CHAPTER 15

Financial Infrastructures in the Context of Financial Development

The Case of Brazil's Stock Exchange

Giselle Datz

Financial infrastructures provide services that facilitate the clearing, settlement, and recording of financial transactions. Insofar as they can allow for these transactions to be made safer and cheaper, infrastructures can boost trading liquidity, which, in turn, tends to reduce price volatility. Far from a static background to financial transactions, financial infrastructures are "spaces for action" constantly in motion (Hall et al., 2023, p. 923). That this constant motion is mostly "unseen" speaks to the efficiency of systems which, like the swimmers in Warren Buffett's famous quote, only notice that they are lacking their swim suits when the tide goes out (Berkshire Hathaway Inc., 2001).[1]

Thanks to inspired efforts combining insights from international political economy, the sociology of finance, and science and technology studies, financial infrastructures have gained more attention as the protagonists, themselves, of the prevalence of financial logics, products, interest, and operations in economic life, known as financialization (Bernards and Campbell-Verduyn, 2019; Petry, 2021; Tan, 2021; Braun and Koddenbrock, 2022; Hall et al., 2023). One of the fruitful contributions of this scholarship is the separation of "infrastructures" from "markets." Despite their mutually constitutive relationship, a focus on financial infrastructures (their technological evolution, limitations, champions, and competitors) allows for the rethinking of "markets beyond a dominant transactional metaphor that privileges exchange as the cornerstone of the economy" (Pardo-Guerra, 2019, p. 11). Financial infrastructures "shape the way core [financial] functions are undertaken" (Bernards and Campbell-Verduyn, 2019, p. 777), creating "the facilities and rigidities within which relational and spatial [financial] reorganization takes place" (Hall et al., 2023, p. 3). In this vein, we add, they can enable or constrain the development of domestic financial markets.

Financial market development is not necessarily about more subordination to foreign financial market forces (Bortz and Kaltenbrunner, 2017) or the unfettered financialization of the local economy. Beyond the diversification of sources of credit, improving access, liquidity, and reducing costs, financial market development also involves stronger

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investor protection and corporate governance. In the same vein, a deeper and more "diversified domestic institutional investor base with domestic currency liabilities can […] help offset international capital outflows," soothing the blow of exogenous economic shocks (CGFS, 2019, p. 5; Sahay et al., 2015; Svirydzenka, 2016).[2] Furthermore, the development of a local investor base can be a (partial) shield to the kind of price sensitivity to global financial shocks that large foreign holdings of domestic assets tend to trigger (IMF, 2014, p. 69). To be sure, financial development provides no assurance of financial stability. Yet, as argued by the Committee on the Global Financial System (CGFS, operated within the Bank for International Settlements), financial infrastructures "with sufficient transparency on pricing and volumes can help maintain confidence in periods of financial market stress, provide information on the build-up of risks, reduce market abuse, and deter other predatory practices in capital markets" (CGFS, 2019, p. 54).

It is well known that "financial institutions and markets around the world differ markedly in how well they provide" key financial services (Čihák et al., 2012, p. 5). Yet the extent to which financial infrastructures not only differ among one another but are differently constrained in how much they contribute to the (further) development of financial markets, has not been explored much by either the emerging literature on financial infrastructures or the broader literature on the international political economy of development.

In this chapter we argue that thinking about the correlation between financial infrastructure and financial development as linear can be too simplistic. Even when they *are* present, up-to-date, and reliable, financial infrastructures' contribution to promoting singular markets may not translate into a deepening of the domestic financial system. That is, technological innovations can advance data gathering and analysis, increase the speed of financial operations, produce and distribute more reliable information on investment options, yet not necessarily enhance and broaden the domestic financial system in ways that contribute to financial deepening. The latter (a term often used interchangeably with "financial development") refers to the "increase in the depth, liquidity, efficiency, and volumes of financial institutions and markets," along with the diversification of domestic sources of finance (Dabla-Norris et al., 2015, p. 141; Kiyotaki and Moore, 2005).[3] Hence, the deterministic assumption that more developed infrastructures lead to more developed markets begs scrutiny. In this chapter we ask: To what extent do financial infrastructures shape markets in middle-income, developing economies? The question not only probes the contingent relationship between infrastructural changes and financial development, but also explicitly acknowledges "the variegated nature of empirical financialization processes" in developing countries (Petry, Koddenbrock, and Nölke, 2023, p. 147).

