Designing a new future

As new technologies accelerate in industrialized countries, Brazil needs a new competitiveness agenda for manufacturing, services, and innovation.
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8 Designing a new future

As new technologies accelerate in industrialized countries, Brazil needs a new agenda if it is to compete in manufacturing, services—and innovation. Brazil is studying what the county can do to accelerate its entry into what has become known as Industry 4.0 or advanced manufacturing. Solange Monteiro identifies lessons that can be learned from countries that are farther ahead in the process.

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In Brazil regulatory advances to unlock the relationship of businesses and research universities in pursuit of technological innovation move slowly; in the US some initiatives are accelerating the pace of productivity gains. In the State of Virginia, 28 companies that are members of the Commonwealth Center for Advanced Manufacturing (CCAM) work with scientists at research institutions on projects of mutual interest. Siemens, for instance, has partnered in 11 projects, of which 5 are classified. Also active in are Canon, Rolls-Royce, Alcoa, and Airbus. The model could well be replicated in Brazil.

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In an interview, Jorge Almeida Guimarães, CEO of Brazilian Research and Industrial Innovation (Embrapii), known as the most pragmatic of public agencies, talks to The Brazilian Economy about the need to invest more in technical education and to link mit more closely to what business needs. Among other activities Embrapii is the catalyst for projects that bring together businesses and research institutions, which it accredits. Guimarães is optimistic that the political crisis will in fact generate opportunities for Embrapii and its partners.

Industry

20 Change to survive

The country’s most recent losses of manufacturing production were in high-tech segments—precisely those where Brazil must work to not fall further behind the most advanced economies. Meanwhile China has made major incursions into Brazil’s markets in the Western hemisphere. Chico Santos consults the experts about what can be done to accelerate economic activity in a fast-changing world.

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So far Argentinians deeply approve of new President Macri’s openness to the world and his decisive actions on the exchange rate and utilities rates. However, anxiety about inflation and unemployment, and the slowdown in the economies of trading partners, will put his administration to the test, particularly during legislative elections in 2017. Nilson Brandão analyses the situation.

Interview

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Former Minister of Strategic Affairs Marcelo Neri, now Director of the Social Policy Center of FGV and EPGE professor, talks to Solange Monteiro about recent administration decisions he questions and insists that Brazil must reintroduce economic and social rationality and move forward on difficult fiscal policy decisions, such as social security reform.
LAST MONTH Brazil’s economic agenda was once again held hostage by political developments. The ever-expanding investigation of money laundering and corruption at state-oil company Petrobras, the opening of the process to impeach President Rousseff, and the exit of the Brazilian Democratic Movement Party from the government’s coalition further complicated the already complex picture of the Brazilian economy.

In this troubled scenario, some points deserve reflection. For one thing, Brazilian society has changed radically since the Constitution of 1988. That Constitution spelled out entitlements for Brazilians that were no doubt just but it also mandated government spending on them without identifying how they were to be paid for. Another point is that access to information, through the technological advances of the Internet and social networks, has become increasingly important for most Brazilians but its effects are difficult to measure in their entirety. The third point is that the rise to power of the Workers Party, to which Rousseff belongs, accelerated the process of social inclusion that had started in the Fernando Henrique Cardoso administration. In other words, the demands of Brazilian society today are quite different from those of 30 years ago. And this fundamental point must be taken into account in public policies in the future.

Today, given the seriousness of the political crisis and the deteriorating economic situation, there is no doubt that comprehensive reform is needed. The great challenge is how it can be done. Is it possible to clean the house and at the same time respond to the aspirations of society and also address Brazil’s political problems?

The country is paralyzed by the fierce dispute between those in favor of and those against the impeachment of the president. Whatever the outcome, it is unlikely that the economy will be able to recover quickly. There is great risk of deepening polarization that has been fed since last year from both ends of the political spectrum. That would certainly prolong the country’s suffering with a political fight that could drag on until the presidential elections in 2018. That would be the worst of all worlds. We hope it will not happen.
**POLITICS**

**House approves proceedings to impeach President Rousseff**

On April 17 the lower house voted 367-137 well over the 342 votes needed, to move for the Senate to impeach the President. The Senate will determine whether Rousseff is put on trial and suspended with Vice President Michel Temer temporarily taking over. The vote is expected by the middle of May. The vote in the lower house sparked jubilation among many Brazilians, who hold Rousseff responsible for the devastating recession and connection with large corruption scheme at state-oil company, Petrobras. At the same time, numerous Brazilians were deeply upset, seeing the House vote as worryingly antidemocratic. (April 18)

**Vice President Temer also on the road to impeachment**

A Supreme Court judge has ordered Brazil’s Congress to start impeachment proceedings against Vice President Michel Temer for allegedly breaking budget laws, which deepens Brazil’s crisis of leadership. Justice Marco Aurelio Mello told the lower house to consider putting Temer on trial on charges he helped manipulate budget accounting as part of the Rousseff administration. Because Temer is next in line for the presidency, impeachment of him as well as Rousseff would open the possibility of a snap presidential election in October to end Brazil’s political impasse. Prosecutors have charged Lula with money laundering and fraud as part of the sweeping Petrobras graft probe, and his ministerial appointment would give him immunity from prosecution by all but the Supreme Court. The government can appeal but the injunction could exacerbate tensions already running high between the executive and the judiciary. (March 18)

**Rousseff blasts the opposition**

Brazilian President Dilma Rousseff condemned the “fascist methods” of opponents seeking her ouster and said the country’s current political crisis would leave a “scar” if not resolved democratically. In an interview with foreign media groups, Rousseff said she was being pressured to resign because her rivals wanted “to avoid the difficulty of removing from power—unduly, illegally, and criminally—a legitimately elected president.” (March 26)

**Brazil’s largest party leaves the governing coalition**

As expected Brazil’s largest party, the Brazilian Democratic Movement Party (PMDB) announced it was leaving the governing coalition and pulling its members from her government, a departure that raises the odds she could soon be impeached by the
Senate. The PMDB leadership decided unanimously that its six ministers in the Cabinet and all other party members with government appointments must resign immediately. Although Rousseff remains in office, the break cripples her fight against impeachment, which could put Vice President Michel Temer, PMDB leader, in the presidential seat. (March 30)

Supreme Court to take up Lula case
The Supreme Federal Court (STF) has voted 8–2 to support Justice Teori Zavascki’s provisional decision to take the case of ex-President Lula out of the hands of Judge Sérgio Moro because it involves people with privileged jurisdiction. Zavascki, who is reporting judge for the Petrobras cases in the STF, stated that “well-intentioned but probable excesses in duty” could endanger the validity of the investigations. (April 1)

Construction company alleges kickbacks to Rousseff campaigns
Andrade Gutierrez, the second largest construction company in the country, made illegal donations to the campaigns of President Rousseff and Workers Party allies in 2010 and 2014 through over-billings for Petrobras projects and electricity. The information was documented as part of plea bargaining between the company’s former president, Otávio Marques de Azevedo, and the Attorney General. The plea bargain is awaiting Supreme Court approval. In 2014, Andrade Gutierrez donated US$ 5 million to the Rousseff’s campaign committee. (April 7)

ECONOMY

Record 2015 Petrobras losses
State-owned oil company Petrobras ended 2015 with losses of US$9.6 billion, compared to US$5.9 billion in 2014, a sign of how hard it has been hit by the international plunge in oil prices. By yearend its total debts amounted to US$136 billion, 40% more than the 2014 figure. (March 22)

