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Municipal Sustainability in Light of the Principle of Destination: A Proportional Analysis of the Asymmetry Between the Productive Base and Consumption Potential (Case Study of Paulínia)

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ABSTRACT

The Tax Reform (Constitutional Amendment 132/2023) shifts the taxation of consumption from the point of origin to the point of destination. This study analyzes the impacts of this transition on the sustainability of Paulínia, São Paulo—a hub of highly specialized industry. It employs a qualitative-descriptive approach based on proportional ratios, comparing the Production Ratio (PR), based on GDP per capita, with the Consumption Potential Ratio (CPR), based on average per capita income. The results reveal a critical asymmetry: while Paulínia has a production capacity 13.34 times higher than the national average, its consumption potential is only 1.64. This gap highlights a "sustainability leak," in which the municipality bears the environmental, social, and infrastructure burdens (Wagner Law), while revenue flows to consumer centers. It can be concluded that the "destination principle" without compensatory mechanisms makes it impossible to sustain the producing region, threatening its socio-environmental viability.

Keywords: Tax Reform; Taxation at the Place of Consumption; Sustainability; Paulínia; Wagner Law.

SUMMARY

1. INTRODUCTION

1.1 The Shift in the Tax Paradigm: From the Origin Principle to the Destination Principle

The Brazilian Tax Reform, consolidated by Constitutional Amendment No. 132/2023, introduces a paradigm shift in consumption taxation by moving from the origin principle to the destination principle. This new system, based on the Tax on Goods and Services (IBS)—a shared-jurisdiction tax among states, municipalities, and the Federal District—and the Contribution on Goods and Services (CBS)—a federal tax—stipulates that tax revenue belongs to the location where final consumption occurs, and no longer to the territory where the good or service was produced.

As analyzed by Pinto Miranda (2019), this shift in the tax base to the time and place of consumption establishes a new spatiotemporal framework, aimed at the homogenizing standardization of tax structures and the reduction of allocative distortions that characterized the previous model. From the perspective of economic efficiency, this transition seeks to align the country with modern standards of neutral taxation, in which, as described by Costa and Vieira (2021), the tax system should be designed to minimize interference in rational decisions regarding the location of capital and production. However, this reconfiguration of the tax spatial framework drastically alters the financial support for subnational entities, challenging what Amorim (2021) classifies as the financial autonomy essential for self-determination and the maintenance of the federal pact of cooperation and balance.

1.2 The Problem: The Mismatch Between Externalities and Revenue in the Context of Sustainability

This paradigm shift introduces a research problem of a territorial and fiscal nature: the misalignment between the location where the negative externality is generated and the location where wealth is taxed. According to Pinto Miranda's (2019) geopolitical analysis, the new tax arrangement institutionalizes a "general interest" that allows disembodied capital to defer and shift its social costs beyond the spatial boundaries of production. Large-scale industrial activities, especially those linked to the petrochemical and energy sectors, do not operate in a geographical vacuum. They require the host municipality to provide resilient infrastructure, specialized public safety services, and rigorous environmental management to mitigate inherent technological risks. As Mello Filho (2023) explains, the local government acts as an indispensable factor of production, since national economies and state apparatuses co-evolve, requiring public authorities to guarantee the technical and infrastructural conditions necessary for industrial activity to flourish.

The central conflict lies in the fact that, while the "burden" of production (such as road wear and tear, pollution, and the risks of chemical accidents) is fixed in the territory of origin, the "benefit" (tax revenue) becomes mobile and migrates to consumer centers. From the perspective of sustainability advocated by Rabbani et al. (2024), true fiscal justice requires that ecosystem users and polluters assume the financial responsibility for their production, a principle that is undermined when the tax system exempts the source of production and prevents the municipality from internalizing these social and environmental costs. This creates a federal imbalance: the producing municipality is compelled to maintain highly complex public services to support production on a national scale, but is compensated only by the limited consumption base of its resident population. According to Rodden (2002), this vertical fiscal imbalance is a central dilemma of federalism, as it creates a dependence on external transfers that undermines fiscal discipline and the capacity for local responses to adverse shocks. This scenario calls into question the sustainability of federal entities that serve as pillars of Brazil's productive matrix but have relatively small populations and low levels of consumption compared to the volume of wealth they generate for the country. As Souza (2003) points out, the Brazilian Federation has historically been characterized by a lack of fiscal equalization mechanisms to offset such asymmetries, which leads to acute distributional conflicts whenever the design of formal rules fails to accommodate conflicting territorial demands.