The empirical focus here is on Brazil: the largest economy in the region, the country with the highest level of financialization (Karwoski, 2020), and the largest stock exchange among its neighbors. Brazil's financial system, like that of other Latin American countries, is bank-based. Yet, the country has been responsible for most initial public offerings (IPO) activity in the region (OECD, 2019, p. 15), has encouraged high-frequency trading (B3, 2022; Petry, Koddenbrock, and Nölke, 2023), and is home to "one of the best-known initiatives in the region for strengthening investor confidence in equity markets," the Novo Mercado segment of the Brazilian Stock Exchange, created in 2000 (OECD, 2019, p. 44). It is hence, among regional peers, a crucial case in the effort of understanding financial infrastructures in the context of financial development. If such development is constrained in Brazil, then it is also less likely to materialize elsewhere in the region.[4]

Advances in Brazil's financial infrastructures have been hard to miss, even if backgrounded in analyses of the country's financial sector. From the electronic interdealer platform for sovereign bonds (SELIC), the consolidation of a central stock exchange (B3), the successful launch and surprisingly rapid adoption of a digital payments platform, known as Pix[5] to the blossoming of financial technology companies in less than a decade, it is clear that the Brazilian public and private sectors have embraced financial technology enthusiastically (CGFS, 2019; Duarte et al., 2022; Bakker et al., 2023; Banco Central do Brasil, 2023; see Kaltenbrunner and Orsi's chapter, this volume). Among these efforts, those which were not designed and executed by the government and are most closely related to the diversification of sources of credit for domestic firms are the centralization and modernization of the Brazilian Stock Exchange.

Through a brief analysis of the Brazilian Stock Exchange since the early 1990s, this chapter highlights both advances in and constraints to capital market development *in spite of* significant technological strides toward creating up-to-date financial infrastructures. It is argued that infrastructural advances may be necessary but insufficient steps toward that goal in developing economies. Structural characteristics of domestic capital markets – such as the availability of subsidized credit and the crowding-out effect of public securities on private ones – constrain domestic capital markets. In the same vein, conjunctural factors, such as persistently high interest rates, also run counter to private and public efforts to increase competition and dynamism in domestic credit markets, even in the presence of an ever more sophisticated domestic stock exchange.[6]

The chapter is organized in three sections. Section 1 discusses what is meant by an understanding of financial infrastructures within the context of financial development in particular, and situates the Brazilian case in its region. Section 2 describes attempts to modernize Brazil's financial infrastructures with a focus on the national stock exchange. The section also highlights the ways in which both structural and conjunctural factors have constrained local capital market development, which, in turn, has shaped the role of the stock exchange in the country's financial system. The conclusion in Section 3 suggests skepticism about deterministic expectations when it comes to linking advancements in financial infrastructures with capital market development. Instead, more productive to understanding the nature and impact of financialization in developing countries is to further inquire about how such financial infrastructures adapt to and evolve in spite of lingering context-specific constraints.

1 Financial Infrastructures in the Context of Financial Development

Despite the growth in middle-income economies' government and corporate securities markets, corporations in these countries still have less access to longer-term, local currency financial streams, and fewer small firms access equity markets than is the case in advanced economies (Didier and Schmukler, 2013; IMF, 2018). In Latin America, in particular, credit to the private sector and liquidity in the domestic equity market are still relatively restricted (Didier and Schmukler, 2013). Capital markets are bank-based and have a short-term horizon. The region has not benefited from the global shift in capital allocated toward developing countries' markets, which in Asia, for instance, has led to a greater volume of IPOs. Even though Latin American listed companies' market capitalization (i.e., the value companies trade in the stock market) as a share of GDP rose from 28% of GDP on average for the period of 1995 to 2000 to 52% of GDP between 2005 and 2010, the blow from the global financial crisis of 2008 (OECD, 2019) and then the pandemic of 2020, along with political cycles, have led to an overall slow recovery.

