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Raising municipal revenue through air rights: A case study of São Paulo, Brazil

Gharad Bryan, Flávia Leite, Camila Maleronka, Juliana Oliveira-Cunha, Caterina Soto Vieira, and Nick Tsivanidis

MARCH 2026

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Gharad Bryan is an Associate Professor at the London School of Economics and Political Science, an Associate of the STICERD Economic Organisation and Public Policy Programme, and a Research Programme Director for the IGC Cities research programme. His research interests include development economics, behavioural economics, and experimental economics.

Flávia Leite is a Ph.D. candidate in the Department of City and Regional Planning at the University of California, Berkeley and a fellow at the Institute for Applied Economic Research (IPEA) in Brazil. Her research fields are housing and land policy.

Camila Maleronka holds a Ph.D. in Urban Planning from the University of São Paulo (2010). Her work focuses on land-based financing instruments, housing policy, and urban planning, with extensive experience leading and coordinating projects with municipalities, international organisations, and research institutes across Brazil and Latin America.

Juliana Oliveira-Cunha is a Ph.D. student in Economic Geography at the London School of Economics and Political Science. She also works as Policy Economist for the International Growth Centre's Cities that Work initiative, helping to translate economic research into clear urban policy guidance.

Caterina Soto Vieira is a Ph.D. candidate in the Department of Economics at the London School of Economics and Political Science. She holds a MSc from PUC-Rio and a BSc from University of São Paulo. Her research fields are Urban, Labour and Development.

Nick Tsivanidis is an Assistant Professor at the University of California, Berkeley Haas School of Business, a fellow at the National Bureau of Economic Research, and a Research Programme Director for the IGC Cities research programme. His research interests include transport and housing in developing countries.

Executive summary

Land value capture (LVC) can be a powerful tool for local governments to finance urban infrastructure and recover part of the unearned land-value increases that result from public investments or regulations. This helps ensure that the benefits of urban development are reinvested in the city for the benefit of the wider population.

São Paulo, the largest city in Latin America, has been a pioneer in implementing LVC. Over the last two decades, the Brazilian city has deployed multiple mechanisms to capture increases in land value. These include two air right tools: the **Charges for Additional Building Rights (OODC)** – applied throughout the city – and the **Certificates of Additional Construction Potential (CEPACs)** – tied to special planning zones called **Urban Operations (UOs)**. Both instruments allow the sale of development rights beyond the basic zoning allowance, with the proceeds earmarked for public infrastructure investment. Between 2004 and 2022, these mechanisms generated more than USD 4.5 billion in revenue, equivalent on average to 8% of the city's annual property tax revenue.

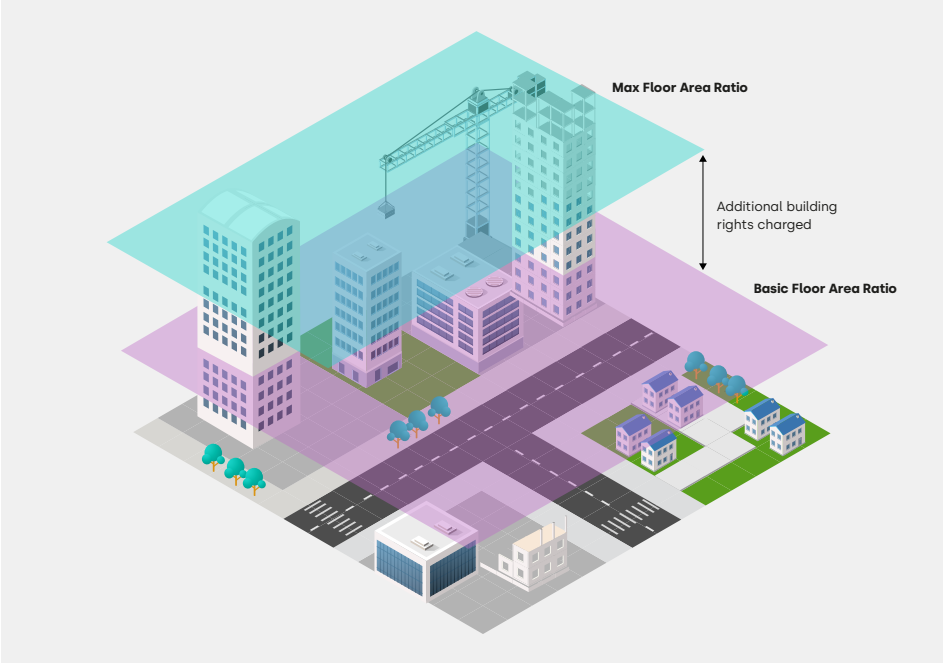
Although both instruments aim to monetise "air rights", their design and impact differ substantially. Drawing on descriptive analysis of administrative and survey data, as well as interviews with developers and policymakers, this case study examines how the two instruments work on the ground, including how they perform in terms of revenue generation, investment, and urban development outcomes. The discussion highlights key considerations and lessons for other cities contemplating the adoption of air rights.

Introduction

Cities across the world have ample plans to invest in necessary infrastructure and public assets, but these are often devoid of clear strategies on how to fund them. In São Paulo, the municipality addressed this challenge by pioneering the use of air rights. This often-underused land value capture (LVC) instrument can be a mechanism to mobilise substantial public resources by recouping part of increase in land value generated by public investments and regulations.[1]

The term "air rights" refers to the legal authorisation to build additional floors or density beyond standard zoning limits, usually in exchange for financial contributions or investments in public infrastructure (see **Figure 1**). Unlike standard density bonuses, which rely purely on zoning permissions, air rights can be treated as an asset when the public sector owns or controls the space above land or infrastructure.

Figure 1: Charging for additional building or "air rights"



Source: Collier et al. (2023).

The most prominent air rights tools deployed in São Paulo are the **Charge for Additional Building Rights** *(Outorga Onerosa do Direito de Construir, OODC)* and the tradable **Certificates of Additional Construction Potential** *(Certificados de Potencial de Construção*

1 LVC instruments can take different forms. These include tax-based instruments, such as land and property taxes, betterment contributions, and special assessments; land-based instruments, including public land leasing, land readjustment, and joint development; and development-based instruments, such as density bonuses, exactions, impact fees, and, in particular, air rights.

Adicional, CEPACs), which are tied to special planning zones known as Urban Operations *(Operações Urbanas Consorciadas,* UOs*)*.

While both are forms of air rights and are based on the same conceptual foundation, their design features are different:

- OODC is based on fixed, formula-driven prices set by the city's masterplan based on location and land use. Revenues flow into a municipal fund, known as FUNDURB, administered by public sector and civil society representatives. This instrument follows a redistributive approach sometimes described as "Robin Hood", with proceeds from high-demand areas financing infrastructure in under-served neighbourhoods.

- CEPACs are sold through public auctions on the Brazilian Stock Exchange, with final prices determined by market demand. They are tied to specific Urban Operations, which restrict the use of revenues to projects defined and overseen by each UO's management committee. This governance structure results in highly localised spending, with funds raised through CEPACs invested exclusively within the UO boundary, predominantly in transport infrastructure.[2] The most successful UOs are in some of the city's most desirable and expensive areas.

OODC and UOs/CEPACs are complementary instruments: together they are intended to address different conditions and stages of urban development. OODC is intended for areas where existing infrastructure can support densification. UOs/CEPACs are applied in areas where major structural investments are required upfront to ensure that new development is accompanied by the infrastructure it needs. In São Paulo, CEPAC revenue has financed major infrastructure projects in areas that required upgrading to keep pace with rising congestion and urban growth.[3]

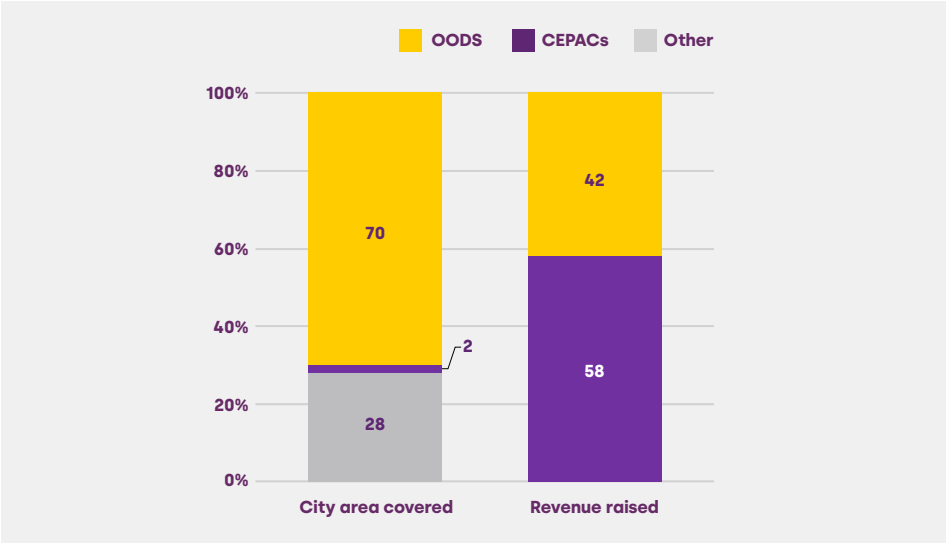
Between 2004 and 2022, these mechanisms generated more than USD 4.5 billion in earmarked revenues. This equates to a little more than USD 230 million per year, or approximately 8% of the city's annual property tax revenue[4] as shown in **Figure 2**.