Unemployment soars to 9.5%
The jobless rate in the three months through January was 9.5%, up from 6.8% for the same period a year ago; 9.6 million Brazilians were out of work. Average monthly wages dropped by 2.5%, from R$1,988 to R$1,939. (March 25)

Trade balance a pleasant surprise
Brazil posted a trade surplus of US$4.4 billion in March, the largest surplus for that month in 27 years and above market estimates of a surplus of $3.9 billion. Imports totaled US$11.6 billion and exports US$16.0 billion, the Trade Ministry reported. (April 1)

Inflation slows to single digits
Brazil’s annual inflation rate slowed in March to less than 10% a year, the lowest in nine months, The official index of consumer prices rose 9.4% in the 12 months through March, down from 10.4% the previous month, statistics agency IBGE said. Lower energy rates and mobile phone bills helped offset another steep increase in food prices. Inflation is still well above the government’s inflation target ceiling of 6.5%. (April 8)

ECONOMIC POLICY

Government expects the 2016 fiscal deficit to hit US$27 billion
The federal government has abandoned its promise to cap spending and acknowledged the possibility of a yearend primary deficit (excluding interest payments) of US$27 billion, equal to 1.55% of GDP. The fiscal outlook may even worsen if Congress does not restore the tax on financial transactions, the CPMF tax. The government is counting on making the CPMF tax effective in September to build reserves by US$2.5 billion. “It’s an elevated deficit, no one is comfortable, but it reflects an economy that faces another year of retraction. That is causing a reduction in revenue that is compromising the fiscal goal,” said Finance Minister Nelson Barbosa. He implied that, if the CPMF tax is not approved, other taxes would have to be raised to meet the current goal. (March 24)
Designing a new future

As new technologies accelerate in industrialized countries, Brazil needs a new competitiveness agenda for manufacturing, services—and innovation.

Solange Monteiro

IN THE FACTORIES of the major industrialized countries, machines that once only performed operations as they were commanded are gathering and processing information and making decisions based on communication—over the Internet, without human intervention—with other machines, with other factories, and even with the consumer. Building on existing technologies, such as the Internet itself and cloud computing, and very precise mathematical models for managing large amounts of data, production
is performed virtually. The result is higher productivity, lower operating costs, and significant customization of manufactured products to the needs of buyers.

Automation of manufacturing has accelerated considerably since the global financial crisis of 2008, led by Germany—where the term Industry 4.0, the fourth industrial revolution, was coined—and the United States, where this process is known as Connected Industry. For the US, the strategy is to boost growth and in part reverse the migration of its industries to countries with cheaper labor; digitalization makes it possible to counter cheaper labor with increasing productivity. The early stages of connected industry have, for example, given new impetus to bankrupt Detroit, once capital of the US automobile industry. For Germany, Industry 4.0, for which it has pioneered research and standards, helps it continue to lead Europe in machinery, production, and patents. There, “in its plant in Amberg, Siemens achieved a 75% level of automation to produce a template for its automation system, Simatic. In other words, today Simatic itself is being used to manufacture Simatic,” says José Borges Frias, Siemens Brazil strategic marketing director for the digital factory. The plant can produce 1,000 different settings for the template, produced in response to demand and delivered in 24 hours. There is no longer need to amass inventory.

### Four industrial revolutions

- **1st** Mechanization, water power, steam power
- **2nd** Mass production, assembly line, electricity
- **3rd** Computer automation
- **4th** Internet of things, cyber and physical systems communicate and cooperate

**Software share in companies’ engineering budget has increased significantly**

Software investment by manufacturers is expected to rise from 30% in 2010 to almost 50% in 2020, gradually reducing the share in physical capital of electronic and mechanical equipment.

The evolution of Industry 4.0 will be the theme of the Hanover Fair, April 25–29, which this year has the US as its main partner. “We are counting on the presence of President Obama and 200 small and medium-sized US companies. We want to show that the United States and Germany are crucial partners in this process,” said Bruce Andrews, US Deputy Secretary of Commerce, in promoting the fair at the German embassy in Washington. It is estimated that in most industrialized countries, starting with Germany, the US, Japan, and South Korea, the number of highly digitized smart factories like the Siemens Amberg plant will expand rapidly in the next 10 to 20 years. According to the International Federation of Robotics (IFR), in each of the last three years, robot sales have overshot the average for the decade. In 2015, robot sales reached 255,000 units, mainly to automotive and electronics companies, many of them in China. According to German software consultants ITQ Gmbh, software investment by manufacturers is expected to rise from 30% in 2010 to almost 50% in 2020, gradually reducing the share in physical capital of electronic and mechanical equipment. According to Eric Spiegel, CEO of Siemens USA, “By 2020 we expect our market for digital products will grow by 7.9%, against 4.6% in automation.”

These new technologies are expected to have a negative impact on employment. According to the World Economic Forum, between 2015 and 2020 reorganization of industry through new technologies should raise labor demand in computing and mathematics (up 3.21%) and engineering (up 2.71%), but will lower it in areas related to traditional manufacture (down 1.63%), and administrative activities (down 4.91%). Boston Consulting Group estimates that by 2025, reorganization caused by Industry 4.0 will entail a 16% reduction in labor costs.

Yellow-green strategy

In Brazil, interest in the new trend, known here as advanced manufacturing, picked up momentum in 2015. Currently, the Ministry of Development, Industry and Foreign Trade (MDIC) leads a study group—with participants from the Ministry of Science and Technology, the Brazilian Industrial Development Agency (ABDI), the Brazilian Development Bank (BNDES), and the Financing Authority for Studies and Projects (FINEP)—to assess how advanced manufacturing will affect the country and identify Brazil’s strategy for integration into it. “We have various research groups working and we intend to have the first report ready by the end of year,” says Marcos Vinicius de Souza, MDIC Secretary of Innovation and New Business. The MDIC is coordinating
workshops in eight capitals for discussion of the issue with representatives of various sectors. The first meeting was in Brasilia in March. “At that time, we realized we still lack knowledge about what is this new industry,” he says. “We are identifying which Brazilian companies use technology, what they use and what are our capabilities in this process,” added Maria Luisa Campos Machado Leal, ABDI Director of Technological Development and Innovation.

Some diagnoses seem clear. “Brazil was only partially engaged in Industry 3.0, and is far from 4.0,” says David Kupfer, coordinator of the Industry and Competitiveness Group of the Federal University of Rio de Janeiro (UFRJ). “We have little laboratory training, research, human resources; we fall short of the frontier with regard to this new stage in the history of industrial automation.” Today, industrial robot density in Brazilian is less than 10 per 10,000 workers, compared to 260 in Germany. Kupfer notes the great disparity between industries in Brazil: “We have a car industry … that consumes technical innovation. On the other hand, a major absorber of capital goods is the mechanical metal sector, where there is a very serious technological gap, and where we will have difficulty adopting new concepts because the point from which we set out is very far back.”

Jorge Arbache, professor at the University of Brasília (UNB) and chief economist for the Ministry of Planning, argues that the best option for Brazil is to create an entirely new agenda for industry. “If we wait to go the entire conventional route that we should have taken in the 20th century and then to do the new standard, we will get further behind. We need policies that create shortcuts,” he says. He cites the case of India, where today two efforts coexist: (1) increase the share of traditional industry in GDP, to support job creation, and (2) promote formation of a computer expert cluster, which now produces software for US and German industries. “The parallel work shortens the route,” he says.

