Current Issues

Latin America

Deutsche Bank Research

May 30, 2006

Brazil: *O país do futuro?*

Economic scenarios for the next 15 years

Brazilian economic growth will accelerate in the coming years. Moderately favourable demographic dynamics and fiscal consolidation will increase the savings ratio. Greater macroeconomic stability, lower interest rates and the increased availability of credit will lift the investment ratio. The quality of human capital is low by international standards, but reforms introduced a few years ago should help improve it, supporting productivity growth. So will greater economic openness and greater macroeconomic stability. Improvements in the institutional and regulatory environment are likely to be gradual. Taken together, this should help underpin higher medium-term economic growth.

In the baseline scenario, we expect Brazil to grow at an average rate of 3.3% a year over the next decade and a half, a considerable improvement relative to its past performance. In a realistic upside scenario, economic growth will average 4.2% p.a., while in a downside scenario economic growth will remain close to its ten-year average of 2.2% p.a.

The emergence of China presents challenges and opportunities. Low labour costs and rapid technological upgrading are set to transform China into a formidable competitor for Brazil's light manufacturing sector. Brazil, on the other hand, is likely to maintain its position in niche high-tech sectors where it has a competitive advantage. Moreover, increased Chinese demand for commodities will provide Brazil with an opportunity to move up the value chain in commodity-related sectors.

Agriculture and processed food, mining and financial services are the sectors most likely to experience above-average growth in the medium term. Stronger growth will benefit all major economic sectors. But increased trade links with Asia, rapidly developing capital markets on the back of greater macroeconomic stability and higher per capita income will fuel above-average growth in commodity-related sectors and financial services.

www.dbresearch.com

Author
Markus Jaeger
+1 212 250-6971
markus.jaeger@db.com

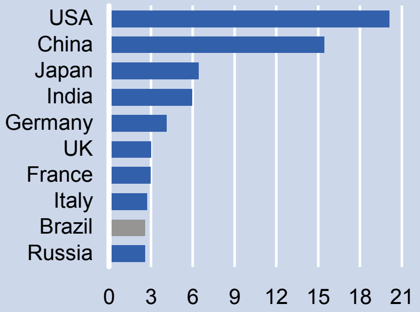
Editor
Maria L. Lanzeni

Technical Assistant
Bettina Giesel

Deutsche Bank Research
Frankfurt am Main
Germany
Internet: www.dbresearch.com
E-mail: marketing.dbr@db.com
Fax: +49 69 910-31877

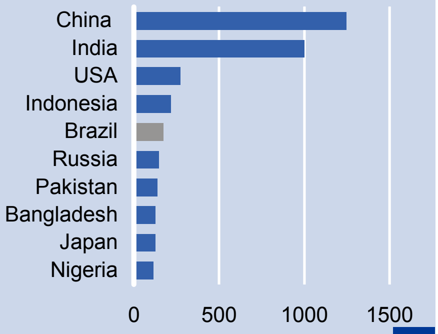
Managing Director
Norbert Walter

Brazil is ninth-largest economy
GDP, PPP, % of world total



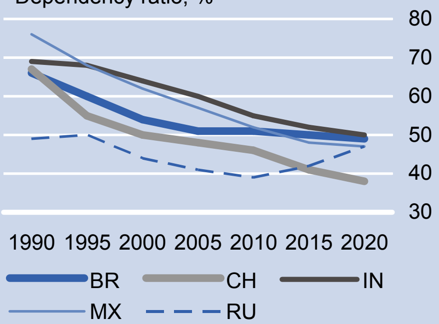
Source: IMF 1

Brazil has fifth-largest population
Population, m



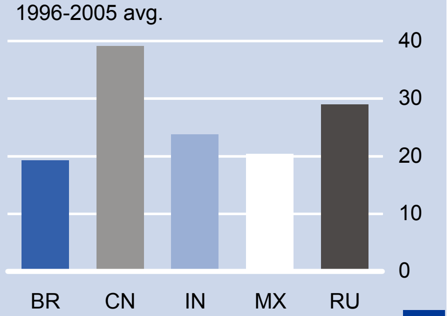
Source: UN 2

Moderately favourable demographics
Dependency ratio, %



Source: United Nations 4

Low savings have kept growth low
Savings ratio, % of GDP, 1996-2005 avg.



Sources: IIF, DB Research 5

Brazil used to be referred to as the "country of the future". For a while, during the 1960s and 1970s, it certainly looked as if Brazil was going to realise its huge economic potential, derived from a large domestic market, abundant natural resources, and low labour costs. But during the 1980s – the so-called "lost decade" – and the 1990s, Brazil underperformed relative to expectations and relative to the fast-growing East Asian economies such as South Korea and Taiwan. Although Brazil managed to overcome hyperinflation during the second half of the 1990s, it continued to experience repeated economic and financial instability. Economic growth averaged a mere 2.4% in 1995-2004. In recent years, economic fundamentals have been improving and some observers have started talking about how economic growth could reach 6% a year and how Brazil could follow Mexico and become an "ex-emerging market"[1]. If this does not quite sound like "fifty years in five", it is still a very optimistic assessment relative to Brazil's more recent performance. In this note, we seek to assess Brazil's medium-term economic growth prospects and the various implications of alternative growth scenarios.