1.3 The Case of Paulínia: A Logistics-Industrial Hub at Risk

This study aims to answer the following question: How can a production-oriented municipality (such as Paulínia, São Paulo) maintain the social, infrastructural, and environmental conditions required for production on a national scale when its revenue is limited to the consumption level of its resident population? According to Musgrave and Musgrave (1989), one of the primary functions of the state is the allocation of resources to correct market failures, such as externalities; however, the effectiveness of this intervention depends on the availability of revenue streams that cover the cost of maintaining these public assets. By contrasting the Production Ratio (PR) with the Potential Consumption Ratio (PCR), we aim to demonstrate that the sustainability of these territories depends on compensation mechanisms that recognize the burden borne at the source. According to the thesis of Al Rubaye et al. (2026), fiscal sustainability should serve as a tool for economic justice, ensuring that industrial development does not result in the impoverishment of the regions that provide the physical basis for national production.

This study, therefore, not only analyzes an isolated case but also offers a critical assessment of the limits of tax simplification in light of the complexity of Brazil's economic geography. As Amorim (2021) argues, the quest for an efficient tax system cannot ignore the fact that financial autonomy is an indispensable condition for guaranteeing the self-determination of subnational governments and for maintaining the three pillars of sustainability (economic, social, and environmental). Without mechanisms to bridge the gap between production and consumption, the new regime risks exacerbating territorial distributional conflicts which, according to Souza (2003), Brazilian federalism has historically sought to accommodate through rules of regional balance, but which may now result in the socio-environmental insolvency of the producing region.

1.4 Objective and Rationale of the Study

The central objective of this article is to demonstrate, through proportional reasoning, how the Tax Reform threatens Paulínia's sustainability by ignoring the structural gap between productive output and local consumption capacity. From the perspective of fiscal federalism, as Amorim (2021) argues, financial autonomy is not merely an administrative element but an indispensable condition for guaranteeing the political and economic self-determination of subnational entities. This research is justified by the fact that the new tax design, by prioritizing destination-based revenue collection efficiency, may undermine the federal pact of cooperation by decoupling revenue from the territory that effectively bears the tax burden, the demands for public services, and the infrastructural responsibilities of industrialization.

The rationale for this approach lies in the need to enrich the debate on the "destination principle," highlighting that the pursuit of national distributive justice may, paradoxically, create profound territorial injustices in municipalities with a high degree of productive specialization. Furthermore, the research is based on the premise put forward by Chevalley et al. (2024) that true state sustainability must be capable of internalizing the social and environmental costs of production. This avoids a predatory scenario in which the production hub acts as a provider of free technical and logistical support for the rest of the nation, without retaining the tax base necessary to ensure the integrity of its own ecosystem and the security of its future generations, while respecting the allocative functions of the state described by Musgrave and Musgrave (1989).

2. THEORETICAL FRAMEWORK

2.1. Wagner's Law and the Pressure for Public Spending

Understanding the sustainability of municipalities with a high degree of industrial specialization first requires a deep dive into public finance theory, specifically regarding the elasticity of government spending. This is because the causal relationship between spending and national income is fundamental to the development of sound economic policies (POSSA et al., 2022). The fundamental theoretical pillar for this analysis is the “Law of Increasing State Activities,” formulated by the German economist Adolph Wagner in the late 19th century (WAGNER, 1883, as cited in MUSGRAVE; PEACOCK, 1958). Wagner posited that, as societies become more complex and industrialized, the public sector’s share of the economy tends to grow inevitably (MELLO FILHO, 2023).

This long-term trend of a more-than-proportional increase in government spending relative to output occurs because rising national income fuels growing demand for social, cultural, and infrastructure goods and services provided by the state (ARESTIS; ŞEN; KAYA, 2021). In the context of municipalities that are home to large production plants, such as the Paulínia petrochemical complex, this theory takes on a practical and urgent dimension: public spending is not merely a function of population growth, but a variable dependent on the technical complexity and economic risk present in the territory (PEACOCK; SCOTT, 2000).

According to the Wagnerian perspective, industrialization requires the state to perform functions that go beyond maintaining basic administrative order (ARESTIS; ŞEN; KAYA, 2021). In territories characterized by productive specialization, what contemporary economic literature classifies as “industrial urbanization costs” arise. These costs represent a category of inelastic expenditure—that is, expenditures that the municipality cannot simply cut without compromising the viability of national production (MELLO FILHO, 2023). In the case of Paulínia, home to one of the country’s largest refineries, municipal public spending must be scaled to support the incessant flow of heavy logistics, the maintenance of high-capacity road networks, and the implementation of contingency plans against large-scale technological and environmental risks (ARESTIS; ŞEN; KAYA, 2021).