- OODC, applied across 70% of the city's zoned area, raised USD 1.9 billion, corresponding to 42% of total air rights revenue.

- CEPACs, which apply to just 2% of the city's zoned area, generated USD 2.6 billion, accounting for the remaining 58%.

2 This is a general rule, although there are exceptions.
3 Furtado and Maleronka (2023).
4 This average comprises the 2014-2022 period.

Figure 2: Share of city area covered and revenues raised by air rights, 2004–2022



Source: Authors based on zoning maps and LVC revenues available in Geosampa (2026) and Gestão Urbana (2026). The zoned area covered by the OOCD refers to 70% as it excludes zones where the max FAR equals 1 ("Other" in the chart).

This case study draws on São Paulo's experience of leveraging air rights. It begins by situating these instruments within Brazil's national regulatory framework and describing their implementation in São Paulo. The main section examines their outcomes, focusing on both the revenue raised and the resulting investments in public goods and services. We then present suggestive evidence that the two instruments may have different spatial effects, an issue that merits further research, as discussed in **Box 1**. We conclude by discussing key considerations and lessons for other cities considering the adoption of air rights.

BOX 1: THE ECONOMICS OF LAND VALUE CAPTURE

Despite the growing use of land value capture instruments – including air rights – to finance public infrastructure, there is still limited evidence on how these tools affect urban development in practice, beyond the revenue they raise.

One key concern is **who ultimately pays**. If developers are able to pass air rights charges on to buyers, land value capture may raise housing prices, shifting the burden from landowners to households. Whether this happens depends on local market conditions, including developers' market power and competition conditions.

Another important question is **how these instruments affect development** itself. Charges that are set too high may discourage construction by making projects financially unviable, while charges that are too low may fail to capture land value and provide little incentive for more intensive land use. In this sense, the specific design and pricing of each instrument – whether through competitive auctions, administratively set values, or negotiated charges – shape how development patterns unfold.

The making of São Paulo's air rights tools

A central feature of Brazil's land policy framework is the concept of "created land" *(solo criado)*, which establishes a common baseline of air rights for all urban properties. This baseline is expressed through the basic floor area ratio (FAR), which defines the amount of building rights inherently available as-of-right on a parcel of land. Any construction potential beyond this baseline is not considered a private entitlement but rather a public asset. By charging for additional building rights above the basic FAR, municipalities can capture a share of the unearned increments in land value that result from regulatory decisions and infrastructure provision.

The concept of *solo criado* emerged in São Paulo in the 1970s amid rapid verticalisation of the city's skyline, and shortly after the adoption of its first comprehensive zoning law. Although the idea was influential in shaping planning debates, it was not immediately implemented. In the same period, the notion of an Urban Operation was also formulated, conceived as a strategic intervention in specific parts of the city where public and private actors could collaborate to finance and implement urban improvements.[5]

By the early 1990s, São Paulo had already begun experimenting with UOs. The first initiatives – *Anhangabaú* (1991, later expanded as Centro in 1997), *Faria Lima* (1995), and *Água Branca* (1995) – helped forge a culture of paying for air rights. These experiences gradually informed more ambitious institutional proposals. In the Faria Lima law of 1995, the idea of issuing tradable certificates, CEPACs, was introduced, though they would only be operationalised some years later, given legal uncertainty over whether such titles would constitute public debt.

Similarly, OODC was only made viable in São Paulo in the 2000s. Earlier attempts at broader reform had faced political resistance. In 1990, the municipal government had already drafted a bill proposing payments for air rights alongside a uniform basic FAR across the city, but the proposal was rejected in the face of strong and openly mobilised opposition from the real estate sector.

It was only with the adoption of São Paulo's 2002 masterplan, following the approval of Brazil's City Statute in 2001, that charging for air rights was formally institutionalised. The City Statute established the legal basis for municipalities to levy charges on additional building rights, notably through OODC and UOs/CEPACs.

5 Maleronka (2010).

The initial draft proposed a basic FAR of 1.0 across the entire municipality, with any construction beyond that limit subject to financial compensation to the city.[6] Again, strong opposition from the real estate sector and the municipal finance secretariat led to changes during the legislative process, and the final version established differentiated basic FARs of 1.0 or 2.0, depending on the zoning, alongside higher maximum limits and the general rule of charging for additional building rights through OODC.

The 2002 masterplan also defined the formula for calculating such compensation, introducing the notion of "virtual land" *(terreno virtual)* as a way to measure and price air rights, and including adjustment factors for planning goals and social interest. Revenues collected through OODC were allocated to an urban development fund (FUNDURB), earmarked for investments in housing, mobility, infrastructure, and environmental projects across the city.

A new regulatory milestone was reached with the 2014 masterplan, which finally adopted a single basic FAR of 1.0. This reform simplified the structure of the instrument and reaffirmed the principle that air rights beyond the basic FAR belong to the municipality for the benefit of all residents. It also modified the calculation formula with new incentives, discounts, and a revised basis for land valuation. These changes expanded the scope of OODC's application and defined the framework under which it continues to operate.

The experience of São Paulo with land value capture instruments has shaped urban policy across Brazil.[7] The federal law incorporated mechanisms like OODC and Urban Operations into national legislation, providing a legal framework for municipalities across the country to charge for air rights.

While São Paulo remains the largest and most consistent user, other Brazilian cities such as Manaus, Recife, and Belo Horizonte have also implemented these tools, often adapting them to local contexts. In several cases, the resulting revenues have been used to finance transport corridors, social housing, and public space upgrades. At the same time, many municipalities continue to face implementation challenges, which helps explain why the adoption of these instruments has remained uneven despite their national legal basis.

6 For comparison purposes, the American Planning Association presents a FAR range from a sample of U.S. cities, ranging from very low (0.30) to quite high (5.00), depending on land use and zoning district.

7 Cities like Curitiba and Porto Alegre had already introduced versions of solo criado before the 2001 City Statute.

Urban Operations and the Certificates of Additional Construction Potential

In São Paulo, Urban Operations have been used primarily as a tool for "upzoning", allowing higher densities and new uses within a defined perimeter. In exchange for the air rights granted, developers must pay compensation to the city: this finances the public works and improvements set out in the UO's plan.

The form of compensation is defined in the specific law that creates each UO. One way through which it may take place is through the acquisition of Certificates of Additional Construction Potential (CEPACs), which are securities issued by the municipality within the scope of the operation.[8]

CEPACs are registered with Brazil's securities market authority, the Securities and Exchange Commission *(Comissão de Valores Mobiliários, CVM)*, and sold through public auctions or private transactions. Because they are treated as financial assets, they can be traded freely on the secondary market and acquired by investors who are not themselves developers. However, interviews with developers and CEPAC brokers revealed that these instruments are considered too expensive and illiquid for speculative purposes, resulting in a small secondary market, used mostly to trade leftover CEPACs that were meant to be used in real estate projects.

The municipality establishes a minimum bid price at issuance, but the effective trading price is determined by supply and demand. Importantly, purchasing CEPACs (or paying any other form of compensation) is only required for those who wish to build beyond the free entitlement guaranteed by the legislation for that UO area. Developers can still undertake projects at the basic level without acquiring certificates.

In UOs where CEPACs are adopted, the specific law establishes both the maximum number of certificates to be issued and the total amount of additional floor space for the perimeter of the UO. Each certificate can be used only within the UO for which it was created and cannot be redeemed by the municipal treasury; its sole function is to serve as a means of exchange for additional building rights. The law also sets equivalence factors that determine how many square metres of additional construction each CEPAC corresponds to.

A certificate is converted into additional floor space only when it is linked to a specific parcel inside the UO's perimeter. Depending on the location of the property within that perimeter, different equivalence

8 In some cases, instead of utilising CEPACs, developers are required to make direct payments to the municipality when applying for building permits.

factors may apply, meaning that the same CEPAC can represent more or fewer square metres according to the rules defined in the UO.

The main UOs in São Paulo are *Água Branca* (UOAB), *Água Espraiada* (UOAE) and *Faria Lima* (UOFL) – all approved between 1995 and 2001.[9]

- **Água Branca:** UOAB was created in 1995 in an industrial area of the city, with the goal of containing manufacturing uses and promoting commercial and residential development, including social housing. CEPACs were only introduced after a major revision in 2013. This UO faced two key challenges that undermined its performance. First, the municipality and city council overpriced the certificates in the initial auction, making projects financially unviable in an area where developers operated with tighter budgets compared to more attractive UO locations. Second, the approval of a new masterplan in 2014 opened up numerous other areas for real estate development, intensifying competition and further discouraging investment in Água Branca. As a result, the UO has failed to attract significant market interest. To date, only two CEPAC auctions have been held, both with weak results. For these reasons, this case study does not examine Água Branca in detail.

