year in royalties from 2008.

The licensing of Biphor™ to *Bunge Alimentos* is *Inova*'s most important endeavour. Biphor™ is a new nanotechnology-based, environmentally-friendly white pigment for paint, coatings and allied products, jointly developed by *Bunge Alimentos* and Unicamp's Chemistry Institute. *Bunge*'s Brazilian subsidiary, the largest South American manufacturer of fertilisers, built a state-of-the-art, large-scale pilot plant, which is already producing Biphor™ samples. Bunge estimates its white pigment could have a 10% world market share by 2010, resulting in annual royalty payments to *Unicamp* in the neighbourhood of USD 45 million over the next decade.

Inova is also working closely with 100 spin-off companies, coordinating studies for the implementation of a technology park adjoining *Unicamp*.

* See *www.inova.unicamp.br* for more information.

Recent R&D initiatives have a strong focus on sustainable development. This is the case of the use of ethanol to replace fossil fuels. About three-quarters of the new automobiles currently sold in Brazil are of the flex-fuel type (as of January 2006), and ethanol has traditionally been added to gasoline (at a maximum rate of 25%) to reduce emissions. Brazil is the largest ethanol producer in the world, and R&D joint ventures among industry, government and universities are focusing on developing better sugar cane varieties, and more efficient planting, harvesting and refining methods to reduce production costs further, although they are already low by international comparison. The *Pro-Álcool* programme implemented in the 1970s was a precursor to the current innovative efforts in this area.

Innovation in the business sector

Brazilian firms tend to engage predominantly in process, rather than product, innovations. According to the Innovation Survey (PINTEC) conducted by IBGE, the National Statistics Bureau, about one-third of Brazilian firms with at least 10 employees engaged in innovative activities during 2001-03, but only 6% of businesses reported to have engaged in innovative activities aiming exclusively at product innovations over the same period (Table 3.3).[2] This 6% ratio remained fairly stable since 1998-2000. Comparison with the European Innovation Survey (EIS) is informative. Brazil's overall innovation rate is comparable

Table 3.3. **Business innovation indicators: 1998-2000 and 2001-03**
In per cent of firms with at least 10 employees

	1998-2000	2001-03
Innovation rate		
Product	6.3	6.4
Process	13.9	12.9
Product and process	11.3	14.0
Any type of innovation	31.5	33.3
Memorandum items:		
Product innovation rate		
Small firms (10-49 employees)	14.1	19.3
Large firms (+500 employees)	59.4	54.3
Process innovation rate		
Small firms (10-49 employees)	21.0	24.8
Large firms (+500 employees)	68.0	64.4
Source of innovation		
Acquisition of machinery and equipment	76.6	80.3
Labour training	59.1	54.2
In-house R&D	34.1	20.7
Main obstacles to innovation		
Costs	82.8	79.7
Economic risk	76.4	74.5
Scarcity of financing	62.1	56.6
Shortage of skilled labour	45.6	47.5
Lack of information	36.6	35.8
Difficulty to adopt standards	25.1	32.9

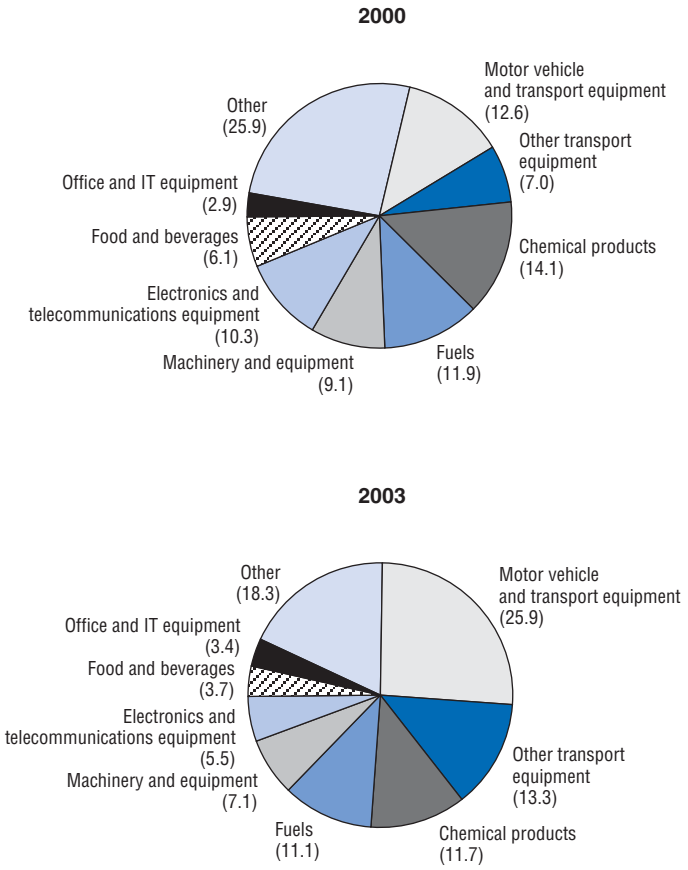
Source: IBGE (Innovation Survey, PINTEC) and OECD calculations.

to that of Spain in the OECD area, but lower than the European average of about one-half. Consistent with emphasis on process innovations in the business sector, the acquisition of machinery and equipment, which embody technologies developed elsewhere, is reported as being the main source of innovation by Brazilian firms. Costs, economic risk and a lack of external financing are deemed the main obstacles to innovation. The increase, from an already relatively high base, in the share of respondents that identified a scarcity of skilled labour and difficulty in adopting standards is noticeable from the earlier to the more recent period.

Small enterprises are becoming more innovative, especially for the development of new products. As a general trend, firms that innovate in products also tend to innovate in processes, but process innovations are often aimed at reducing costs through the diffusion of better existing technologies, rather than at pushing out the technological frontier. Although the sectors that tend to be dominated by large enterprises still account for the bulk of spending on R&D, the innovation rate has been rising faster in the sectors that are more closely associated with a prevalence of smaller enterprises. For example, the motor vehicle and transport equipment sectors accounted for, respectively, 26% and 13% of total R&D expenditure in 2003 (Figure 3.4). The innovation rate in the clothing and wood product sectors rose, respectively, from about 26% to 32% and from just over 14% to 31% between 1998-2000 and 2001-03. The increase in the sectoral innovation rates appears to be conducive to labour productivity gains (Figure 3.5), although this channel of causality would need to be examined more thoroughly, taking account of additional determinants of labour productivity growth.

Figure 3.4. **Composition of in-house R&D intensity by manufacturing sector: 2000 and 2003**[1]

In per cent of total

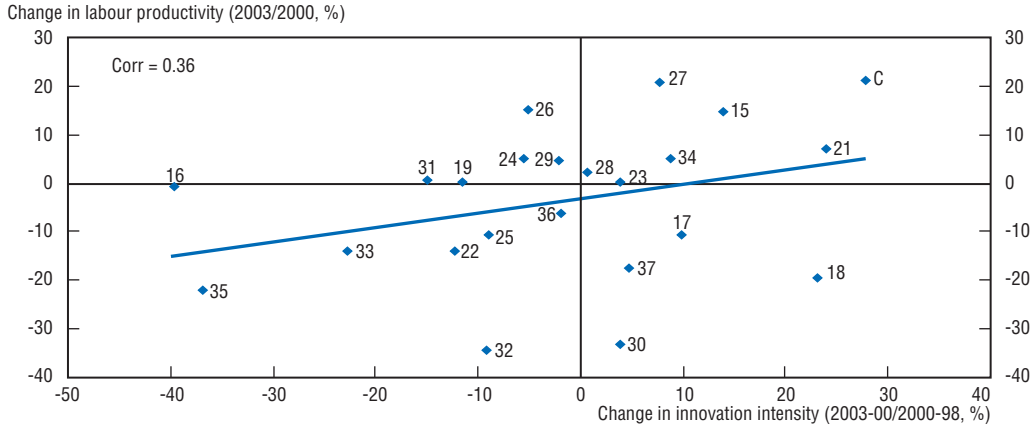


1. The numbers in parentheses are the sector's per cent share in total spending.

Source: IBGE (Innovation Survey, PINTEC) and OECD calculations.

Competition fosters innovation in the business sector. Recent empirical evidence shows that Brazilian firms' innovation effort depends strongly on the market share of foreign affiliates in the sectors where they operate (Araújo, 2005; de Negri *et al.*, 2005). This suggests that competition encourages innovation as a means of catching up with the efficiency level of foreign affiliates. Nevertheless, according to PINTEC, foreign affiliates innovate less than Brazilian firms, at least on the basis of reported R&D spending in relation to turnover. This is likely due to the fact that foreign affiliates already have access to best-practice technologies developed by parent companies located overseas. These firms may also be present in less technology-intensive sectors, such as the exploitation of natural resources. At the same time, Brazilian firms with operations overseas tend to engage more in product innovations at home, to demand more skilled labour and to spend more on labour training than their counterparts that do not have operations abroad. This suggests that exposure to competition in foreign markets, as well as the need to adapt to foreign demands, creates an innovation spillover effect at home. This evidence is consistent with the positive effect of trade openness on labour productivity, discussed in Chapter 1, and with the evidence available for OECD countries that competition in product markets encourages innovation.

Figure 3.5. **Innovation and labour productivity by sector**[1]



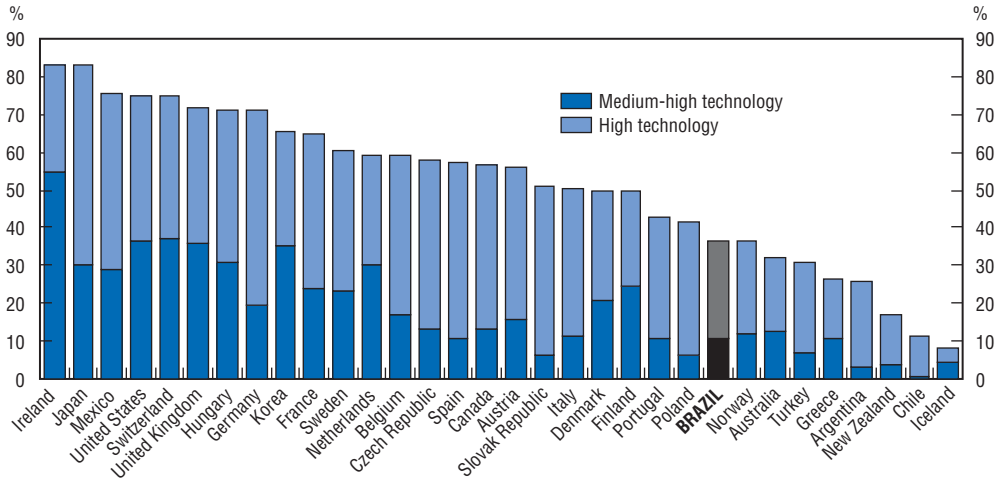
National sectoral classification system (CNAE):
C Mining and quarrying
D Manufacturing:
15 Food and beverages
16 Tobacco
17 Textile products
18 Wearing apparel and accessories
19 Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
21 Cellulose, paper and paper products
22 Printing and publishing
23 Fuels
24 Chemical products
25 Rubber and plastics products
26 Non-metallic mineral products
27 Basic metal industries
28 Fabricated metal products, except machinery and equipment
29 Machinery and equipment
30 Office and IT equipment
31 Electrical machinery and apparatus n.e.c.
32 Electronics and telecommunications equipment
32 Medical and optical equipment
34 Motor vehicle and transport equipment
35 Other transport equipment
36 Furniture and other manufacturing industries
37 Recycling

1. Excludes manufacturing of wood products. Labour productivity is defined as value added per employee.
Source: IBGE (Innovation Survey, PINTEC; and Annual Industrial Survey, PIA) and OECD calculations.

Innovation and scale efficiency are powerful determinants of Brazilian firms' propensity to export. In the case of manufacturing, exporting firms tend to be more scale-efficient, in the sense of being closer to their respective sector's technological frontier, and to have a better educated labour force than non-exporting firms (de Negri and Freitas, 2004). This is regardless of the sector in which the firm operates. The innovation intensity of competing firms, measured by their R&D spending, is also associated with firms' export propensity (Kupfer and Rocha, 2005). The existence of an association between a firm's innovation rate and its propensity to export is important for Brazil to exploit comparative advantages and therefore to increase the technological content of its exports (Figure 3.6). It also underscores the logic of the increasing policy effort to integrate, and maximise synergies, among policies in the areas of innovation and trade competitiveness.

Brazilian manufacturing firms seldom engage in co-operative ventures for innovation. Based on the indicators available from PINTEC and the EIS, only about 11% of innovative enterprises in Brazil co-operate with other firms or universities/research institutions, against 17% in the European Union (Cassiolato *et al.*, 2005). The most important sources of innovation are internal in both Brazil and the EU countries covered by the EIS. Also, Brazilian firms tend to rely more on clients and suppliers as a source of knowledge than their European counterparts, possibly reflecting the importance of *learning by using* in process innovations, which account for the bulk of innovation in the

Figure 3.6. **Technological content of exports: Argentina, Brazil, Chile and OECD countries, 2000-04 averages**[1]



1. Exports with high technological content refer to ISIC Rev 3 codes 353, 2423, 30, 32, and 33; and exports with medium-high technological content refer to ISIC Rev 3 codes 31, 34, 24 (except 2423), 352, 359, and 29.

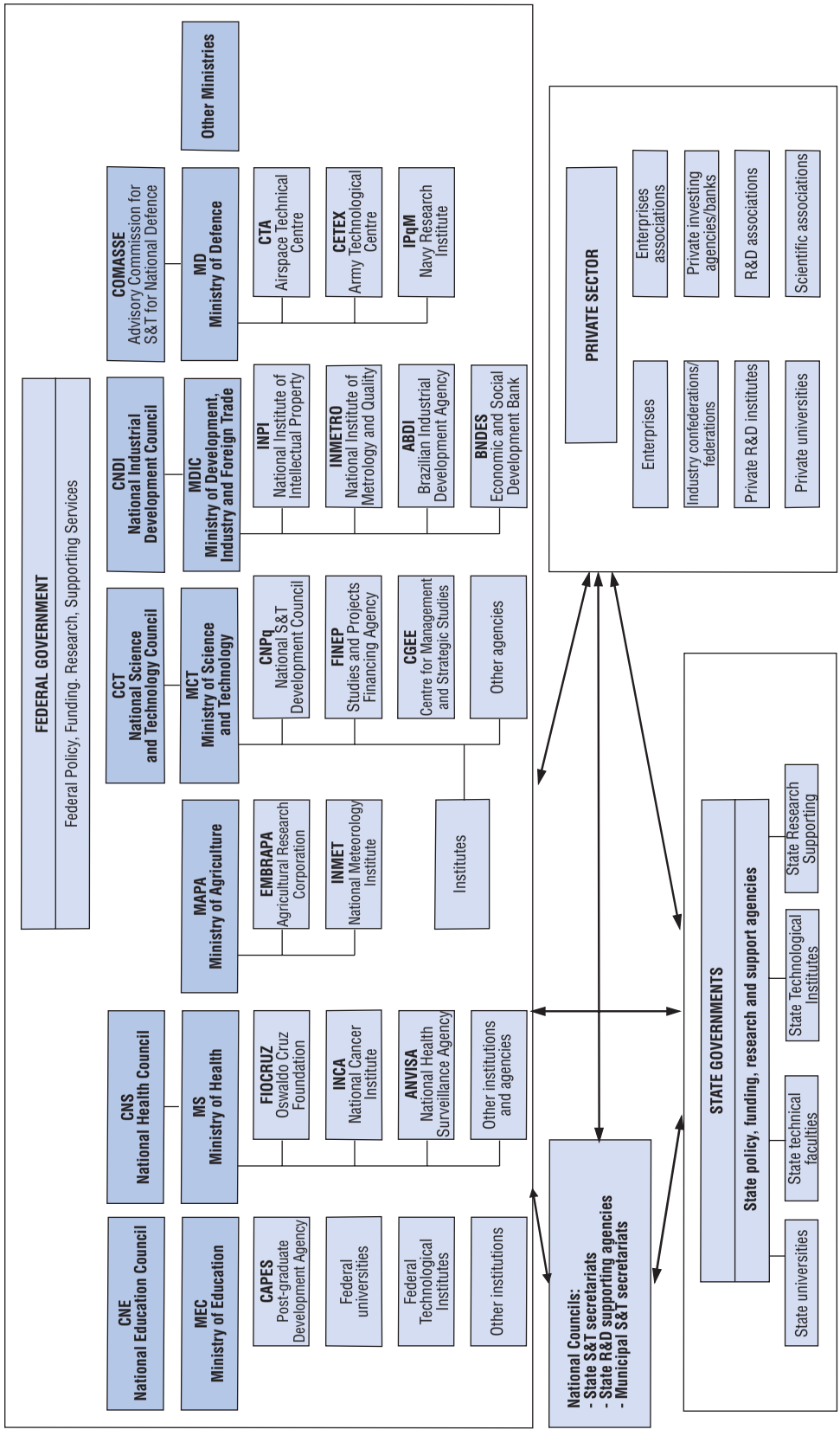
Source: OECD (STAN database), UN Commodity Trade Statistics database (UN Comtrade) and OECD calculations.

business sector. Brazilian firms also rely on information from competitors as a source of knowledge, which is probably due to the importance of *learning by imitating* in innovation in the business sector. Scale effects also matter, with large firms having a higher propensity to co-operate.