Arbache points out that Industry 4.0 implies the intensification of a known trend, “servitization.” In this process companies, often manufacturers, shift from selling products to selling a combination of products and services.
Between 2015 and 2020 the reorganization of industry through new technologies should raise labor demand in computing and mathematics (up 3.21%) and engineering (up 2.71%), but will lower it in areas related to traditional manufacture (down 1.63%), and administrative activities (down 4.91%).

that heighten the value in use. He explains that “Today industrial development is not measured in the traditional way of calculating the share of industry in GDP, but by calculating density by adding to the industry’s share services that are related to the share of manufactures in GDP.” Comparing Brazil and the US makes the difference clearer: Although the share of industry in GDP is similar in both, US industrial density is several times higher than Brazilian. The iconic example is mobile devices, where most of the price pays for services rather than hardware.

Globally, services now account for 64% of foreign direct investment, and are gaining shares in the trade balance of many countries. “When large companies like GE sell turbines as part of packages of engineering, support, and maintenance, this is a clear sign of this change,” says Arbach. “And that is why countries like the US are giving so much emphasis to agreements like the Trans-Pacific Partnership (TPP) and the Agreement on Trade in Services (Tisa). They know that services will increasingly be a source of competitiveness, and of improved international position.”

<table>
<thead>
<tr>
<th>Global ranking</th>
<th>Number of IPv4 addresses</th>
<th>Average speed (Mbps)</th>
<th>% above 10 Mbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>1</td>
<td>24,298,862</td>
<td>26.7</td>
</tr>
<tr>
<td>US</td>
<td>14</td>
<td>143,153,801</td>
<td>14.2</td>
</tr>
<tr>
<td>Germany</td>
<td>22</td>
<td>36,674,664</td>
<td>12.9</td>
</tr>
<tr>
<td>Argentina</td>
<td>80</td>
<td>8,199,701</td>
<td>4.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>88</td>
<td>47,913,625</td>
<td>4.1</td>
</tr>
<tr>
<td>Chile</td>
<td>66</td>
<td>4,750,333</td>
<td>6.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>70</td>
<td>14,091,960</td>
<td>5.9</td>
</tr>
<tr>
<td>China</td>
<td>89</td>
<td>127,187,349</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Sources: Akamai’s State of Internet - Q4 2015 report.
Although most of Brazil’s GDP and jobs are in the service sector, most of the services go to the final consumer, rather than being inputs to industry. An OECD survey shows that, as in industry, services in Brazil suffer from high protection—especially segments most related to Industry 4.0, such as engineering and computing. Regulation is the main barrier. In Arbache’s opinion, “There is considerable room to increase efficiency with better allocation of resources,”

The list of issues complicating adoption of Industry 4.0 is broad, ranging from regulation to tax software to fighting piracy and ultimately cyber security and worker training. The German government is discussing each of these issues in order to advance the digitalization of manufacturing. In Brazil, there are additional long-standing issues that affect competitiveness and the business environment, among them the quality and safety of broadband Internet. A study by the Akamai consultancy points out that the connection speed in the country falls short even of such neighbors as Chile and Mexico. Bosch Industrial Director Julio Monteiro says that “Today we see companies thinking about solutions for their internal environment. But the purpose of Industry 4.0 is to connect services provided between companies, and for that we need efficient broadband.”

Joisa Dutra, Director of the Center of Studies on Regulation and Infrastructure of the Getulio Vargas Foundation (Ceri) points out that improving Brazil’s position will require large investments in infrastructure, “but today we have difficulty in defining mechanisms that align the objectives of market players with the attraction of these investments.” She points out that many industries are going through changes in their business models driven by digitalization and the internet, such as smart grids, which allow consumers to supply electricity to the grid, or the Uber app in the transportation sector, but these conflict with the highly regulated business environment. “These sectors, like Industry 4.0,
“A major absorber of capital goods is the mechanical metal sector, where there is a very serious technological gap, and where we will have difficulty adopting new concepts because the point from which we set out is very far back.”

David Kupfer

require models that encourage innovation, particularly for small businesses, and today these conditions cannot develop in Brazil,” she says.

Another long-standing issue that is a heavy burden on businesses that are candidates for Industry 4.0 is labor flexibility. “Today our way of working is closely tied to a defined contract for a function, but in advanced manufacturing what we have is demands for tasks. There is no need for large number of full-time employees because most predetermined activities will now be done by machines,” explains Jefferson Gomes, professor at the Institute of Aeronautical Technology (ITA). He points out that this encourages outsourcing, with smaller companies supplying larger ones.

Services to support advanced manufacturing are vast: analysis of big data, standardizing systems, data protection and detection of fraud, creating applications and interfaces to technology consulting. There are several ways to connect to the production chain. A Brazilian example is the Recife Center for Advanced Studies and Systems (CESAR). Created in 1996, it provides consulting to companies to improve processes and products based on information technology, offers education projects, and acts as an accelerator for companies. More than 12 years ago, CESAR developed a Troller, an off-road vehicle manufacturer, a prototype for a preventive maintenance system. “The vehicle was designed to connect electronically to the company to report on its performance. As Troller’s vehicles did not have many dealers, identification of any sign of fatigue would allow for preventive maintenance, sending parts to the nearest

Brazilian industry has relatively few robots.

Number of robots in industry in selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>2013</th>
<th>2014</th>
<th>2015*</th>
<th>2018*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>8,564</td>
<td>9,557</td>
<td>10,300</td>
<td>18,300</td>
</tr>
<tr>
<td>China</td>
<td>132,784</td>
<td>189,358</td>
<td>262,900</td>
<td>614,200</td>
</tr>
<tr>
<td>Japan</td>
<td>304,001</td>
<td>295,829</td>
<td>297,200</td>
<td>291,800</td>
</tr>
<tr>
<td>Germany</td>
<td>167,579</td>
<td>175,768</td>
<td>183,700</td>
<td>216,800</td>
</tr>
<tr>
<td>North America (Canada, Mexico and US)</td>
<td>215,817</td>
<td>236,891</td>
<td>259,200</td>
<td>323,000</td>
</tr>
</tbody>
</table>

Source: International Federation of Robotics (IFR). *Estimates
repair shop to avoid problems and delays,” explains Sergio Cavalcante, CESAR superintendent. When Ford acquired Troller, the project was stopped. But along with other projects, it provided a showcase for the CESAR company to expand. Today CESAR, which has offices in Curitiba, Manaus, and Sorocaba, has 520 employees. Cavalcante argues for the need to create incentives for innovation, starting with making the Brazilian market more open, because, he says, “Companies do not worry about innovation and productivity in closed markets.” Cavalcante praises the Technology Framework approved earlier this year, though the related regulations are still pending, because it allows universities to share intellectual property of research they do for companies and institutes of technology, increasing the possibility of partnerships.

Ten years ago in the southern region of Brazil, Falker, an agricultural technology company, began operations, selling products such as soil compaction meters. Currently, Falker researches products for precision farming, which involves machines, software, and equipment. Marcio Albuquerque, Falker’s director, points out that this was only made possible by using Industry 4.0 tools to design solutions to measure the characteristics of plants, analyze parameters through sensors that pass through the crop pulled by tractors, and software to process this information and evaluate the best treatment for each area.

Falker has the advantage of concentrating its efforts on one of the most promising segments for Industry 4.0 tools: agribusiness. “No one works the logistics of agribusiness like Brazil. And in these sectors what is needed is more technology. If we continue to grow, we can reach Industry 4.0 standards,” says ITA’s Gomes. He also cites the country’s experience with deep sea oil and the oil and gas business generally, in addition to textiles and food and beverages as other potential candidates for Industry 4.0. “These technologies already have a level of maturity that makes them cheap. The question is how to combine them, and decide on which human resources and development of which supply chain Brazil needs, and which aspects of infrastructure and regulation are not well developed,” he says.