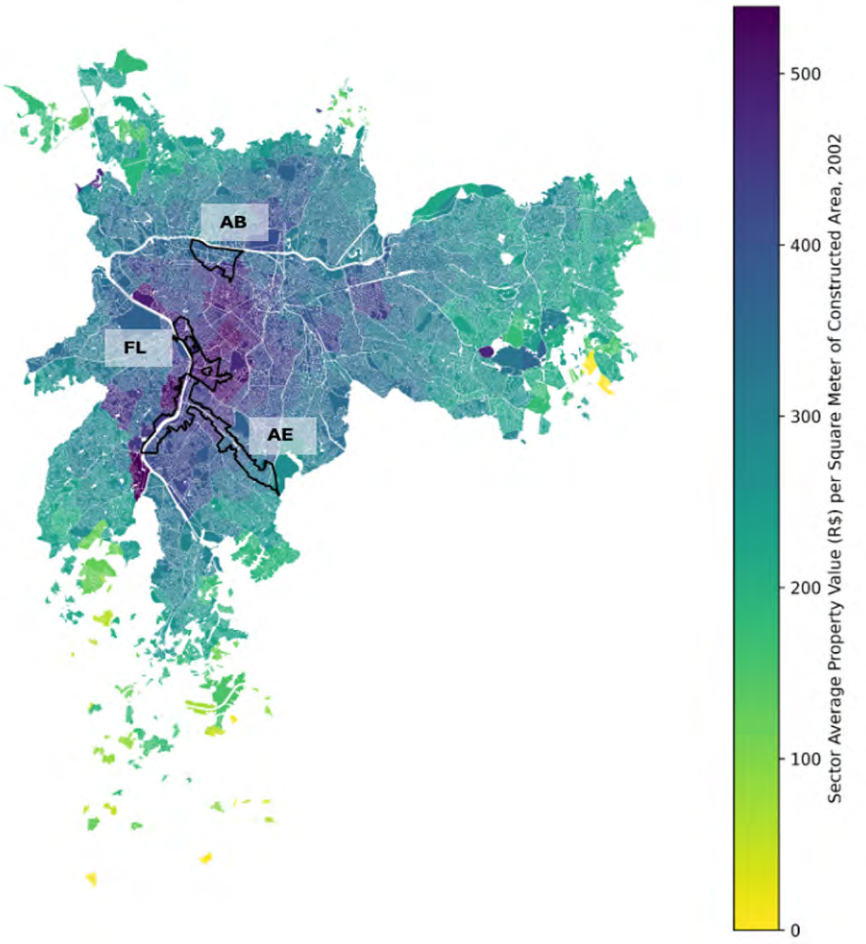
- **Água Espraiada:** UOAE was approved after the formal regulation of the instrument by the City Statute in 2001. The idea for this operation, however, dated back to the late 1980s, when city planners had already considered the construction of an avenue over the Água Espraiada stream to channel development into this area. In the 2000s, the project was expanded to include a broader development corridor, conceived as a natural extension of the Faria Lima corridor. The Água Espraiada UO authorised a maximum issuance of almost 4.5 million CEPACs, corresponding to 4,600,000 square metres.

- **Faria Lima:** UOFL's main objective was to expand infrastructure in the city's most developed business district, enhancing road and pedestrian accessibility, prioritising public transportation, and restructuring public spaces such as streets and squares. Covering an area of 650 hectares, the operation authorised the issuance of up to 1 million CEPACs, equivalent to 2,250,000 square metres of additional building rights.

The main UOs in São Paulo are shown below in **Figure 3**. The perimeter of the three UOs where CEPACs are bought and sold is delimited by the black lines in the map; the rest of the city is subject to OODC. The figure also shows the average price per square metre of constructed area by fiscal blocks using property tax data from 2002.

9 Currently, there is one more active UO in São Paulo: *Bairros do Tamanduateí*. It was approved in 2024, and it has not yet held any CEPAC auctions, therefore it will not be addressed in this case study. The UO Centro remained in place until 2022, when it was replaced by a new urban programme for the central area of the city. Unlike other UOs that focused on financing large new infrastructure and expansion areas, it emphasised revitalising the historic centre through public space upgrades, building restoration, and improving urban amenities. Its objectives were therefore less about stimulating new large-scale construction and more about reversing decline and attracting residents and businesses back to the downtown area.

Figure 3: Average property value per square metre of constructed area, 2002



Source: Authors based on property tax data. Figures in Brazilian Real (2002).

A few observations can be drawn from **Figure 3**. First, the rest of the city has, on average, lower property values than areas with UOs. Second, there is some heterogeneity across UOs, with Água Branca showing lighter colours than Faria Lima and Água Espraiada. Third, there is also heterogeneity within UOs: some areas of Água Espraiada display much lighter colours than its most prestigious areas closer to Faria Lima, where the colours are dark purple.

This rest of this case study focuses on these last two urban operations (UOFL and UOAE), the most important and successful examples of CEPAC implementation in São Paulo. UOFL and UOAE held the first CEPAC auctions in 2004, following the regulation of the certificates by CVM in 2003. In **Tables 1** and **2**, we list the auctions in both UOs, showing the dates on which they occurred in the first column.

Table 1: Auctions in Água Espraiada

Auction date	CEPACs offered	CEPACs sold	% Sold	Premium over the minimum price (%)	Total revenue (USD 2022)
Jul-04	100,000	100,000	100	0	20,211,084
Dec-04	70,000	16,899	24.1	0	3,529,320
Nov-05	56,500	56,500	100	0.27	13,279,008
May-06	180,000	125,969	70	0	29,026,953
Jan-07	50,000	50,000	100	2.75	12,197,576
Apr-07	100,000	100,000	100	0	24,396,339
May-07	167,781	158,773	94.6	0	38,732,914
Feb-08	186,740	186,740	100	141.3	110,508,873
Oct-08	650,000	379,650	58.4	0	108,286,421
Aug-09	73,500	73,500	100	0.74	23,624,774
Nov-09	175,000	72,270	41.3	0	26,418,513
May-10	170,000	137,346	80.8	0	48,666,819
Jun-10	30,000	300,00	100	0	10,726,758
Jul-10	100,000	70,000	70	0	25,497,422
Aug-10	439,075	336,914	76.7	0	125,225,053
Apr-12	600,000	600,000	100	40.11	326,272,327
Jun-12	900,000	760,338	84.5	0	420,347,651
Jul-22	160,000	160,000	100	41.49	93,090,909
Nov-22	160,000	18,100	11.3	0	10,577,278

Source: Authors based on SP Urbanismo data.

Table 2: Auctions in Faria Lima

Auction date	CEPACs offered	CEPACs sold	% Sold	Premium over the minimum price (%)	Total revenue (USD 2022)
Dec-04	90,000	9,091	10.1	0	6,737,095
Oct-06	10,000	2,729	27.29	0	1,869,529
Oct-07	156,730	156,730	100	1.25	115,355,690
Mar-08	83,788	83,788	100	18.31	68,703,332
Feb-09	100,000	55,612	55.61	0	49,370,748
Mar-09	30,000	1,521	5.07	0	1,362,215
Oct-09	120,000	120,000	100	13.51	131,599,068
May-10	92,151	90,636	98.36	84.33	179,668,368
Nov-15	50,000	28,419	56.84	0	67,174,882
Aug-16	30,000	2,405	8.02	0	5,149,087
Sep-17	45,000	9,781	21.74	0	20,720,138
Dec-19	93,000	93,000	100	169.5	473,620,807
Oct-21	12,154	10,318	84.89	0	52,546,446

Source: Authors based on SP Urbanismo data.

There is no established periodicity for auctions, and the intervals between them have varied considerably, with long periods of inactivity. According to developers, this has been one of the main design flaws of Urban Operations, as it increases the risk of building in these locations by creating the possibility that developers may have to wait years to acquire CEPACs and build up to the maximum FAR levels. For example, **Table 2** shows that UOAE did not hold any auctions for almost 10 years between 2012 and 2022.

The quantities offered in each auction, displayed in the second column, are determined case by case by the city, and have varied considerably. For example, if the city wanted to develop an additional 100,000 square metres, it would sell 50,000 CEPACs, each worth 2 square metres.

While the law for each operation sets a minimum price for the CEPAC, every new issuance must be preceded by a feasibility study estimating their value under prevailing market conditions. In practice, however, the city has used the closing price of the previous auction as the minimum for the next. The only exception occurred in 2008, when the municipality drew on the feasibility study to lower the starting price of an Água Espraiada auction, after the previous sale had produced a substantial premium.