Erratic growth performance
Avg. real GDP growth, %

	1931-50	1951-80	1981-93	1994-2004
Brazil	4.6	6.8	1.4	2.7
Argentina	2.9	3.4	1.0	1.7
Chile	2.7	3.4	3.5	4.7
Mexico	4.1	6.4	1.7	2.9
South Korea	0.6	7.5	7.2	5.3

Source: Castelar, Gill, Serven, Thomas, 2001 3

Structural factors & economic growth

Four structural factors drive economic growth according to DB Research's proprietary model *Formel-G* (see Appendix for a detailed description of the model).

1. Demographics: Mildly positive

According to UN projections, the Brazilian population will continue to grow until 2050, albeit at an increasingly slower rate that will fall from currently 1.2% a year to 0.75% a year by 2020. But the share of the population of working age (15-64 years) will stagnate. A broadly stable dependency ratio[2] will therefore not be a major driver of higher investment and higher economic growth. But the absolute increase in the working-age population will tend to have a mildly positive effect on economic growth.[3]

2. Savings & investment: No Asian-style economy

The savings and investment ratios in Brazil have upside potential. The savings ratio averaged 19% of GDP over the past ten years, which compares poorly with high-saving Asian countries but is more

---

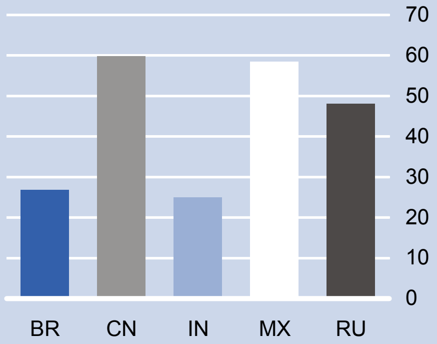
[1] Blazquez & Santiso (2004). Mexico: Is it an Ex-Emerging Market? Journal of Latin American Studies 36. 2004.

[2] The dependency ratio is a measure of the portion of a population which is composed of dependents (people who are too young or too old to work). It is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64, expressed as a percentage.

[3] Bloom & Williamson (1998). Demographic Transitions and Economic Miracles in Emerging Asia. The World Bank Economic Review, 12/3. 1998.

A fairly closed economy

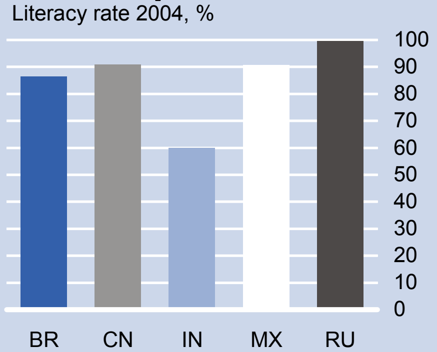
Merchandise trade, % of GDP, 2004



Sources: World Bank, DB Research **6**

Room for improvement in human capital

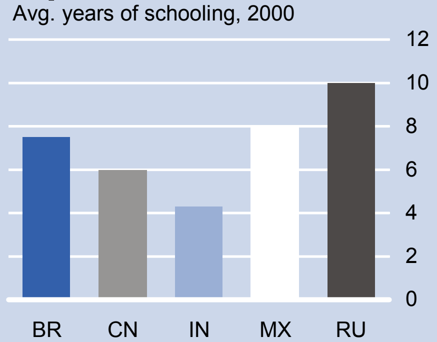
Literacy rate 2004, %



Sources: World Bank, CIA **7**

Poor education given per capita income level

Avg. years of schooling, 2000



Sources: OECD, DB Research **8**

or less in line with most Latin American economies. Over the past decade, the investment ratio exceeded the savings ratio substantially due to a sizeable current account deficit, partly financed by privatisation-related FDI inflows. A "structural" increase in domestic savings of around 3-4% of GDP due, for example, to fiscal consolidation could help lift the savings ratio to 22-23% of GDP on a permanent basis. In that case, an investment ratio of 25% could be achieved, but not much higher, at least on a sustained basis. Chile, for example, which is regarded as a high-saving country by Latin American standards, only managed to save an average of 23% of GDP over the past decade. Mexico has only managed to save 20% of GDP. So while the domestic savings and investment ratios are likely to rise, the expected improvement will not turn Brazil into a high-savings-high-investment, Asian-style economy.

