Brazil in the Age of Electronic Commerce

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E-commerce is growing rapidly in Brazil, led by information-intensive and transaction-intensive sectors such as finance, manufacturing, and retail/wholesale. However, Brazil’s highly uneven income distribution is a major barrier for B2C diffusion. Government policies have emphasized promotional or enabling initiatives such as e-procurement, tax filings, and providing Internet access to social institutions. E-commerce legislation is just now being developed, and decisions on taxation are being negotiated in the context of international agreements. E-commerce raises issues for Brazil in terms of its relationship to the global economy. Although most online purchases involve imported goods, e-commerce also offers opportunities to participate in international value chains.

Keywords B2B diffusion patterns, barriers and opportunities, Brazil, economic impacts, e-commerce diffusion, e-government, information technologies, IT education, sector distribution, telecommunication infrastructure

New technologies usually challenge developing countries that lack the necessary capabilities, as well as the financial and institutional resources, to catch up to leading countries. The Internet, in particular, presents both a window of opportunity for economic and social development, and a threat to further widening the gap between developed and developing countries. This article examines the Brazilian experience in e-commerce, focusing on the role of the national environment and policies and their impacts. It discusses the challenges and opportunities of e-commerce diffusion in the context of a changing macroeconomic environment, infrastructure, government policies, legal framework, and international agreements.

Brazil’s income distribution is highly uneven, so there are effectively two economies and societies. The first is a relatively wealthy population of about 30 million, which has the income, education, and infrastructure to participate in the modern information economy. The second is a poor population of about 140 million, which lacks income and access to the necessary infrastructure to participate. Economic liberalization helped to bring many industrial sectors into the global or regional economy. The result is increased and greater involvement with global supply chains, both of which push Brazilian companies to adopt IT and e-commerce. The financial sector pioneered the use of electronic data interchange (EDI) in 1979. It took a decade for other industrial sectors such as the transportation and automobile industries to catch up and widely diffuse EDI among their business networks. Since 1996, e-commerce has been moving from EDI to the Internet, as Web-based systems become more secure. Brazil is now the largest Internet user in Latin America, with an estimated share varying from a third to half of total users.

Government policies seem to play an important role in Internet diffusion. In Brazil, national policies have emphasized promotional or enabling initiatives, such as e-government and providing Internet access to social institutions. This article looks at the impacts of these policies on e-commerce activity in the private sector.
NATIONAL ENVIRONMENT

Macroeconomic Policy Changes

Since the beginning of the 1990s, Brazilian markets for goods and services have become increasingly liberalized. Tariff and nontariff barriers have been lowered. Inflation rates declined from three digits in 1993 to one digit in 2000, as a result of the Plan Real, a macroeconomic stabilization plan. Restrictions on foreign direct investment in sectors like banking, public services, and mining have been relaxed. In most policy issues, Brazil follows the regional trends and principles established by the so-called “Washington Consensus.” The results of a decade of economic liberalization can be summarized as:

- Sharp increases in foreign investment along with a process of industrial restructuring and concentration.
- Import liberalization and a reduction of both tariff and nontariff barriers.
- Regulatory changes aimed at introducing competition in services and creating a more liberal environment for investment, funds transfer, and price setting.
- Adherence to major international agreements on trade (WTO) and intellectual propriety (TRIPS).
- Strengthening of the Marcos trade zone, thus creating a subregional free market linking Argentina, Brazil, Paraguay, and Uruguay.

The liberalization of investment and trade has contributed to the promotion of e-commerce development for at least four reasons. First, import liberalization facilitated online shopping overseas. Import taxes now average less than 20%, and goods costing up to US$50 are imported duty free. Second, before liberalization, credit cards were valid in Brazil only. International credit cards are of fundamental importance for e-commerce, since about 90% of Brazil’s business-to-consumer (B2C) transactions adopt this form of funds transfer. Third, there are no longer restrictions on foreign direct investment and profit remittance. This has encouraged new foreign ventures, in both e-commerce and associated services. Fourth, liberalization strengthened trade links between local and international supply chains. Consequently, there is an increasing demand for business-to-business (B2B) e-commerce.

Economy and Wealth

The Brazilian economy has been growing at a relatively slow pace compared to its historical growth rates. Inflation control became the highest priority in economic policy. At least four classes of anti-inflationary policies were adopted (Averbug). One was simply to keep a flexible but relatively stable and controlled exchange rate. This policy, however, had to be changed in 1999 due to “speculative attacks” on the overvalued Real. The second was tight monetary control based on very high interest rates and cuts in government expenses. The third was the widespread reduction of import tariffs. This policy was intended to increase the supply of goods and boost competition in the domestic market. The fourth policy was privatization, aimed at attracting foreign investment and reducing the public deficit.

These policies were successful as far as inflation control was concerned, but were detrimental to economic growth. From 1995 to 2000, the average GDP growth was insufficient to promote employment growth. Apparently, the Brazilian economy is caught in a trade-off between economic growth and inflation control.