The pressure on public spending in these municipalities is intensified by the need to provide specific public goods. Public safety, for example, is not limited to visible policing but requires specialized brigades for chemical emergencies and the monitoring of sensitive industrial areas. Public health, in turn, must be structured to address not only conventional demographic demand but also the epidemiological and occupational impacts resulting from a high-industrial-exposure environment (MELLO FILHO, 2023). According to Wagner's logic, the higher a municipality's industrial density and productivity, the higher the minimum level of public investment required to sustain such operations (PRADO; SILVA, 2018).

This multidimensional pressure reveals that public spending in hubs of high industrial specialization is not only substantial but essential for maintaining the State's Triple Sustainability:

• **Economic Dimension:** Embodied in the need to finance resilient logistics infrastructure that ensures the smooth flow of domestic production, avoiding bottlenecks that harm the sector's GDP.

• **Social Dimension:** Manifested in the provision of quality public services to a workforce operating under high risks, ensuring the integrity of the labor force and the well-being of the community affected by industrial operations.

• **Environmental Dimension:** Reflected in the ongoing cost of monitoring technological risks and mitigating externalities, ensuring that productive activity does not compromise the territory's natural capital.

Thus, Wagner's "increasing expenditure" in Paulínia is the inseparable sum of these three dimensions, which together form the indispensable foundation for the hub's viability (MELLO FILHO, 2023).

Consequently, the Wagner Law serves as a cautionary note for the analysis of tax reform: the cost structure of a hub municipality is rigid and tied to its productive base. Unlike purely residential or service-oriented municipalities, where public spending can be adjusted more flexibly to demographics, in industrial hubs spending is "indexed" to the infrastructure supporting production (ARESTIS; ŞEN; KAYA, 2021). The growth in public expenditures in Paulínia, therefore, should not be interpreted through the lens of administrative inefficiency, but rather as a technical and necessary response to the complexity of an economic base that operates on a scale far exceeding the national average (POSSA et al., 2022).

In this sense, any change in the revenue base that disregards this budgetary rigidity imposed by industrial activity ignores the basic premise of German public economics: that the state is the indispensable infrastructural support for successful industrial development, and that this support entails an increasing and inescapable cost (MELLO FILHO, 2023). Maintaining an astronomical GDP per capita requires a proportionally robust "local state," capable of managing the complex tensions between economic development, physical infrastructure, and social welfare (ARESTIS; ŞEN; KAYA, 2021).

2.2. The New Tax Order: The Principle of Destination and Distributive Justice

The reform of the Brazilian tax system, consolidated by Constitutional Amendment No. 132/2023, represents the transition from a fragmented and complex taxation model to a structure based on a dual Value-Added Tax (VAT) system, consisting of the Contribution on Goods and Services (CBS) and the Tax on Goods and Services (IBS). At the heart of this transformation lies the shift in paradigm from "origin" to "destination." As Gobetti and Monteiro (2023) explain, the new system stipulates that the tax belongs to the jurisdiction where consumption takes place and no longer to the jurisdiction where production or the provision of services occurs. Historically, the national tax system allowed the local government where production took place to retain a significant portion of the revenue (the "origin" principle), which, over decades, fostered the concentration of resources in municipalities with a strong industrial base. According to Amorim (2021), this model guaranteed producing local governments the financial autonomy necessary for their self-determination. The new tax order reverses this logic, establishing that the right to the revenue belongs to the location where the good or service is actually consumed.

This new paradigm is underpinned by the ideal of distributive justice and the pursuit of fiscal neutrality. The central argument of proponents of the destination principle is that taxation at the source creates competitive distortions, such as the so-called "tax war," in addition to exacerbating regional inequalities, since poor and densely populated municipalities end up financing, through consumption, the infrastructure of already developed producer municipalities. From this perspective, as Gobetti and Orair (2023) point out, the system seeks to correct what the economic literature classifies as a horizontal imbalance within the federation: revenue should follow the citizen-consumer, regardless of where the industrial facility is located.

However, the universal application of this principle to an economic landscape as heterogeneous as Brazil's poses profound structural challenges. The concept of VAT at destination presupposes that the taxable amount must reflect the final economic benefit, completely exempting the production chain to avoid cumulative taxation. However, by decoupling tax revenue from the producing territory, the system assumes that the state's effort to sustain production is irrelevant to tax sharing. According to Pinto Miranda's (2019) analysis of tax geopolitics, this approach ignores the fact that productive activity is not an ethereal phenomenon occurring in a vacuum; it is a geographic process that requires tangible and costly public services at the point of origin.