The National Innovation System

Brazil's National Innovation System (NIS) is complex (Figure 3.7), but co-ordination between federal and state-level S&T agencies is being fostered. State and federal support initiatives are designed and implemented separately, which may lead to overlapping institutional settings and fragmentation in funding and policy design. However, efforts are being stepped up to promote inter-governmental coordination through the National Council of State Secretaries for Science, Technology and Innovation (CONSECTI) and the National Council of State Research Agencies (CONFAP) in many policy fora, especially in the National Council of Science and Technology (CCT). At the federal level, CCT, an advisory body to the Presidency, is entrusted with a policy coordination role, while the Ministry of Science and Technology (MCT) acts as an executive body with the assistance of FINEP (MCT's financial support agency), CNPq (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*) and CGEE (*Centro de Gestão e Estudos Estratégicos*). On the other hand, industrial policy is formulated by the Ministry of Development, Industry and Trade (MDIC) through CNDI (*Conselho Nacional de Desenvolvimento Industrial*) and ABDI (*Agência Brasileira de Desenvolvimento Industrial*). Coordination among these agencies is promoted by representation of MCT and MDIC in both CCT and CNDI. The sectoral funds (discussed below) are governed by MCT, with the assistance of a technical secretariat. Each fund has a management committee and coordination is fostered through regular meetings that bring together the presidents of these committees under the purview of the Minister of Science and Technology.

Figure 3.7. **National Innovation System**



Source: Ministry of Science and Technology.

The mix of incentive instruments

Direct government support

The mix of instruments to foster innovation is tilted towards direct government support (excluding non-research transfers to universities and research institutions), rather than tax incentives, when gauged by the volume of budgetary resources mobilised and tax revenue foregone. Federal support for innovation is financed through a fund, FNDCT (*Fundo Nacional de Desenvolvimento Científico e Tecnológico*), managed by FINEP (Ministry of Science and Technology). FNDCT was created in 1969 to support scientific research in universities and research institutions. An important shift in policy took place in 2000-02 with the creation of the sectoral funds within FNDCT, when direct support began to focus on fostering sector-specific co-operative ventures between business and universities/research institutions, financed essentially through the earmarking of revenue from specific taxes and contributions (Box 3.4).

Impact assessment is not carried out systematically, despite the growing importance of the sectoral funds as a vehicle for direct government support for innovation. However, according to recent empirical evidence, the creation of the support funds, including FNDCT, appears to be associated with an increase in patent registration by beneficiary enterprises (de Negri *et al.*, 2006a and 2006b). But evidence is inconclusive as to their impact on productivity. This is in part due to the funds' emphasis on encouraging R&D rather than productivity gains *per se*. It takes time for a sustained emphasis on support for innovation *via* collaborative ventures to deliver durable productivity enhancement. Another consideration is that beneficiary firms often already have above-average productivity; they tend to be large enterprises that actively engage in R&D, to have a better educated labour force and to be exposed to competition in foreign markets through exports. In this regard, the deadweight losses associated with this support instrument may be large. The sectoral funds' ability to foster innovation in firms that would otherwise not innovate, and hence have lower productivity, therefore needs to be assessed more thoroughly. Support for innovation financed through BNDES also tends to focus predominantly on large, more productive enterprises, which underscores the policy objective of extending support to those enterprises that would otherwise not innovate. As an initial step towards meeting this challenge, in February 2006 BNDES announced the creation of credit lines in support of innovation activities in small and medium-sized enterprises, including university start-ups.

Public procurement is not used as an explicit support instrument for innovation. There has been continued pressure from the private sector for the government to adopt a more pro-innovation stance in its procurement policy. But Brazilian legislation does not provide for special treatment in public procurement depending on the technological content of purchases, even in the areas of defence and health care. The authorities are nevertheless considering policy options in this area, although so far little progress has been made. Notwithstanding these considerations, there are successful examples related to government procurement and technological development, including the establishment of the aeronautics industry at EMBRAER, the development of ethanol as an alternative fuel with the *Pro-Álcool* programme and the development of a competitive agribusiness sector under the stewardship of EMBRAPA. In any case, it should be noted that innovative procurement, as opposed to purchases of standardised goods, poses challenges.[3] It calls for policy effort on several fronts, including the identification of requirements and

Box 3.4. **Direct government support: The "sectoral funds"**

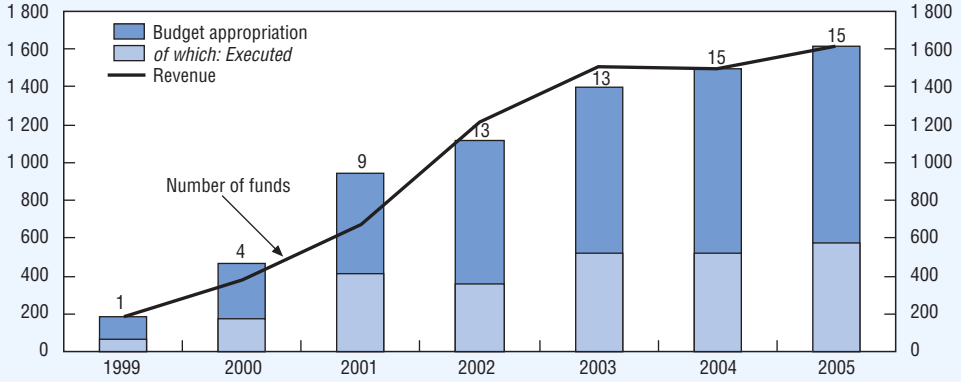
The sectoral funds have become the most important instrument for delivering direct government support for innovation. There are currently 16 such funds in operation, including the Telecommunications Fund (FUNTTEL), which is administered by the Ministry of Telecommunications.

Most sectoral funds are primarily financed by levies on enterprise turnover in the network industries that were privatised in the 1990s, including energy and telecommunications. The introduction of these sector-specific levies was justified as a means of preserving innovation intensity after privatisation, given that the former State-owned enterprises that had hitherto dominated the network industries were active R&D investors. Other sources of finance for the sectoral funds are the earmarking of revenue and a 10% levy on payments to non-residents for technical assistance and royalties. Due to the introduction of the sector-specific levies, financing for innovation rose in tandem with the increase in utility prices after privatisation. The composition of revenue sources varies across the sectoral funds.

The additional flow of revenue into FNDCT associated with the creation of the sectoral funds was estimated in 2000 at BRL 1.1 billion per year during 2000-05. However, actual disbursements have failed to keep up with the increase in financing, partly due to the sequestration of budgetary appropriations (*contingenciamento*) in support of the government's fiscal retrenchment efforts (Figure 3.8).

Figure 3.8. **Sectoral funds: Revenue and disbursements, 1999-2005**[1]

In millions of *reais* of 2005



1. Deflated by the GDP deflator. The number of funds in operation refers to those under FINEP's executive purview.

Source: Ministry of Science and Technology.

Each sectoral fund has a Steering Committee with members from academia, government and industry. These committees make all disbursement decisions, usually aiming at a balance between basic and applied science. Typically, the sectoral funds can finance projects only in their respective sector of activity, although 40% of their funding can be allocated to cross-sectoral activities, which pool resources from different funds. Support is directed predominantly to universities and research institutions, which may work alone or engage in joint ventures with the business sector. Support cannot be granted to enterprises directly. Nevertheless, on average approximately two-thirds of disbursements consist of joint ventures between businesses and research institutions, despite considerable variation across funds. In addition, there are regional targets for disbursement favouring the less developed regions. Only the two cross-sectoral funds – *Fundo Verde Amarelo* and *Fundo de Infra-Estrutura*[*] – currently use alternative support instruments, such as subsidised loans and participation in venture capital funds, which can be more geared to specific projects, especially business start-ups and spin-offs. Projects that require counterpart financing by the beneficiary enterprises are becoming more widespread, although they account for only about 20% of total FNDCT disbursements (Pereira, 2005).

* *Fundo de Infra-Estrutura* is financed by a 20% contribution from each of the other funds (except *Fundo da Amazônia*) and focuses on developing academic R&D infrastructure. *Fundo Verde-Amarelo* is financed by 40% of revenue from special contributions (CIDE), in addition to 43% of the additional revenue accruing from the gradual reduction in tax incentives granted to the ICT industry (discussed below). *Fundo da Amazônia* is financed by at least 0.5% of gross revenue of enterprises located in the Manaus Free Trade Zone.

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specifications that could lead to a successful design of the goods or services to be commissioned, as well as the qualification of suppliers and the design of the tendering process itself. Abidance by international regulations is important. So is the need to ensure a balanced sharing of risk between the government and the supplier in the course of projects and subsequently to allocate intellectual property rights between the government and the supplier once projects have come to fruition.

The supply of venture capital and private equity is expanding but remains relatively under-developed. The use of public innovation funds for venture capital is limited to *Fundo Verde-Amarelo* (discussed above in Box 3.4), but equity investment accounts for a very small share of disbursements. BNDES has been acting in this market segment since 1995, and in 2000 the Ministry of Science and Technology launched the *Inovar* programme, led by FINEP. The market responded well to this initiative, and several Venture Forums were organised to introduce projects to potential investors. More recently, in 2005, BNDES announced the creation of a fund of BRL 260 million directed towards providing start-up capital. The creation of venture capital funds by FINEP and *Banco do Brasil* in 2006 is likely to contribute to the development of this market segment, but it is too soon to evaluate the success of these policies in encouraging further private investment in venture capital. In any case, several other recent measures have made the supply of such financing more attractive. Capital gains on investments in venture capital funds by non-residents are now exempt from income taxation, and bank debits associated with IPOs negotiated outside the stock exchange are exempt from bank debit (CPMF) taxation.

Tax incentives

The revenue foregone through tax incentives for R&D is estimated at about BRL 1.6 billion in 2005, or approximately 0.1% of GDP. This sum is not included in the calculation of Brazil's R&D intensity. There are federal laws providing tax breaks for R&D activities (Table 3.4), but most of these incentives benefit the ICT industry (Laws No. 8248/91, altered by Law No. 10176/01) (Box 3.5). Support was subsequently extended to non-ICT firms (Law No. 8661/93, altered by Law 9532/97 and now revoked). Tax breaks are also granted (Laws No. 8010/90 and 8032/90) to universities and research institutions, exempting them from the payment of import duties on purchases of scientific equipment and materials. Another type of tax incentive (Law No. 8387/91) benefits the ICT firms established in the Manaus Free Trade Zone through the exemption of federal indirect taxes on sales and import tariffs on inputs. The tax code was modified by Law No. 11196/05,

Table 3.4. **Tax incentives for R&D, 2000-2005**

In millions of *reais*

	2000	2001	2002	2003	2004	2005 (est.)	Scope
Total revenue foregone	1 310.2	209.5	944.1	1 239.7	1 228.5	1 637.7	
Law No. 8 010/90	60.3	118.4	111.9	152.0	155.9	117.8	Research materials for academic institutions
Law No. 8 032/90	10.5	6.3	6.5	8.2	11.4	8.2	Research materials for academic institutions
Laws No. 8 248/91 and 10 176/01	1 203.7	..	732.9	961.7	934.6	1 369.1	R&D in ICT companies
Laws No. 8 661/93 and 9 532/97	22.3	22.4	15.2	19.7	37.1	46.1	R&D in non-ICT companies
Law No. 8 387/91	13.4	62.4	77.6	98.1	89.5	96.5	R&D in ICT companies in the Manaus Free Trade Zone

Source: Ministry of Science and Technology (Secretaria de Política de Informática, Secretaria de Política Tecnológica Empresarial and Conselho Nacional de Desenvolvimento Científico e Tecnológico) and Ministry of Development, Industry and Commerce (Superintendência da Zona Franca de Manaus).

Box 3.5. **The ICT sector: From protection to promotion**

The Brazilian ICT sector was shielded from foreign competition during 1977-1992. Bureaucratic impediments created barriers to entry in the electronics industry at large, and upstream activities were protected through stringent national input-content requirements. Support for protection waned in the late 1980s as a result of a large price differential with respect to equipment produced abroad, and on the grounds that it was holding back productivity gains in export-oriented sectors. Quotas were eliminated in 1992, and a 30% import tariff was introduced with a schedule for gradual reduction over time, together with tax incentives for local production. Productivity rose at a fast clip with liberalisation, and prices fell considerably.

Empirical evidence shows that the Brazilian personal computer (PC) industry evolved rapidly after liberalisation.* Technological progress did occur during protection but failed to deliver competitive prices. A lack of competition in upstream sectors and impediments to entry throughout the production chain are considered the main culprits for the maintenance of high prices during protection. The gain in consumer surplus associated with the fall in prices after liberalisation is therefore estimated to have been high.

It was feared that the liberalisation of the ICT sector in the 1990s would adversely affect the banking industry. Brazil's banking automation industry, which remains dominated by bank-owned firms, not only survived liberalisation but is also considered among the most efficient in the world, especially in software development and services technology. Banking automation is a key downstream user of ICT. It requires significant R&D effort and contributes to the diffusion of ICT adapted to local needs. The combination of high inflation in the 1980s, the country's size and culture of using banks for payments created strong demand for ICT as a means of expediting back-office activities and payment processing.

In addition to banking automation, certain applications of ICT have been very successful: the filing of income-tax returns has been carried out almost exclusively through the internet for more than five years. Electronic ballot boxes have been used since 1996 for national and regional elections.

* See Luzio and Greenstein (1995) and Botelho *et al.* (1999) for more information.

which simplifies the procedures for firms to take advantage of the existing tax breaks. This measure has been welcomed by the private sector. It is nevertheless too soon to assess the impact of these recent measures on innovation intensity in the business sector.

The existing tax incentives include: *i*) exemption from federal indirect taxes of sales of selected products and purchases of capital goods and intermediate inputs, *ii*) corporate income tax deductibility for spending on R&D and for payments of royalties for the use of trademarks/patents and technical/scientific assistance, and *iii*) accelerated depreciation and amortisation provisions. Since June 2005 (Decree No. 5468), purchases of capital goods and intermediate inputs have been exempted from IPI taxation (the federal value added tax). Other measures were introduced in 2005 as part of a broad package to ease the tax burden on businesses (Law No. 11196).[4] These include: *i*) exemption from PIS/Pasep and COFINS (federal taxes on value added) of purchases of capital goods and intermediate inputs by exporters, defined as enterprises that export at least 80% of their output, including ICT goods and services;[5] *ii*) exemption from PIS/Pasep and COFINS of retail sales of several types of lower-cost personal computers and peripheral equipment; *iii*) an increase in deductibility from the corporate income tax of spending on R&D to 200% of the

value of purchases; *iv*) an allowance for remittances for the payment of technical/scientific assistance fees to be creditable against the corporate income tax; *v*) exemption from corporate income taxation of remittances for the filing and maintenance of IPRs abroad (through patents, trademarks and cultivars); and *vi*) introduction of deductibility from the corporate income tax for up to 50% of the salaries paid to scientists working in the business sector.

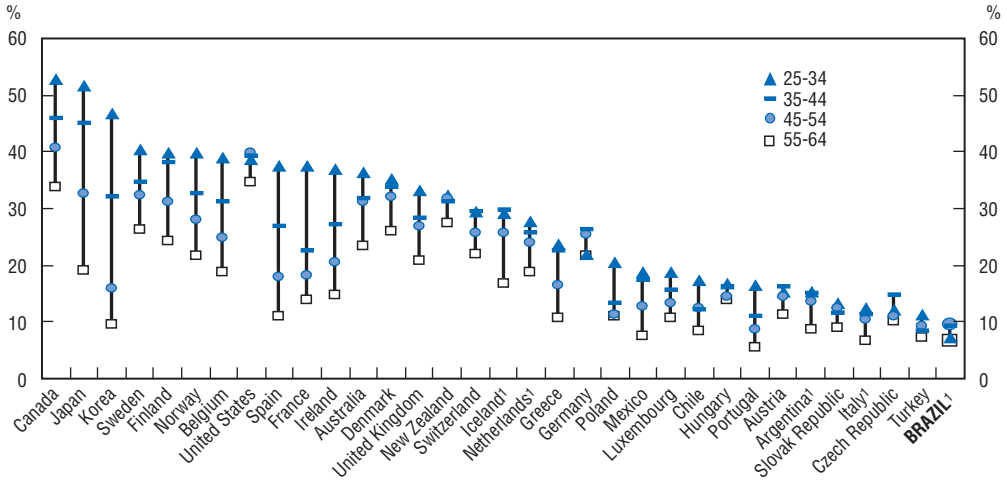
Higher education

Brazil's poor record in educational attainment is among the key obstacles to the generation and diffusion of innovation. An increase in higher-education attainment is needed to improve R&D performance and should benefit from the rapid expansion in enrolment in upper-secondary education in recent years. Notwithstanding this positive development, Brazil lags far behind the best performers in the OECD area and even countries with comparable income levels. Policy initiatives have focused on the expansion of school enrolment for primary and lower-secondary education, which is now nearly universal, especially since the implementation of FUNDEF, discussed in the *2005 Survey*. Less emphasis has been placed on improving the quality of services. The performance gap in primary and lower-secondary education – measured on the basis of standardised tests, such as PISA – is wide relative to most OECD countries, suggesting that there is much room for improvement. In any case, it will take some time for current policies to bear fruit in terms of a sustained reduction in the performance gap, and follow-through is essential. Complementary measures, such as greater emphasis on the use of computers and access to the Internet at school, would contribute to building an education culture conducive to the development of a knowledge-based economy. The government's efforts to make computers available in all public schools are therefore welcome.

The attainment gap in higher education is widening relative to the OECD area, as well as Argentina and Chile (Figure 3.9), a trend that is likely to be reversed only in part by the increase in enrolment in upper-secondary education in recent years. The expansion of the

Figure 3.9. **Tertiary education: Attainment rates by cohort, 2003**

In per cent



1. Refers to 2002.

Source: OECD (*Education at a Glance*, 2005).

university network in recent years has been due essentially to the increase in the number of private institutions (Box 3.6), which focus for the most part on low-cost programmes in management and social sciences. In addition to raising quality issues for the higher-education sector as a whole, these developments do little to increase the supply of

Box 3.6. **An overview of higher education**

Background

There has been a substantial increase in the number of private higher-education institutions, which more than doubled during 1997-2003. These new institutions accounted for about 70% of the 3.9 million students registered in higher education in 2003. Some private universities are now among the largest in the country by number of students and have specialised in low-cost fields of study, such as management and social sciences.