According to Schneider's depiction of the Latin American variety of capitalism (what he calls "hierarchical capitalism"): "in the absence of deep equity and credit markets, business groups, along with [multinational corporations] MNCs, have been the main private institutions for mobilizing large-scale investment," relying mostly "on retained earnings, international loans, or loans from state agencies" (Schneider, 2013, p. 43). Furthermore, Latin American markets are characterized by a high level of ownership concentration and the existence of large industrial and financial conglomerates which impair liquidity in stock markets, increasing transaction costs and inhibiting investment. From 2009 to 2019, Latin American countries recorded the lowest liquidity ratio compared to other regions. Concentration is present in two forms: "trading concentration in which only a few and large companies are actively traded, usually those included in the local index," and in the form of the "concentrated ownership structure" of the listed companies (OECD, 2019, p. 24).

Brazil's financial market is, according to the IMF (2018, p. 30), a "liquid and sophisticated" one. Approximately 475 companies are listed in the Brazilian Stock Exchange, B3, recording an aggregate market capitalization of USD 836 million (in depreciated Brazilian real exchange rate values of May 2023; see B3 2023). The number is widely acknowledged as unimpressive for a country with an economy the size of the Brazil's (Forbes, 2020). Yet is this evidence that capital markets in Brazil are overregulated and/or financial infrastructures lacking? The answer is "no" on both counts.

Petry, Koddenbrock, and Nölke's (2023, pp. 144–145) comparative study of exchanges in Brazil, Russia, India, China, South Africa, and South Korea suggests a conceptual continuum between neoliberal and state capitalist capital markets. In the first, profit creation is the organizing principle and private investors the dominant actors. In state capitalist institutional settings, in contrast, exchanges "organize capital markets to facilitate state objectives" (p. 145), thereby "reproducing state capitalism through financial means" (p. 148). The authors find that Brazil stands out as diverging from the path that points to a state capitalism-based capital market. The ownership structure of the Brazilian exchange is not only private but largely foreign. High-frequency trading is encouraged by domestic financial authorities and the Brazilian Stock Exchange allows for offshore trading of its indices. The authors conclude that investment in Brazil is "relatively liberalized with only a few restrictions" (p. 153). In fact, within their sample of six middle-income economies, Brazil and South Africa are the "most neoliberal in their approach to governing capital markets" (p. 158).

Petry, Koddenbrock, and Nölke's (2023) valuable exploration of domestic financial infrastructures contributes to the broader discussion of variegated capital markets by including non-neoliberal logics into the functioning of these markets and their facilitating infrastructures. Given the intentionally simplistic typology (whether neoliberal or state capitalism-based capital markets), variation *within* the neoliberal "model" remains presumed, but not discussed. In particular, still to be understood are the ways in which neoliberal logic may indeed predominate as the organizing principle of capital markets, which, nonetheless, remain relatively underdeveloped *despite* financial liberalization. To be sure, studies that explore "subordinated financialization" highlight "the growing but subordinate nature of [developing countries'] financial integration, which is dominated by short-term capital flows that remain funded in [advanced economies'] currencies." Even though global financial integration, in this perspective, is understood as "fundamentally shap[ing] the financial practices of domestic agents, such as the holding of financial assets by non-financial corporations" (Bonizzi, Kaltenbrunner, and Powell, 2020, p. 184), such integration has done little to transpose the structural obstacles that still restrict domestic capital market development. These obstacles, in turn, shape the extent to which domestic financial infrastructures, such as stock exchanges, not only operate as marketplaces, but can influence local financial life as actors of financialization themselves (Petry, 2020, 2021; and see Petry's chapter in this volume).