3. Economic openness: Considerable upside potential

Brazil is a relatively closed economy with considerable potential to increase its openness especially as regards trade. Merchandise trade amounted to less than 27% of GDP in 2004 (and this is following a major surge in exports during the preceding years). This compares poorly to the far more open economies of emerging Asia and even other major Latin American economies. Trade openness is important for several reasons. First, it creates a greater capacity to generate foreign-currency revenues necessary to service foreign debt (and thus reduce potential future macroeconomic instability). Second, greater openness should help attract more FDI inflows, leading to the transfer of technology and skills necessary to increase overall productivity and economic growth. Third, greater openness forces the export-oriented and import-substituting sectors to become more competitive[4]. Although the recent surge in exports in Brazil is due to a confluence of potentially temporary factors (competitive exchange rate, positive terms of trade shock, strong economic growth in Argentina, China and the US), we do expect the economy to continue to become more open over the coming years.

4. Human capital: Improving from low levels

The quality of the human capital stock in Brazil is relatively low. Large income differentials generally coincide with a low overall level of human capital endowment. Brazil is one of the countries with the highest degree of inequality in the world and there is substantial evidence that inequality in low-income countries is detrimental to economic growth[5]. Not surprisingly, Brazil scores relatively low on human capital and education indicators given its GDP per capita income levels. Education levels are perhaps the best proxy of human capital. On this measure, Brazil compares poorly (see charts), but trend-wise levels are improving. While primary school enrolment ratios compare satisfactorily, secondary school enrolment ratios are relatively poor. However, reforms under the Cardoso administrations (1995-2002) have paved the way for a gradual increase in enrolment ratios. Similar trends can be observed in average years of schooling, another proxy for the quality of human capital. Whether one looks at enrolment ratios or average years of schooling, the conclusion is the same. The overall level of education in Brazil is relatively low, but the upside potential is substantial. We

[4] Marco Neuhaus (2005). Opening economies succeed: More trade boosts growth. Deutsche Bank Research. Current Issues. November 11, 2005. Frankfurt am Main.

[5] Helpman (2004). The mystery of economic growth. Belknap Press.

expect a sizeable increase in the quality of human capital, which will help raise the economy's growth potential.

Political economy of reform & growth potential

Low level of congressional support makes reform difficult

	Presidential party	
Administration	% of seats	Party
Sarney 1	41.8	PMDB
Sarney 2	44.7	PMDB
Sarney 3	35.4	PMDB
Collor 1	5.1	PRN
Collor 2	5.1	PRN
Collor 3	6.0	PRN
Collor 4	6.0	PRN
Franco 1-5	na	no party
Cardoso 1	12.1	PSDB
Cardoso 2	15.6	PSDB
Lula	17.7	PT

Source: Amorim 2002 **9**

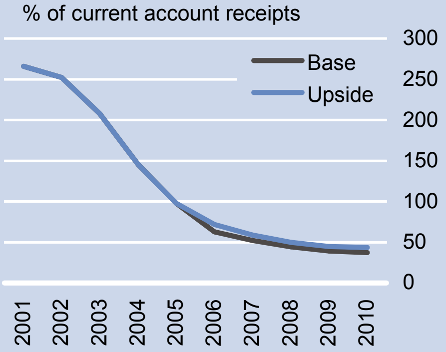
Major structural reform, including the removal of impediments to sustained growth and more sustainable public finances, is likely to progress only slowly. Fiscal and social security reform are necessary to improve the medium-term outlook for debt sustainability, bring down real interest rates and lead to a virtuous cycle of declining debt, lower debt service costs and higher investment. Despite the government's impeccable track record in terms of meeting its pre-announced fiscal (primary surplus) targets over the past few years, a rising social security deficit will make it increasingly difficult to maintain high primary surpluses.

The challenge lies in the structure of the Brazilian political system, which makes forward-looking structural reforms difficult to implement. This is why we expect reforms to be quite gradual, at least in the baseline scenario. Low levels of congressional cohesion[6] and a fragmented party system, restrictive constitutional provisions that require large majorities to be amended and a strong, independent judiciary limit the power of the executive and have in the past ensured that structural reform is slow and gradual in the best of cases, except in times of crisis (e.g. fiscal responsibility law of 1999).

Fortunately, the system allows for a high degree of presidential control of macroeconomic policy[7] (in the short run at least) thanks to various presidential prerogatives. While structural reforms require large congressional majorities, which are difficult to put together and even more difficult to maintain, monetary and fiscal policy is much less influenced by congress and other veto players[8].

Net external debt set to decline further

% of current account receipts



Source: DB Research **10**

Economic stabilisation will boost growth

Increasing macroeconomic stability will help underpin higher and more stable economic growth over the medium term. In the past few years, Brazil has undergone a massive improvement in external solvency and liquidity indicators. The fiscal and public debt position has also improved, though much more gradually. The major macroeconomic adjustment carried out in Brazil in the last three years has laid the foundation for stronger and more stable growth in the years ahead.