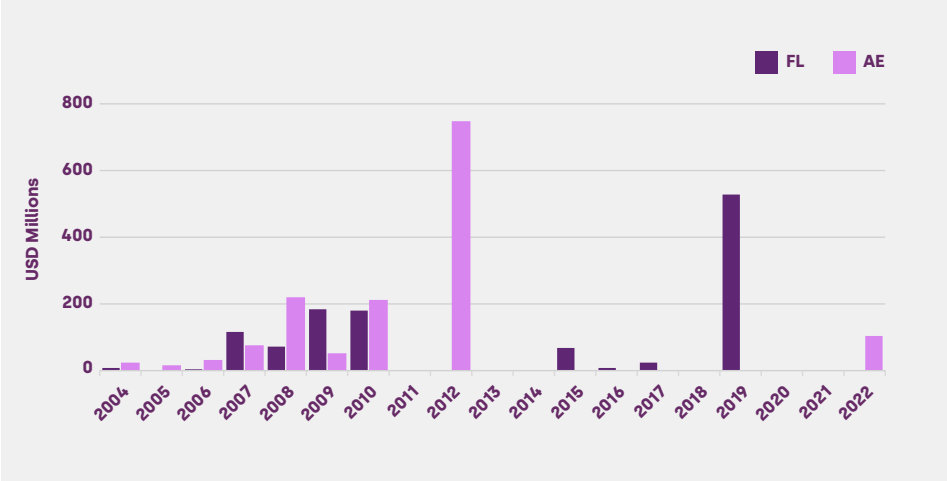
In both Urban Operations, a high premium over the minimum price signals a successful auction, marked by strong competition and, in most cases, 100% of CEPACs being sold. However, the data also highlight the risk of mispricing the minimum auction price. When the floor price was set too high relative to market demand, auctions attracted little interest and only a small share of CEPACs was sold, a pattern particularly visible in the Faria Lima UO.

More broadly, despite the attractiveness of the locations, competitive bidding and the use of auctions as a genuine price-setting mechanism have been the exception rather than the rule. Only about half of the auctions in UOAE, and less than a third of the auctions in UOFL resulted in all the offered CEPACs being sold. In most cases, CEPACs were transacted at the minimum price set by the municipality, indicating that there was a mismatch between the developers' willingness to pay for CEPACs and the minimum prices that were set for them.

Even with these challenges, the revenues generated by both operations have been significant, as shown by **Figure 4**.

Revenues

Figure 4: CEPAC revenue collection in UOAE and UOFL, 2004-2022.



Source: Authors based on SP Urbanismo data. Figures in USD millions, 2022 inflation adjusted.

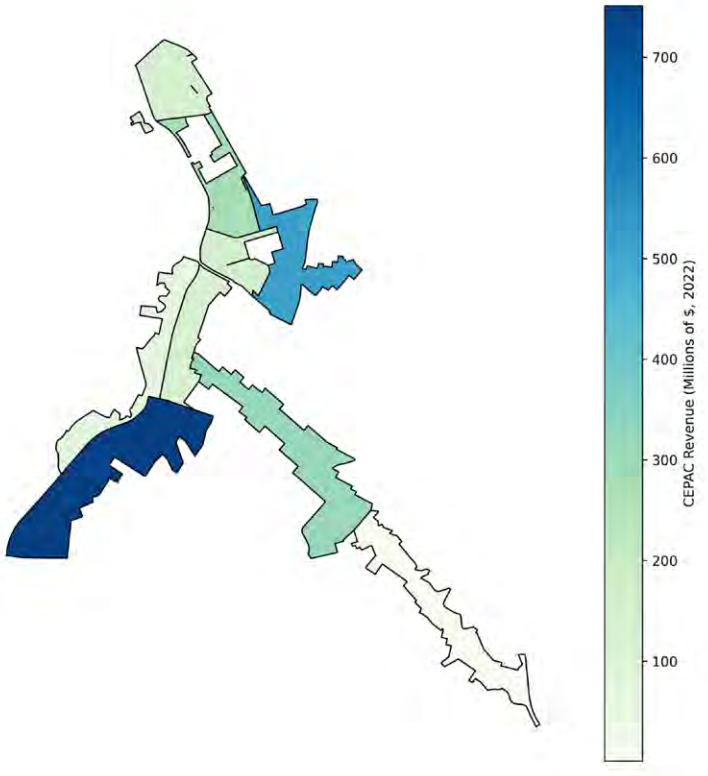
Between 2004 and 2010, there was a relatively steady sequence of auctions, generating recurring annual revenues in the range of USD 100–200 million and consolidating the instrument in its early years. After 2010, however, this pattern gave way to long gaps, with entire years showing no activity and only a few isolated peaks, when revenues exceeded USD 700 million and USD 500 million.

It is important to note that between 2002 and 2014, zoning regulations in São Paulo placed significant restrictions on real estate development in the neighbourhoods most sought after by developers. Urban Operations were the exception: they provided relatively favourable conditions, with higher FARs that made them attractive arenas for new projects. After the 2014 zoning reform, however, the maximum FAR of 4.0 – previously available only within Urban Operations – was extended to many other parts of the city. Coinciding with this change, the number of CEPAC auctions declined, as the relative advantage of developing within Urban Operations diminished.

Each UO has sub-areas with different specifications. They vary in the amounts of additional floor space available, how much a CEPAC is worth in terms of square metres, and other planning characteristics, such as the minimum lot size that could use CEPACs. Some sub-areas were allowed to build more floor space than others, depending on the existing properties and constructed area when the UOs were approved.

Figure 5 shows the distribution of CEPAC revenues by sub-areas within São Paulo's Urban Operations. The northern area corresponds to the UOFL and the southern area to UOAE. We use data from *SP Urbanismo* – a public company of the City of São Paulo responsible for linking CEPACs to land plots and for managing how much floor space has been used already in each sub-area. Combining information from both auctions and CEPAC-to-plot matches, we build an estimated cost for each development that purchased and used CEPACs, which allows us to calculate the revenue raised by the city per sub-area.

Figure 5: CEPAC revenue by UO sub-area, 2004-2022



Source: Authors based on SP Urbanismo data. Figures in USD millions, 2022 inflation adjusted.

The largest revenues are concentrated in the sectors where the operations authorised the greatest amounts of additional floor area. In other words, revenue patterns largely reflect the allocation of development potential defined in each UO's legislation.

Expenditure

Each Urban Operation is established by a specific municipal law that sets out a "programme of interventions", to which all revenues raised must be allocated. CEPAC issuances are tied to defined packages of projects within this programme and require approval from the operation's management group. Composed of representatives from both government and civil society, the management group is responsible for prioritising the planned interventions.

In both UOFL and UOEA, the programmes of interventions are relatively broad and encompass projects of different types, including road infrastructure, public space improvements, and social housing. Using the records of spending with CEPAC funds, we tabulate this into aggregate categories in **Table 3**.

Table 3: Infrastructure spending funded with CEPACs by category, 2004-2022

Category	Spending (USD 2022)	Share of total
Transportation and mobility	668,146,702	58.69%
Urban amenities	141,293,049	19.18%
Housing policy	76,922,779	12.31%
Green spaces	56,795,400	4.96%
Local planning	27,965,428	2.45%
Water and electrical infrastructure	26,551,534	2.32%
Green spaces	960,416	0.09%
TOTAL	**998,635,308**	**100%**

Source: Authors based on SP Urbanismo data. Figures in USD, 2022 inflation adjusted.

The total spending with CEPAC-originated revenue is about USD 1 billion. This represents close to 40% of the total revenue raised by selling CEPACs, showing that Urban Operations have been much more successful at raising revenue than re-investing the funds back into the areas in the forms of public goods and services. Although this gap is mostly a spending inefficiency, related to bureaucratic delays, it raises concerns about transparency, institutional bottlenecks, and the opportunity costs of funds that could otherwise support public infrastructure and housing needs.

Most funds (58.7%) have been spent on transport and mobility infrastructure, particularly road projects, such as the Estaiada Bridge (**Figure 6**) and the construction of two tunnels under the Faria Lima Avenue, which made possible the implementation of BRT corridors.

Figure 6: Estaiada Bridge (UOAE)

Source: São Paulo Municipality.

Close to 20% was spent on urban amenities, and 12.3% on housing policy (although more recent legal revisions have earmarked a substantially higher share for social housing, rising to 35% in the 2024 update). The other categories represented much smaller shares of investment.

Housing investments deserve special mention. Both UOs included programmes to resettle households from informal settlements located within or around their perimeters. New housing complexes have been delivered for former residents, though post-occupation challenges remain significant.

In Faria Lima, the programme covered Favela Coliseu, located within the operation's perimeter, as well as Real Parque and Jardim Panorama in the surrounding area. Resettlement in Coliseu and Real Parque has already been completed, while Jardim Panorama has yet to be implemented. In Água Espraiada, demand for social housing is substantial and, despite the delivery of several projects, remains far from fully met. Among these interventions, the Jardim Edite complex stands out as a particularly symbolic case. Completed in 2014, it introduced social housing on one of the city's most valuable sites (see **Figure 7**).

Figure 7: Jardim Edite **social housing**

Source: IMAGO / Xinhua.