UFRJ’s Kupfer adds that it is important to avoid the temptation to use incentives policy to create protected markets. “The information technology sector has been the Achilles heel of Brazilian industry since the early 80s, a period during which global industry absorbed IT services intensively, and our industry stood still,” he says. Mauricio Canêdo, IBRE researcher, adds that “The Information Technology Act was draconian. The result was that not only did it not develop a competitive local IT industry, it also raised the costs of equipment for the automation of domestic industry in general.”

That makes a strategy for expansion of Brazilian industry even more necessary. Kupfer says, “We need to collaborate so that the industry can get moving again because it has stopped at a time when global manufacturing will move forward in a very comprehensive way … The long term starts today, not tomorrow.”
How collaboration can work

Solange Monteiro

IN BRAZIL REGULATORY advances to unlock the relationship of businesses and research universities in pursuit of technological innovation move slowly; in the US some initiatives are accelerating the pace of productivity gains. The 28 companies that are currently members of the Commonwealth Center for Advanced Manufacturing (CCAM) are encouraged to share projects of mutual interest, and they can also count on the support of scientists from more than one research university, all in the State of Virginia, where CCAM is located. Joseph Moody, CEO of the CCAM, said that for each project the center chooses not to select companies that directly compete with each other. “This way we can create a collaborative space, where companies are complementary in terms of capabilities and the business challenges they face,” he says.

Among the companies participating in the CCAM are NASA, Canon, Rolls-Royce, Alcoa, Airbus, and Siemens. Since the CCAM was created in 2008, Siemens has partnered in 11 research projects, of which 5 are classified. “Among the shared projects one is part of the software used by Local Motors company in 3D printing of cars,” says Helmut Ludwig, executive vice-president of Siemens US and chairman of the CCAM board. Moody points out that the risks and costs of the projects are divided between the companies, but “there are companies that not only fund but also control projects.” Currently, the CCAM has advanced equipment for applications such as additive manufacturing, which allows printing of an object from a digital model generated by customized software. It also has a 3D visualization lab used to virtually reproduce the operation of a machine to help design and manufacture parts. This can prevent faulty designs and save money.

In the case of Rolls-Royce Crosspointe, a UK
company with operations in Virginia, CCAM technological support started with design of the US plant, which opened in 2011. Since 2014, the company has been manufacturing parts for aircraft engines there, some designed to withstand very high temperatures in the combustion system. The plant is highly automated so that each employee can operate up to three machines simultaneously. “Depending on demand, which decides the number of shifts required, an operator can program the machine on Friday to complete a cycle of activities during the weekend,” explains Lorin Sodell, company executive. “Ten years ago, such a process would take twice as long and would require at least twice as many workers.”

Without borders

In the case of car maker Local Motors, collaborative technology is not limited to software supplied by Siemens. The company, which has 116 employees and created in 2007 in Phoenix, has an online community of 52,000 designers, engineers, and consumers around the world, who apply through the company website. “These are people with a real interest in following the development of our projects. We have, for example, adopted a design suggested by a South Korean student, who gets royalties from the product,” explains Justin Fishkin, Local Motors chief strategy officer.

Local Motors has on its resume creation of the first car printed in 3D, presented in 2014 at the International Manufacturing Technology Show in Chicago. The car body is printed in carbon fiber-reinforced thermoplastic, and it takes about 48 hours to print one prototype. The completed car has 50 components. The company expects to receive authorization to market the vehicle in the US in the next 18 months, in the category of low-speed electric cars. It will cost from US$12,000 up, depending on the configuration the customer chooses.

In the showroom, which will be officially opened in June in the State of Maryland, outside Washington DC, the 3D printer and car will share space with a classroom, where Local Motors hopes to attract students to stimulate interest in science, technology, engineering, and mathematics. “We seek to encourage interest in science and technology even in young children; this is part of the essence of our business,” explains David Woessner, general manager of Local Motors in Detroit and Washington DC.

(Solange Monteiro traveled to Washington DC at the invitation of Siemens.)
Brazil needs three times as many scientists and engineers

Jorge Almeida Guimarães
CEO, Brazilian Research and Industrial Innovation (Embrapii)

What are the main obstacles to investment in innovation and technology?
Developed countries invest at least 2% of their GDP in science and technology (S&T). They have at least 3,000 scientists and engineers per million population. Brazil has been investing about 1.2%, and we have only 700 scientists and engineers per million. In other words, we need to quadruple the human resources in this area, and almost double investment in S&T as a percentage of GDP as well as investing more in research, development, and innovation. In addition, in developed countries, companies pay 70% of the total invested in S&T, while in Brazil public funding pays 56% and companies pay 44%—which includes a large share of investment by state-owned oil company Petrobras. If we can raise private sector investment in S&T to 0.9% of GDP within two or three years, and can count on the support of state and federal governments to raise public investment to 1.1%, and also triple the current number of scientists and engineers in Brazil, then yes we will be on the right path.

How has the downturn in 2015, especially in industry, affected Embrapii’s activity?

Solange Monteiro
Embrapii is considered one of the most pragmatic of public agencies. The organization, whose job it is to encourage business innovation, funds up to a third of the projects in its portfolio with grants. The rest of the project funding is divided between the company and the technology center that will carry out the project. At Embrapii since August 2015, veterinarian and biochemist Jorge Almeida Guimarães is optimistic about raising demand for projects in 2016 despite the economic recession. Previously president of Capes (Coordination for the Improvement of Higher Education), he says the country’s investment in research and innovation is far below that of developed countries and it must train more scientists and engineers. Guimarães emphasizes that in addition to financial support, Embrapii has collaborated to improve management in institutions such as technology research institutes to facilitate interaction with the productive sector.
There was no negative effect. We invested R$126 million, of which one-third (R$42 million) was grants that did not have to be repaid. These funds financed projects. We had no difficulties in 2015 and we do not expect any in 2016.

**Embrapii’s budget is R$1.5 billion for 2014–19. However, that would imply an average annual investment well above that observed so far in the period. Is there lack of demand for projects?**

Demand has been good. Among the businesses we have today, the project funding disbursement average is 33% from Embrapii, 19% from research units, and 48% from companies. But the business model is new, and we can only invest when the research units sign contracts with companies. To have more projects, we need more accredited research units, and we are expanding the number. In 2015 we worked with 13 research units. This year, however, we will have 15 new ones, and we estimate that from now on we will operate close to the budgeted amounts.

**What must a research university or institute do to be accredited to work with you?**

The applicant institution, whether public or private, needs to present a proposal for operation for a period of six years based on its previous experience. Its portfolio of skills should describe with evidence areas of activity in which it has operated in the past three years, and a minimum amount of resources coming from contracts with private companies. Once a research unit is selected, we disburse part of the funding, so that it can start searching for companies to partner with. Our experience is that, for every 20 prospective companies, one deal is closed, so the emphasis on attracting customers is important. Embrapii itself is very lean, only 20 people—myself and two directors, three secretaries, and 14 technicians—but the work is very demanding. We do not meddle in institute contract negotiations. But once they are concluded, we require a copy of the contract to know the goals set by the hiring company and monitor the execution of each stage of the project. Our dynamic is different from the long-term financing proposals of a development agency, for which you need to make a report only after a year.