The disconnect introduced by the new tax order lies in the premise that a territory's "tax-paying capacity" should be measured exclusively by its consumption potential. For municipalities that function as productive oases, the transition to the destination-based system imposes a break in the causal link between local economic activity and available revenue. As analyzed by Gobetti and Monteiro (2023), while the previous system (ICMS at the point of origin) functioned as a self-financing mechanism for cities that bore the burden of industrialization, the new IBS model at the point of destination transforms revenue into a resource of an eminently demographic and consumptive nature. In the view of Rabbani et al. (2024), this change redefines fiscal justice but drastically alters the funding sources for local governments.

Thus, the distributive justice sought by the reform, while commendable in terms of national federal balance and the reduction of inequalities (AMORIM, 2021), may create a specific territorial injustice in production hubs. By prioritizing the consumption-based tax base over the production-based one, the reform removes the financial foundation that allowed host municipalities to manage the complexities of their economic structure. The new tax system, therefore, creates a scenario in which producing municipalities risk acting as providers of free infrastructure for the rest of the federation, since the wealth generated there will be taxed and enjoyed by federal entities that did not participate in the costs and efforts necessary to bring about that production.

2.3. Sustainability and the Capture of Externalities

The discussion on tax reform cannot be limited to the mere arithmetic of budgetary gains and losses; it must be guided by the concept of territorial sustainability. In the context of public finance, the sustainability of a subnational entity is defined by its long-term capacity to consistently meet its financial obligations (CHAPMAN, 2008). This capacity requires funding the necessary social needs and infrastructure without compromising the environment or the security of future generations. For municipalities that are home to high-impact industrial complexes, such as the Paulínia petrochemical hub, this sustainability is intrinsically linked to the management of negative externalities.

Negative externalities are market failures that occur when the production of a good generates adverse impacts on third parties or the local environment that are not reflected in the final price of the product. In the case of a large refinery, the externalities are tangible and severe: they include the emission of air pollutants, the constant risk of chemical accidents, and the accelerated deterioration of urban infrastructure due to heavy logistics traffic. As Pinto Miranda (2019) points out, productive activity is a geographic process that requires tangible and costly public services at the point of origin. Traditionally, the taxation system at the point of origin allowed the municipality to use tax revenue as a natural compensation fund to mitigate these damages. With the shift to the destination principle, this compensatory cycle is disrupted: the burden of externalities remains confined within the geographical boundaries of the producing municipality, while the fiscal "bonus" from the circulation of wealth is exported to the regions of consumption (PINTO MIRANDA, 2019).

This configuration creates what could be described as a scenario of fiscal-environmental imbalance. Paulínia's sustainability becomes vulnerable because the cost of maintaining natural and physical capital continues to follow the scale of production (Ratio 13.34), while funding for such maintenance is dictated by the scale of local consumption (Ratio 1.64). According to Rabbani et al. (2024), true state sustainability must balance the economic, social, and environmental pillars. Without resources commensurate with the risk it bears, the municipality may be forced to reduce investments in critical areas of monitoring and contingency planning, transforming local liabilities into social and economic risks of national magnitude.

Furthermore, fiscal sustainability under Brazil's new federalism must address the dilemma of "reverse cross-subsidization." Under the pure destination system, the producing municipality indirectly subsidizes the quality of life in purely consuming municipalities (GOBETTI; MONTEIRO, 2023). This occurs because the consumer benefits from a product whose environmental production costs were fully "paid" for and absorbed by the population and the public coffers of Paulínia, without any direct tax contribution toward the restoration of that territory. The tax (IBS), which should serve to internalize social costs, ends up being distributed geographically in a manner unrelated to the source of the damage (PINTO MIRANDA, 2019).

Therefore, the sustainability of territories with high levels of industrial specialization depends on the creation of mechanisms that recognize the territorial nature of risk. The efficiency of a tax system should not be measured solely by its capacity to collect revenue, but by its ability to allocate resources where the costs of sustaining life and infrastructure are highest (CHAPMAN, 2008). As Rabbani et al. (2024) argue, fiscal justice requires the revitalization of local autonomy and the correction of imbalances where the burden of responsibilities is disproportionate. Ignoring the asymmetry between the retention of negative externalities and the migration of revenues is to condemn industrial hubs to a process of chronic fiscal insolvency, where the wealth produced for the nation paradoxically results in the impoverishment of the entity that sustains it.