The federal government finances about two-thirds of public spending on higher education, and about one-half of the public institutions are federal. The supply of higher-education institutions is tilted towards universities, and only 1.5% of higher-education students were enrolled in technological institutes (*escolas técnicas*) in 2003, a share that has nevertheless almost doubled since 1999.

Access to higher education is by examination, which is carried out in a decentralised manner. Public universities are free of charge, and there is little systematic information on tuition fees in the case of private universities. There are few student-loan schemes or much financial support for students from disadvantaged backgrounds. The introduction of quotas for non-white students in the federal universities is being debated, and a few institutions have set up such a quota system on a voluntary basis. Other universities have adopted affirmative-action initiatives to enhance the admission of graduates from the public high-school network.

The expansion of the public higher-education system has not kept pace with demand, as the ratio of applicants to accepted students rose from 6.6 to 8.4 during 1993-2003, whereas it fell from 2.4 to 1.5 for the private institutions. Despite the increase in enrolment, attainment remains low, even for the younger cohorts, because drop-out and failure rates are high. The graduation rate increased somewhat in the public universities, to 73% in 2003 from about 60% in 1993, but remains fairly stable at 55% in their private counterparts.

Quality assessment

Effort has been made to assess the quality of higher education through SINAES (*Sistema Nacional de Avaliação do Ensino Superior*). Since 2002, an assessment has been carried out by submitting a representative sample of first- and last-year students of different fields of study to an exam (ENADE, *Exame Nacional de Desempenho dos Estudantes*). ENADE's sample included 140 340 students in 2004, enrolled in 13 knowledge areas in public and private institutions. The performance of each student is assessed together with that of the institution to which he/she is affiliated and compared with that of fellow students in the same career and field of study.

There is a quality gap between private and public institutions. Based on the assessments carried out in 2004, students enrolled in federal universities had the highest scores both in general knowledge and career-specific tests. Input quality indicators also differ between private and public institutions. The student/teacher ratio, for example, rose slightly over time, from 12 to 15 during 1993-2003 and is higher for private than public institutions. The students placed outdated libraries, the structure of curricula and limited access to computers among the main weaknesses of their institutions.

scientists and engineers, so as to strengthen the innovation potential of universities. The stock of engineers graduated per thousand population – 0.08 in Brazil, against 0.22 in the United States; 0.33 in France and Germany, and 0.8 in South Korea – illustrates the country's deficit in this area.

Policy recommendations

Brazil's key challenge is to encourage productivity-enhancing innovation in the business sector. Academic excellence in several niche areas is encouraging university patenting, but joint R&D efforts between universities and businesses remain nascient, partly due to legal impediments to the transfer and sharing of proceeds from intellectual property rights (IPR). The Innovation Law, approved at end-2005, is a step in the direction of removing these impediments. But boosting innovation is a multi-dimensional policy endeavour, as recognised by the authorities, which calls for a comprehensive approach that goes beyond the S&T area. In this respect, the strengthening of the current policy framework (PITCE) – by exploiting synergies between productivity-enhancing innovation and trade competitiveness, as well as refocusing industrial policy on trade promotion, rather than protection – is a significant step forward. So are the federal government's recent efforts to reduce the domestic tax burden on innovative enterprises. Notwithstanding these positive developments, import tariffs remain high for capital goods and intermediate inputs, and complementary measures to tackle the shortage of human capital, which is among the most important constraints to innovation, should rank prominently in the government's policy reform agenda. To reach the OECD average of about 1.6% of GDP, Brazil's business R&D intensity would have to rise by a factor of 4 – an illustration that underscores the scope for improvement in this area.

Strengthening the framework conditions for innovation

Some of the key framework conditions for innovation are yet to be fulfilled. Macroeconomic volatility and high real interest rates reduce investors' appetite for risky projects, including R&D, in comparison with investment in fixed-income securities. The policies discussed in Chapter 2 to make the economy more resilient to shocks by consolidating macroeconomic adjustment will therefore contribute to making innovative activities and investment in R&D more attractive. Initiatives to deepen the financial markets would also contribute by improving the market environment for risky ventures. The reform of bankruptcy legislation and the strengthening of equity markets are among the key policy initiatives that have been taken in this area (Annex 1.A1). But additional structural measures can be considered. These include further pro-competition regulatory reform in product markets, given the strong association between labour productivity growth and trade and investment openness, discussed in Chapter 1, as well as the fact that innovation appears to be bolstered by competition from foreign firms.

On the basis of the indicators of restrictiveness in product market regulation (PMR), as reported and discussed in the *2005 Survey*, there appear to be reasonably robust economy-wide competitive pressures in Brazil. The country's score is on a par with Chile's and Mexico's, the Latin American comparators for which information is currently available, and the average of emerging markets in the OECD area. In a global environment where product market regulation is becoming increasingly competition-friendly, further reform in this area could make Brazil even more attractive to productivity-enhancing FDI. A 2004 survey conducted by the Economist Intelligence Unit found that Brazil ranked sixth on a list of

targeted countries for foreign investment in R&D laboratories (Economist Intelligence Unit, 2004). However, Brazil fares particularly poorly on the basis of the PMR indicators with respect to outward-oriented policies, because average import tariffs remain relatively high, despite the gradual easing that took place over the 1990s, discussed in Chapter 1. A further easing of tariff protection could therefore be innovation-enhancing, because the acquisition of capital goods and equipment is an important source of embodied technologies in the manufacturing sector. Stepping up the policy effort in this area would complement the measures (discussed above) to reduce the domestic tax burden on innovative activities.

Facilitating R&D co-operation between universities and businesses

Linkages between universities and businesses need to be strengthened. The main restriction today is the limited number of researchers working in the business sector. By removing the legal impediments for public universities and research institutions to protect, commercialise and share the proceeds of their joint intellectual property, the passing of the Innovation Law late in 2005 is a considerable step forward in this area. Universities and research institutions can therefore act as contract researchers, which is especially useful for firms that are too small to finance in-house research. In this regard, initiatives, such as Unicamp's *Inova*, in the provision of legal and technical assistance to businesses in setting up collaborative ventures with universities and subsequently registering their joint IPR, are laudable. The recently introduced partial deductibility of expenditure on researcher salaries from corporate income taxation may also facilitate business-university co-operative ventures. But more is needed to expedite the registration of patents, especially given the increase in academic patenting in recent years, including by reducing the backlog of applications to be processed by INPI, the National Patent Office.[6] Long delays in the processing of patent and trademark application not only slow the diffusion of new technology, but also weaken the incentive for innovation by increasing the time span before IPR holders can begin to amortise their innovation costs.

Improving the architecture of the NIS

Brazil's NIS has changed markedly since the creation of the sectoral funds and would benefit from greater clarity in the assignment of functions and responsibilities, particularly in the area of long-term strategic planning. These functions have become increasingly concentrated in cross-sectoral bodies, such as CGFS (*Comitê de Coordenação dos Fundos Setoriais*), created in 2004. Until then, these functions had been shared by CGEE, FINEP, CNPq and the sectoral funds' administrative committees, creating excessive fragmentation. In the current institutional set-up, however, the role of CGEE could be clarified so as to assign the agency a clearer advisory role in long-term planning. In doing so, more attention could be devoted to regular assessments of the economic impact of existing support programmes and the framework conditions needed in support of the government's overall S&T policies. In any case, efforts should be stepped up to foster coordination among CCT, CGEE, CNDI and ABDI at the federal level.

Intergovernmental co-operation should be enhanced to create policy synergies. Increased co-operation over time between FINEP and CNPq in the operation of the sectoral funds is a welcome development at the federal level. But this is not the case across the different levels of government. Intergovernmental co-operation could be strengthened by inviting representatives of the state-level S&T institutions to work closely with the federal

government in setting priorities and carrying out strategic planning for the sectoral funds. They could also participate in the administrative committees of the funds that are most relevant to their own policy priorities, regional specificities and support portfolios. Increasing participation of the business sector in these administrative committees would also be welcome.

All in all, the increasing emphasis – within the government and beyond – that is being given to support for productivity enhancement, rather than R&D *per se*, and trade competitiveness within PITCE calls for greater co-operation among a broader range of policymakers. This includes not only the ministries of Science and Technology, and Education, and their subordinate agencies (FINEP and CNPq in the Ministry of Science and Technology, and CAPES in the Ministry of Education), but also the ministries of Development and Trade (especially CNDI and ABDI), National Integration, Agriculture and other bodies, such as BNDES, APEX (the trade financing agency), SEBRAE (the SME support agency), and the state-level S&T agencies. A flexible institutional setting, with a clear mandate for long-term planning and strong advisory capabilities, is therefore essential for policy synergies among these interlocutors to be maximised.

Improving the cost-effectiveness of government support

The current administration's objective of raising Brazil's R&D intensity to 2% of GDP, closer to the OECD average, predominantly on the back of higher government spending, is yet to be met. The main weakness of the current support mechanism is its reliance on earmarked funding, which creates budgetary rigidities and has failed to generate a stable source of government support for S&T. As in other areas, revenue earmarking is a common instrument in Brazil to deal with volatility in financing and hence to ensure continuity in public policies, especially in periods of fiscal stress. However, in addition to complicating macro-fiscal management, revenue earmarking prevents the allocation of funds to the sectors where their use could turn out to be most cost-effective. It may therefore also undermine contestability, which is a pre-requisite for cost-effectiveness in direct support for innovation, by creating captive sources of finance for selected sectors/activities. As a result, the goal of ensuring continuity and stable financing for innovation support programmes should be pursued through the prioritisation of programmes, rather than budget rigidities. It should nevertheless be noted that, in a situation of fiscal stress, it may be particularly difficult to preserve budgetary appropriations for R&D while other outlays may be subject to sequestration.

The creation of the sectoral funds has been a landmark in Brazil's innovation policy, but more emphasis should be placed on cross-sectoral support, which would allow resources to be shifted horizontally across funds. Options for improvement in this area include focusing eligibility conditions on joint ventures between businesses and higher-education institutions, preferably with counterpart financing by businesses and including through the minority participation of the sectoral funds in venture capital initiatives. SMEs could also be included in the business-university R&D ventures benefiting from government support. These initiatives would contribute to strengthening transparency and contestability in the allocation of existing budgetary resources. In this regard, the experience of Spain in the OECD area with the creation of CENIT (*Consorcios Estratégicos Nacionales para la Investigación Técnica*) in 2005 may be instructive, although it is too soon to evaluate the cost-effectiveness of the programme and its impact on productivity.[7]

The efficiency of tax incentives can be improved. The recent initiative (Law No. 11 196 of 2005) to streamline the legislation for tax incentives and to extend the benefits current available for the ICT sector to the rest of the economy is welcome. So is the exemption of IPOs and venture capital operations from bank debit taxation (CPMF). As a result of these measures, the tax incentive intensity is expected to increase over the coming years to 0.24% of GDP, or more than double the current level. But more can be done in the tax area to strengthen the market environment for risk-taking in the form of venture capital. Several provisions of the 2005 law are yet to be promulgated. Also, capital gains accruing from the sale of venture company shares could be exempted from income taxation as an additional support measure towards developing this market segment. Moreover, the phasing-out of the existing tax incentives for the firms located in the Manaus Free Trade Zone could be considered when it is due for renewal in 2013 as a means of making the provisions of the tax code more homogeneous across activities and regions.

In any case, it should be recognised that the optimal balance of support instruments – between direct subsidies and tax incentives – is not clear-cut, because both policy instruments involve deadweight losses (*i.e.* support may be granted to activities that would have taken place anyway) and pose governance risks. The cost-effectiveness of alternative policies also depends on design and implementation, which calls for a careful assessment of plans and outcomes (OECD, 2006). In general, because small firms often do not have enough tax liabilities to benefit from tax incentives, or a solid credit history and tangible assets that can be used as collateral to tap credit markets, a case can be made for greater reliance on subsidies for support to innovation in the SME sector, including start-ups. As a general principle, however, transparency and contestability are important pre-requisites for effective support, regardless of enterprise size.

The need for high-quality information on S&T and R&D indicators and outcomes to undertake analysis of cost-effectiveness should not be underestimated. The Ministry of Science and Technology is working on improving the quality of S&T and R&D indicators, as well as on the reporting and dissemination of these indicators on a regular and timely basis, in accordance with the recommendations of the Frascati, Camberra and Oslo manuals. Policy effort in this area is therefore welcome.

Addressing problems in higher education and vocational training

The main challenge for higher education is to expand supply while reducing the quality gap between private and public universities. The increase in the number of private higher-education institutions, coupled with the relatively poor performance of the students enrolled in these institutions on the basis of ENADE (Box 3.6), raises questions about quality control. The challenge of reducing the quality gap will need to be addressed, preferably before the demand pressures associated with the expansion in enrolment at the secondary education level reach the tertiary level. Making curricula more attuned to market demands, updating libraries and increasing the availability of ICT equipment are all part of the solution, based on the weaknesses identified in the 2004 ENADE. Student performance indicators could also be used for tightening the accreditation requirements of private institutions. In any case, given the wealth of information provided by ENADE, including on students' socio-economic backgrounds, more research should be done on the policy determinants of performance in tertiary education.

At the same time, universal access to publicly funded higher education fails to address some of the equity challenges that have arisen from the expansion of the private university

network. Because there are no tuition fees in public institutions, students from disadvantaged backgrounds would not in principle be constrained from enrolling in higher education on the basis of income. However, these students typically do not have the academic performance required to compete for a place at a public university with better-off students who had the means to attend better, most often private, secondary schools. They are left with the option of enrolling in private institutions, but currently do not receive means-tested support from the government to pay for tuition fees and to cover their living expenses during their studies. Therefore, the fact that higher education is provided free of charge in public universities does not *per se* remove financial constraints to higher education for students from disadvantaged backgrounds, while extending subsidies to more affluent social groups. The introduction of quotas for students based on ethnicity does not solve this problem, because the intended beneficiaries may lack the means to support themselves during their studies. This policy measure would instead contribute to the perpetuation of high drop-out rates among vulnerable socio-economic groups.

On vocational/technical training, Brazil is not alone is struggling to find options for better preparing youths for the labour market, particularly those who are unlikely to pursue tertiary education. The Brazilian education system does not have separate streams for vocational and general education, which, as argued in Chapter 4, is a positive pre-condition for building an effective system of lifelong learning. Nevertheless, there is a lack of options for vocational training, which may discourage enrolment in upper-secondary education by those students who cannot, or do not wish to, go on to university, despite the fact that returns to education are high at that level. The government intends to create double qualification (general and vocational) programmes at the upper-secondary education level. This would be welcome, as discussed in Chapter 4.

With regards to the technological institutes, which typically have tertiary-education status, the fact that they have outdated equipment and curricula makes them ill-prepared to respond to market demands. This raises concern about the quality of services and makes co-operative ventures with businesses difficult. The government's intention to increase the supply of tertiary education-level technological institutes by setting up new institutions and converting a few current institutions into universities is questionable. Instead, it would be advisable to step up efforts to monitor the quality and market-orientation of the training offered in these institutions on a regular basis before new ones are created. More generally, the increase in youth unemployment in recent years and the fact that the labour market is putting an increasingly high premium on skills, as discussed in Chapter 4, calls for greater policy effort in this area as a means of reversing the deterioration in low-skill individuals' employability. Increasing the supply of shorter tertiary-education programmes would also be advisable as a means of meeting the demand for higher-education qualifications with a more practical, less academic focus. The example of the technological faculties (FATECs) in the state of São Paulo could be considered at the federal level (Box 3.7).

Summary of recommendations

This chapter's main policy recommendations are presented in Box 3.8.

Box 3.7. **Short-term higher-education technology courses: The experience of São Paulo**

A new strategy for the expansion of higher-education opportunities attuned to regional demands has been pursued by the state of São Paulo over the last ten years in parallel with the expansion of enrolment in the state's three traditional, academic research-oriented universities (University of São Paulo, USP; University of Campinas, Unicamp; and University of the State of São Paulo, Unesp). To do so, the state has created a parallel university system – the technological faculties (FATECs) – to meet a growing demand for professionals with the technological skills required by industry.

The number of FATECs rose from 6 in 1994 to 26 in 2006, bringing total enrolment from 5 000 to 18 000 students. The creation of another nine campuses is planned for the next few years. The campuses are located across the state, with the expansion planned to cover those areas that are currently underserved. There is fierce competition for vacancies in the three-year courses offered: typically one in every eight candidates is accepted through a selective entrance examination. The operating cost is about USD 3 000 per enrolled student per year, significantly lower than the average cost of higher education in Brazil.

Almost all campuses offer training in management and informatics, and most also cover fields related to the regional economy. For example, located in the city of São Paulo, the largest campus offers training in industrial automation, construction, materials technology, mechanics, hydraulics and sanitation. Other campuses focus on textile technology, logistics and transportation, electronics and agribusiness.

Box 3.8. **Summary of recommendations: Innovation**

Strengthen the framework conditions for innovation

- Continue to reduce the domestic tax burden on capital and ICT goods.
- Gradually eliminate import tariffs on capital goods and intermediate inputs to facilitate access to productivity-enhancing technologies embodied in imports.

Facilitate patenting

- Take steps to reduce the current backlog of patent and trademark applications to be reviewed by INPI.

Address the problems of higher education and vocational training

- Make curricula more attuned to market demands, update libraries and increase the availability of computers.
- Use student performance indicators (on the basis of ENADE) for tightening the accreditation requirements of private institutions and for encouraging improvement through greater co-operation with the government.
- Create double qualification (general and vocational) programmes at the upper-secondary education level.
- Increase the supply of shorter, more practically-oriented post-secondary education programmes.

Improve the cost-effectiveness of direct government support

- Conduct regular impact assessments of the existing instruments, including those financed by the sectoral funds.