A key feature of Urban Operations is that they concentrate infrastructure investments within their boundaries, creating, at least in theory, a self-reinforcing mechanism. From a developer's perspective, this design is central to maintaining incentives: the expectation that revenues will be reinvested locally supports future land value appreciation within the operation area, helping to justify the upfront cost of acquiring additional building rights. From the municipality's perspective, the same mechanism enables the mobilisation of high revenues, as developers' willingness to pay is strengthened when the link between contributions and local value creation is credible. Redirecting these funds elsewhere would weaken this incentive by breaking the link between payment and localised value creation.

This territorial focus and the feedback loop it generates represent a fundamental distinction between UO/CEPACs and the OODC, as the next section shows.

Charge for Additional Building Rights

While CEPACs concentrate and reinvest resources within UOs in accordance with a defined urban project, the OODC captures value citywide and redistributes infrastructure investment. Another important difference is the timing of payment: OODC is paid at the moment of licensing, as part of the building permit process, while CEPAC revenues depend on municipal auctions that occur only when new certificates are issued.

In essence, additional building rights are charged throughout the city (except in UOs) for construction above the basic FAR (as-of-right) and up to the maximum FAR. The trajectory of OODC in São Paulo can be divided into two phases. The first extends from its adoption in the 2002 masterplan until 2014, when a new masterplan introduced significant reforms and inaugurated the second phase.

The OODC formula set by the 2014 legislation describes the price paid for every additional square metre of built area:

OODC (per square metre) = (LA / CA) x AV x Fs x Fp

where LA equals the land plot area; CA refers to the additional constructed area a developer wants to build beyond the as-of-right FAR; AV is the assessed value set in the city's masterplan for different locations; Fs is an adjustment factor (social factor), varying from 0 to 1 depending on the land use (for example, social housing projects and public facilities are exempt through the multiplication of a zero factor); and Fp, a planning factor varying from 0 to 1.3, depending on the macro area in which the project is located (in areas where the city wants to incentivise development, this factor is lower, and vice versa).

Between 2002 and 2014, the basic FAR varied across the city, set at 1.0 or 2.0 depending on the zone, while maximum FARs generally reached 2.5, with some limited areas going up to 3.0 or 4.0. The 2002 masterplan introduced district-level air rights "stocks", establishing ceilings on how much additional construction could be authorised within each district.[10] In the districts most attractive to real estate developers, these air rights stocks were exhausted by the mid-2010s. Unlike the current formula (above), the calculation of compensation to be paid to the municipality relied on the official assessed land values used for property taxation (called IPTU), rather than on a specific table in the city's masterplan, which was updated from time to time but often diverged from current market prices.

The 2014 masterplan marked a turning point. It introduced a basic FAR of 1.0 for the entire city and allowed maximum FARs of up to 4.0 around mass transit corridors, with lower maximums (1.0–2.0) elsewhere. This reform substantially expanded the scope of OODC by increasing the

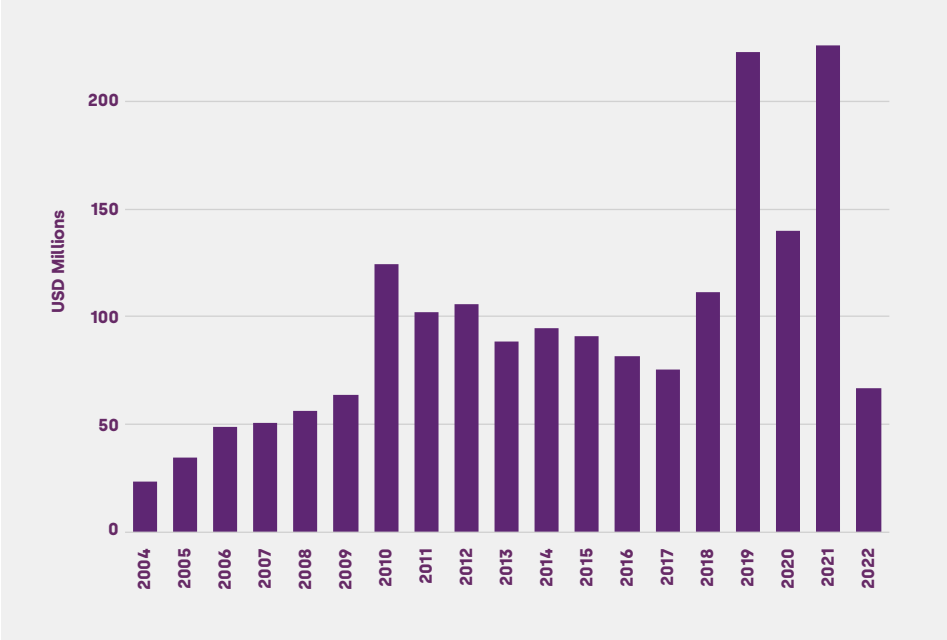
10 The city of São Paulo has 96 districts; they are equivalent to a large neighbourhood.

amount of air rights subject to taxation. It also replaced the property tax cadastre as the valuation base, with a specific table created for OODC purposes, designed to approximate market values more closely. However, this new base has not been systematically updated, aside from occasional monetary adjustments, limiting its capacity to reflect changing land market conditions.

Between the two regulatory phases, there was a long transition during which both regimes coexisted. Projects submitted before the approval of the new masterplan could continue under the previous rules, and since licensing procedures often take years, the shift from one framework to the other was gradual. This meant that the revenue curve did not immediately reflect the regulatory reform, but over time a new level of resources became evident.

Revenues

Figure 8: OODC revenue collection, 2004-2022

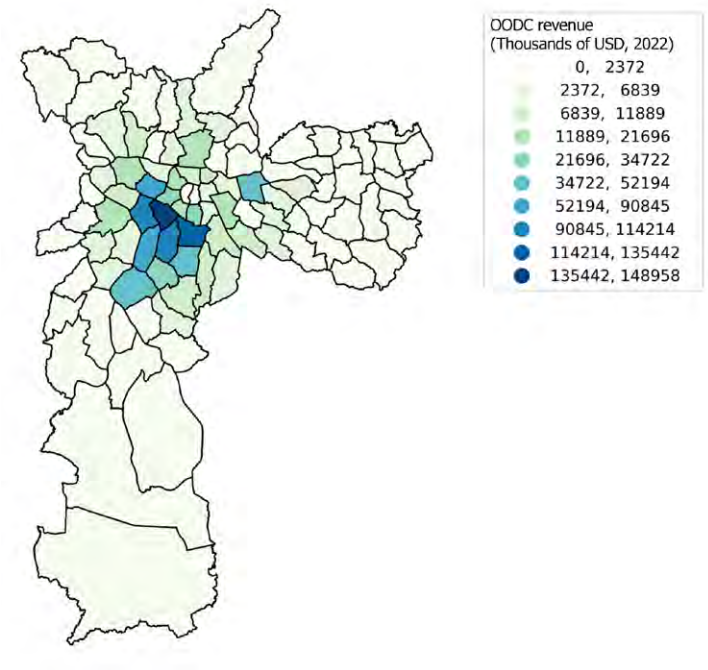


Source: Authors based on São Paulo Municipality data. Figures in USD millions, 2022 inflation adjusted.

As shown in **Figure 8**, in the first years after OODC was introduced, revenue collection grew gradually, reflecting both the consolidation of the instrument and the exhaustion of district-level air rights "stocks" in the areas most attractive to real estate developers. From 2018 onwards, revenues reached unprecedented levels – a shift that reflects the cumulative impact of the 2014 masterplan reforms, which expanded the scope of chargeable air rights and introduced a new valuation base.

The map in **Figure 9** shows the spatial distribution of OODC revenues across São Paulo between 2013 and 2022.11 During these years, up to USD 1.2 billion was collected. Collections have been highly concentrated in the central and southwestern districts, where market demand for real estate development is strongest. These areas include consolidated business districts and corridors of high-income residential expansion, where developers consistently seek to build above the basic FAR and thus generate significant payments.

Figure 9: OODC revenue across city districts, 2013-2022



Source: Authors based on São Paulo Municipality data. Figures in USD thousands, 2022 inflation adjusted.

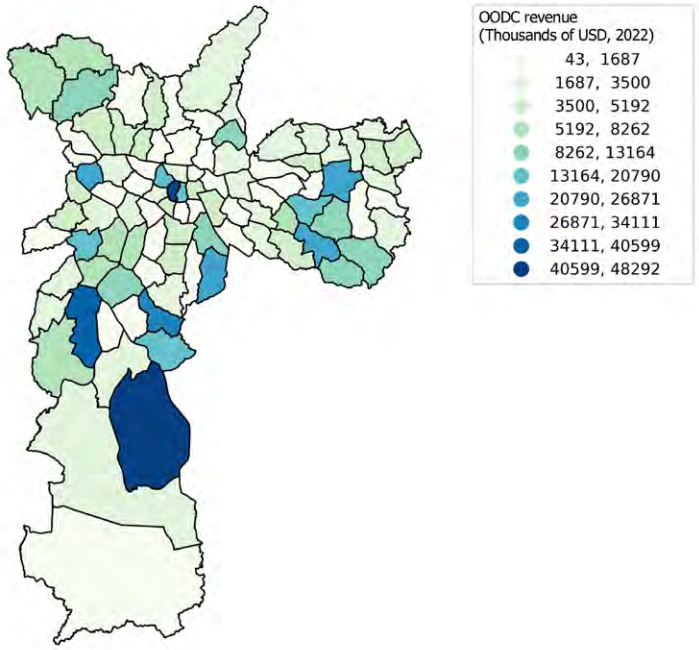
In contrast, peripheral districts contributed little to OODC revenues, even though projects paying OODC are spread across the entire city. This reflects both lower land values and limited demand for high-density projects. The pattern underscores the redistributive rationale of the instrument: although most resources are collected in the most dynamic real estate markets, they are legally earmarked to an urban development fund called FUNDURB, which can finance investments in less serviced areas of the city. FUNDURB is administered by public sector and civil society representatives.