3. METHODOLOGY

3.1. Research Design and Approach

The study employs the Location Quotient (LQ) technique, a classic metric in regional science for identifying territorial specializations (ISARD, 1960; HADDAD, 1989), operationalized here through proportional ratios. The central objective is to analyze the sustainability of the municipality of Paulínia, São Paulo, in the context of tax reform, using the construction of proportional ratios of economic performance and tax revenue potential as a method.

The choice of this case study is justified by Paulínia's uniqueness within the Brazilian federal context: the municipality is home to Petrobras's largest oil refinery (REPLAN), which generates a concentration of wealth and a demand for infrastructure that distort national averages. As identified by Gobetti and Monteiro (2023), Paulínia stands out among cities with extremely high per capita tax revenue, making it a critical case for highlighting systemic flaws in the universal application of the "destination" principle that might go unnoticed in aggregated analyses of large regions.

3.2. Rationale for Proportional Analysis (Ratios vs. Actual Values)

Unlike conventional fiscal analyses that use nominal or real monetary values, this study opts to use proportional ratios. This methodological choice is strategic for three fundamental reasons:

1. Isolation of Cyclical Variables: Nominal values in reais are susceptible to distortions caused by inflation, fluctuations in the international price per barrel of oil, and the 50-year tax transition rules provided for in the Tax Reform. Ratios, being dimensionless, allow for the observation of permanent structural imbalances.

2. Comparative Benchmark (Brazil = 1): By adopting the national average as the denominator, a "normal level" is established. Any value above 1 indicates an intensity higher than the national average, allowing us to quantify how "off the curve" Paulínia lies in terms of productive effort and consumption capacity.

3. Focus on Qualitative Sustainability: The focus of this research is not on calculating the exact municipal budget in 2033 or after the end of the transition period, but on demonstrating the asymmetry of scales between the burden that remains in the territory and the benefit that migrates to the destination.

3.3. Data Collection and Processing

The data used come from official secondary sources, ensuring the study's replicability. Databases from the Brazilian Institute of Geography and Statistics (IBGE) were consulted, specifically:

• **Regional Accounts (2022):** To extract municipal Gross Domestic Product (GDP).

• **Demographic Census (2022):** For data on population and per capita household income.

The choice of the year 2022 as the time frame is a central element of the methodological reliability of this study. This choice is justified by the Demographic Census conducted during that period, which is the only official source capable of providing comprehensive and accurate data on per capita income at the municipal level. Unlike sample estimates conducted in intercensal years, the 2022 data allow for the calculation of the Consumption Potential Ratio (CPR) based on actual rather than projected values, ensuring the statistical synchronization necessary for comparison with production data (GDP).

To construct the variables, municipal GDP was cross-referenced with the population to obtain GDP per capita, and total income was cross-referenced with the number of inhabitants to obtain average income per capita.

3.4. Definition of Analysis Variables (Proxies)

The study employs two key variables, conceived as indicators of the pre- and post-reform tax landscape. This methodological strategy of using relative indicators is supported by Gobetti and Orair (2023), who, in their simulations, use proxies for population share in consumption to estimate the future subnational tax base. The variables are defined as follows:

1. Production Ratio (PR): Calculated by dividing Paulínia's GDP per capita by Brazil's GDP per capita (GDP_{per capita_Paulínia} / GDP_{per capita_BR}). This variable serves as a proxy for the Wagner Law, representing the scale of industrial activity that requires infrastructure, security, and environmental risk mitigation. According to Possa et al. (2022), GDP per capita is the fundamental pillar for measuring the elasticity and expansion of public spending in industrialized economies. As analyzed by Prado and Silva (2018), this metric allows for capturing the "marked rigidity" and autonomous dynamics of spending in territories with high productive complexity.

2. Consumption Potential Ratio (CPR): Calculated by dividing Paulínia's per capita income by Brazil's per capita income (*Income_{per capita_Paulínia} / Income_{per capita_BR}*). This variable serves as a *proxy* for the IBS Tax Base; per capita income represents the consumption potential of the local population as well as the maximum revenue the municipality could achieve if the tax were levied exclusively at the point of consumption (resident consumption).

3.5. Limitations and Scope

The analysis acknowledges that Brazil's tax transition, consolidated by Constitutional Amendment No. 132/2023, involves compensation funds and population-based "revenue insurance" criteria—both of which are temporary—that can mitigate immediate losses for subnational governments. However, in line with Amorim's (2021) argument that excessive dependence on external transfers can render municipal autonomy an "illusion," the scope of this study is limited to analyzing the territory's organic fiscal capacity. As Pinto Miranda (2019) points out, productive activity is not an ethereal phenomenon but a geographic process that requires tangible public services at the point of origin; thus, the focus of this research is to observe how the territory sustains itself without the support of these temporary external aid measures.