Box 3.8. **Summary of recommendations: Innovation** *(cont.)*

- Focus sectoral-fund support on horizontal projects with counterpart financing from businesses.
- Introduce alternative support instruments, such as risk-sharing, matching grants and loan subsidisation, which may be more applicable to start-ups.
- Improve contestability in the allocation of sectoral-fund support by reducing emphasis on regional and sectoral earmarking.

Improve the cost-effectiveness of tax instruments

- Conduct regular impact assessments of the existing tax instruments, including those related to the Manaus Free Trade Zone.
- Exempt the capital gains from the sale of venture company shares from income taxation.

Strengthen the National Innovation System

- Promote co-operation between federal and the state-level S&T and innovation promotion agencies.
- Assign CGEE a clear advisory role in long-term planning.

Notes

1. The number of ISI (Institute for Scientific Information) publications underestimates scientific production because it excludes publications in local outlets. In order to enhance the visibility of Brazilian scientific production, in 1999 FAPESP and the Latin American and Caribbean Centre for Health Sciences Information organised an open-access web portal, *Scielo* (Scientific Electronic Library Online, *www.scielo.org*), offering access to more than 150 peer-reviewed journals. See Alonso and Fernández-Juricic (2002) for more information.
2. PINTEC surveys a sample of over 84 000 enterprises accounting for total turnover of about USD 850 billion (at a PPP exchange rate) and reported R&D expenditures of USD 4.5 billion (PPP).
3. See Fraunhofer Institute for Systems and Innovation Research (2006) for more information and analysis of case studies for selected European countries.
4. At the state level, there are initiatives based on the federal Innovation Law. In the state of São Paulo, for example, draft legislation has been submitted to the state legislature expanding the reach of the federal law to state-owned institutions.
5. The law created two tax regimes, respectively, for exporting firms (Regime Especial de Aquisição de Bens de Capital para Empresas Exportadoras, Recap) and for exporters of ICT services (Regime Especial de Tributação para a Plataforma de Exportação de Serviços de Tecnologia da Informação, Repes).
6. INPI's effort to reduce this backlog includes the introduction of registration applications through the Internet for trademarks in April 2006 and for patents in November 2006, as well as hiring temporary workers.
7. The programme consists of consortia involving at least four companies, including two small enterprises, and at least two public research institutions. Each consortium is led by one of the large participating companies. Projects must extend over a four-year span, with a budget of EUR 5-10 million per year, and include advanced scientific and technological developments. The leader and the other private-sector participants must provide at least 50% of the funds, with the remainder financed by the programme. The consortia must invest 25% of the funds in public research institutions and at least 16% in the participating small enterprises. The leading companies obtain 9% of public funding but can steer the direction of the research effort towards their strategic objectives.

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Chapter 4

Improving labour utilisation

Labour force participation is comparable to the OECD area for prime-age males. It is somewhat lower for females and is trending down for youths as a result of rising school enrolment. The labour market is placing an increasing premium on skills, making it particularly difficult for the less educated to find a job. Labour informality is pervasive and turnover high, especially for the less educated, discouraging investment in labour training and the acquisition of job-related skills, and perpetuating income disparities. The main policy challenge is to improve labour utilisation by reducing informality and fostering human capital accumulation on and off the job. A stable macroeconomy is a pre-condition for reducing unemployment, but a greater focus on activation within the current policy framework would be advisable. To close the remaining gender gap, female labour force participation in full-time jobs could be encouraged by increasing the supply of affordable child care and pre-school education. Labour turnover can be reduced by mitigating the incentives for negotiated separation, which currently arise from the design of severance insurance (FGTS) in the event of unfair dismissal. Skill marketability can be enhanced through the introduction of a national skills certification system, and labour training can become more cost-effective through increased contestability in existing programmes.

To raise the economy's growth potential through a better use of labour inputs, Brazil faces the challenge of increasing labour utilisation and boosting labour productivity through human capital accumulation on and off the job. The rate of labour force participation is comparable to the OECD area for all segments of the working-age population, although it is somewhat lower for prime-age females. Informality is widespread, especially among the less educated, for whom labour turnover is also high, discouraging investment in productivity-enhancing human capital accumulation through labour training. The labour market is offering greater rewards for skills, a trend that is associated with the pro-competition reforms of the 1990s, including trade and investment liberalisation. But, while rising returns create incentives for youths to delay entry into the labour market so as to spend more time in education, the demand for unskilled labour is declining, worsening the job prospects of the less educated. These trends underscore the need for policy action to tackle labour informality and to encourage human capital accumulation, including for those who are already in the labour market.

Background and main issues

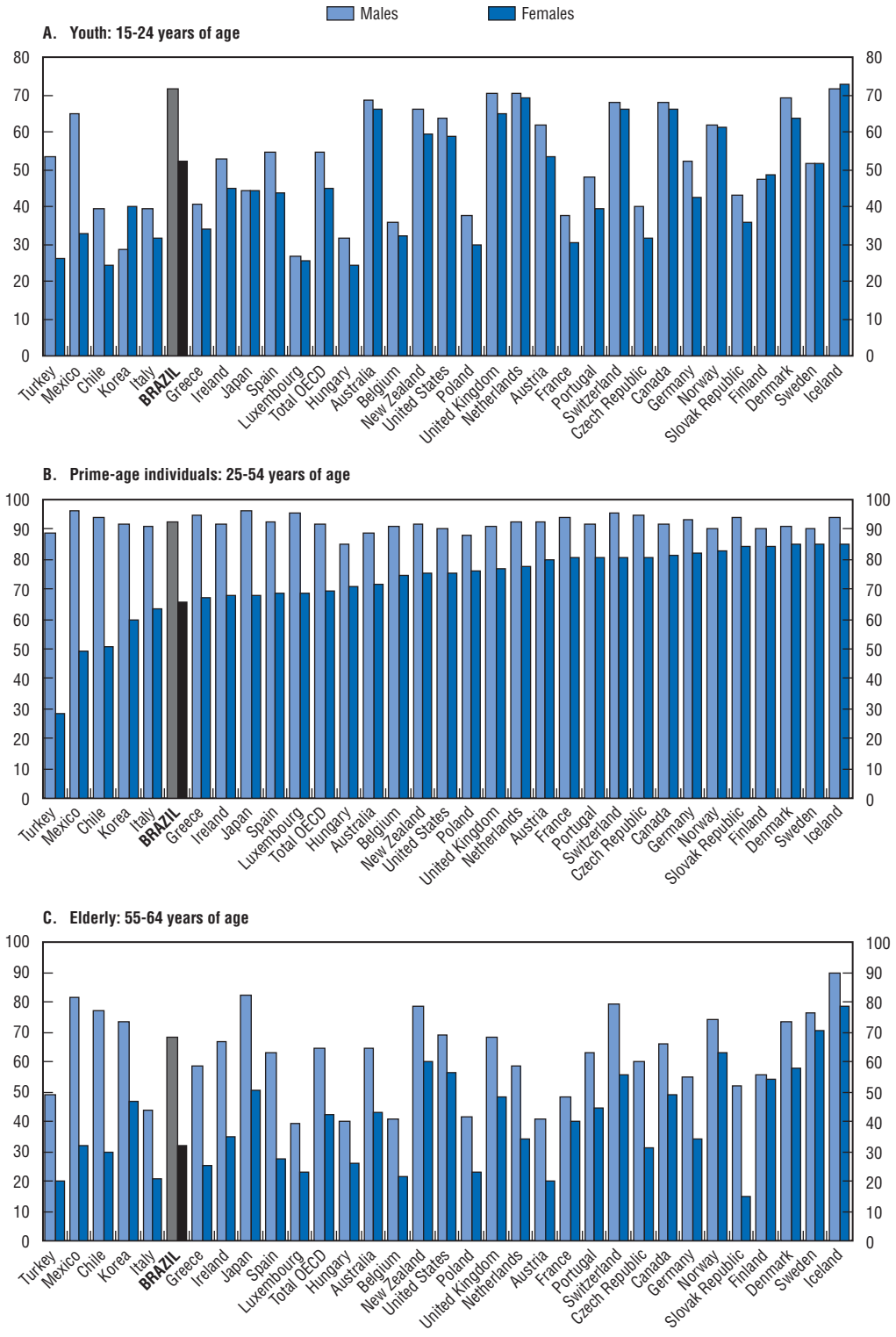
Trends in labour force participation and unemployment

Labour force participation is comparable to the OECD average for prime-age males but is somewhat lower for females (Figure 4.1). Labour supply increased considerably for prime-age females during 1982-2004, more than compensating for the decline in participation for prime-age males (Table 4.1).[1] Participation remains high in comparison to the OECD average for youths aged 15-24, despite a uniform decline for both males and females aged 15-19 over time, especially since 1992, reflecting the rapid increase in secondary school enrolment that has taken place since the 1990s. Several countries in the OECD area have managed to combine high participation rates among the young with high educational enrolment. This is likely to occur in Brazil as enrolment increases further because many youths who will wish to remain at school may need to work to finance their studies. Among the elderly, participation is comparable to the OECD average for males but is slightly lower for females. The introduction of age-related means-tested income transfers in 1993 – RMV and LOAS, discussed in Chapters 1 and 2 – is likely to be an explanatory factor for declining participation among the elderly.

Cohort effects are particularly strong in female labour force participation and have contributed to closing the gender gap in labour supply over the years. Participation peaks at 35-39 years of age and has increased considerably for the younger cohorts, although they are delaying entry into the labour market, as in the case of males, for whom participation rises sharply after 20 years of age, peaks at 30-34 years and then begins to fall after 44 years of age for all cohorts (Figure 4.2). Women in the 20-24 age group had a higher participation rate in 2002 than previous cohorts at that age. As in the OECD area, the increase in female participation across generations reflects changing social norms and family patterns, in addition to educational attainment. For males, by contrast, participation rates have tended

Figure 4.1. **Labour force participation by age and gender: Brazil, Chile and OECD countries, 2004**

Countries ranked by participation rate for prime-age females



Source: IBGE (National Household Survey, PNAD), OECD (Labour Force Statistics) and OECD calculations.

Table 4.1. **Labour force participation, employment and unemployment by age and gender, 1982, 1992 and 2004**

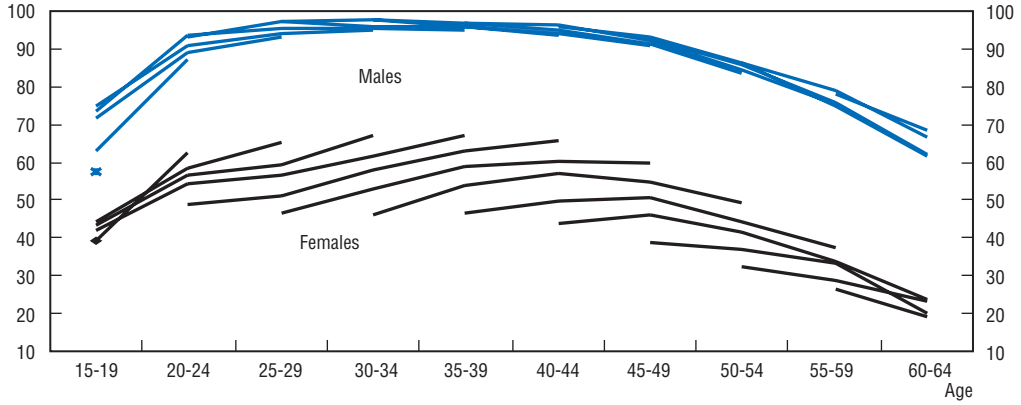
In per cent

	Participation rate			Employment rate			Unemployment rate		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Males									
15-24	82.5	80.6	71.8	75.5	72.2	61.0	8.4	10.5	15.0
of which: 15-19	73.7	71.7	57.0	66.8	63.2	46.2	9.3	11.9	19.0
25-54	95.3	94.2	92.6	92.7	90.3	88.1	2.7	4.2	4.8
55-64	73.8	71.5	68.5	72.7	69.8	66.0	1.5	2.4	3.7
65+	35.4	36.7	28.8	35.2	36.3	28.2	0.7	1.2	2.2
15+	85.3	84.1	79.5	81.6	79.3	73.8	4.4	5.7	7.2
Females									
15-24	45.2	49.9	52.2	40.2	41.9	39.3	11.1	16.2	24.7
of which: 15-19	42.1	44.1	39.4	37.1	35.9	27.0	11.8	18.5	31.4
25-54	43.6	55.1	65.6	41.9	51.4	59.4	4.1	6.7	9.4
55-64	22.7	28.5	31.8	22.5	28.0	30.5	1.0	1.9	4.1
65+	7.3	9.5	8.0	7.3	9.4	7.8	0.6	1.8	1.5
15+	39.8	47.4	53.3	37.3	43.1	46.5	6.4	9.1	12.8

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Figure 4.2. **Labour force participation: Cohort effects**[1]

In per cent



1. Each line in the figure depicts the evolution of a given cohort's participation rate in 5 different waves of PNAD (1982, 1987, 1992, 1997 and 2002). For example, the line that starts at age 30-34 and ends at age 50-54 depicts the participation rate of the cohort born during 1948-52, which is aged 30-34 in 1982 and 50-54 in 2002.

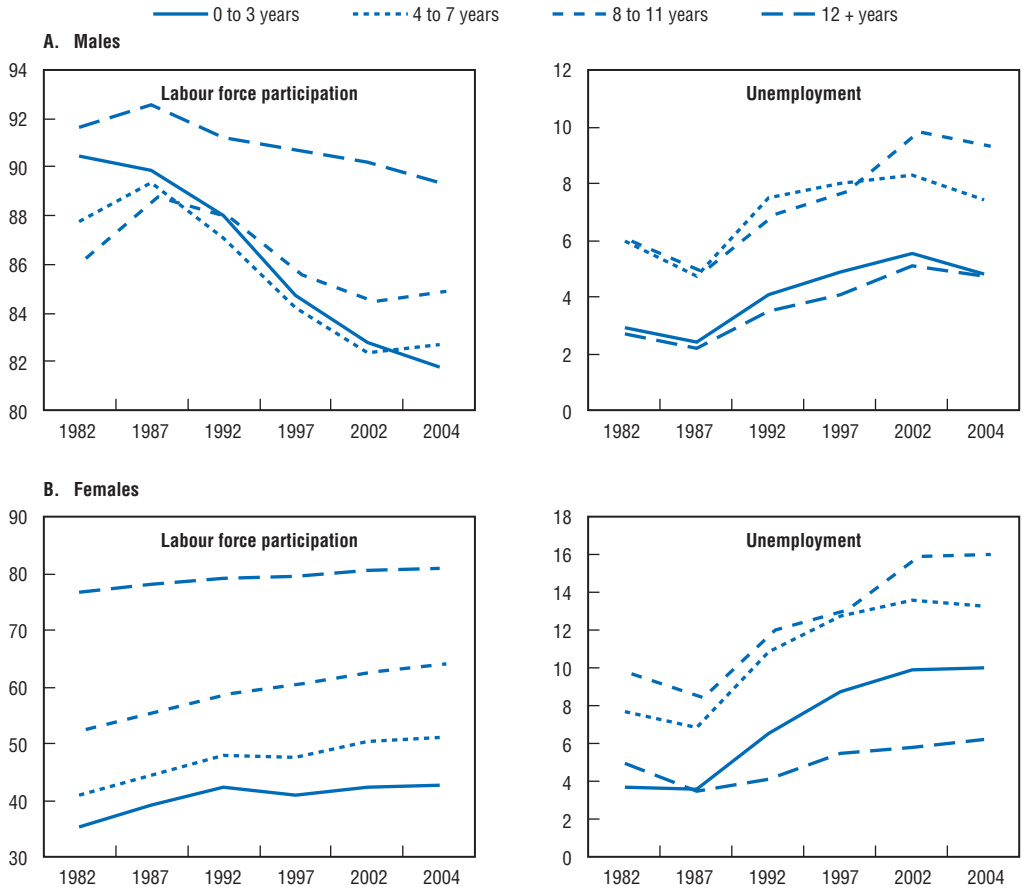
Source: IBGE (National Household Survey, PNAD) and OECD calculations.

to vary much less across cohorts. In any case, the increment in female participation rates in successive cohorts is losing momentum. The current gender gap in labour supply is therefore likely to persist, albeit at a lower level, leading to a continued under-utilisation of women's skills.