11 We restrict the time series from 2013 and 2022 because we can only observe investment made with FUNDURB funds from that year onwards.

Expenditure

FUNDURB expenditure has not been uniform either. **Figure 10** shows that, between 2013 and 2022, spending was concentrated in São Paulo's historical centre and in some peripheral districts in the southern and eastern parts of the city, where many low-income households live. Despite a revenue collection of USD 1.2 billion during these 10 years, only 70% of that amount (USD 833 million) was spent – a lower mismatch than in the case of the UOs, but still a gap that reveals spending inefficiencies and bureaucratic delays.

Figure 10: OODC spending by city district, 2013-2022



Source: Authors based on São Paulo Municipality data. Figures in USD thousands, 2022 inflation adjusted.

Table 4 shows the breakdown of FUNDURB's spending by type of project funded between 2013 and 2022. During this period, more than two-thirds of the funds were spent on housing (43%) and transportation (30%). The investment in housing encompasses social housing projects, land acquisition, land tenure regularisation, and slum upgrading initiatives. Transportation projects include bus and bicycle lanes, as well as sidewalk and road improvements.

This shows a stark contrast with the spending in UOs, which dedicated a much smaller share of investment on housing policy. This spending, as shown in **Figure 10**, has been concentrated in the two main central districts of the city as well as in peripheral ones.

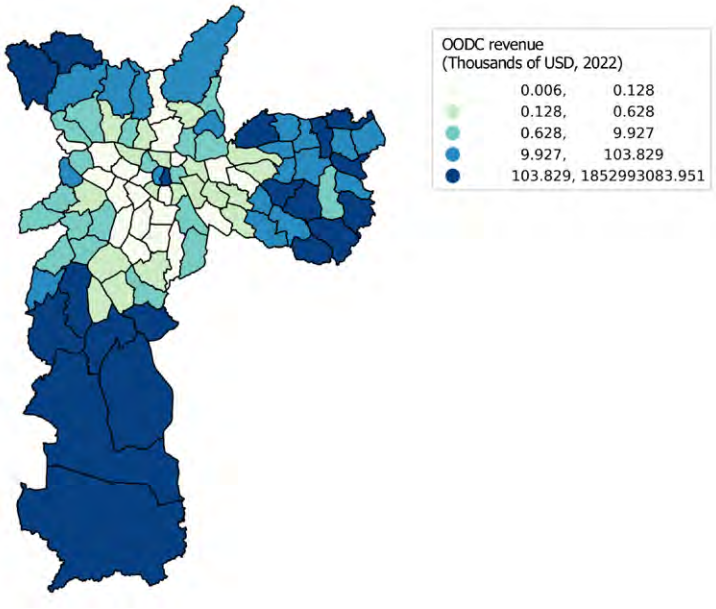
Table 4: Infrastructure spending funded with OODC by category, 2013-2022

Category	Spending (USD 2022)	Share of total
Housing policy	358,001,358	43%
Transportation and mobility	248,259,208	30%
Water and electrical infrastructure	114,605,165	14%
Green spaces	50,662,899	6%
Urban amenities	34,197,660	4%
Cultural heritage and preservation	17,470,115	2%
Local planning	9,885,589	1%
TOTAL	**833,081,994**	**100%**

Source: Authors based on São Paulo Municipality data. Figures in USD, 2022 inflation adjusted.

Another way of looking at the same issue is shown in **Figure 11**, which maps the ratio of FUNDURB spending to revenues by district. A ratio higher than 1 (indicated in darker blue) means that the amount spent (invested) in a district was higher than the amount of OODC revenues this district generated. Considering the OODC's redistributive purpose, we would expect to see higher ratios in low-income districts (predominantly located in the periphery and the city's historical centre), and lower ratios in wealthier areas.

Figure 11: Share of OODC spending over total revenue by city district, 2013-2022



Source: Authors based on São Paulo Municipality data. Ratios based on 2022 inflation adjusted figures.

Comparison of developments funded through CEPACs vs OODCs

This section contrasts the performance of São Paulo's two main air rights instruments – OODC and UOs/CEPACs – drawing on survey data of real estate launches compiled by Geoimóveis between 2006 and 2023. Geomóveis is a platform specialised in gathering detailed real estate data on new developments in Brazil's largest cities. The methodology involved identifying projects in this dataset financed through CEPACs and OODC and constructing a CEPAC–Geoimóveis crosswalk using a human-in-the-loop fuzzy matching process.[12]

For the purposes of this study, OODC developments were defined as all projects in the Geoimóveis dataset that were not associated with CEPACs and that met three criteria: buildings of at least four stories, located outside the perimeter of Urban Operations, and with only market-rate units (excluding social housing).

Revenues from CEPAC auctions have consistently been larger than those from OODC, and the analysis that follows helps to explain, at least in part, why this is the case. In the following subsections, we compare the two instruments not only in terms of total revenue, but also according to the types of development they generated. The analysis examines differences in land use (commercial versus residential projects), building standards (luxury versus standard developments) and typologies (from studios to large penthouses), as well as average unit sale prices. This allows for a better understanding of how each instrument interacts with São Paulo's real estate market and why their fiscal performance diverges so sharply.

Table 5 below highlights systematic differences between developments subject to OODC and those financed through CEPACs.

Table 5: Development characteristics by air rights instrument, 2006-2023

	OODC	CEPAC
Count	3,746	198
Residential (%)	0.93	0.83
Commercial (%)	0.07	0.19
Luxury (%)	0.27	0.60
Mean floors	16.25	21.7
Mean unit price per sqm	14,193.83	23,380.90
Mean unit area	143.83	280.13

Source: Authors based on Geoimovéis and SP Urbanismo.

12 Geoimóveis data are collected by active human search, typically involving direct calls by data collectors to developers' sales offices.

The vast majority of almost 4,000 projects in the dataset fall under OODC, while fewer than 200 are associated with CEPACs. OODC captures a predominantly residential market, with over 90% of projects being residential and only a small share being commercial (7%). By contrast, CEPAC-financed developments are more mixed, with around one-fifth of projects being commercial.

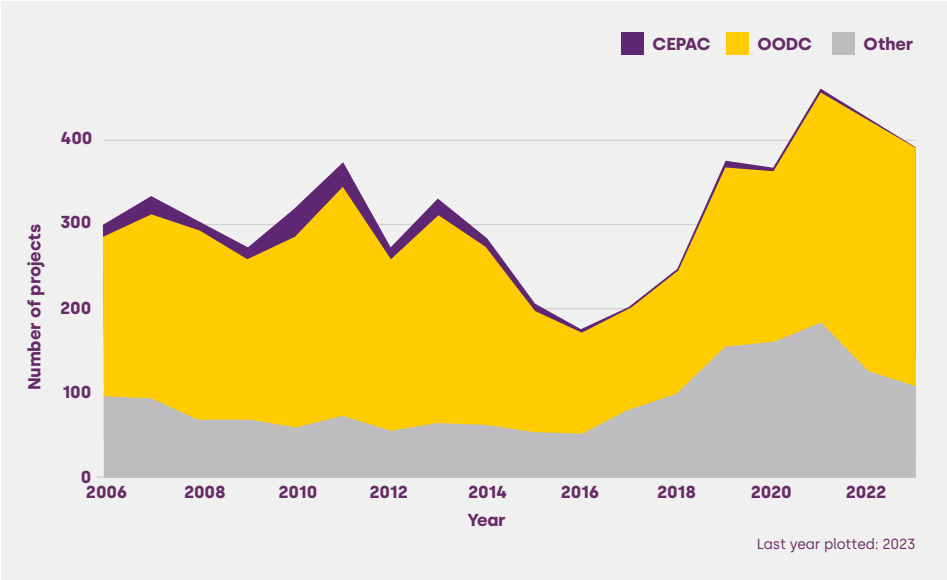
CEPAC projects also stand out in terms of product characteristics. They are much more frequently luxury developments (60%, compared to just over a quarter under OODC) and taller, averaging nearly 22 floors against 16 for OODC projects. Unit prices reflect this: the average sale price per square metre in CEPAC areas is more than 60% higher than in OODC projects, and the average unit size is almost double.