The central focus is on demonstrating the structural "gap" between productive output (level of production) and financing potential (level of consumption), treating income as the most accurate indicator of local tax-paying capacity under the new tax regime. According to Chapman (2008), income is a superior metric of economic capacity compared to simple population counts, as it recognizes that tax revenues are effectively derived from the flow of income.

Therefore, the study does not aim to accurately predict the absolute values of the municipal budget at future dates, but rather to highlight the breakdown of the causal link between production and tax revenue, which, in the view of Pinto Miranda (2019), represents a shift of social costs beyond the spatial boundaries where wealth is generated.

4. ANALYSIS OF THE RESULTS

4.1. The Magnitude of Production and the Excessive Expansion of Public Expenditures

To analyze the fiscal imbalance, production and income data for the municipality of Paulínia were compared with the national average, using the most recent data available (2022). The nominal values and the ratios resulting from this comparison are summarized in Table 1:

Table 1 – Comparison of Production and Income Indicators (Paulínia vs. Brazil)

Indicator	Paulínia (2022)	Brazil (2022)	Ratio (Paulínia / Brazil)
GDP Per capita	R$637.764,58	R$47.802,02	13,34 (PR)
Average per capita Income	R$2.680,07	R$1.638,06	1,64 (CPR)

Source: Prepared by the author based on data from the IBGE.

The starting point for understanding the fiscal imbalance in Paulínia lies in analyzing its Production Ratio (RP). When applying the proposed methodology, the data reveal an index of 13.34. This figure is not merely a statistic of economic performance; it is an indicator of a scale of productive activity that operates thirteen times above the Brazilian national average. In practical terms, for every unit of wealth produced by an average citizen in Brazil, the territory of Paulínia generates the equivalent of thirteen units. This disparity places the municipality in an exceptional category within fiscal federalism, characterizing it as a hub of extreme industrial specialization. According to Pinto Miranda (2019), the rational location of productive activities intensifies spatial agglomeration, requiring local government to act as a guarantor of the infrastructure conditions necessary for the circulation of goods on scales that transcend territorial boundaries.

This productive hypertrophy demands a proportional counterpart in terms of government effort. As explored in the theoretical framework, public spending in municipalities of this magnitude is not merely discretionary but a variable dependent on the existing technical complexity. As Prado and Silva (2018) point out, there is marked rigidity in certain Brazilian public expenditures that limit the administrator's room for maneuver, especially where the growth of domestic production dictates state needs. In Paulínia, this effort manifests itself in the three dimensions of sustainability defined in this study:

• **Economic Dimension:** The need to finance high-capacity road networks and logistics networks to support the distribution of domestic fuel production.

• **Social Dimension:** Investment in specialized health and public safety services, required by the density of risks and the large workforce surrounding the refinery. According to Mello Filho (2023), the state assumes the burden of managing the complexities of industrialization, acting as an indispensable "factor of production."

• **Environmental Dimension:** Funding for monitoring systems and technological readiness to mitigate negative externalities. According to Rabbani et al. (2024), state sustainability must internalize environmental costs to ensure the integrity of the ecosystem and future generations

Thus, although the Wagner Law explains why spending in Paulínia is high, it is this threefold dimension of sustainability that details where these resources are allocated. As Chapman (2008) argues, the sustainability of a subnational entity is defined by its long-term capacity to meet its financial responsibilities in the face of structural pressures. The ratio of 13.34 thus embodies a strict financial commitment that the municipality assumes toward the federal government in exchange for hosting the production plant.

Thus, the ratio of 13.34 serves to embody the "burden side" of the fiscal equation. It demonstrates that the municipality of Paulínia is "scaled"—in terms of land use, environmental risks, and technical infrastructure—for a massive economic reality. Until this model was introduced, revenue collection based on the source of income allowed municipal revenue to grow in tandem with this productive effort, ensuring what Amorim (2021) defines as the financial autonomy essential for the self-determination of the federated entity. The existence of this high rate of production was simultaneously the cause of high public spending and the source of its financial coverage. As we will see below, the introduction of the destination principle breaks this cycle by ignoring the fact that the 13.34 scale of production will not disappear with the tax change, even though the resources to sustain it tend to dwindle

4.2. The Ceiling on Consumption Potential and the Decoupling of Income

While the Production Ratio (PR) reveals an industrial giant, Paulínia's Potential Consumption Ratio (PCR)—calculated at 1.64—brings the analysis back to the reality of the tax base under the IBS regime. This index indicates that, although the municipality produces thirteen times more than the Brazilian average, the per capita household income of its residents is only 1.64 times higher than the national average. This nearly eightfold disparity between what is produced and what can be consumed locally is the crux of the municipality's fiscal vulnerability. As Pinto Miranda (2019) points out, the shift in the tax burden toward consumption creates a spatiotemporal matrix that relieves productive capital of the tax burden and transfers it to more stationary bases, such as resident households.