In this vein, here we are interested in grasping the extent to which financial development can remain a truncated process amid steady financial integration, growing financialization (Bonizzi, 2017; Karwoski, 2020), and notable digitalization (Paraná, 2018; Bakker et al., 2023) – in large part boosted by modern financial infrastructures. Applying an "infrastructural gaze"

(Westermeier, Campbell-Verduyn, and Brandl in this volume) to financial development allows for not only the unpacking of micro and macro relations, but even more specifically, for an understanding of the ways in which micro-financial processes are *contingent* on macrostructural and conjectural dynamics in ways that differentiate developing from advanced economies. In this sense, beyond "subordination" (evocative of hierarchical ordering and likely dependence), financial *development* is indicative of particular contingencies related to exogenous dynamics as well as path-dependent and endogenous (domestic) policy directions, as specified later in this chapter.

In the Brazilian case, a neoliberal operating logic in the financial sector is nonetheless shaped by the ubiquitous presence of the state (Taylor, 2020). In 2018, public banks provided 55% of total bank credit. As stated in the 2018 International Monetary Fund's (IMF's) Financial Assessment Report for Brazil, "government debt securities are the centerpiece of the fixed income market and are the single most important asset class held by investment funds, pension funds and insurance companies." Moreover, "the role of public banks and state-owned firms, the critical importance of repos collateralized by government securities as the main instrument for conducting monetary policy and carrying out interbank transactions, and the centrality of government securities as the main liquid financial instrument in Brazil are distinguishing features" of the Brazilian financial system (IMF, 2018, p. 19; see also Lazzarini, 2011).

In order to better understand these dynamics, we turn next to a brief empirical analysis of the Brazilian Stock Exchange, B3.

2 The Brazilian Stock Exchange as a Contingent Financial Infrastructure: Micro Innovations and Macro Constraints

Until the early 1990s, prevailing high inflation was a deterrent to Brazilian economic growth and stability, but also "an important source of financing both for the government, in the form of inflation tax, and of self-finance for investing companies – especially for those with strong market power and capacity to increase mark-ups rapidly" (Studart, 2000, p. 21). In this context, private financial institutions focused on providing short-term loans and intermediation of the foreign savings. As a result, despite the creation of an independent regulatory body for domestic financial markets (the Brazilian Exchange Commission, or Comissão de Valores Mobiliários – CVM) in 1976, as well as the updating of legislation about duties and liabilities of financial intermediaries and issuers, capital markets "remained fledgling throughout the 1980s and 1990s" (de Mello and Garcia, 2011, p. 26; Taylor, 2020). The many financial crises originated in developing countries affecting Brazil in the 1990s further discouraged advancements in the domestic financial sector.

With the price stability brought about by the Real Plan of 1994, regulatory shifts helped shape a new Brazilian financial landscape given: capital market liberalization, the banking reform in 1988, and government bailout programs targeting state banks after the 1995 crisis. Add to these the entry of new foreign investors attracted by the appreciation of the *real*, more flexibility in regulations involving investment funds and other institutional investors, relatively high interest rates, and the growth of government debt. Capital and financial derivatives markets grew. Foreign financial institutions and domestic institutional investors gained a prominent role in Brazilian capital markets (Studart, 2000). However, between 1995 and 2003, there were only six IPOs in the country. Rather than access funds through the Brazilian Stock Exchange, domestic firms relied on foreign markets, through American depositary receipts (*World Finance*, 2014).

Indeed, while sovereign bond markets underwent a major shift from foreign currency-denominated bonds to local currency bonds, diminishing significantly the exchange rate risk of public debt (Didier, Hevia, and Schmukler, 2012), equity markets experienced a bumpier evolution. Between

2004 and 2021, the number of IPOs rose substantially, but not consistently (*Folha de São Paulo*, 2023). The rise was in part the result of the establishment of the then-Brazilian Stock Exchange, Bovespa's, Novo Mercado in 2000, a listing segment with rules in line with international standards for corporate governance, meant to enhance corporate disclosure, transparency, and accountability (Didier and Schmukler, 2013). After the initial period of macroeconomic instability in the early 2000s, Novo Mercado caught on. Total market capitalization increased more than sevenfold from 2003 to 2011. New amendments to the standards were approved by companies on the special listing segments in June 2017, entering into force in January 2018. They included a reviewed definition of independent directors, and stricter rules related to internal audits and audit committees (OECD, 2019).