External vulnerability has declined sharply

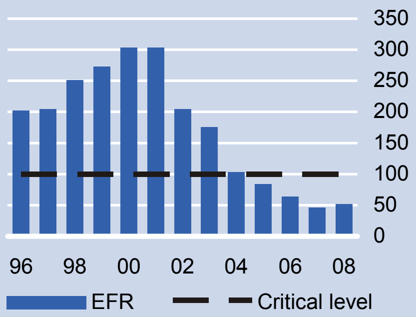
Brazil's gross external debt has declined dramatically. While gross external debt amounted to a little more than 23% of GDP by end-2005, external debt measured relative to current account receipts

[6] Pereira (2002). Institutional conditions for presidential success in the legislative arena. Working Paper 27. Center for Brazilian Studies, 2002.

[7] The Fiscal Responsibility Law further increased the control of the federal government over public finances through the creation of a framework for budgetary planning and the prohibition to use federal government funds to finance state and local government debt.

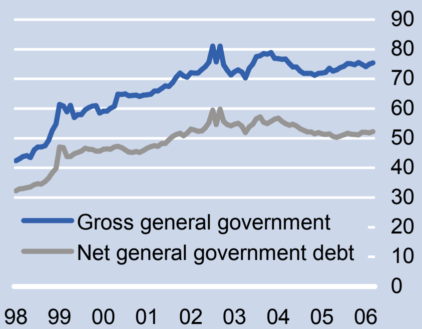
[8] Ames (2002). The Deadlock of Democracy in Brazil. University of Michigan Press, 2002.

Manageable external financing requirements
% of FX reserves



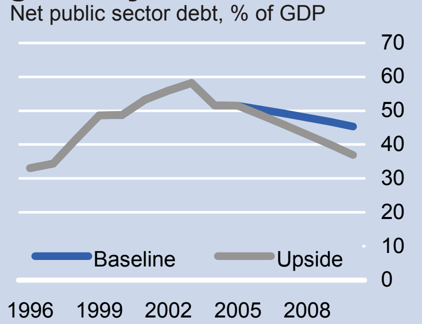
Source: DB Research **11**

Public debt has stabilised at high levels...
% of GDP



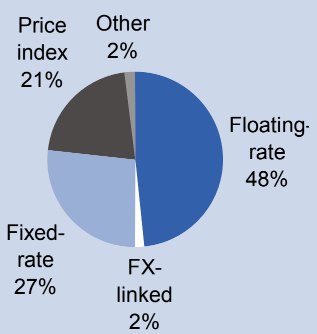
Source: DB Research **12**

... but is set to decline gradually
Net public sector debt, % of GDP



Sources: DB Research **13**

Debt structure still poor (I)
Composition of federal domestic government debt, April 2006



Source: Ministry of Finance **15**

amounted to 130%. This compares with 50% of GDP and 300% of current account receipts in 2002. This is a dramatic improvement. While the strong surge in exports has been helped by cyclical factors (read: strong global growth, high commodity prices), we expect this trend to continue, even if at a lower pace. Net external debt will decline faster than gross debt. A continued fair-to-strong current account performance plus net FDI inflows in the order of 1-2% of GDP make declining net external debt levels virtually a certainty. This is noteworthy, as many analysts still regard Brazil's high level of external indebtedness as its main vulnerability.

Equally important, gross external financing requirements as a percentage of FX reserves, a key liquidity risk ratio, has fallen below the critical level of 100%. This suggests that Brazil, though still vulnerable, is now in a much better position to withstand an external liquidity shock.

High level of public debt remains an important risk factor

But Brazil's public debt will remain at relatively elevated levels. The Lula administration has made some progress on the fiscal front by raising the primary surplus target and partially reforming the social security system. This has led to lower fiscal deficits and a lower public debt burden. Helped by the real currency appreciation since 2002, the gross general government (net public sector) debt-to-GDP ratio declined to around 75% (52%) of GDP at end-2005 from 78% (58%) of GDP at end-2002. Public-sector interest payments (slightly different from the "general government" concept) have fluctuated between 7-15% of GDP over the past few years. In 2005, nominal public-sector interest payments amounted to 8% of GDP. This is high, but if measured relative to public-sector revenues (which amount to 35-40% of GDP), it is manageable. Our debt sustainability analysis shows that, provided the government continues to run 4% of GDP-plus primary surpluses and domestic real interest rates stabilise near or slightly below historical levels, net public-sector debt will decline, albeit only gradually (see chart 13). The still elevated level of public debt represents Brazil's greatest macroeconomic vulnerability.