**So far, what sectors have been more receptive to Embrapii assistance?**

Areas taking the most advantage of our help so far are information technology, oil and gas, and medical equipment. The health sector is not yet responding as we wanted, but we are working on it. Still underrepresented are biotechnology and chemicals, which has an extremely negative external trade balance.

**Are you not concerned that the uncertainties generated by the economic and political crisis could reduce the appetite of companies for innovation?**

Our view is that the crisis can generate even more opportunities than you can imagine. We continue to receive lots of project proposals from companies. Some sectors in Brazil are already well-capitalized. The export sector is now benefiting from the exchange rate depreciation, it is capitalized, and it is seeking innovation, because they know that their competitiveness depends on innovation, so they will have to invest. Agriculture, health—Brazil is the fifth largest world pharmaceutical market—are capitalized.

**Are there risks that budget cuts could compromise Embrapii’s activity?**

I think cuts are unlikely because we do what is missing in Brazil. It has often been said that Brazil produces a lot of science but few patents because the research does not interact with the productive sector. We are very new within this system, but we are making it happen. Brazil has 60 years of experience in research and development. During this period, state and federal governments have funded a lot of human resource development and laboratory training. Now we are taking the next step, putting this investment at the service of technological development.
Change to survive

Chico Santos

FOR TWO CONSECUTIVE YEARS, the manufacturing industry has performed disastrously, its production falling by 3.8% in 2014 and 9.7% in 2015, according to the government statistics agency, IBGE. From a structural point of view, the sector’s share in total Brazilian GDP has been declining for three decades: it was 19.89% in 1947, peaked at 35.88% in 1985, and has been declining since, hitting 11.4% in 2015. Meanwhile, according to the Federation of São Paulo (Fiesp) in 2013 the share of manufacturing in GDP was 31.8% in China and 31.1% in South Korea.

Particularly worrisome is that the most recent losses of manufacturing production were in high-tech segments—precisely those where Brazil must work to not fall further behind the most advanced economies.

According to the Institute of Industrial Development Studies (IEDI), last year production of high-tech goods fell 19.8%, with office supplies and information technology leading the fall (~42.7%).

“It’s a relatively new and troubling aspect, indicating that much of the growing contraction of investment is happening in sophisticated electronic equipment,” says Rafael Fagundes Cagnin, IEDI economist. He says that between 2000 and 2010 data showed the share of high tech in total Brazilian industrial production fell from 8.9% to 5.2%, while the mining industry share jumped from 5% to 11.5%. Cagnin laments that results are particularly bad for an industry segment that is at the technological frontier.

A systematic analysis by IBRE researcher Lia Valls Pereira of Brazilian losses and gains in foreign trade has revealed another disturbing aspect: the incursions of China into traditional Brazilian markets, especially neighboring South American countries. In 2014, the Valls Pereira study found, China accounted for a quarter of Brazilian losses in exports of manufactured goods to South America.

The Chinese now have 23.1% of the South American market for high-tech products, 23.2% in medium-high products and 31.4% in medium-low-intensity
products. Valls Pereira points out that, as part of its effort to join the group of industrial countries that is most technologically advanced, China has an aggressive marketing strategy in South America, having signed trade agreements with Chile and Peru, and offering abundant credit to numerous countries in the region.

**The Soviet disease**

Regardless what China does, the questions continue to be: What can Brazil do to contain its own advancing deindustrialization? And, what strategies can Brazil adopt to do so successfully? Mauricio Canêdo, an IBRE colleague of Valls Pereira, points out that “the decline of Brazilian industry predates the strong presence of China in the international markets,” having started in the 1980s.

In characterizing Brazilian deindustrialization, Canêdo refers to the “Soviet disease,” a term coined by fellow IBRE economists Régis Bonelli and Samuel Pessôa. It defines the overly sprawling industrial development of all segments of production, based on a closed market and focused on domestic supply.

**“Much of the growing contraction of investment is happening in sophisticated electronic equipment.”**

*Rafael Fagundes Cagnin*

“Brazilian deindustrialization is not new and it is not something unheard of; it is not something that just happened now,” Canêdo says, noting that other major countries like Australia and Canada are also undergoing deindustrialization, though he adds that “these countries became wealthy before deindustrialization had occurred.” Canêdo sees Brazil as at a crossroads: A middle-income country that is no longer a cheap labor economy but does not yet have the breadth to compete in sectors more intensive in, for example, technology and innovation. “This middle way is very uncomfortable for Brazil,” he says, “and the question is how to get out of this hole?”

**Share of the manufacturing industry declined from 17.4 in 2005 to 11.4 in 2015.**

*(share of manufacturing industry in GDP, %)*

![Graph showing the decline in share of the manufacturing industry from 2005 to 2015.](image)

*Source: IBGE.*

**IBRE estimates.**
The way out

Canêdo cites the example of South Korea. Now a major exporter of goods and technology, in the 1970s its per capita income was similar to Brazil’s. Its government then began to support a development model that at first focused on the domestic market for such basic industries as shipbuilding and steel industry—as did Brazil.

But there were differences at the time that explain why South Koreans have made the leap and Brazilians have no idea yet how to do it. First, Canêdo emphasizes, South Koreans defined that domestic market-led growth was a temporary model and production of steel and ships needed to be eventually replaced by production of more technologically sophisticated goods. To make the transition, the country invested heavily in education to compete internationally; it understood that with a relatively small population (about 50 million) growth could not be sustained based on the domestic market alone.

“Brazil has a relatively small industrial segment geared to survive in the domestic market. It does not have scale, is not competitive, and survives only with protection,” Canêdo says. Unlike South Korea, Brazil has failed to open up the economy and has been caught in its own protectionist trap. As an example of what could have been done, Canêdo points to Brazilian airspace company, Embraer, one of the few national industrial successes, because its policy was guided by a model “focused on the world market.”

The company’s founders understood that it made no sense to establish an airspace industry directed only to supplying Brazil’s domestic market.

Future success will only be possible if the protectionist trap is disassembled, says Canêdo, although he recognizes that will be difficult. Brazil also needs to start building an efficient infrastructure and improving the business environment. “We need to expose Brazilian industry to international competition,” he insists.

Industry segments that desperately need to find ways to survive if they are to compete internationally, Canêdo says, are intermediate inputs and the machinery and equipment segments. He believes that the possibility of buying cheaper inputs, whatever the origin, may be the key to growth, as is being able to modernize the manufacturing facilities at competitive costs. “Protecting intermediate inputs, machinery and equipment too much has a negative effect on the whole production chain,” he says.

In short, exposing industry to international competition is essential if the economy is to move.
forward. Also essential is giving industry more autonomy so that it can become competitive. Canêdo believes Brazil’s development banks should be giving priority to financing projects that will have high returns for society, such as infrastructure, sanitation, and research and innovation.

If the economy is to be opened to competition, the local content policy—requiring companies to purchase specified amounts of local goods and services—is counterproductive and outdated. “Local content is important at the beginning for a limited period, but the objective should be to sell goods and services in the world market competitively,” Canêdo says, pointing out that the assessment of local content by the bureaucracy does not work.

Finally, Canêdo makes three observations:
1. Brazilian institutional capacity to do its work may not be adequate to resist the pressures of lobbies fighting to retain the status quo where so much is protected by the government.
2. It is too late for Brazil to move beyond technological boundaries by producing semiconductors. That opportunity has been lost. Instead, it must deepen the production chains based on natural resources, where the country has built significant capacity, such as offshore oil, ethanol, renewable energy, and agribusiness.  
3. There is more to progress on development than industrialization: “We managed to industrialize Brazil, but not solve its problems.”