Educational attainment is an important determinant of labour force participation. Female participation has increased particularly fast for those individuals with intermediate levels of education (8-11 years), especially since 1992 (Figure 4.3). The modest increase in participation for the best educated females reflects in part their already high participation rates throughout the period 1982-2004. As in the OECD area, the gender gap in educational attainment is narrowing (OECD, 2002). By contrast, in the case of males, the

Figure 4.3. **Labour force participation and unemployment rates by gender and years of education, 1982-2004**

In per cent, population aged 15-64



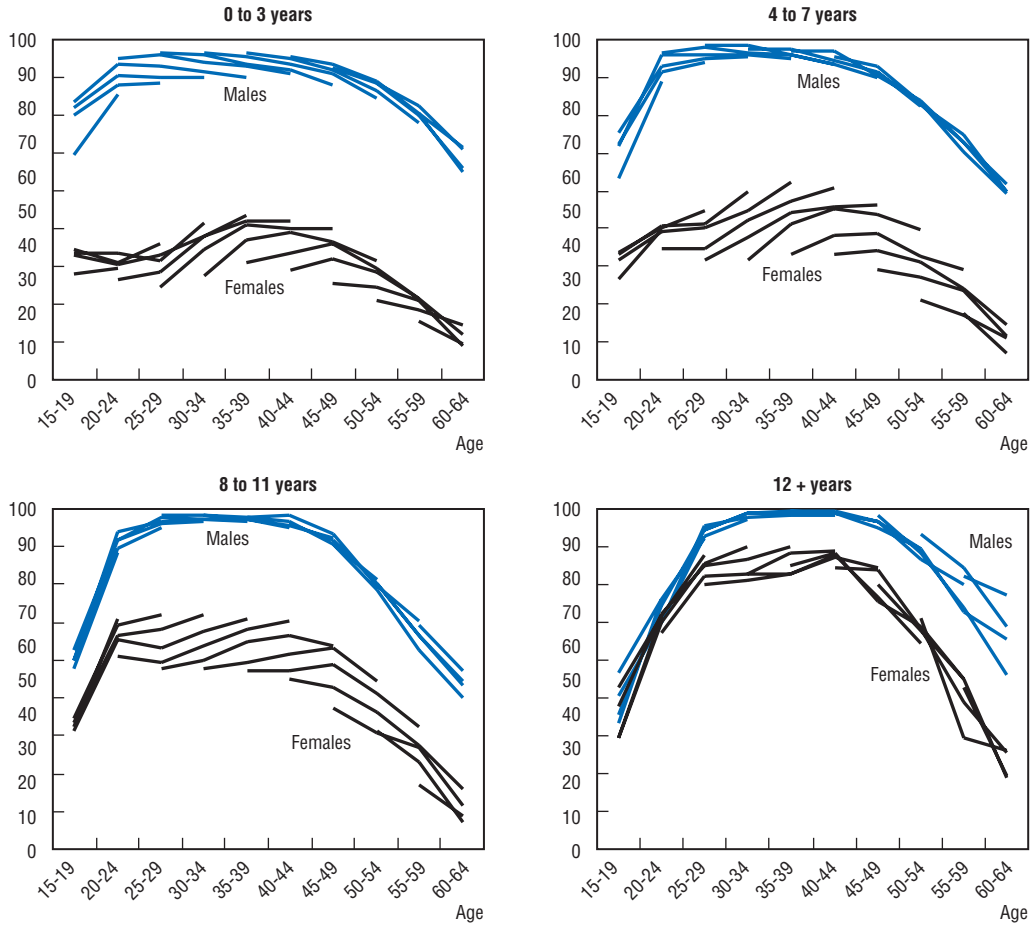
Source: IBGE (National Household Survey, PNAD) and OECD calculations.

fall in participation has been the sharpest for the least educated individuals, especially among the younger cohorts. Although the gender participation gap is widest for the least educated individuals, there are strong cohort effects for females in the 30-49 age bracket, with a marked increase in participation (Figure 4.4). Although it could be argued that the high correlation between labour force participation and educational attainment might exacerbate income inequality, which is already high in Brazil, empirical evidence is mixed. The income share of low-income females rose faster than that of their middle-income counterparts in the 1980s and 1990s, but this increase has not resulted in an appreciable fall in earnings inequality largely because of the concomitant increase in participation of higher-income, better educated females (Scorzafave and Menezes Filho, 2005).

As in the case of labour force participation, cohort effects are strong for female unemployment. The unemployment rate has risen more steeply for the younger generations, especially for less educated females (Figure 4.5). The trend towards rising youth unemployment relative to the unemployment rate of prime-age workers has also taken place in most OECD countries since the early-to-mid 1990s. This means that, although many youths are delaying entry into the labour market in order to spend more time in education, others are not studying and are finding it difficult to find a job.[2] In the

Figure 4.4. **Labour force participation: Cohort effects by years of education**[1]

In per cent



1. Each line in the figure depicts the evolution of a given cohort's participation rate in 5 different waves of PNAD (1982, 1987, 1992, 1997 and 2002). For example, the line that starts at age 30-34 and ends at age 50-54 depicts the participation rate of the cohort born during 1948-52, which is aged 30-34 in 1982 and 50-54 in 2002.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

case of Brazil, the share of youths aged 15-19 who are studying and that of older youths, aged 20-24, who continue to study while working almost doubled during 1982-2004 (Table 4.2).

The average years of schooling of working youths has therefore increased, especially since 1997 (Figure 4.6). But the fact that about 15% of youths aged 15-19 and 25% of those aged 20-24 are not studying or working, despite some improvement over time, is worrisome, especially against the background of rising unemployment. Moreover, parents' educational attainment is among the main determinants of youths' decisions on the allocation of time between school and work.[3] This suggests that policy action in this area has strong intergenerational effects: it affects not only the current generation directly but also future ones through the effects of parental education on children's educational attainment.

The gender gap in labour supply is accentuated by a higher prevalence of part-time work among females. About 17.5% of employed women worked less than 20 hours per week in 2004, against 13.5% in 1982. The corresponding ratios for men were 3.3% in 1982 and 6.4% in 2004. As a result, females work on average 7-8 hours per week less than males

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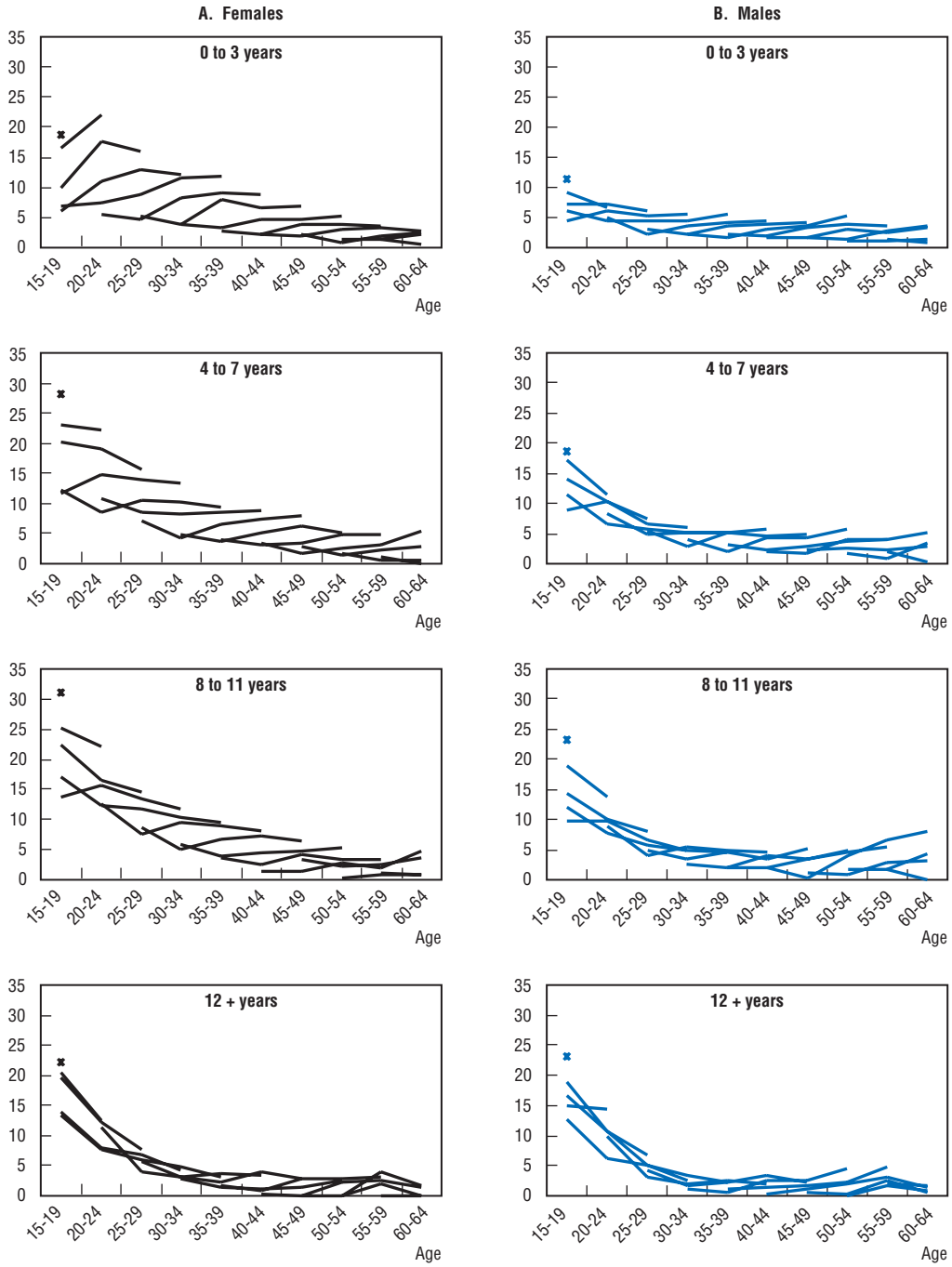
Figure 4.5. **Unemployment: Cohort effects by years of education**[1]

In per cent



1. Each line in the figure depicts the evolution of a given cohort's participation rate in 5 different waves of PNAD (1982, 1987, 1992, 1997 and 2002). For example, the line that starts at age 30-34 and ends at age 50-54 depicts the participation rate of the cohort born during 1948-52, which is aged 30-34 in 1982 and 50-54 in 2002.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

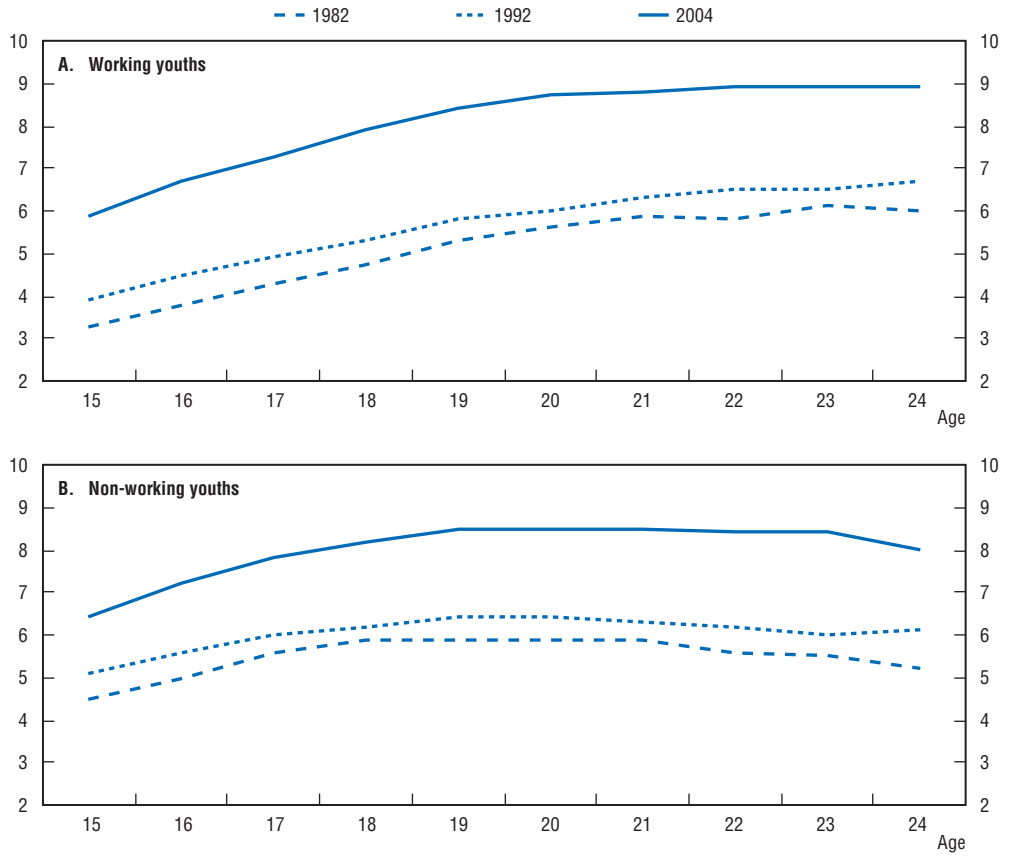
Table 4.2. **Distribution of youths by education and employment status, 1982-2004**

In per cent of youths in each age group

	1982	1987	1992	1997	2004
15-19 years					
Not studying or working	20.4	18.7	18.5	16.3	14.7
Not studying but working	37.6	38.3	30.8	20.6	16.5
Studying and not working	27.7	27.6	32.0	41.9	48.5
Studying and working	14.3	15.5	18.8	21.1	20.2
20-24 years					
Not studying or working	29.6	26.3	27.7	26.7	25.0
Not studying but working	55.8	59.0	55.4	51.4	49.6
Studying and not working	6.0	5.8	6.9	8.9	10.8
Studying and working	8.6	8.8	10.0	13.0	14.6

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

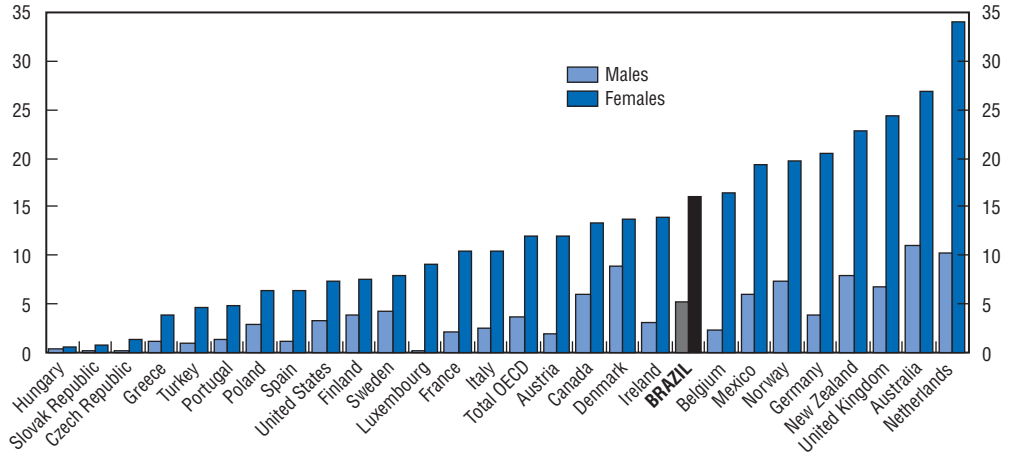
Figure 4.6. **Average years of education by age: Youths aged 15-24, 1982-2004**



Source: IBGE (National Household Survey, PNAD) and OECD calculations.

(44 hours for males *versus* 37.2 hours for females in 2004). The incidence of part-time work in Brazil is comparatively high for females by OECD standards (Figure 4.7), suggesting that there may be a clear preference for it as a means of reconciling professional and household responsibilities.[4] Alternatively, constraints on the allocation of working time may deter those women who are willing to work on a full-time basis from doing so. In any case, the higher incidence of part-time work among females exacerbates the gender gap in total employment.

Figure 4.7. **Part-time work by gender: Brazil and OECD countries, 2004**
Individuals aged 15-64 years working less than 20 hours per week, in %



Source: IBGE (National Household Survey, PNAD), OECD (Labour Force Statistics) and OECD calculations.

Educational attainment is a powerful determinant of labour supply, as noted above, but also of employability in the formal sector. This is important because labour informality is pervasive in Brazil: despite high participation rates, own-account workers and those without social security coverage made up approximately 48% of the employed population in 2005 (based on the Monthly Employment Survey, PME). This ratio increased steadily over the 1990s (Chapter 1) but appears to have been trending down since late 2003. A heavy tax burden on labour and restrictiveness in employment protection legislation (EPL) are considered the usual culprits for labour informality in the OECD area. But it is also possible that informality stems from self-selection, in the sense that workers expect higher earnings in the informal sector and then choose to remain in that sector, despite the benefits, including social security coverage and severance/unemployment insurance, to which they are entitled in the formal sector (Box 4.1). For many workers, however, especially the least educated, there may be no alternative to informality, especially as the premium placed by the labour market on formal educational attainment increases. Dealing with informality calls for policy action not only to reduce duality in the labour market but also to ensure the fiscal sustainability of the social security system through the broadening of the base for social security contributions, as discussed in Chapters 1 and 2.

Labour turnover is high in the formal sector by OECD standards (Figure 4.8), especially for youths.[5] Turnover is probably higher in the informal sector, but not directly observable. In many OECD countries, high labour turnover is due to EPL stringency for regular contracts combined with flexibility for fixed-term and temporary-work contracts. But this is not the case in Brazil, as discussed in the *2005 Survey*. Job precariousness is a usual culprit, but high labour turnover and informality are also due to some extent to policy design in the case of Brazil because of the incentives workers face to withdraw their FGTS (severance insurance mechanism) account balances by negotiating separation with employers and claiming what are voluntary quits to be unfair dismissals. On the one hand, individual FGTS balances are remunerated at below-market rates of return (Chapter 1), which reduces the opportunity cost of withdrawals for employees. On the other, the value of the severance indemnity due in the event of unfair dismissal is often negotiated between employees and employers, weakening the disincentive facing employers to terminate a contract while

Box 4.1. **Labour informality: Self selection or market segmentation?**

Empirical evidence on the nature of labour market informality is far from conclusive.[1] The conventional metric for labour informality in Brazil is social security coverage. Own-account workers are also often treated as informal in empirical analysis. Among the early studies, Barros *et al.* (1992) find that the transition from formality to informality implies wage losses and *vice versa* , which suggests the presence of barriers to entry into the formal sector, characterising market segmentation. Carneiro and Henley (2001) find evidence of self-selection for workers in the informal sector – suggesting that these workers choose not to have social security coverage – but not for those in the formal sector. Tanuri-Pianto and Pianto (2002) show that the formal-informal earnings gap is higher at the bottom of the earnings distribution and that this gap cannot be explained by differences in worker characteristics. This evidence is suggestive of market segmentation. On the other hand, the smaller earnings gap for the better-off is due almost exclusively to differences in individual attributes, reinforcing the hypothesis of self-selection at the top end of the earnings distribution.

The evidence reported more recently by Soares (2004b) uses a special issue of the National Household Survey (PNAD) in the 1990s which introduced a question about whether informal-sector workers would like to obtain a job in the formal sector.[2] About 70% of interviewees answered that they would like to switch to the formal sector. The empirical results suggest that the distinction between market segmentation and self-selection is nuanced and that education remains an essential determinant of a worker's desire for a formal-sector job and his/her probability to be offered one. Less educated workers tend to be more likely to "queue" for a formal-sector job but have a lower probability of being offered one. Non-whites, females and new entrants are among the groups that are least likely to be "picked from the queue", once they have joined it. Importantly, a spell in the informal sector tends to severely jeopardise a worker's ability to be subsequently offered a formal-sector job, probably owing to the fact that employers interpret these spells as carrying information about the worker's productivity. The experience of the OECD countries also suggests that informality adversely affects formal employment prospects (OECD, 2004).