In terms of wealth and income distribution, Brazil ranks third in the Americas in GDP value, after the United States and Canada. However, in per capita terms, Brazil falls behind the top five wealthiest countries in Latin America. Also, it has one of the worst income distributions in the Americas. While it is true that the poor became less poor in the last decade by increasing their absolute income, it is also true that the income distribution did not change much. From a comparison of the data between 1992 and 1999 (PNAD, 1999), we conclude that:

- The bottom 40% of workers increased their income by 40%, while the top 1% increased their income by 38%.
- More than 5% of the population moved above the poverty line.
- The Gini coefficient remained stable, declining slightly from 0.571 to 0.567 (the closer to 1, the more unequal the income distribution).
- The top 1% of workers kept their 13.1% share of total salaries, while the bottom 40% of workers also kept their 14% total share.

Despite an unbalanced income distribution and regional economic and social differences, Brazil has relatively large middle and upper-class market segments, which encourage private investment in e-commerce. Per capita income of the top 20% of the population (about 34 million people) is about US$15,000 a year, equivalent to many European countries. At the same time, the bottom 40% of the population lives on an average per capita income of US$1,000. For its unbalanced income distribution, Brazil was nicknamed “Belindia” by Edmar Bacha, for combining an upper class with a consumption level similar to Belgium, and a lower class similar to India.

Human Resources

By all indicators, education levels increased substantially in the last decade. These include literacy and enrollment at
TABLE 1
Human resource indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Mexico</th>
<th>Brazil</th>
<th>Korea</th>
<th>Taiwan</th>
<th>Malaysia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (millions)</td>
<td>98.8</td>
<td>170.1</td>
<td>44.9</td>
<td>21</td>
<td>20.1</td>
</tr>
<tr>
<td>Adult literacy (%)</td>
<td>90</td>
<td>83</td>
<td>98</td>
<td>N/A</td>
<td>84</td>
</tr>
<tr>
<td>Mean years of education</td>
<td>4.7</td>
<td>3.9</td>
<td>8.8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Secondary enrollment ratio (%)</td>
<td>58</td>
<td>45</td>
<td>101</td>
<td>N/A</td>
<td>57</td>
</tr>
<tr>
<td>Master’s and PhD in science and engineering awarded, 1990</td>
<td>5916</td>
<td>N/A</td>
<td>7070</td>
<td>4011</td>
<td>N/A</td>
</tr>
<tr>
<td>R&amp;D scientists and technicians per 1,000 people</td>
<td>0.3</td>
<td>0.2</td>
<td>2.9</td>
<td>N/A</td>
<td>0.2</td>
</tr>
<tr>
<td>Number of software professionals</td>
<td>321,482</td>
<td>549,840</td>
<td>340,168</td>
<td>140,070</td>
<td>53,389</td>
</tr>
</tbody>
</table>

a UNDP (1998).
b UNDP (1993).
e 2000.

all educational levels. By the turn of the century, primary education was almost universalized (95.7%), and 78.5% of the population in the age of pursuing secondary education was already enrolled, compared to less than 60% in 1992. Secondary education is usually considered a necessary condition for IT uses; the higher the level of education, the better is the Internet diffusion. In comparative terms, Brazil has an absolute high availability of software professionals, as compared to other developing countries, as shown in Table 1.

There are 405 undergraduate courses in information technology-related subjects. About 22,000 students got their degree a year before, while nearly 200,000 students were registered (MCT, 2000, p. 70). It should be noted, however, that other students from areas like applied sciences and mathematics eventually become IT professionals. In 2000, about 3000 students were taking postgraduate courses in computer sciences, of which 20% were pursuing a doctoral degree. Despite recent growth, the supply of qualified workers may not match future demand. According to an IDC Report (UFRJ, 2001), until 2004 there will be 403,000 job vacancies in Brazil in the area of networks. It estimates that only 155,000 people would be qualified to fill this demand.

Infrastructure

Telecommunications Infrastructure. Since 1998, when the Brazilian telecommunications infrastructure was privatized and the market reregulated, telecommunication services have expanded dramatically. In only 3 years, tele-density almost doubled from 120 to 232 fixed lines per 1000 inhabitants in 2001. Unattended demand attracted private investments estimated at 1.49% of the GDP in 2000 (see Table 2), the second highest level in the Americas after Chile. As a consequence, the availability of telecom services has increased in a wide range of areas. The quality of services has improved substantially, and in most areas connections no longer drop with noticeable frequency as before.

In 2002, however, telephone operators claimed that the market had already reached its ceiling and that there were no longer additional families who could afford to pay a telephone bill. Bills in arrears increased substantially after the network expansion, and some operators were cutting off more lines than installing new ones. Private solutions brought services to the middle and upper classes, but are not affordable to the majority of the population.

The experience of most developed countries shows that price and availability of the telecommunications infrastructure are clearly associated with competition and market access (Sachs, 2000). Along with new regulations, technology plays a key role in shaping new market structures in telecommunications services. In Brazil, competition is already present in cellular phones, international calls, and value-added services. However, in fixed mainlines and longdistance data communications, competition has proven to be more difficult to achieve. The reasons for that are both technical and economic. A natural monopoly seems to work in basic infrastructure services, and sunk costs provide overwhelming competitive advantages to existing firms. Fixed telecommunications services fall into this category in most countries in the world. In Brazil, the state-owned telecommunications holding company
TABLE 2
Telecommunication indicators