But government debt composition has improved significantly

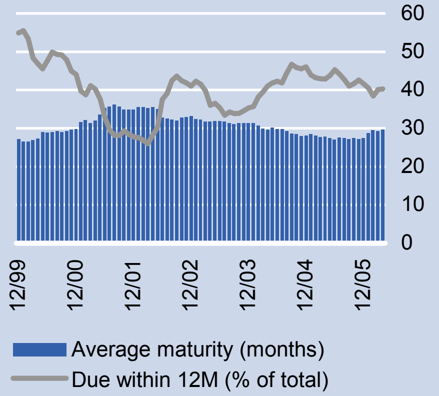
Public debt sustainability: 2005-10

		Scenarios	
Assumptions		**Base**	**Upside**
CPI	% change	5.0	4.0
Real GDP	%	3.3	4.2
Ex. rate appr. (- = app.)	% yoy	3.0	2.0
Int. rate on dom. debt	%	15.0	12.0
Int. rate on ext. debt	%	9.0	8.0
Primary balance	% of GDP	4.2	4.5

Source: DB Research **14**

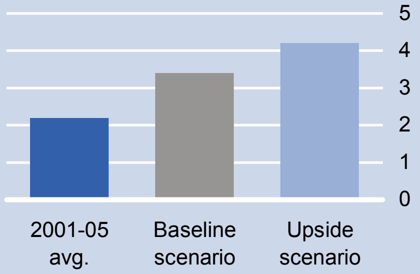
Nonetheless, Brazil has made dramatic progress in reducing the vulnerability of government debt to external shocks. Government debt denominated in foreign currency amounted to more than 40% of GDP and government debt linked to the exchange rate reached almost 30% of GDP in 2002. Currently, taking into account central

Debt structure still poor (II)



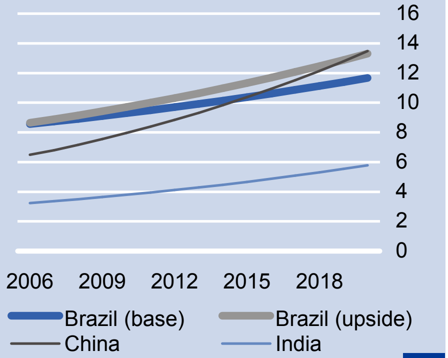
Sources: Ministry of Finance, DB Research **16**

Better times ahead
Avg. real GDP growth, % p.a., 2006-2020



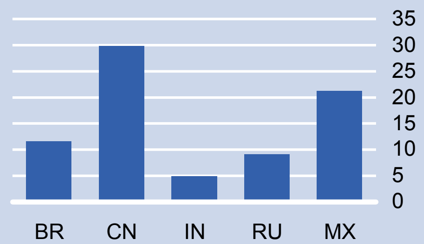
Source: DB Research **17**

Head-to-head with China
GDP per capita (PPP), USD '000



Source: DB Research **18**

Lagging behind in technological upgrading
High-tech exports 2004, % manufacturing exports



Source: World Bank **19**

bank swaps, domestic FX-linked debt is negative (implying that currency depreciation leads to a *lower* debt-to-GDP ratio), while net external public-sector debt amounts to less than 1% of GDP. This is to be welcomed given the economy's traditional vulnerability to a reversal in capital inflows.

But while currency risk has decreased, government debt remains vulnerable to interest rate shocks. More than 70% of domestic government debt is floating-rate or short-term debt. More than 40% of domestic federal market debt falls due within 12 months. This means that an external shock that pushes up domestic real interest rates would strongly impact government debt dynamics. The short maturity of the debt also makes it vulnerable to roll-over risk. The debt structure therefore still renders Brazil vulnerable, but these risks will likely decline over the next 1-2 years if the government maintains fiscal discipline and manages to issue more longer-term, fixed-rate bonds.

Economic growth scenarios

Based on the quantitative-qualitative analysis, we propose three different scenarios to which we attach different subjective probabilities.

Baseline: "Gradually moving forward" (p = 60%)

— **Real GDP growth averages 3.3% per year**. Some progress with regard to structural reforms takes place (after the 2006 elections). But due to the mechanics of the political system, reform is very gradual. The overall investment ratio reaches 25% due to structural reform and further fiscal adjustment. Human capital keeps improving from low levels.

Upside scenario: "Beating expectations" (p = 25%)

— **Economic growth averages more than 4% a year** thanks to increased macroeconomic stability, higher savings and investment (including FDI flows). Over time, the investment ratio reaches a very high 27% of GDP. Unexpectedly, the government manages to push through important structural reforms. Increased investment and an improved regulatory framework help sustain higher economic growth, including the greater availability of private-sector credit. Human capital levels increase at a rate similar to the baseline scenario.

Downside: "*Remaining* the country of the future" (p = 15%)

— **Economic growth averages 2.5% a year**. Occasional macroeconomic policy slippage and occasional domestic political volatility lead to bouts of financial and economic instability. High interest rates and modest economic growth combine to prevent the government debt ratio from falling. Structural reforms do not progress at all. The 2006 elections produce a divided Congress, effectively undermining the prospect of future reform until 2010 and preventing economically important but politically sensitive reforms from taking place. An uncertain medium-term outlook pushes down the savings ratio to its 10-year average of 18% of GDP.