**Where industrialization has worked**

IEDI’s Cagnin is an advocate of industrialization as an inducer of development. “Industry has a very strong chain effect,” he says. “It is at the center of the production system and revolutionizes the way and production of other sectors, such as services and agriculture.” Cagnin explains that in Brazil “industrial employment pays better and is mostly formal,” so that downsizing industry would worsen the labor market profile. To Cagnin, formalizing regularizes worker incomes and gives workers access to the credit market and greater access to consumer durables. That is why, he says, “The setback of industry that we are witnessing is worrying.”

Cagnin believes that of all the structural factors affecting development of Brazil’s industry, the only positive news recently has been the major exchange rate depreciations since 2014. “The exchange rate was an economic price that was out of place,” he says. However, all the other structural constraints are still in place, such as infrastructure bottlenecks, the complexity of the tax system, and high interest rates. He agrees with the argument that the Brazilian production structure is “relatively closed” and exports little, but warns that trade liberalization alone does not solve the problems—and the country can still lose what it has achieved. “It is no use opening the economy when there is an appreciated exchange rate.”

**The Chinese now have 23.1% of the South American market for high-tech products, 23.2% in medium-high products and 31.4% in medium-low-intensity products.**
“Brazil has a relatively small industrial segment geared to survive in the domestic market. It does not have scale, is not competitive, and survives only with protection.”

Mauricio Canêdo

exchange rate, with a surreal tax system, and high interest rates,” he said, explaining that the persisting economic imbalances are barriers to global integration of the Brazilian economy.

Cagnin believes pursuing greater interaction of the Brazilian economy with the international economy is more important than simply opening its economy. “Inclusion in global production chains is the key to sophistication,” he said, stressing that will be very difficult to achieve if the economy’s imbalances are not addressed. He sees market niches as a way for Brazilian industry to enter global production chains, citing as examples the progress of the pharmaceutical industry since generic drugs were introduced and the successes of the airspace sector.

Productive development

João Carlos Ferraz, Director of Planning of the Brazilian Development Bank (BNDES), sees major changes in corporations in 15 to 20 years. The changes are starting in the most advanced centers but gradually spreading throughout the world.

Ferraz proposes expanding the concept of production chains beyond traditional industry to the film and cultural sectors. He suggests replacing the concept of industry with “productive development” to cover systems and market solutions of which an industrial product itself is only one part, the most obvious example being mobile communication.

With the caveat that speaking about the future may have nontrivial risks, Ferraz said confronted with “some strong trends and critical uncertainties ... the only thing to say is that, given the complexity and level of Brazil’s industrialization, the future is open and any scenario can happen.”

Ferraz identifies the first major trend to be the breakdown of boundaries between productive activities caused by technical progress, market dynamics, and consumer demand. “Industries no longer provide products but integrated systems, hardware with a lot of associated software,” he says. With integration taking precedence over production, there has emerged the “Internet of things,” with machine talking to machine. In this new universe, he says, there is not yet a definitive model of organization and relationships among companies; all possibilities are open.

The second significant trend is the incorporation of factors that will be decisive for productive development: knowledge, which can be translated as research and development (R & D), intensive use of information and communication technologies, and intensive use of flexible technologies. Another component of the emerging systems, Ferraz suggests, is emphasis on sustainability, with the maximum possible reduction of carbon emissions.
The third trend is for the relationship between manufacturers and their suppliers and customers to evolve into an almost organic system. Given the extent of the information consumers now have and the possibility of customizing products, ultimately, he predicted, “We could have individualized mass production.”

The problem is that all these trends are associated with “critical uncertainties,” Ferraz points out. The greatest of these is that it is not possible yet to know how much these trends will be diffused among companies and countries, on what scale they will spread, and for how long.

Another question relates to labor relations in this new corporate world. “Probably we are talking increasingly of tasks versus jobs,” he says. Potentially information technology could affect 30% to 40% of formal employment in the US market by eliminating human intervention in service sector activities.

Then there is the question of the business model. “The departmental structure and vertical, monothematic companies will not survive the need for interaction,” Ferraz believes. “We know that network structures are relevant, but we do not know how they will be organized in fact.” Another big question is how in the future producers and companies will relate to governments and how companies and workers will be represented.

Ferraz is concerned about another, somewhat dramatic, uncertainty: though productive development undoubtedly has great potential for wealth generation, he says, “given the changes in labor relations, it is unclear how this wealth will be distributed and if it will be distributed sufficiently widely to keep the economy going.” Unless the distribution of income feeds back into markets, productive development would be limited throughout the world.

In this new global context, where would Brazil stand? “Clearly Brazil’s challenge will be the development and dissemination of productive processes in line with global trends,” Ferraz avers. As the country’s productive knowledge is not at the international frontier and is limited in terms of innovation, efficiency, and quality, in his view it will have the disadvantage of starting from a modest platform.

The advantage of these limitations is that Brazil is in a position to adopt best practices, and “has no barriers to success.” In principle it could make a leap and find new ways to reach the frontier.

But the great Brazilian advantage in this future new world, one not yet properly valued, Ferraz says, is the country’s diversity at all levels: ethnic, cultural, biological, business models, and foreign investment. In his view, this diversity will allow Brazil to experiment with many alternatives during the transition to the new world.

Exposing industry to international competition is essential if the economy is to move forward. Also essential is giving industry more autonomy so that it can become competitive.
The rebuilding of Argentina

So far Argentinians deeply approve of new President Macri’s openness to the world and his decisive actions on the exchange rate and utilities rates. However, anxiety about inflation and unemployment, and the slowdown in the economies of trading partners, will put his administration to the test, particularly during legislative elections in 2017.

Nilson Brandão

AFTER TWELVE YEARS of the dominance of left-leaning kirchnerism in Argentine politics—presidents Nestor Kirchner (2003-2007) and Cristina Kirchner (2008-2015)—, the country appears now to be moving to a stage that is more market-friendly as it seeks access to international capital markets to finance its growth. But though the election of Mauricio Macri has opened new perspectives, there are still concerns about persistently high inflation and unemployment, as well as the economic
slowdown in two of Argentina’s main trading partners, Brazil and China.

In mid-March *La Nación* newspaper reported that 69% of Argentinians approve of the Macri government and 29% disapprove. In other words, after its first 100 days, more than two-thirds of Argentina supported the new administration and the measures adopted by the current president, who won the election with a margin of only 3%, and supporters include some who had voted for other candidates. But the polls also revealed anxiety about inflation and unemployment, which raises the question of how long demand for short-term results and gradual policies to rebalance the economy in the medium term can coexist.

So far the Macri administration has ended exchange rate controls, adjusted public utility rates, lowered the tax on exports to encourage production especially of agricultural commodities, resumed negotiations with holders of Argentina’s bonds who did not participate in the 2005 and 2010 debt restructuring, and made advances in foreign policy.

**Back to the markets**

Emblematic were this year’s visits to Argentina of three world leaders: Matteo Renzi, Prime Minister of Italy; French President François Hollande; and recently US President, Barack Obama. Obama’s visit was particularly significant given the anti-Americanism of previous years.

To show the world a new Argentina, in January, Macri traveled to Davos, Switzerland, for the World Economic Forum, accompanied by opposition leader Sergio Massa. The purpose was to demonstrate domestic political conciliation in favor of the changes underway, and to remind the world of the existence and importance of Argentina, which for at least 10 years had not been present in Davos.