<table>
<thead>
<tr>
<th>Country</th>
<th>Telecom investment as % of GDP, 2000&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Main phone lines per 1000 population, 2000&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cell-phone subscribers per 1000 population, 2000&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Percent digital phone lines, 2000&lt;sup&gt;a&lt;/sup&gt;</th>
<th>CATV subscribers per 1000 population, 2000&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>0.67</td>
<td>213.17</td>
<td>163.37</td>
<td>100.00</td>
<td>159.32</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.49&lt;sup&gt;*&lt;/sup&gt;</td>
<td>181.80</td>
<td>136.31</td>
<td>92.50</td>
<td>13.70</td>
</tr>
<tr>
<td>Canada</td>
<td>0.57</td>
<td>676.51</td>
<td>284.60</td>
<td>99.70</td>
<td>259.41</td>
</tr>
<tr>
<td>Chile</td>
<td>1.56</td>
<td>221.22</td>
<td>223.62</td>
<td>100.0</td>
<td>45.20</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.89</td>
<td>124.72</td>
<td>142.33</td>
<td>99.98</td>
<td>23.11</td>
</tr>
<tr>
<td>United States</td>
<td>0.29</td>
<td>699.74</td>
<td>397.91</td>
<td>91.60</td>
<td>252.13</td>
</tr>
<tr>
<td>Venezuela</td>
<td>0.24</td>
<td>107.80</td>
<td>217.46</td>
<td>80.00</td>
<td>40.21</td>
</tr>
<tr>
<td>Latin America&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.05</td>
<td>165.38</td>
<td>150.46</td>
<td>95.02</td>
<td>32.25</td>
</tr>
<tr>
<td>OECD&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.73</td>
<td>524.53</td>
<td>457.27</td>
<td>94.82</td>
<td>145.37</td>
</tr>
</tbody>
</table>

<sup>a</sup>From International Telecommunication Union (2001). ITU definitions: main telephone lines refer to telephone lines connecting a customer’s equipment (e.g., telephone set, facsimile machine) to the public switched telephone network (PSTN), and which have a dedicated port on a telephone exchange (most countries also include public payphones); telecommunications investment refers to the annual expenditure associated with acquiring ownership of property and plant used for telecommunication services and includes land and buildings; cellular mobile telephone subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology that provides access to the PSTN; digital percent refers to the percentage of main lines connected to digital exchanges (indicator does not measure the percentage of exchanges which are digital, the percentage of interexchange lines which are digital, or the percentage of digital network termination points); CATV subscribers refers to households which subscribe to a multi-channel television service delivered by a fixed line connection. The per capita values are calculated using the estimated mid-year population value.

<sup>b</sup>Only countries included in the 44-country sample are used in the classification. Latin America consists of the following countries: Argentina, Brazil, Chile, Mexico, and Venezuela.

<sup>c</sup>Only countries included in the 44-country sample are used in the classification.

(TELEBRAS) was split into three different regional companies and one long-distance. Their access to the final user is a key competitive advantage not easy to replicate by new entrants.

The newly privatized operators benefited from a “natural monopoly,” granted by the acquisition of existing network capacity. The price paid for acquiring the public switched telephone network (PSTN) in privatization bids was, in some cases, below the reproduction costs— which are necessary to duplicate the capacity—since the risks, either technical, political, and/or financial, of investing in emerging markets were considered high. Consequently, new competitors face entry barriers, since they have to pay a high monopoly cost to interconnect to local backbones. A concentration process, reducing the existing nearly 50 telephone operators to less than a dozen, is the likely outcome.

Information Technology Infrastructure. Since the early 1970s, Brazil has developed capabilities in both production and use of information technologies. Prior to liberalization in the early 1990s, Brazil had a larger and more technologically advanced domestic IT industry, which produced a wide range of systems, peripherals, and even components. Despite setbacks, the country is one of the few developing countries with extensive technology capabilities in both hardware and software design and manufacturing.

Mexico and Brazil are the only Latin American countries with substantial IT hardware production. However, Brazil produces mostly for the internal market and is also a heavy importer. In 2000, the deficit in the electronic industry’s balance of payment reached US$6.5 billion. As Table 3 shows, the Brazilian IT market represented 2.38% of total GDP in 2000, a level well above the Latin American average, and inferior only to the United States and Canada in the Americas.

With an IT market of about US$20 billion, Brazil offers opportunities for startups to target niche markets at home, as government programs actively support local entrepreneurs through incubator programs. As Dedrick et al. (2001) put it, the fact that Brazil had a domestically owned computer industry before liberalization meant that many professionals gained experience in financing, launching, and managing their own companies.

Internet Infrastructure. In Brazil, Internet infrastructure is very heterogeneous. Usually subscribers in more developed regions have options between various Internet packages, and it is normally possible for users to establish
TABLE 3
IT infrastructure in the Americas