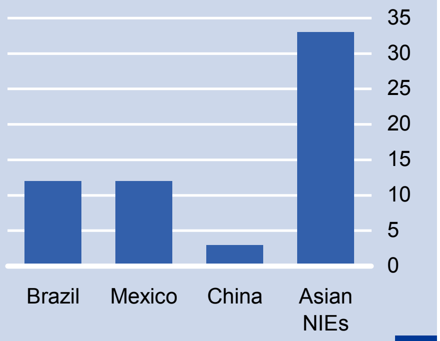
Top-five business locations: Responses from TNCs*

*Countries are ranked according to the number of responses that rated each as the most attractive location. TNCs: Transnational corporations.

Source: UNCTAD 20

Hourly compensation costs of manufacturing worker

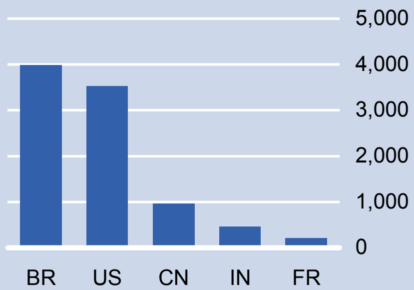
% of US compensation, 2002



Sources: Bureau of Labour Statistics, DB Research 21

High energy prices to give boost to ethanol industry

Top-5 ethanol producers (gallons, m), 2004



Source: Earth Policy Institute 22

Implications of future economic scenarios

We briefly want to look at how Brazil's economic outlook compares with that of other fast-growing emerging markets, how Brazil is likely to fit into the emerging global division of labour and which economic sectors are set to perform best over the coming years.

Brazil, China and the other BRIC economies

How does Brazil compare with India, China and Russia? If our growth projection is correct, Brazil will continue to lag behind China and India, and possibly even Russia, by a considerable margin with regard to economic growth. While China and India will grow more than 5.5% a year over the next decade, Brazil is likely to grow less than 3.5% a year. China and India, like Brazil, suffer from substantial structural shortcomings. Yet China and India have grown at an average of 9% and 6% a year, respectively, since the mid-1990s, but Brazil a mere 2.5%. We expect the growth disparity between Brazil and China/India to narrow somewhat over the coming years. But higher economic growth in China and India will lead to a more rapid increase in GDP per capita incomes than in Brazil. On a PPP basis, Chinese per capita incomes are projected to catch up with Brazil's before the end of the next decade (see chart 18).

China's rapid integration into the world economy will create challenges for Brazil's manufacturing sector. Over time, low wages, a competitive exchange rate and gradual technological upgrading will turn China into a formidable competitor for the Brazilian manufacturing sector in third markets and in the domestic market, although Brazil is likely to remain competitive in some areas of technological excellence such as medium-sized aircraft. At the same time, Brazil will be able to build on its comparative advantage in the natural resources sector, as we argue in the next section.

Agriculture and mining are set to benefit disproportionately

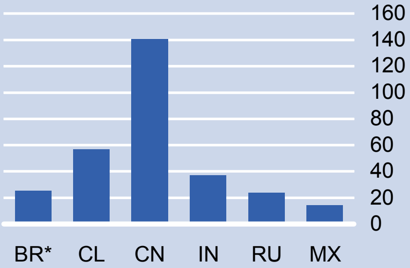
Mining and agriculture, though very cyclical, are the sectors that are likely to post above-average growth rates. Brazil clearly has an advantage in agriculture given the large supply of arable land. The comparative advantage is particularly pronounced in land-intensive agriculture (e.g. soy). Rapid economic growth in China (and to a lesser extent in India) will support demand for raw materials and agricultural products. China is already a net foodstuff importer and the rise of an urban middle class will further increase Chinese demand for more and increasingly high value-added agricultural products. China's rapid industrialisation has the same effect on raw materials (e.g. iron ore), though this sector is more cyclical than foodstuffs. So there are good reasons to be upbeat about the medium-term growth prospects in these sectors, especially if Brazil manages to move further up the value chain (e.g. agro-technology, distribution and marketing of foodstuffs) and reduce current obstacles such as a deficient transport infrastructure. If energy prices remain high, ethanol and ethanol-related technologies offer considerable growth potential from an already leading position (see chart 22).

While higher medium-term economic growth and rising per capita incomes will benefit all economic sectors, sectors where Brazil is able to foster a high degree of international competitiveness and expand exports will post faster growth than domestic or import-competing sectors.