Taken together, these differences suggest that CEPACs capture the upper tier of São Paulo's real estate market, concentrated in high-end, high-rise projects, while OODC applies more broadly across standard residential production. This contrast is reinforced by the geography of UOs, which are located in a far more homogeneous portion of the city – its most highly valued districts and the central business district, where clusters of high-standard corporate towers dominate the landscape.

Although this analysis disregarded social housing typologies, it is important to note that they are exempt from OODC charges and are located predominantly outside the boundaries of UOs. This further reinforces the contrast: CEPAC revenues are tied to luxury-driven developments within delimited central areas, while OODC operates on a citywide scale but excludes the segment most oriented towards social need.

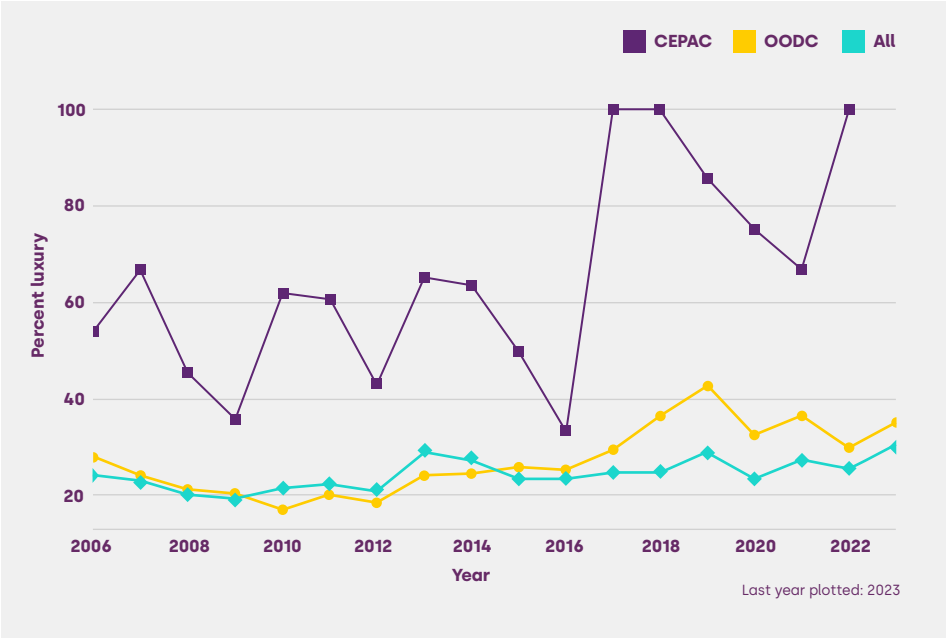
The series of charts that follows highlights the contrasting dynamics of OODC and CEPAC projects over time.

Figure 12: Number of projects in CEPAC vs OODC areas, 2006-2023



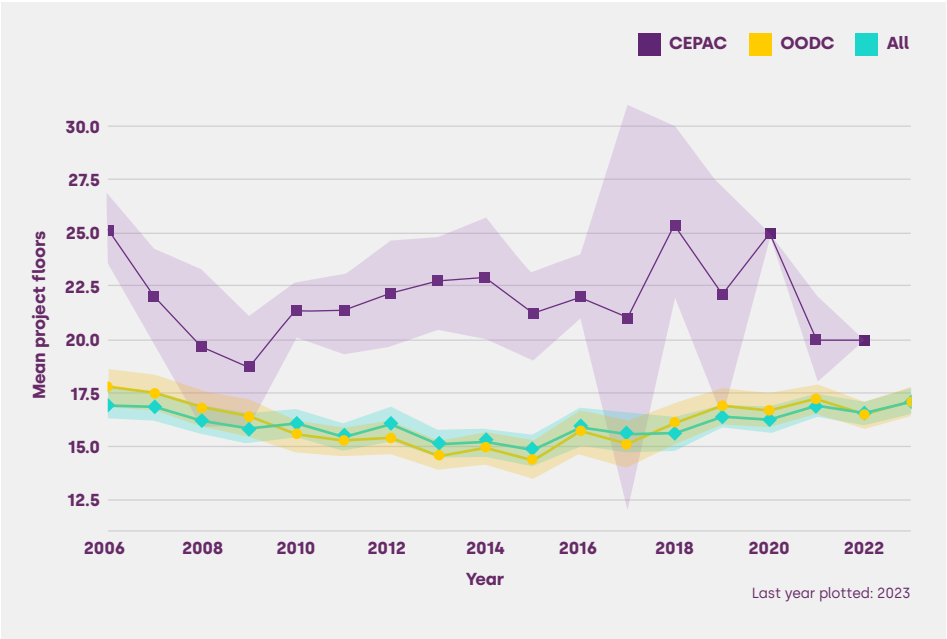
Source: Authors based on Geoimóveis.

Figure 13: Share of luxury projects in CEPAC vs OODC areas, 2006-2023



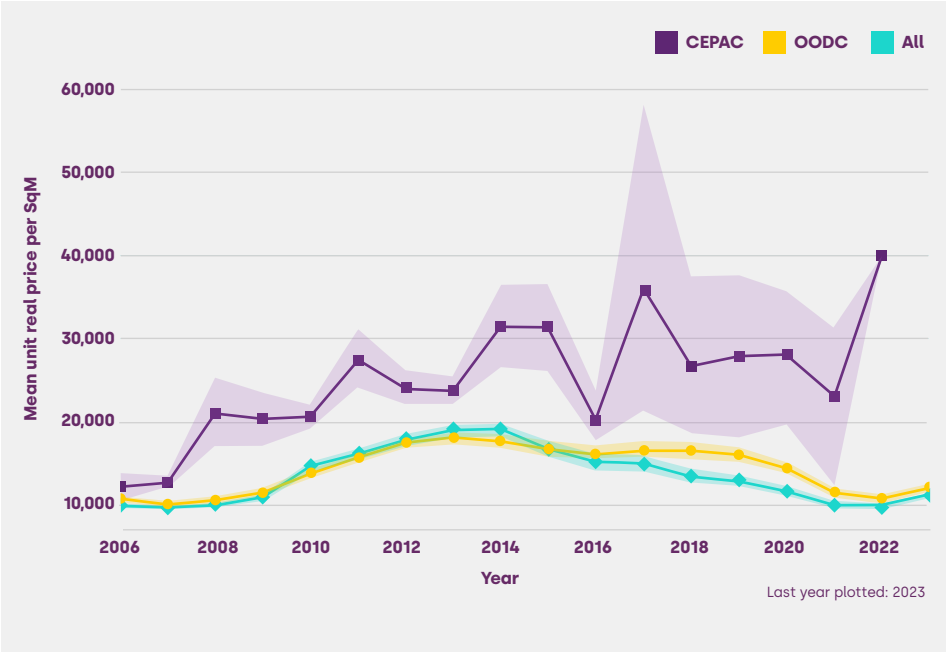
Source: Authors based on Geoimóveis.

Figure 14: Mean number of floors in projects in CEPAC vs OODC areas, 2006-2023



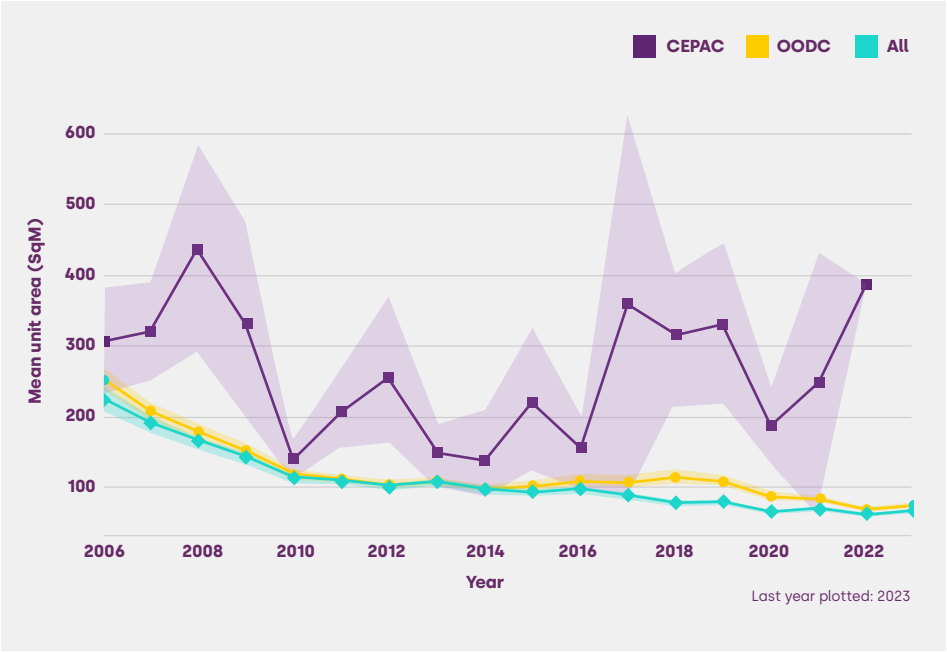
Source: Authors based on Geoimóveis.

Figure 15: Average unit price in CEPAC vs OODC areas, 2006-2023



Source: Authors based on Geoimóveis.