<table>
<thead>
<tr>
<th>Country</th>
<th>IT as % of GDP, 2000</th>
<th>PCs per 1000 population, 2000</th>
<th>IT hardware production, US$M, 2000</th>
<th>IT hardware exports, US$M 1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>1.29</td>
<td>51.31</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.38</td>
<td>44.09</td>
<td>$9083.78</td>
<td>$321.00</td>
</tr>
<tr>
<td>Canada</td>
<td>3.83</td>
<td>390.24</td>
<td>$3316.73</td>
<td>$4496.64</td>
</tr>
<tr>
<td>Chile</td>
<td>1.67</td>
<td>166.80</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Mexico</td>
<td>1.00</td>
<td>50.57</td>
<td>$10,281.00</td>
<td>$37,967.00</td>
</tr>
<tr>
<td>United States</td>
<td>4.56</td>
<td>585.18</td>
<td>$88,488.62</td>
<td>$37,967.00</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1.30</td>
<td>45.51</td>
<td>$254.02</td>
<td>$2.00</td>
</tr>
<tr>
<td>Latin America</td>
<td>1.60</td>
<td>52.22</td>
<td>$19,618.79</td>
<td>$7201.00</td>
</tr>
<tr>
<td>OECD</td>
<td>3.60</td>
<td>312.01</td>
<td>$231,341.80</td>
<td>$169,573.80</td>
</tr>
</tbody>
</table>

*a* International Data Corporation (2000). IT is defined as “the revenue paid to vendors (including channel mark-ups) for systems, software, and/or services.”


*c* Reed Electronics Research (2000).

*d* Only countries included in the 44-country sample are used in the classification. Latin America consists of the following countries: Argentina, Brazil, Chile, Mexico, and Venezuela.

*e* 1998 Data.

A good dial-up connection to a local ISP. A competitive and sophisticated Web design market exists, incorporating the latest development technology. In 2001, 15.5% of telephones were connected with the Internet.

Competition in leased line provision for business has been introduced in most large urban areas, and prices are falling but are still high. Price differences between the United States and Brazil are particularly high in some markets, such as long-distance, high-speed connection to IP networks.

The situation is considerably better for international links, since there are options to use alternatives developed by independent international carriers with their own cable and satellite infrastructure. Also, in segments of the market where, for technical reasons, competition is more easily enhanced, such as mobile cellular phones, ISPs, and other value-added services, the prices have already come down. Falling prices should stimulate Internet use and attract more potential e-commerce customers, while also making it easier for business to establish e-commerce sites.

FINANCIAL RESOURCES: USE OF CREDIT CARDS, DEBIT CARDS, AND STORED VALUE CARDS

The use of credit cards in Brazil has been growing at a fast pace since the early 1990s. From 1992 to 2001, cardholders almost quadrupled to 30 million users with over 1 billion transactions a year. Two factors were key driving forces behind the boom. First was the liberalization of the use of credit cards by Brazilians traveling in foreign countries. Second was the stabilization of the national currency, which improved the acceptance of credit cards by retailers. Brazilian consumers are now the largest users of credit cards in Latin America, and the country ranks eighth worldwide. In 2000, overall purchases by credit cards reached US$26.5 billion, equivalent to 7% of total private domestic consumption in Brazil. The growing use of credit cards means that more people have the means to purchase goods online.

There is a significant correlation between income level and the use of credit cards. According to a survey conducted by Credicard, about two-thirds (65%) of consumers with an income level above US$1250 a month hold a card, while only 19% of people with an income level between $150 to $250 do so. About 34% of the Brazilian population over 16 years old living in metropolitan areas with an income level above US$150 a month hold a credit card.

NATIONAL POLICY

Enabling Policies

Enabling policies are those that support or promote the use of e-commerce. Two government policies may be distinguished in Brazil as relevant to Internet diffusion. The first is the FUST (Telecommunications Universalization Fund), which finances information and communication technologies for social purposes. Presently, its principal project is linking libraries to the Internet. The second enabling policy is the program Br@gov, which aims to increase Internet use in three main areas: (1) information and
services, to provide online access to public services, more transparency to government actions, more efficiency in the use of information technology, and integrated communications networks for public administration; (2) procurement through the Internet, expecting a cost reduction of 20% in general goods due both to more bargaining power and a reduction of “intermediaries”; and (3) taxes, aimed at reaping the opportunities of e-commerce for improved taxpayer services. In 2001, according to the Federal Tax Authority, 90% of the 13.5 million income tax declarations received were handled through the Internet.4

As far as private and community initiatives are concerned, two classes of initiatives can be distinguished. One is the National Research Network (RNP5), which provides high-speed backbones to universities, hospitals, and other social institutions by wholesale purchasing and reselling of spare capacity available from private infrastructure providers. The other includes nongovernmental organization (NGO) initiatives such as the Committee for Informatics Democratization and Viva Rio, aimed at providing Internet training to youth in low-income communities.

E-Commerce Legislation

There is not yet any specific legislation related to e-commerce. The rules governing online sales are the same as those applied to the “Code of Customers Defense.” However, there is a project in the legislature, Project of Law number 1589/99, to regulate electronic commerce and authentication of digital signatures. The project has been approved in the Commission for Science and Technology and is waiting for plenary decision. The proposed law includes6:

- Certification of electronic signatures by a public notary and their annexation to electronic documents.
- The use of a cryptographic system based on a public or asymmetric key. The codified message will be received using a private key decodified by the corresponding public key.
- The acceptance of foreign-certified documents only if Brazilian contracts receive the same treatment overseas.

Within Brazilian federal government agencies, official document exchange is already done electronically using a public key infrastructure. The 3585 and 3587 presidential decrees established that beginning in January 2001, official documents for normative acts must be transmitted electronically.