Economy likely to attract increased foreign investment

Brazil is undoubtedly an attractive investment destination. It offers investors a large domestic market of 180 m and as part of Mercosur offers a platform to access another 70-80 m consumers. In the latest UNCTAD survey, Brazil was among the top five investment destinations of TNCs[9] (see chart 20). Still, foreign direct investment has been modest over the past decade relative to GDP, especially after stripping out privatisation-related inflows. A fairly high degree of labour market rigidity, the lack of domestic long-term financing, concerns about macroeconomic stability and regulatory uncertainty (e.g. utilities) have limited foreign direct investment. These short-comings notwithstanding, foreigners' interests will intensify if the China-commodity-price story remains in place. Naturally, structural reforms, greater macroeconomic stability and faster economic growth will also help increase the attractiveness of other sectors, especially services.

Considerable growth potential in bank credit
Bank credit, % of GDP, 2004



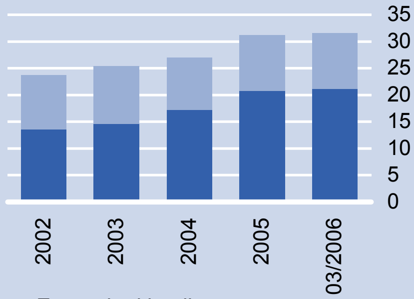
* Public-sector bank lending around 1/3 of total domestic credit

Source: IMF **23**

Financial services will be another important growth sector

The financial sector is also set to grow thanks to lower interest rates and greater macroeconomic stability. Domestic credit to the private sector is quite low, around 30% of GDP, around one-third of which consists of loans extended by public-sector banks (see chart 23). Recent bankruptcy and judiciary reform, once fully implemented, should make banks more willing to extend credit and increase loan volumes. Higher economic growth and lower interest rates should make borrowers more willing to take out loans. Not surprisingly, loan volumes have been increasing in recent years (see chart 24). If the downward trend in interest rates continues, domestic loan volumes will continue to grow strongly.

Lower interest rates to fuel loan growth
Financial system credit operations, % of GDP



Source: Central bank **24**

Extension of government yield curve supportive of domestic capital market development

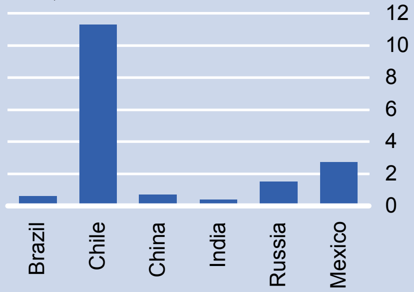
The authorities are currently trying to extend the maturity of the nominal government bond yield curve. The recent tax changes with regard to foreign purchases of domestic government securities will create a deeper and more liquid secondary bond market. This will help develop domestic capital markets, attracting many exciting opportunities for domestic and foreign financial institutions. Local derivatives will be a particularly important growth area. But all of this is critically dependent on continued fiscal consolidation and improved monetary stability.

Greater economic stability will also help develop the domestic corporate bond and securitisation market. While domestic bonds issued by financial institutions are sizeable (>10% of GDP), the domestic corporate bond market is negligible (see chart 25). But similar to the loan market, the domestic corporate bond market could take off quickly on the back of lower and more stable interest and inflation rates. Chile and Mexico have led the way (see chart 25). The macroeconomic conditions for the development of an active securitisation market are increasingly in place, even though interest rates will probably need to fall further. Similarly, the demand for housing provides the basis for potentially rapid growth of a domestic mortgage market. If the authorities manage to put legal and institutional conditions in place, the mortgage market could become a profitable and high-growth sector.

[9] UNCTAD, World Investment Report 2005

Corporate bond market still negligible

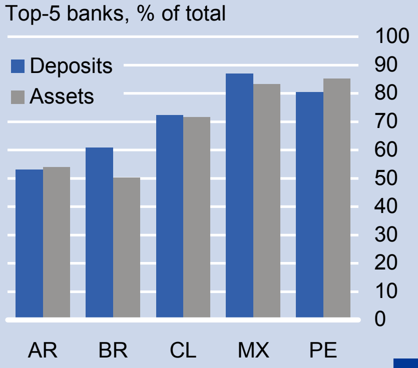
Domestic corporate bonds outstanding 2004, % of GDP



Source: IMF 25

Room for banking sector consolidation

Top-5 banks, % of total



Source: Moody's 26

Financial sector becoming attractive to foreign investors

The financial sector is likely to attract greater foreign investment for a number of reasons. First, foreign participation in the banking sector is still relatively low, suggesting room for foreigners to buy into the sector. Second, even though the private sector is dominated by a handful of large commercial banks, the overall degree of concentration is comparatively low compared to other Latin American and Eastern European banking sectors. The top five banks control around 50-60% of deposits and assets. This could be attractive from a foreign bank's perspective, as it leaves room for further consolidation. Third, the growth outlook for the financial sector is pretty positive. Higher economic growth, a faster increase in GDP per capita incomes, rising savings and a potentially rapid development of domestic capital markets offer plenty of business opportunities. Yes, Brazilian banks look expensive on a price-to-book basis and a strong exchange rate does not help. But foreign interest is increasing, as the recent acquisition of the premier local investment bank by a large European bank and the minority stake taken by a large US bank in one of the top three private-sector banks demonstrate. Foreign acquisitions will help develop fledgling domestic capital markets (e.g. mortgages) and they are likely to increase competition, leading to lower interest rates and supporting higher medium-term economic growth.