The nature of this disparity can be explained by economic phenomena typical of capital-intensive industrial hubs, such as oil refining:

• Income Leakage and Profit Exportation: A large portion of the value added that makes up Paulínia's GDP does not translate into wages for local residents. These are operating surpluses that are returned to the corporations' headquarters or to the federal government, in the case of Petrobras. Thus, wealth "circulates" through the municipality, generating impacts, but does not "anchor" consumption capacity among the resident population in the same proportion. According to Pinto Miranda (2019), this dynamic highlights a process of "disembodiment" of capital, in which production generates national wealth, but the territory of origin bears only the social and environmental costs.

• The Phenomenon of Commuting: Paulínia attracts thousands of skilled workers who, although they contribute to production (GDP), live and consume in neighboring cities within the Campinas Metropolitan Region (RMC). Under the logic of tax reform, the tax revenue generated by these individuals' labor will flow to the commuter towns. According to Amorim (2021), glaring regional inequality and the lack of equitable economic development prevent the distribution of tax authority from acting, on its own, as an instrument to guarantee financial autonomy.

• Income as the Revenue Ceiling: It is crucial to understand that, under the destination-based taxation model, a municipality's fiscal "success" is no longer tied to the productivity of oil refineries but instead depends directly on the purchasing power of local households. As established by Complementary Law No. 214/2025, IBS revenue belongs to the jurisdiction where final consumption occurs. The ratio of 1.64 therefore represents the new ceiling on the municipality's organic revenue-generating capacity. Paulínia is no longer taxed as an "energy hub" but is now taxed as an "upper-middle-class city."

The gravity of this scenario lies in the fact that the IBS is a tax on final consumption. When Paulínia ships fuel to supply transportation fleets in other states, the tax amount embedded in each liter of diesel will be credited to the state where the truck driver refuels, not where the fuel was refined. For Paulínia's coffers, what will remain is the tax on its residents' domestic consumption, which—as demonstrated by the RPC of 1.64—is insufficient to sustain the cost structure inherited from its industrial past. From the perspective of fiscal justice advocated by Rabbani et al. (2024), this change redefines who bears the burden of financing the state, but risks ignoring the financial responsibility associated with production.

Thus, analysis of the 1.64 index reveals the "destination trap" for producing municipalities. Consumption potential is a demographic and social variable that evolves slowly, whereas the loss of revenue resulting from the shift to the "origin" principle is immediate and proportional to the scale of the industrial base. By replacing a tax base of 13.34 with one of 1.64, the reform fails to recognize that Paulínia's public investment needs will not be reduced to the 1.64 level. As Chapman (2008) warns, sustainability requires that subnational governments maintain a balance between their resources and their financial responsibilities, lest they jeopardize the provision of basic services. This creates a structural sustainability deficit that threatens the viability of the industrial hub itself.

4.3. The Sustainability Leakage: Retention of the Burden and Migration of the Bonus

A comparative analysis of the Production Ratio (RP of 13.34) and the Consumption Potential Ratio (RPC of 1.64) reveals more than just an accounting imbalance; it exposes a failure in the allocation of territorial responsibilities. This phenomenon can be described as the "sustainability leak," a process in which the municipality of Paulínia is compelled to bear 100% of the negative externalities of production, while the fiscal windfall derived from that same activity migrates to other levels of government. As Rabbani et al. (2024) argue, true fiscal justice and sustainability require that the state internalize social and environmental costs, lest the burden of these damages be unfairly borne by the local community while the benefits are exported.

The burden retained in Paulínia is geographically fixed. The environmental liabilities inherent in oil refining—which include the risk of groundwater contamination, greenhouse gas emissions, and the degradation of local biodiversity—cannot be redistributed at the federal level. As Mattei and Matias (2019) point out, the environmental taxation model should serve as compensation or indemnification for society, functioning as an instrument for financing and redistributing these costs. Similarly, the physical wear and tear on municipal infrastructure is a local and immediate cost. A municipal highway that collapses under the weight of tanker trucks transporting fuel throughout southeastern Brazil requires repairs financed by Paulínia's treasury. However, under the logic of the destination principle, the tax paid on this fuel will be collected by the municipality where the product is consumed, creating a scenario in which Paulínia subsidizes national logistics without receiving the revenue necessary to maintain its own physical assets. From the perspective of Musgrave and Musgrave (1989), the maintenance costs of public goods such as roads are partially independent of traffic, but their expansion and preservation require consistent revenue streams to ensure the collective benefit.