Among the changes taking place since 2019, by far the most significant were the ones that transformed the stock exchange itself. As part of a number of mergers among Brazilian firms, clearing houses were integrated. In particular, the São Paulo Stock Exchange (Bovespa) merged with the main futures exchange (BM&F) to form BM&FBovespa in 2008. In 2017, BM&FBovespa purchased Cetip, the country's largest central depository for over-the-counter private securities, and derivatives, becoming B3, the abbreviation for Brasil, Bolsa e Balcão (*Agência Brasil*, 2017). Its clearing and settlement services are part of a plan to promote "a single set of rules, a single participant structure and register, unified processes for position allocation, clearing and control, a single settlement window, a single risk management system, a single collateral pool, and a single safeguard structure." The logic was "to provide better liquidity management, more efficient capital allocation, more efficient margin calculation and lower operational risk for participants," along with a cost reduction of about 30% (CGFS, 2019, p. 40; *Agência Brasil*, 2017).

B3 is a private firm whose own stocks are traded in the Novo Mercado segment of the exchange, and which is regulated by the National Monetary Council, Brazil's central bank, and the Brazilian Securities and Exchange Commission (CVM.gov.br). B3 manages the Brazilian stock and derivatives markets. Its total amount negotiated in fixed and variable income reached approximately USD 437 billion in 2022 (B3, 2023). Among its newer products, B3 lists exchange-traded funds (ETFs), albeit the "numbers are still modest," given low liquidity relative to international markets. According to B3, as of 2020, there were twenty-two ETFs listed on the exchange, "16 referenced to stock indexes, two of them foreign (referenced to the S&P 500), and six tracking fixed income indexes" (*Focus*, 2020). The number of investors in ETFs grew 141% from 41,468 in December 2018 to 100,029 in November 2019, revealing that these funds became a port of investor entry into stock markets in light of "the improvement in the country's macroeconomic scenario and the low interest rate" (*Focus*, 2020). Indeed, B3's role in the Brazilian financial system is contingent and adaptive. We move next to explaining both the nature of this contingence and B3's efforts to adapt and expand in spite of it.

2.1 *B3 Boxed In: Constraints to Stock Market Growth*

Capital market development in Brazil has been constrained by the country's long battle with high inflation, the primacy of state sources of long-term credit, and persistently high interest rates. These macro dynamics have determined the extent to which diversification of investment outside of government bonds is both feasible and attractive to private investors. By the same token, the nature and scope of the role and impact of the country's stock exchange is delimited by these characteristic obstacles to the growth and variety of private credit sources and investment opportunities outside of the state and traditional banking system.

Monetary stability has been Brazil's long-term battle. That is despite the adoption of an inflation-targeting regime and much more solid economic fundamentals, "stress-tested" through many a global crisis (Barbosa-Filho, 2009; Segura-Ubiergo, 2012; de Gregorio, 2019). The combination

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of political risks, particularly prevalent in electoral cycles, and a history of inflationary challenges have led to contractionary monetary policies which have positioned Brazil's interest rates among the world's highest. Their impact on local markets is unescapable, as we explain in what follows.

Another key structural constraint associated with Brazil's institutional and economic development has been the role of public (development) banks like the Banco Nacional de Desenvolvimento Econômico e Social (BNDES), which provides relatively cheap (earmarked and subsidized) credit to local firms. Since around 2014, earmarked credit in Brazil corresponded to approximately 40% of total credit in the country, most of it distributed by the BNDES (Barroso and Nechio, 2019). Although this trend was partially reversed during the Bolsonaro presidency (2016–2020), particularly when it came to subsidized (below market) interest rate loans, returning President Lula da Silva has promised to get the BNDES back to its role as a key source of financing for national firms (*InfoMoney*, 2023). This role, however, has historically discouraged capital market development, while the particularly concentrated ownership structure of most Brazilian firms made them more reluctant to go public, fearing the loss of internal managerial control (Lazzarini, 2011; Schneider, 2013).