“In Argentina we are seeing a moment in which there is a normal democratic transition from the two great political factions, which are radicalism and Peronism,” according to Marcos Azambuja, who for six years was Brazil’s Ambassador to Argentina. Azambuja believes both Brazil and Argentina are at a difficult juncture. “Both countries are not having a brilliant time. Economically, leadership has gone to the Pacific coast,” the ambassador said citing the economic performance of Chile, Colombia, Peru, and Mexico. “These countries have found a formula, a better economic model,” he said during the seminar on “The New Government of Argentina: Lessons for Brazil,” conducted by the Brazilian Institute of Economics (IBRE) in March.
The IMF believes … that Argentina is at the “beginning of an important transition to correct macroeconomic imbalances and microeconomic distortions.”

The International Monetary Fund Outlook for Latin America and the Caribbean published in January heightens the contrast: it projects that output for the region will decline by 0.3%, mainly because of the negative performance of Venezuela (−8%), Brazil (−3.5%), and Argentina (−1%), relieved somewhat by growth in Peru (3.3%), Colombia (2.7%), Mexico (2.6%), and Chile (2.1%). Chile, Colombia, and Peru, the IMF notes, are continuing a relatively orderly adjustment process, “in which a combination of sharp devaluation of the currency, gradual fiscal consolidation, and accommodative monetary policies [has] avoided economic contraction.” Those three countries, the IMF said, have “sound economic policies, credible institutions, sound financial markets, and favorable costs of external debt.” Mexico’s growth reflects a stronger US economy.

In describing Brazil’s problems, the IMF cited the worsening political scene, macroeconomic weaknesses, and “major scandal,” as well as rising unemployment and inflation. Brazil, the report said, continues to “postpone the adoption of a credible fiscal strategy to keep public debt on a sustainable path,” which has caused international rating agencies to downgrade Brazil’s risk rating.

The IMF believes, on the other hand, that Argentina is at the “beginning of an important transition to correct macroeconomic imbalances and microeconomic distortions.” Before Macri was inaugurated, the IMF highlighted as significant steps forward “elimination of restrictions on the foreign exchange market, abolition of various restrictions on international trade, announcement of the main guidelines of the new macroeconomic policy, and partial removal of energy subsidies.” It noted, however, that although expectations have improved, adjustment must be careful to avoid recession in 2016.

Argentine economist Guillermo Rozenwurcel pointed out that for five decades his country has been on a volatile course that he calls “crash and go.” Rozenwurcel listed, as “legacies” the country must deal, with the progressive deterioration of external and fiscal balances, annual inflation above 25%, and a fall in GDP per capita from about US$15,000 to US$13,600.

The need for patience

“There are pent-up demands and a desire for improvements in Argentina. … There is support [for the new administration], but it is linked to more or less rapid results,” Rozenwurcel said, adding, “Patience is very short.” He warned of the risk of a sudden change from excessive hope to exaggerated pessimism.

The results of the February Ifo-FGV Latin America Economic Survey support the perception that prospects have improved. The Expectations
Indicator for Argentina jumped from 94 points in December to 166 points in January. The assessment is that people and corporations approved the initial actions of the Macri administration and there is “great optimism” about the country’s economic outlook. In contrast, opinion about Argentina’s current situation improved only a little, from 50 to 52 points, which is still “unfavorable.”

Domestically, the Macri administration has already moved to greater transparency. In the week before the Obama visit, even having only a minority in the House, the administration pushed through the House of Representatives by a vote of 165 to 86 a draft law that would facilitate payment to creditors that were left out of previous restructurings—the “holdouts.” According to Rozenwurcel, “That was very significant not only from the point of view of the progress of the debt negotiation, but also from a political point of view,” Rozenwurcel said. The opposition lent support to the draft law.

“This opens up a positive perspective on governability,” Rozenwurcel said, “which was in doubt because the government’s party only has a minority in the House of Representatives.” The government is proposing to repay the debt at a 25% discount. To move forward the proposal must still be approved by the Senate, where there is still a significant number of supporters of former president Kirchner. The government considers agreement on the debt to be crucial if Argentina is to access foreign credit; the country was shut out of the international market in June 2014.

“In Argentina we are seeing a moment in which there is a normal democratic transition from the two great political factions, which are radicalism and Peronism.”

Marcos Azambuja

Economist Fabio Giambiagi of the Brazilian Development Bank believes the ability to dialogue with different stakeholders has been instrumental for Macri to establish bridges and build consensus—an example Brazilian politicians should follow: “The Argentine president is dialoguing on three different fronts: Peronists interested in leaving behind the old government legacy, the group of Sergio Massa; the block of governors that converged to Macri and favor governability; and the traditional parliamentary leadership that cultivates dialogue,” Giambiagi explained.

In general, Icatu Seguros economist Victoria Werneck said, it is expected that if Argentina had a more friendly relationship with the market, that would, among other things, open access to international financial markets, reduce capital costs, make it possible to refinance public debt at lower cost, attract foreign direct investment, and perhaps “become more successful in negotiating international agreements.” In her opinion, “Macri is considering what the rest of the world thinks about Argentina.”
“Argentina has been negotiating its debt with foreign bond holders and is returning to the international financial market. Thus the crisis of lack of foreign exchange is being eased, which will allow elimination of its barriers on imports.”

José Augusto de Castro

Argentina urgently needs foreign capital and foreign exchange, and the outlook is promising. Despite the inauspicious recession in Brazil and significant slowdown in China’s economic growth, says José Augusto de Castro, president of the Foreign Trade Association of Brazil (AEB), “my expectations for the economy of Argentina are good because the recent changes to eliminate the tax on exports of soybeans, wheat, corn, sorghum, and meat will generate more dollars and stimulate an increase of the planted area, which will generate more dollars, rebuild foreign exchange reserves, and increase the power of imports, in the medium term benefiting Brazilian exports of manufactured goods to Argentina.”

The peso devaluation also makes Argentine products more competitive, which again stimulates increases in the production and export of agribusiness commodities. Although imports will cost more, that will not have much impact on the decision to import because there is little local production of manufactured goods. Castro explains that “As a result of these measures, Argentina has been negotiating its debt with foreign bond holders and is returning to the international financial market. Thus the crisis of lack of foreign exchange is being eased, which will allow elimination of its barriers on imports.”

The AEB estimates that Brazilian exports to Argentina this year will reach US$14.7 billion, up 15% from 2015, and imports from Argentina will amount to US$9.2 billion, 10.9% less than last year, resulting in a favorable trade surplus for Brazil of US$5.5 billion. Brazil will buy less from its neighbor due to its domestic recession and devaluation of the Brazilian real. Rozenwurcel lamented that “These projections appear realistic and for us Argentineans cause concern because we need more foreign exchange to recover.”

In coming months, despite the encouragement of Argentine exports, devaluation and public tariff increases will keep inflation high, especially in the second half of 2016. In the opinion of Roberto Iglesias, Director of the Center for Studies in Integration and Development (CINDES), “Inflation is something that Macri really needs to take care of and that to me is the dilemma in the short term. It wears out any president. In my view, though, he has still respect because people know, in most cases, that he is correcting distortions, problems that the previous government left.” Recognizing that Argentine will have legislative elections in 2017, it is likely that the government is already working on policies to keep the economy stable and address remaining bottleneck.
Research, development and dissemination of important economic and social performance indicators:

FGV’s Brazilian Institute of Economics carries out economic research and analysis, stimulating the growth of public and private businesses across the country. The Institute’s statistics forecast principal short-term economic trends, serving as an excellent tool for planning and strategic decision-making.
The National Household Survey—the PNAD—has found in recent months a significant increase in the number of unemployed and a drop in the purchasing power of workers. Are we going backwards in terms of reducing inequality?