1. See Soares (2004a) and Ulyssea (2005) for surveys of the empirical literature.
2. This allows for dealing more effectively with the identification and exclusion problems that make empirical analysis difficult in this area. The identification problem arises because one needs to distinguish the reasons why an informal-sector worker might want to queue for a formal-sector job from the determinants of actually obtaining one. The exclusion problem refers to the need to explain the determinants of wages that do not affect a worker's probability to queue for a formal-sector job and to be offered one.

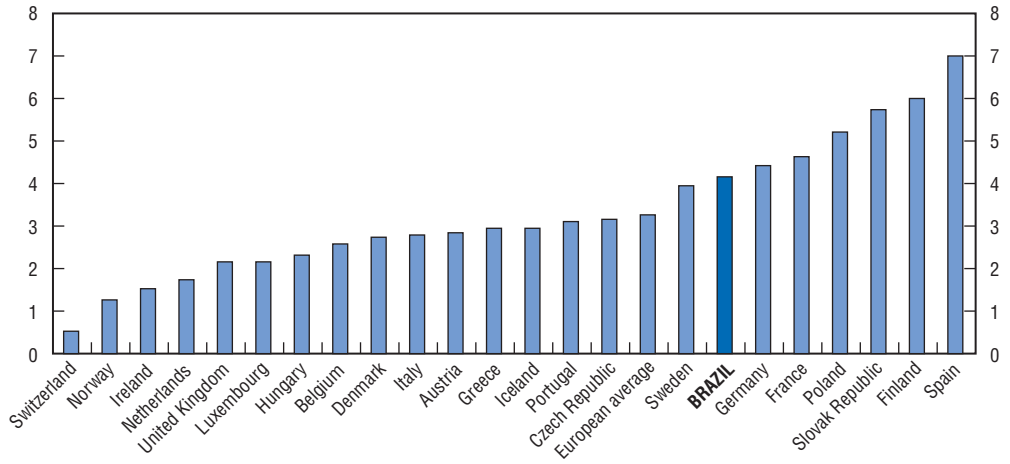
claiming unfair dismissal so that the employee can withdraw his/her account balances. Negotiated separations therefore provide employees with short-term gains (*i.e.* the severance indemnity plus the outstanding FGTS account balance) to the detriment of longer-term benefits related to career advancement and the accumulation of job-specific human capital. In this respect, a preference for negotiated separations suggests that workers perceive the returns to seniority and social security coverage to be low.

Returns and determinants of earnings

The increase in labour force participation over time is likely to be motivated in part by rising returns to education. Estimates vary depending on the methodology used, but returns to schooling are estimated at about 10% for each additional year of education for employed workers (Ueda and Hoffmann, 2002). They are also somewhat higher for females

Figure 4.8. **Labour turnover:[1] Brazil and European countries, 2005**

In per cent



1. Calculated as min (admissions, separations) divided by employment and refers to the second quarter of 2005 for all countries.

Source: Ministry of Employment and Labour (CAGED Database) and European Labour Force Survey.

than males (Silva and Kassouf, 2000), for individuals working in the primary sector than in the secondary (manufacturing and construction) sector (Soares and Gonzaga, 1999), and for those living in urban areas than their rural counterparts (Loureiro and Carneiro, 2001). Returns also depend on the quality of education: they are lower for workers educated in states where formal education is deemed to be of lower quality, measured for example by higher pupil-teacher ratios (Arias *et al.*, 2002).

The increase in returns to education has been noticeable for individuals who have attained upper-secondary and higher education, especially since 1992, a period that has been marked by trade liberalisation and pro-competition reforms, as discussed in Chapter 1 (Table 4.3). Average earnings rose for those workers with 12+ years of education relative to their less educated counterparts. But the narrowing of the earnings gap for less educated workers does not imply that returns to education are falling. This is due essentially to a supply effect. Empirical evidence suggests that trade liberalisation was associated with a rising skill premium, with demand for skilled labour increasing faster in the sectors that experienced larger increases in import penetration (Pavcnik *et al.*, 2003; Sachsida *et al.*, 2005). Because the supply of skilled labour also rose, given the increase in the labour force's average years of schooling, the structural reforms of the 1990s are associated with a reduction in the earnings gap between workers who have completed only primary education and those holding high school degrees (Gonzaga *et al.*, 2005). Moreover, there is additional evidence that this supply effect is reducing the earnings gap within the group of individuals with 12+ years of education between high-school leavers and those with higher education (Ferreira, 2004).

Educational attainment, rather than experience, has become more highly rewarded over time. The increase in the returns to formal education is consistent with a progressive estimated reduction in returns to experience, suggesting that formal education has become more important than seniority in shaping workers' earnings capacity, particularly for the lowest-paid workers (Arabsheibani *et al.*, 2003). This is also the case in the informal sector and across gender and racial lines. Earnings discrepancies between formal- and

Table 4.3. **Returns to education and relative labour supply by gender, 1982-2004**

In per cent

	1982	1987	1992	1997	2004
			Males		
Relative earnings[1]					
4-7 to 0-3 years of education	191.4	178.0	170.2	169.0	163.9
8-11 to 4-7 years of education	192.4	185.5	174.1	183.1	159.7
12+ to 8-11 years of education	235.9	244.7	257.1	271.2	306.5
Relative labour supply					
4-7 to 0-3 years of education	68.5	86.2	93.4	107.5	125.8
8-11 to 4-7 years of education	48.5	61.9	77.4	87.0	124.5
12+ to 8-11 years of education	50.7	45.2	35.5	35.3	31.2
	1982	1987	1992	1997	2004
			Females		
Relative earnings[1]					
4-7 to 0-3 years of education	171.0	160.9	147.2	135.7	132.4
8-11 to 4-7 years of education	219.2	202.7	188.9	185.8	157.3
12+ to 8-11 years of education	204.7	239.0	229.0	267.9	285.8
Relative labour supply					
4-7 to 0-3 years of education	62.9	80.1	90.7	110.9	137.6
8-11 to 4-7 years of education	50.6	63.5	78.4	93.8	135.5
12+ to 8-11 years of education	40.0	39.5	37.2	35.3	35.7

1. Defined by the ratio of average monthly earnings to hours worked for prime-age workers for each group distinguished by educational attainment.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

informal-sector workers seem to depend on skills rather than on whether the worker has social security coverage or not (Menezes Filho *et al.*, 2004), despite the gradual decline over time in the share of workers employed formally, at least until 2003 (Chapter 1). Skill-adjusted earnings differentials have also narrowed over time between non-whites and whites for the younger cohorts. Empirical evidence suggests that differences in skills account for most of the earnings differential between low-paid whites and non-whites (Arias *et al.*, 2002; Campante *et al.*, 2004; Reis and Crespo, 2005). Moreover, the earnings gap between males and females is closing over time, reflecting the increase in female educational attainment and the ensuing increase in female participation in better-paid occupations.

There is limited empirical assessment of the returns to labour training and vocational education. The absence of a national system of skills certification currently in place prevents the marketability of skills acquired through labour training on or off the job, making private returns difficult to quantify. While Brazil's educational system places little emphasis on vocational education, labour training services are provided predominantly in a decentralised manner through a multitude of sector-specific non-governmental institutions – the "S" system – financed through para-fiscal levies on enterprise payroll (Box 4.2). However, the fact that Brazil's labour turnover rate is high discourages investment on the part of employers in labour training and consequently the accumulation of productivity-enhancing human capital through on-the-job training. Incentives are therefore also weak for employees to acquire job-specific qualifications in expectation of seniority gains.

Box 4.2. **Labour training, skills certification and job placement**

Labour training policy is set by the Ministry of Labour. Recent initiatives include the creation of vocational training centres (CEPFPs) and the launching of a national labour training programme (*Programa Nacional de Qualificação*, PNQ) in 2003 to replace PLANFOR, created in 1995. PNQ targets vulnerable groups, including the unemployed, low-skill workers and school-leavers, and provides training and skills certification. These programmes are funded primarily by FAT, the unemployment insurance fund. About 140 thousand people benefited on average from labour training provided through PNQ in 2003-04.

Labour training is delivered primarily at the sectoral level by the non-governmental organisations that are part of the "S" system (Table 4.4). Services are financed through levies on enterprise payroll, which are collected through the social security system and allocated in full to the sectoral service providers. These levies yielded approximately 0.25-0.28% of GDP in revenue during 2003-05.

Table 4.4. **The "S" system: An overview**[1]

Institution (sector)	Area of activity/financing	Output
SENAI (industry, including telecommunications and transport), created in 1942, administered by the National Confederation of Industry (CNI)	• Vocational training, technical and technological assistance. • Financed by a 1% levy on enterprise payroll.	2.8 million workers trained per year in a network of 726 training units.
SENAC (commerce), created in 1946, administered by the National Confederation of Commerce (CNC)	• Vocational training open to society as a whole. • Financed by 1.5% levy on enterprise payroll.	1.9 million workers trained in a network of 663 schools and 50 mobile units distributed throughout the country.
SENAR (rural training), created in 1991, linked to the National Confederation of Agriculture	• Rural vocational training and social inclusion. • Financed by 2.5% levy on enterprise payroll.	17 thousand rural workers have benefited from the Institute's Literacy Programme.
SENAT (transport), created in 1993, administrated by the National Confederation of Transport (NCT)	• Vocational training. • Financed by 1% levy on enterprise payroll (social security contribution in the case of own-account workers).	…
SEBRAE (industry and commerce)	• Training for entrepreneurs in SMEs. • Financed by 0.3% of funds of SENAI, SESI, SENAC and SESC.	…

1. Excludes the other institutions linked to the "S" system for which labour training is not the main area of activity (*i.e.* SESC, SEST, SESI, INCRA, DPC and *Fundo Aeroviário*).

The combination of publicly funded labour training and activation policies is relatively recent in Brazil. An employment subsidy programme (PNPE, *Programa Nacional de Estímulo ao Primeiro Emprego de Jovens*) was introduced in 2003 for low-skill youths aged 16-24 years with disadvantaged backgrounds. The subsidy is equivalent to approximately one minimum wage per year per vacancy filled through a job placement institution. Approximately 240 thousand youths have benefited from the programme.*

Skills certification is a recent endeavour. A certification programme was implemented in 2003 targeting low-income, low-skill individuals, as well as the unemployed, as a means of improving their employability. Currently there are two pilot programmes in industry in the metropolitan area of São Paulo, but a national skills certification system is not yet in place.

Job placement is carried out under the purview of SINE (*Serviço Nacional de Emprego*), in place since 1976, through local job centres and non-profit organisations. More recently, SINE has been targeting vulnerable groups, including youths, women and individuals aged 40 years and above. Placement rates are nevertheless low, at about 20% of job seekers.

* See Andrade (2005) for more information.

Policy recommendations

The main issue arising from the analysis of trends in labour supply and unemployment is the combination of falling participation among youths as a result of rising school enrolment, coupled with increasing unemployment, high labour turnover and persistent informality, especially for the less educated. To a certain extent, these trends are closely inter-twined: unemployment may discourage labour force participation and prevent access to the formal sector, and an increase in labour supply may result in higher unemployment and informality if labour demand does not rise in tandem or if the qualifications of potential entrants do not match market requirements. Brazil's key policy challenge in this area is therefore to improve the use of labour inputs through human capital accumulation on and off the job. Because female participation is closely correlated with educational attainment, as in the OECD area, policies that foster human capital accumulation for the population as a whole would contribute to reducing the remaining gender gap in employment. Moreover, adding a hitherto untapped supply of skills to the labour force would contribute to raising the economy's potential growth.

There is compelling empirical evidence that education is a powerful determinant of both labour force participation and employability (Annex 4.A1). Employment prospects appear to improve for males only for the better educated (eight years of education or more), and the labour market appears to have become increasingly discerning over time on the basis of education in the case of females. As regards youths, by contrast, a rising education premium appears to delay entry into the labour market, except for the best educated females. This suggests that even workers with a good initial education increasingly require access to continuing training if they are to improve their employability. Employment prospects have deteriorated for prime-age individuals and youths living in urban/metropolitan areas, an issue which raises considerable social concern.

Strengthening the framework conditions for labour utilisation

Macroeconomic stability is an important framework condition for improving labour market performance. To the extent that a stable macroeconomy is associated with lower real interest rates, it encourages investment and physical capital accumulation, and creates incentives for firms to seek productivity gains through innovation (Chapter 3). Labour productivity and employment are therefore likely to rise. At the same time, greater economic resilience to shocks makes business cycles less pronounced, reducing the scope for hysteresis-type mechanisms that contribute to turning cyclical into structural unemployment, with a detrimental impact on labour utilisation. This is important because long-term unemployment (over 12 months) has risen over time in Brazil, affecting about one-third of the unemployed in the metropolitan region of São Paulo in 2003 compared with only 15% in 1991.

Labour market performance can also be enhanced through further pro-competition reform. The experience of OECD countries suggests that the removal of regulations that impede entry and expansion of new firms is associated with better employment outcomes, especially when it is complemented by other demand-side reforms, such as the easing of constraints imposed by employment protection legislation. In Brazil, competition-enhancing deregulation in product markets has taken place in tandem with trade and investment liberalisation, as in many countries in the OECD area. Trade and investment liberalisation has been associated with productivity gains in the manufacturing sector, as

discussed in Chapter 1. Further reform could therefore contribute to job creation, especially when broad activation policies are put in place to mitigate the job displacement effect that pro-competition reform may create in some sectors.

Facilitating female labour force participation

Public finances permitting, consideration should be given to facilitating access to child care so as to encourage female labour supply and close the remaining participation gap with respect to males. Mothers with young children may opt for part-time work as a means of reconciling household and work responsibilities, and the share of females working less than 20 hours per week is already comparatively high in Brazil in relation to the OECD area. But a number of these part-timers may want to work longer hours. The experience of most OECD countries is that preferences for female participation, in particular among couples with young children, are much higher than actual female labour supply.[6] Many working mothers currently rely on help from parents and relatives for child care, but this is likely to change when the younger cohorts grow older because of their higher participation rates. It will therefore be important to increase the supply of affordable child care, because the empirical evidence reported in Annex 4.A1 suggests that the disincentive effect on female labour supply and employability associated with young children increased during 1982-2004. By the same token, the experience of OECD countries suggests that the gender gap in employment widens as the number of children in the household unit increases. Because female employability also depends strongly on educational attainment, the constraint imposed by a lack of affordable child care services may affect the less-educated individuals disproportionately.

A scarcity of publicly funded pre-school education is an additional hindrance to female labour force participation. Only about 64% of children aged 4-6 are engaged in pre-school education, whereas only 12% of those aged 0-3 are in child care. Mothers with younger children, especially those in low-paid jobs, often find it prohibitive to work while having to pay for these services out of pocket. In this regard, the recent initiative to extend the financing mechanisms currently in place for primary and lower-secondary education to pre-school education is a step in the direction of increasing the supply of publicly funded services. It is also important from the point of view of boosting educational attainment, because international experience suggests that access to early childhood education can improve school outcomes later in life. Another consideration is that the tax system of several OECD countries often poses an additional constraint on female labour force participation to the extent that it penalises second earners, who are most often women. But this is not the case in Brazil, where the tax system is more neutral, because spouses file their income tax returns separately and there is no allowance for dependent spouses, the loss of which would contribute to increasing the effective tax rate on second earners relative to that on single individuals.

The length of the school day, which is currently short, may also discourage women from taking up a full-time job. Most public and private schools have two shifts per day, morning and afternoon. A move from part- to full-time schooling would remove this obstacle, although it would require concerted policy action among all levels of government for financing the incremental service delivery costs. In any case, gradualism would be recommended for implementation. Part-time schooling is commonplace in Latin America, other than Chile, where full-day schooling is now in place following three years of gradual implementation (OECD, 2005a).

Options for reducing formal unemployment

Properly designed active labour market policies (ALMPs) can be used to tackle unemployment by enhancing work experience and the skills of those groups with the least stable employment histories, such as youths, women and the less educated. Activation programmes differ from conventional public employment services because they make participation in training and job-creation programmes, for example, compulsory for targeted groups, especially recipients of unemployment insurance and some social assistance benefits. In practice, however, the cost-effectiveness of ALMPs has been found to differ significantly between different types of programmes. In particular, the outcomes of public job creation and wage subsidy schemes need to be assessed against the fact that these programmes often entail large dead-weight losses and substitution effects, and create costs to the budget. Brazil's experience with activation programmes is relatively recent. Federal programmes such as PLANFOR/PNQ and PNPE (Box 4.2) focus on training for the unemployed and vulnerable segments of the labour market. Their budgets are small in relation to total FAT-funded programmes, which include the Salary Bonus and unemployment insurance. Experience with recent initiatives, such as the Youth Consortia (*Consórcios Sociais da Juventude*), which is a pilot programme combining labour training with income support conditional on engagement in community care activities, seems promising, and their impact on employment for the targeted population should be fully assessed.

The option of making it compulsory for unemployment-benefit recipients to participate in an activation scheme could be considered. It is essential that employment services ensure that recipients look for jobs while engaged in an activation scheme. In general, the introduction of compulsory activation has been justified in a few OECD member countries to prevent a loss of skills or motivation as a result of long-term unemployment. The duration of unemployment insurance in Brazil – limited to five months – does not seem to create disincentives for activation, as in many OECD countries. However, the unemployment benefit payments were 150% of the minimum wage on average during 1994-2004, which may be high in relation to the median entry salary. The experience of OECD countries where activation programmes have been assessed over extended periods of time suggests that long-term vocational training programmes can considerably improve participants' employability (OECD, 2005b). But, when evaluating the appropriateness of these initiatives, it is important to consider that countries with limited resources for activation should give priority to other job-search activities, which could be made mandatory for benefit recipients.