In contrast, regulators have attempted to introduce leaner rules when it comes to stock exchange activities in particular. In mid-2022, as a result of consultations between the public regulator and market participants, a new resolution (No. 160-1) by the national Securities and Exchange Commission was instituted, aiming at simplifying IPOs. Retail investors will have access to more transparent and standardized information about IPOs, in an attempt to both protect investors and spur further capital market development (Anbima, 2022).

With monetary instability diminished but not defeated, the benchmark interest rate (SELIC) in Brazil, remains high, well above the European (0.75%), and US rates (2.5%) (Banco Central do Brasil, 2022). In the last 18 years, from 2004 to 2022, the average Brazilian real interest rate was 5% per year (Banco Central do Brasil, 2022). Therefore, investors are highly compensated for their investment allocations in public securities without having to incur in much risk. Shorter-term floating rate or inflation indexed securities are Brazil's predominant asset class (IMF, 2018).

In fact, a lingering "conjunctural" factor (because some periods of decline have been experienced), high interest rates are a notorious deterrent of growth in domestic capital markets (IMF 2018; OECD, 2019). These rates are mostly the product of iterated and largely successful price stabilization attempts. They also help finance the government deficit. Yet such high interest rates, as explained, make relatively low-risk public securities continuously attractive, crowing out private securities. In addition, the Tesouro Direto platform, launched in 2002 (similar to the TreasuryDirect program offered by the US Department of the Treasury), makes purchasing government bonds easily accessible to individual investors (Miranda, 2018). That is even easier now that the system has been connected to the PIX platform of mobile/digital payments (Ministério da Economia Brasil, 2022).

It is difficult for capital market products to compete with such broadly available and advertised federal securities (Miranda, 2018). The volume of stocks traded in the Brazilian stock market only surpassed that of fixed income investments (bonds) between 2007 and 2010 – excluding 2009, when the impacts of the financial crisis of 2008 were felt. More recently, the volume of investments in stocks beat bonds in 2022, when interest rates were at their lowest level in recent history (ANBIMA, 2022).[7] The presidential elections in the end of 2022 have since reversed this brief reprieve. Figure 15.1 displays the evolution of nominal interest rates in Brazil over the past twenty-seven years.

Moreover, Brazilian individual investors "favor bank paper over stocks and corporate bonds." Banks' certificates of deposits are extremely popular since they offer returns comparable to those on government bonds with similar maturities (Miranda, 2018).

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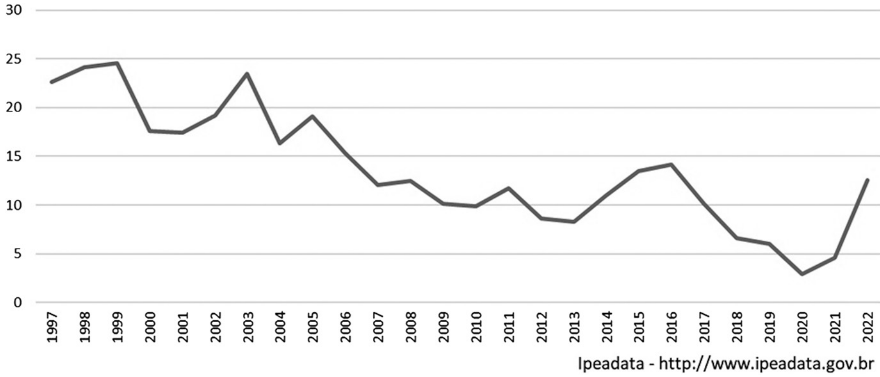

Figure 15.1 Brazilian interest rates, 1996–2023.
Source: Author's elaboration based on data by Ipea, 2023.