Despite the economic collapse since 2010 and the explosion of unemployment, informal employment, and inflation, until the end of 2015 the PNAD recorded no fall in workers’ incomes. Through the second quarter of 2015, wages had not fallen, and neither had the number of those employed, or their incomes. However, in the

**The threat of a growing inequality**

**Marcelo Neri**  
Director of the Social Policy Center of FGV

**Solange Monteiro**

In 2015 Brazil recorded its first decline in both economic growth and social welfare since 1992, breaking the trend that had kept social welfare rising faster than GDP for more than a decade. According to Marcelo Neri, an active participant in the evolution of that trend, the recession threatens the country with growing inequality, and Brazil will not be able to break out of this trap if in making the necessary fiscal adjustment it chooses to cut the program that most efficiently reduces poverty. Neri, former Minister of Strategic Affairs, criticizes the decision to make no nominal adjustment to the Family Grant (Bolsa Família) in order to increase the minimum wage by 11.5%. He emphasizes that Brazil must reintroduce economic and social rationality and move forward in difficult fiscal policy decisions, such as social security reform.
third quarter the fall began, and in the fourth quarter it intensified, accompanied by the first rise in income inequality since the turn of the century. Measuring social welfare as average labor income per capita growth adjusted by income inequality, the fourth quarter of 2015 showed a welfare loss of 5.7% in 12 months. It was the first time since 1992 that both economic growth and social welfare fell in the same year. In the 1999 and 2003 crises there had been a significant drop in income, but less inequality had helped to mitigate the social welfare loss. Only since the end of 2015 has the social welfare trend reversed. This new fact makes it clear that we have a social crisis.

Is this the end of the resilience in employment and income that we have seen? Undoubtedly, we are at a turning point. Since the 2003 recession ended, there has been a mismatch between the growth of GDP per capita, which went up by 29% between 2003 and 2013, and the PNAD data on labor income, which grew about twice as much in the same period. Because of the increase in labor income and the reduction of inequality, social welfare rose three times more than GDP. Since any economics textbook will tell you that the labor market pays for productivity, this mismatch represented a fundamental imbalance. … That mismatch between the growth in labor income and in GDP per capita has widened since 2010. In the first Rousseff administration, GDP per capita decelerated abruptly in response to the end of the commodities boom and growing internal imbalances, yet labor income continued to grow—by 2014 it was averaging real annual per capita growth of 4.8%. Income inequality actually declined slightly in 2012 and 2013, and then plunged: In 2014, income grew 3.3% and income inequality fell the most in 10 years. Although the economic crisis started in 2011, the start of a new lost decade, the social crisis—the fall in labor income and the rise in income inequality—began only at the end of 2015. Then it arrived in full force.

How can we protect the most vulnerable people in the current crisis? Today Brazil has a growing inequality trap. On the one hand we have the rising inequality of labor income; on the other we have fiscal tightening. This year the Family Grant Program had zero nominal adjustment even though inflation is already in double digits. And that is the most pro-poor program we have. The Family Grant reduces income inequality by far more than all the other cash transfer social programs. Yet we raised the minimum wage by 11.5%, which is higher than the established rule; that will increase public spending by far more than the Family Grant. It is a machine to generate inequality. Given the need for fiscal

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1 To provide a measure of social welfare adjusted by income inequality, Sen Amartaya proposed to multiply the average income by the measure of income inequality, calculated as 1 minus the Gini index. Inequality acts to reduce the average of equitably distributed income.
We raised the minimum wage by 11.5%, which is higher than the established rule; that will increase public spending by far more than the Family Grant. It is a machine to generate inequality.

adjustment, we should protect the Family Grant because it reduces income inequality and has no tangible effect on fiscal adjustment, since it represents only 0.6% of GDP, while pensions account for 12%—20 times more. Funding for the Family Grant has been frozen in nominal terms since May 2014, yet the program is responsible for 20% of the large reduction in inequality that occurred since 2000. We are going backward in terms of income inequality.

How do you think the reform agenda should address the issue of inequality?

Beyond the actuarial disaster of social security, we cannot understand Brazil today without taking into account representative surveys of the views of the population. There is a clear parallel between the economic crisis and the disillusionment of Brazilians with the government. According to the Gallup World Poll, Brazilian satisfaction with public services has been falling since this decade began. Trust in government generally has also fallen. The dissatisfaction reveals itself in increasing tax evasion, by both individuals and legal entities. During the hyperinflation in 1990s we would get rid of money printed by the government, generating the inflationary spiral; now we evade taxes, exacerbating the fiscal crisis.

Brazil had become used to a high rate of revenue, fiscal room for spending that was not sustainable. And we fell into the trap. Brazil has now been hit by fiscal constraints that are not transitory but long term, forcing cuts in public spending. Because it is more difficult to cut other budget items, the government has cut the Family Grant, thus increasing inequality. We have to get out of this vicious cycle and find a virtuous fiscal adjustment.

Is it possible to combine fiscal adjustment with policies that mitigate income inequality?

We must make the fiscal adjustment. If we do not, the social prospects will be even worse, … Given the fiscal fragility, we are surprisingly close to poverty without the protection of formal employment or a social safety net.

You said that, with the crisis, we should assess the social benefit per unit of tax spent, so that we can do more with less. How can this be done?

When I was in the Strategic Affairs Secretariat, we created minimum standards of assessment for federal government programs. Today there is no assessment. We have plenty of data, but we do not evaluate programs. In Central America, for example, smaller countries hire one institution to execute a social program and another to evaluate it. Brazil does not do this. Any government program that survives for a few months becomes a permanent program in the budget. The one exception is the Family Grant, which replaced the Zero Hunger program quickly, in a year. The result is that we are in a difficult fiscal...
situation but we have no idea what spending to cut—we entered this difficult fiscal situation without a route out. Future generations will pay the bill.

So social security reform is also important for reducing inequality. Social security reform is absolutely essential. But I see no strategy to deal with it. The social security problems result from excellent news: we are living longer, and I would say better. According to the United Nations Atlas of Human Development, every three years in the last two decades we have gained a year of life expectancy. In 2003, the Fountain of Youth survey here revealed that cash transfers to low-income elderly Brazilians improved their health. Now and again we heard criticism of the Family Grant and praise of cash transfer programs for the elderly. How we treat low-income seniors is a good example of Brazil’s social policy: it lets a citizen live a miserable life, illiterate, without decent health care, and at the end of their lives, we give them a winning ticket. Yet every dollar spent on the Family Grant program reduces poverty by four times more than increases in social security benefits. It should be a no-brainer. But just like the minimum wage policy, social security reform is taboo.

How do you expect that this year will end in terms of inequality? Economic stability has been lost, after it was hard-won by the Real Plan in 1994, which ended hyperinflation. We are in a critical situation that points toward chronic crisis, in which families cannot replace what they lose. In general, Brazilians have admirable creativity and flexibility, not losing their minds when they lose their jobs, finding informal work or setting up their own businesses. But this flexibility has reached its limit. Right now the most important thing is to reintroduce economic and social rationality — there is no conflict between these things. Brazil is very polarized in terms of ideas and passions, though paradoxically it has never been so integrated in terms of income distribution and education.

Brazilians have the odd ability as a society to produce collective derangements. This is a historic one. And unlike the time of hyperinflation, today there is no possible quick solution. We must work hard, build consensus, and calm things down.