The issue of e-commerce taxation depends on international agreements rather than local decisions. It is very much dominated by the OECD countries. The World Trade Organization (WTO) Secretariat is proposing a widespread liberalization of trade in services. Within the WTO, developing countries have raised concerns about possible tariff revenue implications resulting from a ban on customs duties on electronic transmissions. Any decisions that Brazil may take on modifying its tax legislation to accommodate e-commerce will have to take into account the significant role of tax and tariff revenues in its national budget, as well as bilateral concessions in other trade areas. Developing countries usually rely more on import tariffs and consumption taxes rather than income taxes. In the case of Brazil, tariffs are not relevant, but, unlike developed countries, consumption taxes are more important than income taxes.

E-COMMERCE DIFFUSION

Diffusion Rates

As elsewhere in the Americas, the diffusion of e-commerce in Brazil has increased rapidly in the last 2 years. However, statistics on Internet diffusion vary widely, according to different sources. A basic distinction that can explain these differences is between active and eventual users. An active user is defined as an individual who had accessed the Internet during the last month. The wider definition may eventually double the number of users. IDC estimates that Brazilian B2B trade reached US$1.7 billion in 2000, a figure similar to that for Mexico. Both countries together account for 75% of Latin American B2B trade, as Table 4 shows. In per capita terms, Brazil (0.32%) is on level terms with the Latin American average. An alternative e-commerce diffusion indicator is the availability of secure servers, a necessary condition for transactions on the net.

Business-to-Business (B2B) Electronic-Commerce

Usage Patterns. Business-to-business is widely recognized as the most important sector for e-commerce. Firms are more likely to buy through the Internet than

![FIG. 1. User pattern and size of firms. From Tigre (2000).](image-url)
TABLE 4
E-commerce in the Americas

<table>
<thead>
<tr>
<th>Country</th>
<th>Secure servers per 1,000,000 population, 2000, 1998&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Secure servers with strong encryption per 1,000,000 population, 2000, 1998&lt;sup&gt;a&lt;/sup&gt;</th>
<th>B2B trade in US$M, 2000&lt;sup&gt;b&lt;/sup&gt;</th>
<th>B2C Trade in US$M, 2000&lt;sup&gt;b&lt;/sup&gt;</th>
<th>percent e-commerce sales of GDP, 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>0.66</td>
<td>0.35</td>
<td>$634.99</td>
<td>$52.58</td>
<td>0.24</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.59</td>
<td>0.34</td>
<td>$1720.78</td>
<td>$202.86</td>
<td>0.32</td>
</tr>
<tr>
<td>Canada</td>
<td>15.73</td>
<td>14.97</td>
<td>$12,923.30</td>
<td>$2649.52</td>
<td>2.20</td>
</tr>
<tr>
<td>Chile</td>
<td>0.87</td>
<td>0.43</td>
<td>$228.61</td>
<td>$15.86</td>
<td>0.35</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.25</td>
<td>0.13</td>
<td>$1753.86</td>
<td>$82.35</td>
<td>0.32</td>
</tr>
<tr>
<td>United States</td>
<td>28.30</td>
<td>25.11</td>
<td>$118,457.20</td>
<td>$44,084.29</td>
<td>1.63</td>
</tr>
<tr>
<td>Venezuela</td>
<td>0.41</td>
<td>0.27</td>
<td>$285.44</td>
<td>$9.10</td>
<td>0.24</td>
</tr>
<tr>
<td>Latin America&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.50</td>
<td>0.28</td>
<td>$4623.66</td>
<td>$362.74</td>
<td>0.30</td>
</tr>
<tr>
<td>OECD</td>
<td>10.09</td>
<td>8.39</td>
<td>$268,500.30</td>
<td>$69,146.65</td>
<td>1.33</td>
</tr>
</tbody>
</table>

<sup>a</sup>From Netcraft (http://www.netcraft.com). Strong encryption is defined as having a key length greater than 40 bits (systems limited to a 40-bit key are classified as “weak” since it has been shown that messages encoded using a 40-bit key with RC4 can be broken in about a week by a good computer science student using facilities available in a good computer science lab).

<sup>b</sup>From IDC (2002).

<sup>c</sup>Only countries included in the 44-country sample are used in the classification. Latin America consists of the following countries: Argentina, Brazil, Chile, Mexico, and Venezuela.

are individuals, since they traditionally shop at a distance using communications such as telephone and fax. Individuals, in contrast, are more likely to go shopping physically. Also, considering the number of transactions across the value chain, there is much more business between firms than sales to final consumers.

In Brazil, expectations about the potential of e-commerce in business are high. New startup dot-com firms are striking to get financial resources to enter the market despite the failures of NASDAQ. Large businesses in almost all sectors are now creating Web-based services. Population attitude toward the Internet is also very positive. Computers are the second most wished-for consumption item after cars, according to an IBOPE<sup>7</sup> survey.

Excluding government transactions, approximately 90% of electronic commerce by value is conducted between businesses. Large enterprises have used Internet technologies to develop networks between their business operations. Small to medium-sized enterprises (SMEs) are rapidly exploiting the ways in which the Internet can be used to give access to new domestic and overseas markets.

The usage pattern of e-commerce was traced using the results of two surveys on the diffusion of the Internet in Brazilian business. Although these studies are based on limited samples, they have the advantage of relying on empirical information rather than on estimates.