Figure 16: Average unit area in projects in CEPAC vs OODC areas, 2006-2023



Source: Authors based on Geoimóveis.

OODC curves are comparatively stable across time, reflecting the breadth of its application: it captures a large volume of developments citywide, which smoothes out submarket variations. In contrast, the trajectories for CEPAC projects appear far more erratic. Because UOs represent a much narrower segment of the market, the number of projects is relatively small. This makes the series more sensitive to fluctuations, as a few projects can shift the averages significantly.

The timing of CEPAC auctions further accentuates this volatility: peaks in project launches and in indicators such as average unit size, price, or luxury share often follow major issuances, while lulls reflect periods when new certificates were not made available.

It is worth highlighting two aspects of the time series presented in the charts above. First, the macroeconomic crisis that Brazil underwent between 2013 and 2016 reshaped real estate development. In the figures, we can see this turbulence reflected in sharp fluctuations in the number of projects and units. This period also coincides with the scarcity of new CEPAC auctions, which meant that only a limited number of projects could be built inside UOs, and these tended to be concentrated in higher-end segments.

As already mentioned, a second important change in the period was the approval of the 2016 new zoning law in São Paulo, which increased the competitiveness between the two instruments. By increasing allowed densities across the city, the new legislation favoured OODC projects, leading to more supply, taller projects, and stable average prices after 2016. Meanwhile, CEPAC projects, which became rarer, were increasingly concentrated in the luxury niche, with larger, taller units and significantly higher average prices per square metre.

Together, the graphs suggest that OODC functions as a systemic and stabilising revenue source, while CEPACs operate more like a niche instrument, which has generated very high yields but is subject to irregular cycles tied to auction schedules.

CEPACs are inherently limited because they operate only within a restricted project area (UOs), and their revenue performance depends heavily on the intensity of developer competition within that boundary. When demand for that UO is high, CEPAC auctions can generate very large returns; when demand is weak, auctions may underperform or even fail. OODC, by contrast, applies citywide and its revenue potential does not depend on competitive bidding: the amount collected from each project is defined by assessed values set by the city and remains constant regardless of market competition.

In this sense, CEPACs function as a targeted, project-specific tool, while OODC provides a more stable and continuous revenue stream. Hence, the two instruments operate in complementary ways.

Key lessons

The comparison between OODC and Urban Operations with CEPACs in São Paulo offers valuable insights into how air rights instruments work in practice. Drawing on two decades of experience, six broad lessons emerge for other cities considering the adoption of air rights, particularly with respect to the conditions under which these instruments generate revenue, how they are administered, and the extent to which they advance equity objectives in urban policy.

1. **Air rights generate the highest revenues in areas with strong land values and sustained demand for density**

   Air rights instruments generate substantial revenues only in locations with strong demand for high-density development and high underlying land values. In São Paulo, CEPAC revenues were highly concentrated in a small number of districts and projects located in the city's most valuable areas, where competition among developers was intense. By contrast, OODC applies citywide and captures value across a much broader set of projects but yields lower revenues per development. This contrast highlights that air rights are not a universal revenue solution: their fiscal performance is fundamentally shaped by local market conditions rather than by the legal or technical design of the instrument alone.

2. **How air rights are priced determines both revenue levels and volatility**

   Pricing mechanisms play a central role in shaping both the level and the stability of revenues. Auction-based instruments such as CEPACs allow prices to respond to market demand and can generate very high revenues when competition is strong, but they are also vulnerable to mispricing, timing issues, and market downturns, resulting in irregular issuance and volatile returns. Formula-based instruments such as OODC offer greater predictability and administrative simplicity, but rates do not respond to competitive/demand pressures, and revenue performance depends critically on how frequently valuation parameters are updated. São Paulo's experience illustrates the trade-off between upside potential and revenue stability inherent in different pricing approaches.

3. **Administrative complexity matters for determining which air rights instruments a city may be able to effectively implement**

   Although CEPACs and OODC share the same conceptual foundation, they differ sharply in their institutional and administrative requirements. OODC is embedded in routine licensing procedures and applied citywide, allowing it to function with relatively limited additional administrative capacity. CEPACs, by contrast, depend on complex legal frameworks, CVM-regulated auctions, a detailed programme of interventions, and continuous monitoring of development rights, making them more demanding to administer and more sensitive to political and market pressures. For cities with

lower administrative capacity, São Paulo's experience suggests that simpler, integrated instruments like OODC are more feasible and less risky than auction-based mechanisms.

4. Local reinvestment sustains higher revenues but may limit wider redistribution

Developer willingness to pay for air rights depends critically on a credible link between contributions and local reinvestment. In São Paulo's Urban Operations, the requirement that CEPAC revenues be reinvested within the operation's perimeter is intentional: it reinforces land value growth in the same area and sustains demand for additional building rights. However, this same mechanism concentrates resources and urban transformation in already valuable locations, limiting the scope for redistribution across the city. OODC deliberately weakens this local feedback by pooling revenues at the citywide level, trading off per-project revenues for greater redistributive potential. The experience shows that high revenue generation and redistribution are often in tension and must be balanced through instrument design.

5. Governance and spending rules determine whether equity goals are realised

Raising revenues through air rights does not automatically translate into equitable outcomes. In CEPAC-financed Urban Operations, Management Groups including civil society representation formally define investment priorities, yet spending has largely favoured road infrastructure that most directly enhances local land values, with social housing allocations expanding only after successive legal revisions. Although OODC revenues flow into a citywide fund with stronger redistributive intent, allocations have also been subject to delays. These patterns underscore the importance of robust governance arrangements, including clear and enforceable spending targets, transparent project selection, and timely execution, to ensure that air rights revenues align with stated public priorities.

6. No single air rights instrument is likely to meet all policy objectives

São Paulo's experience demonstrates that air rights instruments may perform best when used in combination rather than in isolation. CEPACs function as high-yield, area-based tools suited to strong real estate markets and large, capital-intensive projects, while OODC provides a more stable, systemic mechanism for citywide value capture and redistribution. Treating these instruments as substitutes risks undermining both revenue generation and equity goals. A balanced policy approach instead recognises the complementarity between possible instruments and deploys each tool where its strengths are greatest.

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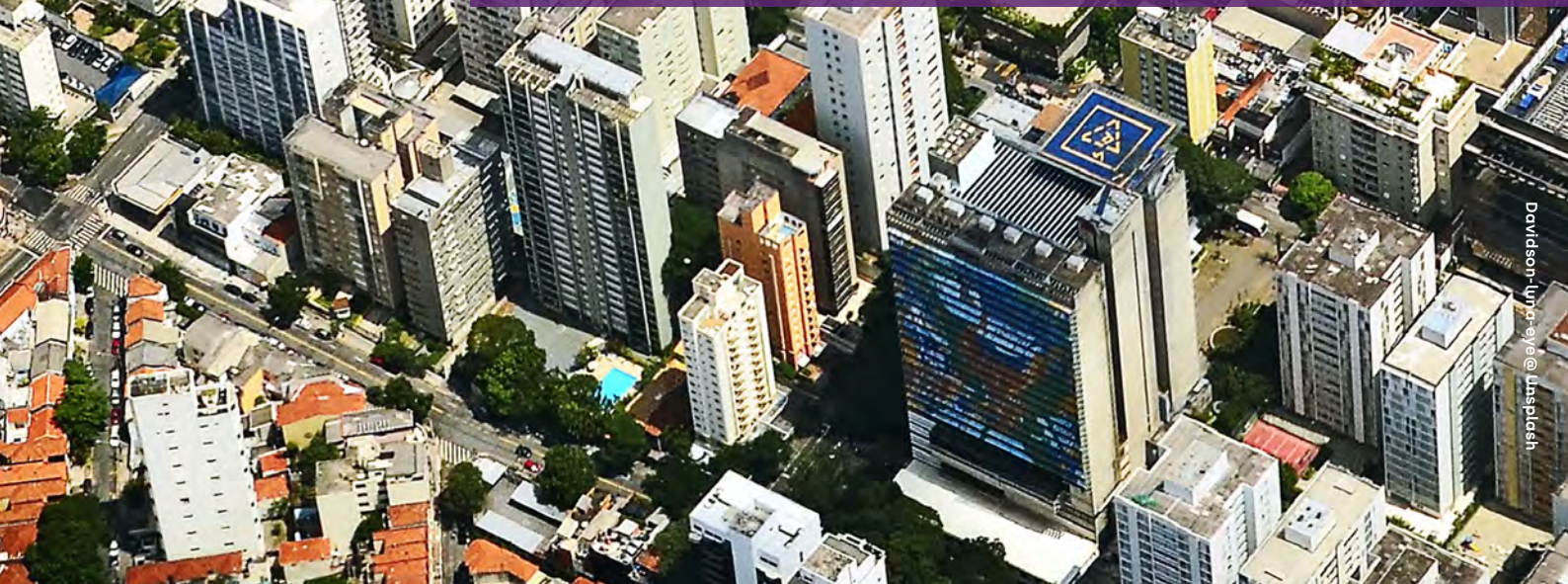

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