Institutional investors are also attracted to the high returns on government bonds. Not unlike their peers in the region, Brazilian pension funds concentrate their portfolios on public bonds; they buy and hold assets, adding little liquidity to secondary markets and not contributing significantly to capital market expansion (Stallings and Studart, 2006; Park, 2012; Didier and Schmukler, 2013; Datz 2014). In a relatively high interest rate environment, investing in low-risk domestic bonds is a conservative but also profitable bet for these large domestic investors (Abrapp, 2022; Previ, 2022–2019; Petros, 2022–2021). Hence, despite the substantial growth of Latin American institutional investors, their role in the stock market and in fostering financial development more broadly has been relatively limited (de la Torre, 2012; Datz, 2013).

2.2 *Adaptation, Expansion, and Competition*

Despite the significant constraints to the further development of domestic capital markets, such as fiscal instability, subsidized credit, and high interest rates, B3 continues to adapt and expand. According to B3's CEO, the exchange is "engaged in the evolution and transformation of the Brazilian financial market, which has more demanding and sophisticated clients than ever before, powered by technological innovation" (Finkelsztain quoted in *Focus*, 2022). That ambition is indicative of B3's engagement in broadening the variety of financial services and investments it can provide to investors, such as domestic and international ETFs, including cryptocurrency ETFs (*Focus*, 2022). In this sense, the stock exchange not only "regularize[s]" financial activity (Hall et al., 2023), facilitating financial investment and diversification, but contributes directly to the (further) digitalization of (Brazilian) financial life (Paraná, this volume).

Indeed, as the number of individual investors engaging with the Brazilian Stock Exchange increases so does B3's drive toward its own technological updating. In 2022, the exchange created B3 Digital Assets (B3 Digitas), whose mission is to offer market infrastructure to digital assets. After acquiring data analysis firm Neoway in 2021, B3 also bought Neurotech3, a firm that specializes in artificial intelligence, machine learning, and big data. Fueling these moves is the stated goal to develop new products and services based on B3's proprietary databases (Reuters, 2021; B3, 2022). Such efforts by the Brazilian Exchange have not remained unnoticed. After being selected Global Exchange of the Year in 2019 and 2020, B3 was awarded Best Technology Innovation by an Exchange by London's *Futures and Options World* magazine (*Focus*, 2022; B3, 2023). The accolades situate B3's efforts positively among its competitors, rewarding its technological prowess in particular.

Global competition among security exchanges pushes these infrastructure providers to constantly modernize their platforms

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(*American Banker*, 2023). In middle-income countries' markets this competition is less pressing, but far from absent. The Brazilian Stock Exchange, in particular, faces competition from the New York Stock Exchange (NYSE), where newer fintech companies have preferred to list given that they are more easily compared to other technology companies in that market, leading to more generous valuations (*Euromoney*, 2022). Yet, more recently, some Brazilian companies have started to make the move from Nasdaq, a New York-based stock exchange, back to Brazil. Delisting is a rare move once a company has gone public in the USA. Yet higher US interest rates and the risk aversion that those incite in stock trading have led to lower liquidity in US stocks. Of the eighteen Brazilian IPOs issued in the NYSE since 2017, only four, all linked to the financial industry, have daily liquidity (i.e., are traded among investors). Trading at less than USD 1 million daily, ten other Brazilian companies are off the funds' radar. These "low cap" companies are also less covered by global analysts and hence attract less investor interest. In this context, competing with 8,000 other companies in the NYSE becomes unsustainable, given the considerable fixed costs involved (*Valor International*, 2023). Should they return to the Brazilian Stock Exchange, these companies will find a financial infrastructure that uses technological innovation as a key adaptive strategy to expand its impact on a still-constrained domestic financial system.

3 Conclusion

Financial infrastructures are not merely a set of static foundations on which financialization is played out. As new studies have established, they are actors dynamically engaged in the competitive process of further expanding financial activities. Technological advances are believed to potentialize this role of financial infrastructures, expanding modes and strategies for investing, as well as connecting local and global markets.