The first source of information is my own research, covering 220 firms in different business sectors, including retailing, banking, information services, and manufacturing (Tigre, 2000). The survey was designed to study the diffusion stages of e-commerce in different sectors and sizes of firms. It shows that the vast majority of the surveyed firms were already linked to the Internet, but they were still at an early stage of user development. More than 50% of the firms used the Internet for e-mail and to access information only, a user pattern more typical of individuals rather than corporations.

The study proposes taxonomy of use patterns based on three stages (Figure 1). An initial stage is characterized by simply introducing Web mail. Firms at this stage are usually small and conservative. They do not fear that the Internet will become an immediate threat to their current business practices and they use it just for exchanging e-mails and accessing information in Web sites. About 35% of the surveyed firms were still in this stage.

The second is the interactive stage. Firms in this stage have a Web site, presenting products, services, and institutional information, yet users cannot complete transactions online. At this stage, firms are testing Internet potential and waiting for customers’ response. Gradually, new information and services may be added to the site, and eventually it could become transactional. About 50% of the surveyed firms were at this stage.

The third is the transactional stage, in which e-commerce effectively takes place. At this stage, users can access Web sites and make transactions. These include direct sales of products and services, money transfers, and logistic integration with suppliers and customers, as well as special Web services. Firms at this stage are usually large and aim to increase productivity and to develop new market channels. They count on their bargaining power to induce business partners to follow their standards and
operational practices. About 15% of Brazilian surveyed firms had already reached the transactional stage. They were usually in the financial and information sectors.

The second survey was conducted in October 2000 by the Sao Paulo Industrial Federation (FIESP), with a wider sample. Of the 807 respondents (87% of which were small-sized), only 5% undertook e-commerce transactions (FIESP, 2000). However, the majority of these businesses believe that they will introduce e-commerce in the near future, as the Internet becomes an important channel for trade between firms. The driving forces behind B2B expansion are market access and cost reduction. Since an increasing share of interfirm business is migrating to the Web, firms are encouraged to enter into B2B, especially in hierarchical networks and complex value chains.

The two surveys are difficult to compare for several reasons. First, while the FIESP survey dealt only with manufacturing firms, my survey included all sectors. Second, my survey was somewhat biased toward firms that already use information technologies, since the questionnaire was distributed by an IT magazine. Third, while the FIESP survey covered only the state of San Paulo, my survey included other states as well, although the leading Brazilian state represented the majority of answers. However, the data were adapted to fit similar samples. For my survey, I considered only industrial firms. For the FIESP survey, I excluded firms that were not IT users. The results are significantly similar, thus giving some credibility to both studies.

**Sector Distribution.** Unfortunately, the empirical evidence is not very helpful in defining the sector distribution of e-commerce in Brazil. From the data collected from different reports on diffusion of e-commerce in individual sectors, combined with some sort of “educated guess,” we propose the ranking shown in Table 5.

It should be noted that leading e-commerce sectors are information-intensive and transaction-intensive sectors. In Brazil, the financial sector has been the largest IT and e-commerce user. While intersector comparative information is not available, there is plenty of evidence about the leading role of the banking sector in both IT and e-commerce development. Since the days of the Information Policy during the 1980s, some of the largest Brazilian banks, like Itaú and Bradesco, have developed internal technological capabilities in service automation. Speeding up financial information and transaction flows usually paid off in a scenario characterized by very high inflation. These capabilities were further used to pioneer Internet banking. Today, more than two-thirds of all banking transactions done in Brazil (67.1%) are labeled as “electronic,” according to FEBRABAN, the national banking association. This includes the Internet, automatic teller machines, and call centers. Recently, major banks have entered the e-commerce business, taking advantage of their existing infrastructure and client base.

The role of the federal government as an e-commerce user is seen in procurement through reverse auctions (US$900 million), information services, and tax collection through the Internet. Retailing is probably the third largest user. While B2C is still at an early stage of development, major supermarkets and department stores are already heavy users of e-commerce to manage their procurement and logistic operations. Manufacturing follows, especially in hierarchical networks such as the automobile, electronics, and petrochemical industries. However, the results of the two surveys on the manufacturing sector show that only a small percentage of firms (from 5 to 6%) are in the transactional stage. Within my sample of various sectors, the manufacturing sector was the least advanced as far as e-commerce is concerned.

Transportation and distribution are relatively intensive users, since they play a key role as supply-chain integrators. Agriculture is rapidly increasing its e-commerce operations, mainly in commodities markets. Finally,

<table>
<thead>
<tr>
<th>Sector</th>
<th>How e-commerce is used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Finance</td>
<td>Transactions, investments, B2C</td>
</tr>
<tr>
<td>2. Government services</td>
<td>Information services, tax collection, elections, procurement</td>
</tr>
<tr>
<td>3. Retailing</td>
<td>Procurement, logistics, B2C</td>
</tr>
<tr>
<td>4. Automobile industry</td>
<td>Supply chain management, components trade, on-line sales</td>
</tr>
<tr>
<td>5. Transportation and distribution</td>
<td>Auctions for idle capacity, transport supply sites</td>
</tr>
<tr>
<td>6. Construction</td>
<td>Bidding, subcontracting, material trade</td>
</tr>
<tr>
<td>7. Pharmaceutical</td>
<td>Supply chain and distribution to retailers</td>
</tr>
<tr>
<td>8. Electronics</td>
<td>Supply chain management, distribution, B2C</td>
</tr>
<tr>
<td>9. Agriculture and food</td>
<td>B2B marketplace, equipment and parts supply</td>
</tr>
<tr>
<td>10. Petrochemicals</td>
<td>Sales of intermediary goods, plastics and chemical products</td>
</tr>
<tr>
<td>11. Office equipment, parts, and stationery</td>
<td>Supply of stationery, computer supplies, spare parts</td>
</tr>
</tbody>
</table>
nonhierarchical networks, dealing with standardized products such as construction materials, office equipment, parts, and stationery suppliers, are discovering the Web as an important marketplace.