Summary and conclusion

Brazil has made substantial progress towards greater economic stability. A combination of greater macro-stability, increased investment and openness, and gradual economic reform will lead to higher medium-term economic growth. The natural resources sector stands to benefit disproportionately from the on-going structural changes in the world economy. Strong Chinese demand will provide Brazil with a great opportunity to increase exports and growth. High-tech niches where Brazil has achieved a competitive advantage will also benefit. If domestic structural reform continues and macro-economic stability is maintained, the financial sector will be another "winner".

Should reforms progress much faster than anticipated, economic growth could average more than 4% over the next 15 years. For this to happen, the authorities will need to implement wide-ranging structural reforms in the fiscal, tax, regulatory and labour areas. But if our institutional view of Brazilian politics is right, reform progress will be only gradual. Even so, Brazil's economic performance over the next 10-15 years will be superior to the performance of the last decade and a half. Brazil's future looks brighter today than it has done at any point during the past couple of decades.

Markus Jaeger (+1 212 250-6971, markus.jaeger@db.com)

Appendix

DB Research growth model *Formel-G*[10]

Population growth, fixed capital investment, human capital and economic openness are the four main drivers of economic growth in our proprietary growth model. The analytical framework is theoretically based on the neoclassical production function, which is extended by using human capital as a measure of the quality of labour input and trade openness to capture institutional efficiency. By taking human capital and openness on board, the analytical framework models technological progress explicitly and comprehensively. This contrasts with growth accounting models, which arbitrarily assume convergence of per capita income levels without providing a fundamental explanation for technological progress.

Taking the experience of other countries into account generates a more reliable model. The empirical analysis uses a panel estimation approach with the “pooled mean group estimation” technique. It quantifies the linkages between real per capita GDP and the four fundamental drivers of growth, taking account of the information in the time series. We estimated the model for 12 emerging markets and generated similar common long-run coefficients as the companion model for 21 OECD countries: A 10% rise in the investment rate raises GDP by 13% over the long run. A 10% increase in human capital (average years of education of the working-age population) leads to a long-term gain in GDP of 9% in emerging markets. A half-point gain in openness (trade share adjusted for population size and differences in price levels) raises GDP by 7% in the long run. Country-specific constants capture other influences on growth.

The model’s forecasts for the four growth drivers stem from a three-stage approach. Extrapolation of the trajectories of the last 20 years or so is the starting point, with the exception of population growth, where we use UN forecasts. The second stage takes information from levels and changes in other countries into account to dampen excessive movements in the variables generated in the first stage. The third and most important stage captures structural breaks through a broad-based country-specific assessment of six clusters of trends in politics, society and business. Depending on our assessment of these trends, we adjusted the forecasts of all four growth drivers.

---

[10] For further details see Stefan Bergheim (2005). Global growth centres 2020: "*Formel-G*" for 34 economies. Deutsche Bank Research. Current Issues. March 23, 2005.

Picture on page 1 taken from: morgueFile

Current Issues

Global growth centres

Available faster by e-mail:
marketing.dbr@db.com

Substantiated, long-run growth forecasts are back in the limelight following the New Economy euphoria and the emerging market crises over the past 10 years. Deutsche Bank Research uses an innovative combination of modern growth theory, state-of-the-art quantitative techniques and systematic trend analysis to analyse the long-run growth perspectives of 34 economies. We identify growth stars, explain the reasons for their success and derive conclusions for companies, investors and policy-makers.

Live long and prosper!
Health and longevity as growth drivers .... March 20, 2006

Mexico 2020: Tequila sunrise
A medium-term growth perspective .... February 16, 2006

Opening economies succeed
More trade boosts growth .... November 11, 2005

Dynamic sectors give global growth centres
the edge .... October 31, 2005

Human capital is key to growth
Success stories and policies for 2020 .... August 1, 2005

Global growth centres 2020
"Formel-G" for 34 economies .... March 23, 2005

All our publications can be accessed, free of charge, on our website **www.dbresearch.com**
You can also register there to receive our publications regularly by e-mail.

Ordering address for the print version:

Deutsche Bank Research
Marketing
60262 Frankfurt am Main
Fax: +49 69 910-31877
E-mail: marketing.dbr@db.com

Printed by: HST Offsetdruck Schadt & Tetzlaff GbR, Dieburg

ISSN Print: 1612-314X / ISSN Internet and e-mail: 1612-3158