Focusing on the largest economy in Latin America, with the largest capital market and stock exchange, we have argued that the extent to which financial infrastructures shape markets in middle-income economies is a function of structural (path-dependent) and conjunctural conditions (cyclical and less unique to the case). Despite significant technological and managerial advances in the operationalization of the national stock exchange, amid an increasingly more enabling regulatory environment, Brazil's fundraising in capital markets is still relatively limited and greatly affected by macroeconomic cycles, particularly fiscal policy uncertainties – a structural characteristic of the local economy in spite of notable improvements since the 1990s. Persistently high-yielding public bonds still crowd out private securities for the most part. The country's modern stock exchange hence operates within constraints that make evident the nonlinear connection between the growing technological mastery and ambition of financial infrastructures and the deepening of financial markets. Indeed, infrastructural advances may be necessary but insufficient steps toward this end.

Once we dismiss the deterministic assumption that the development of infrastructures leads to the development of capital markets in the aggregate, we can better understand not only "the facilities and rigidities" *created by* financial infrastructures in financial (re)organizing, as Hall et al. (2023, p. 3) suggest, but also the "facilities and rigidities" within which they operate. What happens despite or even as a result of existing constraints, as well as what fails to materialize given enduring structural obstacles and unfavorable conjunctural trends inform our understanding of financial "development" beyond teleological expectations. This is not just about finding out how infrastructures can help overcome obstacles to (macro)financial development – they simply may not – but, rather, how different platforms are continuously modernizing given domestic obstacles to more robust market development, in a progression that is more adaptive "evolution" than partial equilibrium (thwarted growth).

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Notes

1. The full quote reads: "you only find out who is swimming naked when the tide goes out." This was mentioned in reference to "assessing the soundness of reinsurance protection" and the need to apply a "stress test to all participants in the chain," being sure to "contemplate a catastrophe loss occurring during a very unfavorable economic environment" (Berkshire Hathaway Inc., 2001).
2. As Heng et al. (2016, p. 12) point out, "recent economic studies document the existence of a certain threshold of financial development beyond which additional deepening generates decreasing returns to growth and stability. One possible explanation is that large financial systems divert resources from productive activities to speculative and risky financial investments. Also, excessive leverage and risk-taking can lead to increased economic and financial volatility with potentially negative consequences for long-term growth, especially if regulation and supervision are inadequate."
3. The World Bank defines "financial depth" more narrowly as "domestic private credit to the real sector as percentage of local currency GDP," deliberately excluding "credit issued to governments, government agencies, and public enterprises." Also excluded are credit issues by central banks. See: www.worldbank.org/en/publication/gfdr/gfdr-2016/background/financial-depth (Accessed September 24, 2024).
4. The second-largest economy in Latin America, Mexico, also features a bank-based financial system. Banks account for half of the whole Mexican financial system, which remains "relatively small." With assets of about 100% of GDP, the Mexican financial system is smaller than that of peer developing economies and has not grown much in size and complexity since 2016. In particular, the use of capital markets for firm financing is "limited" (IMF, 2022, p. 15).
5. In just over a year since its launch in November 2020, Pix recorded 114 million users, or 67% of the adult population (Duarte et al., 2022). It is used by more than 800 financial institutions, and dominates all forms of retail payments, including credit and debit cards (Banco Central do Brasil, 2023).
6. The analysis developed here on the below-expectations development of the Brazilian capital markets despite marked technological advances in the country's stock exchange complements Ionnou and Wójcik's (2022, p. 65) study of fintech firms in Latin America. Notwithstanding the sector's much-landed and quick growth, fintech firms "have not challenged but contributed to an already high level of concentration in the geographies of financial services in Latin America." These firms have not displaced bank incumbents, making clear that contextual, structural conditions go a long way in explaining the "gulf between the expectations that FinTech will decentralize finance in spatial terms, and the reality of FinTech enhancing the power of established financial centers."
7. Even though some authors have associated high interest rates with greater financialization in developing countries (Kaltebrunner and Painceira, 2017; Karwoski, 2020), that was linked to capital inflows, not domestic capital markets.

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