The evidence from the surveys suggests that in competitive attempts to adopt e-commerce, size in itself does not affect the outcome very much. However, it is apparent that there are some applications that are particular to very large firms (more than 500 employees). These include Extranet and Intranet. On the other hand, it was found that micro (less than 10 employees) and small firms (from 10 to 50) buy more often through the Web and tend to provide more technical services online than do larger firms.

The micro firm (less than 10 employees) is a special case. The survey shows that there are many sophisticated Internet users among software and information micro enterprises. The diffusion of e-commerce in micro and small firms is reinforced by the surge of virtual shops, where almost all business is undertaken through the Web. Small virtual shops seldom sell commodities, since they cannot compete with large established businesses in these market segments. Rather, they are specialized in niche markets, serve specific business communities, or supply customized services.

The findings of my previous study show that medium-size firms are not important e-commerce users, since they fall behind larger and smaller firms in typical e-commerce applications. They are typically in the interactive phase, making available a Web site containing institutional information but rarely undertaking transactions online. The main reasons are the lack of organizational flexibility, risk aversion, financial constraints, and shortage of qualified IT people. As far as large firms are concerned, they are relatively intense users of Intranet, Extranet, and online sales of products and services. As expected, very large firms (over 500 employees) are usually the most advanced users.

The FIESP survey generally supports the finding that e-commerce is not necessarily associated with the size of the firm. It found that micro enterprises use e-commerce more than small and medium-sized firms, while large firms are more intensive users than very large ones. However, these data are not easily comparable to the other survey, since the survey was based only on industrial firms.

**Barriers to E-Commerce Diffusion.** According to the FIESP survey, the main difficulty in using the Internet in business transactions is the need to first implement organizational changes. Fifty-eight percent of the firms understand that they have to “reinvent” their operational structures in order to take full advantage of e-commerce. The existence of few trading partners on the Internet is also a barrier for 45% of firms. Thirty-seven percent agree that the investment required for introducing e-commerce is a barrier, considering not only equipment and software, but also marketing and organizational costs. As expected, this barrier affects small firms rather than large. About one-third of firms agree that integration with business processes (procurement, stocks, distribution and accounts), access to information about technology and business models, and security and privacy are important obstacles. The availability of ready-to-use solutions, service providers, and technology packages, as well as hiring qualified people, are not considered to be major problems.

As for my survey, the nature of barriers for e-commerce diffusion is somewhat different, at least concerning their relative importance. The survey shows that security is considered the main obstacle, since firms avoid realizing transactions that involve online transmission of confidential information. The second major obstacle is the lack of qualified personnel to introduce and operate the new channel. Third is the telecommunications infrastructure, including access to high-speed digital lines and quality of transmission. Marketing costs were also quoted as a major barrier for e-commerce, since most sites lack appropriate promotion and remain almost unknown to Internet users.

**Business-to-Consumer**

B2C trade in Brazil reached US$202 million in 2000, according to IDC. A recent survey of 7200 people in 12 countries conducted by Ernst & Young10 shows that the typical Internet consumer in Brazil is younger than in the United States (34 years of age compared to 42), less wealthy, predominantly male (75%), and usually holds a university degree. Brazilians buy less frequently online than Americans do, both in terms of average number of purchases per year (9 vs. 13) and in value terms ($493 vs. $896). In both countries, most consumers had increased their buying frequency in the previous 12 months.

The comparison between the types of products purchased online reflects different consumer habits. In both Brazil and the United States, CDs, books, and computers are the best sellers, although in a different order. But while Brazilians buy electronics and videos, Americans more frequently use the Internet to buy clothes and airline tickets.

According to IBGE,11 families in the upper 10% of the income distribution account for 60% of all domestic computer owners. A likely implication is that Internet diffusion should not rely only on traditional IT solutions. In order to reach the low-income population, there is a need to enhance public and shared facilities, as well as inexpensive solutions such as open software and network computers.

**Regional and Institutional Factors**

E-commerce was born as a worldwide business. Recent data, however, show that consumers are increasingly demanding products from Web sites located in their own
countries. In 1995, about 95% of Internet flow was international (Brazilian users accessing a foreign Web site). In 1997, access to foreign sites went down to 60%, and 3 years later, more than half of all B2C transactions were undertaken by Brazilians on local sites.

One of the findings of the Boston Consulting Group report is the weakness of U.S., English-language players in Latin America. Their market share was expected to drop from 32% of the market in 1999 to a mere 7%, or $40 million in sales, in 2000. Also, the report argues that pan-regional plays are proving to be much less attractive than originally anticipated. In most cases, they are too difficult to implement. The cost of entering a number of Latin American markets at once will not generate the kind of scalability that leads to profitability.