Discouraging early retirement and disability/sickness inactivity

The 1998 social security reform introduced parametric adjustments to discourage early retirement, as discussed in Chapter 1. In particular, a new methodology for calculating old-age pensions made the replacement rate dependent on the length of contributions. As a result of these reforms, the average retirement age (for length-of-contribution pensions) rose from about 49 years in 1998 to just over 53 years in 2004. But it remains low by OECD standards, reflecting to a large extent the absence of a minimum retirement age for private-sector workers retiring on the basis of length of contribution, which runs counter to international trends. The pervasiveness of early retirement is worrisome because Brazil's advantage relative to the OECD area related to its still young population is offset by the fact that life expectancy at 60 years of age is comparable to the OECD average, putting a heavy burden on the budget at a time when the country should be preparing to deal with

population ageing. The introduction of a minimum retirement age for private-sector workers is therefore essential not only from the vantage point of making better use of labour resources, but also for ensuring the fiscal sustainability of the pension system (discussed above). Because about 28% of retirees aged 64 currently work, options for combining pensions with income from work could be envisaged to strengthen incentives for increasing participation among older workers, especially for males for whom participation is falling steadily.

There has been a surge in recent years in disability and sickness benefits, which to a large extent reflects administrative weaknesses. The contracting-out of assessment of compliance with the eligibility requirements for disability/sickness benefits is alleged to have lowered monitoring standards. Administrative efforts have been made to address this problem, including through a census of beneficiaries and the introduction of automatic cessation of sickness benefits according to estimated rehabilitation time. In addition to improvements in the administration of the social security system, there are demand-side policy options that may be considered for discouraging abuse. For example, the Netherlands introduced experience rating for employers, whereby contributions are based on past recourse to the system, as well as stronger requirements for both employers and employees to engage in reintegration efforts for people on long-term sickness benefits (Brandt *et al.*, 2005). A similar arrangement could be considered in Brazil.

Dealing with labour informality

Dealing with informality requires policy actions that go beyond the labour market. The tax burden on labour (including payroll taxes and employers' social security contributions) is high in Brazil, driving a wedge between the marginal productivity of labour and the reward for work. This is particularly detrimental to employability in the formal sector in the case of less educated individuals, who are most likely to work informally. An option for making social insurance affordable to those with low incomes would be, budget conditions permitting, to target exonerations of employers' social security contributions on low-paid workers. This would lower the cost of employing them without reducing their wages. In this regard, the government has recently allowed the employer's social security contribution due on the first minimum wage paid to domestic workers to be deductible from his/her personal income tax liabilities. This measure creates short-run costs for the budget associated with a reduction in contribution rates, but these costs would likely be compensated by the increase in the pool of contributors through a reduction in informality. Average direct tax wedges on very low labour income have trended down in the OECD area as a result of the introduction or strengthening of explicit "making-work-pay" policies.[7] In any case, at a time of continued need for fiscal adjustment, the cost-effectiveness of these policy options would need to be carefully assessed.

Improvements in detection and enforcement capabilities could be helpful, but options for raising the attractiveness of formal employment are likely to play a crucial role in reducing informality. Eligibility for unemployment and severance insurance (FGTS) is conditional on formal employment, but there are a host of old-age social assistance benefits and pensions for which eligibility does not depend on formal social security coverage. While addressing social demands for an old-age safety net, the lack of formal employment conditionality for these programmes reduces the opportunity cost of informality, as discussed in Chapter 1. Access to publicly funded health care services is universal, hence unconditional on formal labour market status, which also weakens the

incentive for formality while undoubtedly serving a social objective. In this respect, the need for fine-tuning the design of social protection programmes in a manner that does not create a disincentive for formal employment should therefore rank high among the authorities' policy priorities in the social area.

The rate of return on individual FGTS balances should be raised. FGTS balances are currently remunerated at a below-market interest rate, which reduces the opportunity cost of informality. But an increase in the rate of return on FGTS balances would also raise the cost of firing borne by employers, because the separation indemnity due to the employee in the event of unfair dismissal is proportional to his/her accumulated FGTS assets. For these reasons, the option of increasing the rate of return on FGTS savings should be complemented by a gradual phasing out of the separation indemnity. By reducing the cost of firing, this measure would contribute to making Brazil's employment protection legislation (EPL) more flexible, while preserving a safety net for the unemployed, because workers who lose their jobs already rely on unemployment insurance and have access to their accumulated FGTS savings. Policy efforts in this area would be consistent with the recommendation made in Chapter 1 to gradually eliminate the existing directed credit mechanisms that are financed through FGTS, such as the housing/mortgage system. Such initiatives would also underscore the synergies that exist between financial and labour market policies.

The reform option recommended above for severance insurance through FGTS would also contribute to reducing labour turnover. But, until the severance indemnity is eliminated, consideration should be given to the option of increasing the share of the indemnity that is deposited into FGTS, instead of being paid directly to the employee. Empirical evidence suggests that the increase in 2001 of the severance indemnity was associated with a reduction in labour turnover (Gonzaga, 2003). The severance indemnity was raised by 10 percentage points to 50% of the accumulated balance, but the increment is now deposited into FGTS rather than being paid directly to the worker. This wedge between the cost of dismissal faced by the employer and the benefit accrued to the employee is thought to have weakened the incentive for negotiated separations.

Making labour training more attractive

The fact that the Brazilian education system does not have separate streams for vocational and general education is a positive pre-condition for building an effective system of lifelong learning. But much more needs to be done to improve vocational education, which is currently neglected, and labour training. Efforts to increase the supply of vocational training while integrating it into upper-secondary education would be welcome, as discussed in Chapter 3. On labour training, policy options include measures to improve information flows and transparency in the training market and well-targeted government co-financing schemes for employers' and employees' investments in training. The funding of labour training through the "S" system could be reformed by introducing greater contestability and competition. This could be achieved by replacing transfers to service providers by vouchers that could be granted to individual workers and redeemed against training received from accredited institutions. Professional counselling should be provided to assist workers in choosing which training to undertake.

Creating a national skills certification system is essential for improving the marketability of labour training and therefore improving the employability of trained workers. Skills certification would therefore also contribute to reducing informality. To the

extent that the less educated workers who are currently trapped in the informal sector may acquire marketable skills, they can compensate for a lack of formal educational attainment through labour training. Although pilot certification programmes are currently in place in industry in the metropolitan region of São Paulo, it would be advisable to extend these initiatives to the sectors, such as construction and services, where informality is more widespread, as well as to the poorer regions of the countries, while ensuring that national standards are set and complied with.

Summary of recommendations

This chapter's policy recommendations are presented in Box 4.3.

Box 4.3. **Summary of recommendations: Labour utilisation**

Facilitate female labour force participation

- Improve access to child care and pre-school education.
- Move gradually from part- to full-time schooling.

Reduce unemployment

- Increase focus on activation within the current policy framework.
- Require unemployment benefit recipients to participate in an activation scheme after some time has elapsed.

Discourage early retirement and disability/sickness inactivity

- Pursue further pension reform (discussed in Chapter 2).
- Improve the monitoring of disability/sickness benefit concessions.

Tackle labour informality

- Reduce social security contributions for low-paid workers.
- Reduce the incentives for negotiated separation by raising the rate of return on FGTS balances and gradually phasing out the severance indemnity in the event of unfair dismissal.

Make labour training more attractive

- Improve the supply of vocational training while integrating it into upper-secondary education.
- Create a national skills certification system.
- Consider the options of replacing the current system of direct funding to institutions by voucher-type funding schemes to introduce contestability into the "S" system.

Notes

1. The data used to calculate the labour market indicators in this chapter are available from the National Household Survey (PNAD). PNAD is a yearly survey covering about 300 000 individuals aged 15-64 throughout the country. The statistics reported in this chapter refer to 1982, 1987, 1992, 1997 and 2004. A new methodology used from 1992 broadened the concept of labour market participation, but adjustments have been made to ensure comparability over time.
2. Fernandes and Picchetti (1999) estimated the incidence of unemployment and inactivity in Brazilian metropolitan regions using a multinomial logit model based on the 1995 PNAD. The authors found an inverted U-shaped relation between education and unemployment, peaking at around 9 years of schooling. They also found a negative relationship between schooling and

inactivity and that the probability of being unemployed rises with age non-linearly, with a maximum estimated probability at around 30 years of age.

3. Menezes Filho, Picchetti and Fernandes (2000) show that the increase in educational attainment of youths between 16 and 17 years of age in the 1990s was strongest among the children of less educated mothers (0-3 years of schooling). But these youths are also likely to work while studying. Empirical evidence suggests that the probability of "studying and not working" is only 25% for youths with illiterate parents, as opposed to 80% for those whose parents have higher education for Latin America as a whole.
4. Part-time rates are not change significantly different for prime-age individuals (25-64 years of age), suggesting that part-time work is not confined to youths as a means of reconciling work and study responsibilities.
5. Based on PME data during 1983-2002, Flori (2003) concludes that the duration of unemployment spells is similar for youths and prime-age individuals, but employment spells are shorter for youths, resulting in higher turnover.
6. See Jaumotte (2003) for empirical evidence for OECD countries.
7. The tax-related incentive for informality depends on the composition of the tax burden at the enterprise level between taxes on labour and on value added. Because labour costs are deducted from output in the calculation of value added, value added-based taxation does not in principle create an incentive to conceal employment.

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ANNEX 4.A1

The determinants of labour force participation and employment

This Annex uses household survey (IBGE/PNAD) data to estimate the determinants of female labour force participation and employability for prime-age (25-54 years) males and females, and youths (15-24 years). A probit model is estimated and the conventional explanatory variables are included in the estimating equations, including personal characteristics (years of schooling, age, age squared, household head status, number/age of children, household income and ethnicity) and market characteristics (dummies for place of residency, urban/rural status and metropolitan area effects). The dependent variable takes the value of "1" if the individual participates (is employed, in the employment equations) and "0", otherwise. The tables below report the marginal effects of the variables (*i.e.* the expected change in the probability of participation/employability given a marginal change in the explanatory variable), along with the estimated coefficients and standard errors. The Oaxaca-Yun decomposition is used to single out how changes in individual characteristics and in the estimated coefficients have affected participation/employability during 1982-2004.* Table 4.A1.1 reports the sample means of the data set.

Female labour force participation

The sample includes over 80 000 females aged 25-54 who have reported non-zero earnings in 1982 and 2004. The results reported in Table 4.A1.2 suggest that the higher the educational attainment (relative to the omitted group of the least educated individuals, defined as those with 0-3 years of education), the higher the probability of labour force participation. A strong association between educational attainment and female labour supply is also found in the OECD area (Jaumotte, 2003). Female labour supply tends to rise with age in an "inverted-U" fashion. The disincentive effect associated with having young children has increased between 1982 and 2004, possibly due to a lack of availability of affordable day care and pre-school education. Moreover, household income (excluding the reference individual) was found to matter: participation rates are higher the higher the household income, but the marginal effect is lower in magnitude than in 1982. Other differences have weakened over time, including along ethnic and regional lines, although

* The Oaxaca-Yun and Oaxaca-Blinder methodologies for decomposition are analogous. However, as the probit model is non-linear, the decomposition components need to be linearised, and as such will not necessarily add to one.

Southern women still tend to participate more, as well as those living in metropolitan areas.

The results of the Oaxaca-Yun decomposition, reported in Table 4.A1.3, suggest that the effects of changes in the variables outweigh those of changes in the coefficients (the total effect is higher in Column B than in Column D), which capture variations in the "returns" to the different explanatory variables. The decomposition exercise suggests that educational attainment is a key determinant of female participation, accounting for over 45% of the increase in labour supply during 1982-2004 (Column B). Changes in the estimated coefficients account for 37% of the increase in female participation, including a fall in the returns to age and education for the better-educated individuals (Column C).

Employability

Prime-age females

The results of the probit model, reported in Table 4.A1.4, suggest the presence of a rising education premium, and that markets appear to have differentiated more in 2004 than in 1982 among the different levels of education. Age, with the usual "inverted-U" shape in 1982, but not in 2004, is an additional important determinant. Regional differences in employability have increased over time, and ethnic effects remain, to the detriment of non-whites. Living in urban/metropolitan areas has become a progressively more important factor militating against employability over time. The results of the Oaxaca-Yun decomposition, reported in Table 4.A1.5, suggest that the effects of changes in coefficients outweigh those of changes in variables (Columns B and D). The increase in educational attainment contributed to increasing employability in both 1982 and 2004 (Columns A and C). The change in the coefficients on age turned out to have an important effect on employment probabilities in 2004: holding all other changes in coefficients constant, unemployment would have risen by almost 9.5 percentage points instead of the actual 5.3 percentage-points increase during 1982-2004 (Column C), had this change not occurred.

Prime-age males

The results of the probit estimations, reported in Table 4.A1.6, suggest that educational attainment was a powerful determinant of employability in both 1982 and 2004, as in the case of prime-age females. Employment prospects were found to improve significantly in 2004 only for individuals with higher levels of education. Age had no effect on employability in 1982, but did in 2004. Unlike prime-age females, the number of children does not affect prime-age male employability. For both prime-age males and females, living in urban areas, and in particular in metropolitan centres, is associated with lower employment prospects. Regional differences in employability have become more marked for prime-age males than females. Moreover, the Oaxaca-Yun decomposition, reported in Table 4.A1.7, suggests that the effects of changes in coefficients outweigh those of changes in variables (Columns B and D), as in the case of prime-age females. The increase in educational attainment contributed to reducing unemployment through changes in variables, but rising urbanisation had the opposite effect (Column A). Changes in the coefficient on age turned out to have an important effect on employment, as in the case of prime-age females, but contributed to increasing, rather than reducing, employment (Column C).

Female youths

The results of the probit estimations, reported in Table 4.A1.8, confirm the finding for prime-age individuals of a rising education premium between 1982 and 2004. Living in urban areas reduces the probability of being employed. There has been greater differentiation across the regions, as in the case of prime-age males. In addition, the results of the Oaxaca-Yun decomposition, reported in Table 4.A1.9, suggest that the effects of changes in coefficients outweigh those of changes in variables (Columns B and D), as in the case of prime-age individuals. The increase in educational attainment contributed to reducing the employability of those individuals with up to 8-11 years of schooling through changes in variables (Column A), but the increase in returns to education has had the opposite effect, regardless of the number of years of schooling (Column C).

Male youths

The results of the probit estimations, reported in Table 4.A1.10, suggest that an increase in educational attainment reduced the probability of employment in 2004 for individuals with up to 11 years of education. Living in urban/metropolitan areas also reduced the probability of being employed, as in the case of prime-age individuals. The Oaxaca-Yun decomposition, reported in Table 4.A1.11, suggests that the effects of changes in coefficients outweigh those of changes in variables (Columns B and D), as in the case of prime-age individuals. The increase in educational attainment contributed to reducing employment for those with 8 years of schooling or more through changes in both variables and returns (Columns A and C).

Table 4.A1.1. **Labour force participation and employment equations: sample means, 1982 and 2004**

	Participation		Employment							
	Prime-age females		Prime-age females		Prime-age males		Female youths		Male youths	
	1982	2004	1982	2004	1982	2004	1982	2004	1982	2004
Participates	0.4	0.7	..	..	..	..	..	..	..	..
Is employed	..	..	1.0	0.9	1.0	1.0	0.9	0.8	0.9	0.9
Years of education										
4 to 7 years	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.4	0.3
8 to 11 years	0.2	0.4	0.2	0.4	0.2	0.4	0.3	0.6	0.2	0.5
12+ years	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1
Age	37.1	38.1	36.3	37.6	36.9	37.8	19.5	20.3	19.6	20.1
Age^2	1 448.7	1 525.2	1 383.3	1 478.2	1 431.8	1 496.5	388.2	419.4	392.2	411.8
Head of household	0.1	0.2	0.2	0.2	0.9	0.8	0.0	0.0	0.2	0.2
Other	0.2	0.2	0.2	0.2			0.8	0.8		
Household income	1 183.9	1 114.7	1 189.2	1 116.3	436.5	649.0	1 349.3	1 222.6	951.4	1 057.4
No. of children			1.2	0.7	1.5	0.8	1.0	0.7	1.0	0.6
No. of children by age										
0-2 years	0.3	0.1	..	..	..	..	..	..	..	..
3-5 years	0.4	0.2	..	..	..	..	..	..	..	..
6-10 years	0.6	0.4	..	..	..	..	..	..	..	..
11-17 years	0.8	0.5	..	..	..	..	..	..	..	..
Adults in household	2.8	2.7	2.8	2.6	2.7	2.7	3.5	3.2	3.5	3.3
Urban	0.8	0.9	0.8	0.9	0.7	0.8	0.8	0.9	0.7	0.8
South-East	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.5	0.4
Centre-West	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
North-East	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3
South	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1
Metropolitan area	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3
White	0.6	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.5

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.2. **Labour force participation: prime-age females, 1982 and 2004**

Dep. variable: "1", if participates and "0", otherwise[1]

	1982			2004		
	Marginal effect	Coefficient	Standard deviation	Marginal effect	Coefficient	Standard deviation
Years of education						
4 to 7	0.065	0.165	0.011	0.075	0.212	0.013
8 to 11	0.251	0.642	0.016	0.179	0.515	0.014
12+	0.517	1.602	0.026	0.312	1.159	0.020
Age	0.039	0.100	0.006	0.033	0.090	0.006
Age^2	–0.001	–0.001	0.000	–0.001	–0.001	0.000
Head of household	0.332	0.868	0.016	0.167	0.505	0.013
Other	0.221	0.561	0.016	0.071	0.204	0.016
Household income	0.000	0.000	0.000	0.000	0.000	0.000
No. of children by age						
0-2	–0.096	–0.245	0.009	–0.126	–0.348	0.014
3-5	–0.038	–0.097	0.008	–0.041	–0.114	0.011
6-10	–0.001	–0.003*	0.006	–0.024	–0.068	0.008
11-17	0.018	0.047	0.005	0.009	0.025	0.006
Adults in household	0.005	0.013	0.004	–0.001	–0.004*	0.005
Urban	–0.018	–0.045	0.012	0.004	0.011*	0.014
South-East	–0.023	–0.059+	0.031	0.018	0.050	0.020
Centre-West	–0.068	–0.175	0.035	–0.005	–0.013*	0.025
North-East	–0.014	–0.034*	0.031	–0.011	–0.030*	0.021
South	0.061	0.153	0.032	0.076	0.219	0.023
Metropolitan	0.020	0.051	0.011	0.002	0.005*	0.011
White	–0.064	–0.163	0.011	–0.030	–0.085	0.010
Constant	..	–1.838	0.117	..	–1.281	0.115
No. Obs.		84 258			83 331	
Pseudo-R^2		0.12			0.0907	