There are at least three arguments for customers’ preference for local rather than international virtual shopping. The first is language. Brazil is the only Portuguese-speaking country in America, and people are not usually willing and able to use Spanish-language sites, despite the similarities between the two Iberian idioms. The English language is more diffused among people with a higher level of education. But as a survey conducted by Forrester Research shows, consumers are more willing to buy on sites designed in their own language. It should be noted, however, that language does not necessarily define Web-site location, since content can be written in different languages and hosted in any country in the world.

The second advantage is logistic. A locally based site can deliver faster than an overseas site without local operations. In addition, it can avoid time delays caused by customs inspections. Local distribution networks are becoming a major competitive advantage for local sites dealing with physical goods. For example, Cultura.com, a traditional Brazilian bookshop, competes both in price and delivery time with Amazon.com, even in foreign published books and CDs, due to its nationwide physical distribution network.

The third argument for customer’s preference for local sites is legal and statutory factors. These refer to regulation of transactions, privacy protection, security, and intellectual capital protection. Users are more familiar with local rules and practices and may feel insecure buying from a foreign country. Consumer protection laws are country specific and customers have nowhere to complain in case of dissatisfaction. On the other hand, for security reasons, consumers are concerned with credibility rather than nationality. Of course, well-known multinationals enjoy much more consumer trust than scarcely known local sites. In Brazil, like elsewhere, brand names and good service reputation are important competitive advantages in the virtual market.

These arguments do not necessarily contradict the conventional wisdom about borderless, open commerce created by the Internet. In the case of Brazil, they simply mean that, in order to succeed in the e-commerce market, multinational Internet service providers have to invest in local content and distribution networks either directly or by subcontracting and establishing business alliances with local Web sites and distribution firms.

**Economic Impacts**

The benefits of the Internet for increasing productivity and competitiveness are associated more with B2B applications, rather than B2C. E-commerce provides opportunities for cost reductions through access to market information, less bureaucracy, and better supply-chain management. The benefits of transaction cost reductions and coordination between trading partners are so evident that e-commerce is becoming a compulsory tool to participate in many international economic activities.

Another major impact of B2B electronic commerce is the further globalization of value chains. Most multinational corporations have already transferred at least part of their procurement operations to the Internet. Consequently, new opportunities are created for international trade. However, large firms are acquiring more bargaining power through the association of several buyers (or suppliers) in a single site.

For developing countries this is a double-edged sword. On the one hand, it reduces barriers to entry in the international market, by increasing access to market information. On the other hand, the concentration of e-commerce in only a few developed countries increases the import bias among firms in developing countries. Table 6 shows that in countries where e-commerce is well developed, such as the United States, the import share of Internet purchases is limited to 10%. In Latin America, by contrast, 74% of Internet procurement consists of imports.

Online purchasing involves both B2B and B2C transactions. It includes hardware, software, services (consulting, Web design, Web hosting, ASPs), and other products and services. A Brazilian manufacturing firm revealed that online international prices for components, services, and equipment are usually 10% cheaper than local prices, even

**TABLE 6**

<table>
<thead>
<tr>
<th>Region</th>
<th>Import share (percent)</th>
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<tbody>
<tr>
<td>Latin America</td>
<td>74</td>
</tr>
<tr>
<td>European Union</td>
<td>41</td>
</tr>
<tr>
<td>Asia</td>
<td>65</td>
</tr>
<tr>
<td>United States</td>
<td>10</td>
</tr>
</tbody>
</table>

*Note. From International Telecommunication Union (2000).*
after adding import tariffs and transportation costs. From the microeconomic point of view, this is a source of cost reduction and competitiveness.

CONCLUSIONS

Internet and e-commerce use in Brazil started out as an extension of the United States, with mostly English content and imported products. But now a vibrant local market is developing, with domestic companies offering local products and Portuguese-language content. Most Brazilian firms are already linked to the Internet, but they are usually at an early stage of development. The use of e-commerce is led by information-intensive and transaction-intensive sectors such as finance, manufacturing, and retail/wholesale. Large businesses have been leading adopters, along with microenterprises in some technology-related sectors. Mid-sized firms have been slower to participate.

The findings of this study concerning government policies show that public agencies may play an important role as users and inducers of e-commerce practices. Government use of the Internet for procurement, tax filings, and other services has stimulated e-commerce activity in the private sector. E-commerce legislation is just now being developed, and decisions on taxation are being negotiated in the context of international agreements. In spite of the lack of e-commerce legislation, Brazilian companies and consumers are doing business online, relying on other means to verify each other’s reliability and trustworthiness.

The diffusion of e-commerce in Brazil has been relatively rapid compared to other developing countries. However, the future growth of e-commerce may be limited by social and economic factors such as income level, income distribution, and education. The vast majority of the population is unlikely to participate in e-commerce until income levels are raised and lower cost access to information technology is made available. Income distribution is probably the most important factor in determining the actual and potential use of B2C e-commerce.

NOTES

1. Statistics on e-commerce are not very precise, since the methodologies adopted differ widely. This is discussed elsewhere in the article.
3. Ibid.
5. Rede Nacional de Pesquisas em Português.
8. FIESP represents more than 40% of total Brazilian industrial production.

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