1. All coefficients are statistically significant at the 5% level and above, except for those identified by (*). (+) identifies statistical significant at the 10% level.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

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Table 4.A1.3. **Decomposition of female labour force participation: prime-age females, 1982 and 2004**

Based on the estimated equations reported in Table 4.A1.2, ΔFP = 0.22

	Variables	Per cent of ΔFP	Coefficients	Per cent of ΔFP
	A	B	C	D
Years of education				
4 to 7	–0.001	–0.7	0.005	2.1
8 to 11	0.057	25.9	–0.017	–7.9
12+	0.047	21.3	–0.022	–9.9
Age	–0.004	–2.0	–0.080	–36.6
Head of household	0.031	14.0	–0.026	–11.7
Other	0.004	1.9	–0.022	–10.2
Household income	0.003	1.4	0.025	11.2
No. of children by age	0.019	8.5	–0.004	–2.0
0-2				
3-5	0.007	3.4	–0.001	–0.5
6-10	0.000	0.1	–0.009	–4.1
11-17	–0.005	–2.3	–0.004	–1.9
Adults in household	–0.001	–0.3	–0.013	–7.4
Urban	–0.002	–0.8	0.017	8.0
South-East	0.001	0.3	0.018	8.1
Centre-West	–0.001	–0.5	0.005	2.1
North-East	0.000	0.1	0.000	0.2
South	–0.001	–0.3	0.004	1.7
Metropolitan	–0.000	–0.2	–0.006	–2.6
White	0.004	1.7	0.015	7.0
Constant	0.000	0.0	0.201	91.3
Total	0.158	71.7	0.081	37.0

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.4. **Employability: prime-age females, 1982 and 2004**

Dep. variable: "1", if is employed and "0", otherwise[1]

	1982			2004		
	Marginal effect	Coefficient	Standard deviation	Marginal effect	Coefficient	Standard deviation
Years of education						
4 to 7	–0.002	–0.029*	0.032	0.000	0.002*	0.025
8 to 11	–0.001	–0.019*	0.037	0.019	0.125	0.024
12+	0.015	0.233	0.052	0.060	0.494	0.033
Age	0.007	0.091	0.016	0.004	0.027	0.010
Age^2	–0.000	–0.001	0.000	–0.000	–0.000*	0.000
Head of household	–0.001	–0.013*	0.037	0.004	0.025*	0.020
Other	–0.012	–0.151	0.036	–0.038	–0.228	0.023
Household income	0.000	0.000	0.000	0.000	0.000	0.000
No. of children	–0.001	–0.019+	0.010	–0.010	–0.066	0.008
Adults in household	0.001	0.010*	0.011	0.002	0.013*	0.008
Urban	–0.028	–0.483	0.044	–0.049	–0.401	0.030
South-East	–0.013	–0.181	0.075	–0.014	–0.091	0.035
Centre-West	–0.005	–0.062*	0.089	–0.000	–0.002*	0.043
North-East	0.002	0.022*	0.077	–0.017	–0.108	0.035
South	–0.008	–0.105*	0.080	0.014	0.099	0.040
Metropolitan	–0.007	–0.098	0.026	–0.040	–0.248	0.016
White	0.012	0.157	0.028	0.012	0.081	0.017
Constant	..	0.150*	0.297	..	0.840	0.185
No. obs.		37 254			54 877	
Pseudo-R^2		0.0603			0.0564	

1. All coefficients are statistically significant at the 5% level and above, except for those identified by (*). (+) identifies statistical significant at the 10% level.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.5. **Decomposition of employability: prime-age females, 1982 and 2004**

Based on the estimated equations reported in Table 4.A1.4, $\Delta E = -0.05$

	Variables	Per cent of ΔE	Coefficients	Per cent of ΔE
	A	B	C	D
Years of education				
4 to 7	0.000	0.0	0.001	–1.3
8 to 11	0.004	–7.6	0.002	–3.9
12+	0.005	–9.1	0.002	–4.1
Age	0.004	–7.0	–0.094	174.6
Head of household	0.000	–0.5	0.001	–0.9
Other	0.001	–2.7	–0.001	2.5
Household income	–0.000	0.7	0.001	–1.9
No. of children	0.005	–9.1	–0.004	7.8
Adults in household	–0.000	0.6	0.001	–1.2
Urban	–0.006	10.6	0.005	–9.0
South-East	0.000	–0.5	0.003	–6.0
Centre-West	0.000	0.0	0.000	–0.5
North-East	0.000	–0.7	–0.002	4.7
South	–0.000	0.4	0.003	–5.1
Metropolitan	0.001	–2.3	–0.004	8.2
White	–0.000	0.9	–0.003	6.3
Constant	0.000	0.0	0.052	–95.7
Total	0.014	–26.0	–0.040	74.4

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.6. **Employability: prime-age males, 1982 and 2004**

Dep. variable: "1", if is employed and "0", otherwise[1]

	1982			2004		
	Marginal effect	Coefficient	Standard deviation	Marginal effect	Coefficient	Standard deviation
Years of education						
4 to 7	–0.003	–0.054	0.024	0.001	0.011*	0.025
8 to 11	0.005	0.119	0.032	0.007	0.086	0.025
12+	0.013	0.370	0.049	0.022	0.326	0.037
Age	0.001	0.011*	0.013	0.003	0.036	0.010
Age^2	0.000	0.000*	0.000	–0.000	–0.000	0.000
Head of household	0.040	0.558	0.032	0.053	0.491	0.022
Household income	–0.000	–0.000*	0.000	0.000	0.000	0.000
No. of children	0.000	0.000*	0.008	–0.001	–0.014*	0.009
Adults in household	0.000	0.000*	0.009	–0.001	–0.013+	0.008
Urban	–0.020	–0.551	0.034	–0.032	–0.508	0.032
South-East	–0.010	–0.218	0.067	–0.017	–0.193	0.040
Centre-West	0.000	0.002*	0.079	–0.010	–0.106	0.049
North-East	–0.009	–0.169	0.068	–0.022	–0.236	0.040
South	–0.003	–0.061*	0.072	0.000	–0.000*	0.046
Metropolitan	–0.006	–0.116	0.022	–0.022	–0.241	0.018
White	0.004	0.087	0.022	0.005	0.060	0.018
Constant	..	1.690	0.247	..	1.273	0.196
No. obs.		75 869			70 861	
Pseudo-R^2		0.0822			0.0632	

1. All coefficients are statistically significant at the 5% level and above, except for those identified by (*). (+) identifies statistical significant at the 10% level.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.7. **Decomposition of employability: prime-age males, 1982 and 2004**

Based on the estimated equations reported in Table 4.A1.6, $\Delta E = -0.02$

	Variables	Per cent of ΔE	Coefficients	Per cent of ΔE
	A	B	C	D
Years of education				
4 to 7	0.000	0.1	0.001	–4.4
8 to 11	0.002	–7.3	–0.000	1.1
12+	0.001	–4.8	–0.000	0.8
Age	0.000	–1.0	0.013	–57.9
Head of household	–0.004	17.6	–0.003	12.3
Household income	0.000	–2.0	0.001	–2.6
No. of children	0.001	–3.9	–0.001	4.5
Adults in household	0.000	–0.2	–0.002	7.9
Urban	–0.005	21.1	0.001	–6.7
South-East	0.001	–3.2	0.001	–2.6
Centre-West	–0.000	0.5	–0.000	1.6
North-West	0.000	–0.2	–0.001	3.6
South	0.000	0.0	0.001	–2.2
Metropolitan	0.000	–1.9	–0.002	9.3
White	–0.000	1.8	–0.001	3.6
Constant	0.000	0.0	–0.020	89.8
Total	–0.004	16.5	–0.013	58.1

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.8. **Employability: female youths, 1982 and 2004**

Dep. variable: "1", if is employed and "0", otherwise[1]

	1982			2004		
	Marginal effect	Coefficient	Standard deviation	Marginal effect	Coefficient	Standard deviation
Years of education						
4 to 7	–0.036	–0.193	0.035	0.001	0.002*	0.052
8 to 11	–0.043	–0.223	0.039	–0.010	–0.033*	0.050
12+	–0.027	–0.139	0.063	0.075	0.263	0.063
Age	–0.018	–0.098*	0.066	0.043	0.138	0.062
Age^2	0.001	0.003	0.002	–0.001	–0.002*	0.002
Head of household	0.028	0.167	0.086	0.052	0.179	0.055
Other	–0.005	–0.029*	0.041	–0.008	–0.026*	0.032
Household income	–0.000	–0.000*	0.000	0.000	0.000	0.000
No. of children	–0.005	–0.030	0.010	–0.014	–0.047	0.011
Adults in household	0.001	0.006*	0.009	–0.004	–0.012*	0.009
Urban	–0.102	–0.690	0.039	–0.127	–0.473	0.035
South-East	–0.001	–0.008*	0.074	0.031	0.099	0.043
Centre-West	0.007	0.039*	0.085	0.034	0.115	0.053
North-East	–0.011	–0.058*	0.077	0.008	0.027*	0.044
South	0.018	0.105*	0.079	0.090	0.318	0.050
Metropolitan	–0.026	–0.137	0.025	–0.106	–0.332	0.022
White	0.013	0.070	0.026	0.019	0.062	0.022
Constant	..	2.591	0.646	..	–0.948*	0.612
No. obs.		21 270			19 519	
Pseudo-R^2		0.0488			0.0507	

1. All coefficients are statistically significant at the 5% level and above, except for those identified by (*). (+) identifies statistical significant at the 10% level.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.9. **Decomposition of employability: female youths, 1982 and 2004**

Based on the estimated equations reported in Table 4.A1.8, $\Delta E = -0.136$

	Variables	Per cent of ΔE	Coefficients	Per cent of ΔE
	A	B	C	D
Years of education				
4 to 7	–0.000	0.1	0.014	–10.6
8 to 11	–0.004	2.6	0.010	–7.7
12+	0.005	–3.5	0.004	–2.9
Age	0.017	–13.0	0.493	–362.9
Head of household	0.001	–1.0	0.000	0.0
Other	0.001	1.0	0.009	–6.4
Household income	–0.001	1.0	0.009	–6.4
No. of children	0.005	–3.5	–0.003	2.3
Adults in household	0.001	–1.0	–0.011	8.4
Urban	–0.015	11.3	0.031	–22.8
South-East	–0.001	0.9	0.010	–7.1
Centre-West	0.001	–0.6	0.001	–0.6
North-East	0.000	–0.1	0.004	–2.8
South	–0.004	2.9	0.007	–5.6
Metropolitan	0.001	–0.6	–0.013	9.2
White	–0.001	0.9	–0.001	0.7
Constant	0.000	0.0	–0.657	483.7
Total	0.006	–4.2	–0.101	74.6

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.10. **Employability: male youths, 1982 and 2004**

Dep. variable: "1", if is employed and "0", otherwise[1]

	1982			2004		
	Marginal effect	Coefficient	Standard deviation	Marginal effect	Coefficient	Standard deviation
Years of education						
4 to 7	–0.017	–0.132	0.025	–0.031	–0.147	0.040
8 to 11	–0.003	–0.059+	0.030	–0.036	–0.175	0.039
12+	–0.011	–0.083*	0.068	–0.019	–0.088*	0.059
Age	–0.013	–0.101+	0.054	0.025	0.119	0.059
Age^2	0.000	0.003	0.001	–0.000	–0.002*	0.001
Head of household	0.049	0.497	0.039	0.090	0.546	0.040
Household income	0.000	0.000*	0.000	0.000	0.000	0.000
No. of children	0.002	0.016	0.008	0.003	0.015*	0.011
Adults in household	–0.001	–0.005*	0.007	0.000	–0.001*	0.009
Urban	–0.085	–0.811	0.030	–0.115	–0.711	0.034
South-East	–0.010	–0.075*	0.058	–0.033	–0.159	0.043
Centre-West	0.010	0.087*	0.068	0.002	0.012*	0.054
North-East	–0.016	–0.124	0.060	–0.042	–0.194	0.043
South	0.008	0.069*	0.063	0.015	0.076*	0.050
Metropolitan	–0.023	–0.170	0.021	–0.086	–0.379	0.021
White	0.013	0.100	0.021	0.019	0.094	0.021
Constant	..	2.837	0.527	..	0.154*	0.573
No. obs.		40 434			27 292	
Pseudo-R^2		0.0809			0.0853	

1. All coefficients are statistically significant at the 5% level and above, except for those identified by (*). (+) identifies statistical significant at the 10% level.

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

Table 4.A1.11. **Decomposition of employability: male youths, 1982 and 2002**

Based on the estimated equations reported in Table 4.A1.10, $\Delta E = -0.065$

	Variables	Per cent of ΔE	Coefficients	Per cent of ΔE
	A	B	C	D
Years of education				
4 to 7	0.002	–3.0	–0.001	1.3
8 to 11	–0.002	3.6	–0.013	19.6
12+	–0.000	0.6	–0.000	0.1
Age	0.001	–2.0	0.513	–783.7
Head of household	–0.001	0.9	0.001	–2.3
Household income	0.000	–0.1	0.006	–8.6
No. of children	–0.001	1.4	–0.000	0.3
Adults in household	0.000	–0.2	0.003	–4.5
Urban	–0.012	17.9	0.017	–25.3
South-East	0.001	–0.9	–0.007	10.5
Centre-West	0.000	–0.2	–0.001	1.9
North-West	–0.000	0.6	–0.004	6.6
South	–0.000	0.4	0.000	–0.3
Metropolitan	0.000	–0.2	–0.012	18.8
White	–0.001	1.6	–0.001	0.9
Constant	0.000	0.0	–0.555	848.0
Total	–0.013	20.4	–0.054	83.3

Source: IBGE (National Household Survey, PNAD) and OECD calculations.

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List of acronyms

ABDI	Brazilian Agency for Industrial Development *Agência Brasileira de Desenvolvimento Industrial*
AEB	Brazilian Space Agency *Agência Espacial Brasileira*
APEX	Export Promotion Agency *Agência de Promoção de Exportações*
BB	Bank of Brazil *Banco do Brasil*
BCB	Central Bank of Brazil *Banco Central do Brasil*
BIOTA	Virtual Institute of Biodiversity *Instituto Virtual da Biodiversidade*
BNDES	National Development Bank *Banco Nacional de Desenvolvimento Econômico e Social*
CAPES	Post-Graduate Development Agency *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior*
CCFS	Sectoral Funds' Coordination Committee *Comitê de Coordenação dos Fundos Setoriais*
CCT	National Council for Science and Technology *Conselho Nacional de Ciência e Tecnologia*
CEF	Federal Savings Bank *Caixa Econômica Federal*
CGEE	Centre for Management and Strategic Studies *Centro de Gestão e Estudos Estratégicos*
CMN	National Monetary Council *Conselho Monetário Nacional*
CNDI	National Council for Industrial Development *Conselho Nacional de Desenvolvimento Industrial*
CNPq	National Council for Scientific and Technological Development *Conselho Nacional de Desenvolvimento Científico e Tecnológico*
EMBRAPA	Brazilian Agricultural Research Corporation *Empresa Brasileira de Pesquisa Agropecuária*
FAPESP	State of São Paulo Research Foundation *Fundação de Amparo à Pesquisa do Estado de São Paulo*
FAT	Workers' Fund *Fundo de Amparo ao Trabalhador*
FGTS	Severance Insurance Fund *Fundo de Garantia por Tempo de Serviço*

FINEP	Financing Agency for Studies and Projects *Financiadora de Estudos e Projetos*
FNDCT	National Science and Technology Fund *Fundo Nacional de Desenvolvimento Científico e Tecnológico*
IBGE	Brazilian Institute of Geography and Statistics *Instituto Brasileiro de Geografia e Estatística*
INOVA	Agency for Innovation – University of Campinas *Agência de Inovação da Universidade de Campinas*
INPI	National Institute of Intellectual Property *Instituto Nacional de Propriedade Industrial*
IPEA	Institute for Applied Economic Research *Instituto de Pesquisa Econômica Aplicada*
LDO	Budget Guidelines Law *Lei de Diretrizes Orçamentárias*
RGPS	Social-Security Regime for Private-Sector Workers *Regime Geral da Seguridade Social*
RPPS	Social-Security Regime for Public-Sector Workers *Regime Próprio de Previdência Social*
SEBRAE	Support Agency for Small and Medium-Sized Enterprises *Serviço Brasileiro de Apoio às Micro e Pequenas Empresas*
SENAC	*National Commercial Training Service* *Serviço Nacional de Aprendizagem Comercial*
SENAI	*National Industrial Training Service* *Serviço Nacional de Aprendizagem Industrial*
SENAR	*National Rural Training Service* *Serviço Nacional de Aprendizagem Rural*
SENAT	National Transport Training Service *Serviço Nacional de Aprendizagem do Transporte*
SESC	Retail Trade Social Service *Serviço Social do Comércio*
SESI	Industry Social Service *Serviço Social da Indústria*
SEST	Transport Social Service *Serviço Social dos Transportes*
SINE	National Employment System *Sistema Nacional de Emprego*

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