This asymmetry poses a severe risk to long-term sustainability. For Paulínia to maintain its production index of 13.34, the municipal government must continue to invest in highly complex surveillance, occupational health, and traffic engineering services. However, since it is funded solely based on the 1.64 consumption potential index, the municipality faces a "maintenance deficit." According to Chapman (2008), the sustainability of a local government is defined by its ability to meet long-term financial responsibilities; without tools to stabilize its finances in the face of structural infrastructure pressures, this ability tends to disappear. In the long term, the inability to finance infrastructure that supports production can lead to the deterioration of local public services, which, in turn, jeopardizes the very efficiency of the industrial facilities located within the territory. As analyzed by Possa et al. (2022), productive investment in infrastructure is what provides the conditions for increased economic activity and the generation of value for GDP.

The tax bonus, unlike the tax burden, becomes volatile and nomadic. The IBS, designed to be neutral and efficient, ends up ignoring the "geography of risk." By exempting the source, the tax system treats the refinery as a "transit point" rather than a "territory of impact." The result is a transfer of fiscal welfare: Paulínia "exports" potential revenues that could be invested in environmental mitigation technologies and "imports" exclusive responsibility for crisis management. This imbalance violates the principle of sustainability, as it severs the financial link that allowed the municipality to internalize the costs of the externalities it, by virtue of its economic vocation, agreed to host. As Chevalley et al. (2024) warn, environmental degradation is often caused by a small productive group that reaps the benefits, while the burden is shared across society in a way that creates an imbalance in environmental responsibility.

In short, the erosion of sustainability poses a threat to municipal autonomy. If the cost of "existing as an industrial hub" remains at 13.34, but the capacity to "generate revenue as a consumer city" falls to 1.64, Paulínia loses the tool to manage its own territorial destiny. The municipality ceases to be a manager of its economic structure and becomes a bystander to wealth that flows across its borders, leaving behind only the marks of wear and tear and financial uncertainty for the coming decades. As Amorim (2021) points out, without financial autonomy and the capacity for self-financing, the self-determination of subnational entities becomes an illusion. Similarly, Souza (2003) argues that the design of Brazilian federalism, by ignoring effective fiscal equalization mechanisms, exacerbates distributive conflicts and regional tensions.

4.4. Structural Mismatch and the Breakdown of Fiscal Equilibrium

The culmination of the analysis of the results reveals that the gap between production capacity and consumption potential in Paulínia represents not merely a statistical fluctuation, but a structural rupture in the territory's fiscal equilibrium. As discussed by Pinto Miranda (2019), the new consumption-based tax framework fails to recognize that productive activity is a geographic process that requires tangible public services fixed at the point of origin. When comparing the "Maintenance Cost" (derived from the index of 13.34) with the "Revenue-Generating Capacity" (limited by the index of 1.64), a disparity of approximately eight times is observed. This asymmetry is what defines the unsustainability of the destination-based taxation model for municipalities with a high degree of industrial specialization, since, according to Chapman (2008), fiscal sustainability requires that the entity maintain a consistent balance between its resources and its long-term financial responsibilities.

This analysis concludes the chapter by demonstrating that Paulínia's fiscal future, under current rules, is one of an inevitable decline in the quality of its public services and its capacity for territorial management. The loss of this financial base undermines what Amorim (2021) defines as financial autonomy, an indispensable condition for guaranteeing the self-determination of the local government. The disconnect between the productive base and the consumption base reveals a disconnect between those who produce wealth and those who retain the resources to manage the impacts of that production. As emphasized by Mello Filho (2023), the state acts as the indispensable infrastructural and social support for industrial success; by removing this financial support, tax reform threatens the very operational viability of the industrial hub, since the municipality is no longer able to internalize the social and environmental costs required by industrial activity (RABBANI et al., 2024).

5. CONCLUSION / CONTRIBUTION

5.1. Summary of Findings: The Twilight of Autonomy in Industrial Hubs

This study sought to analyze the impact of Brazilian tax reform on the sustainability of Paulínia, São Paulo, using the asymmetry between the productive base and consumption potential as a lens. In the context of the state's functions, this sustainability depends on an efficient partnership between the public sector and the market to achieve social and economic objectives (MUSGRAVE; MUSGRAVE, 1989). The results obtained through the Production Ratio (PR of 13.34) and the Consumption Potential Ratio (CPR of 1.64) confirm the central hypothesis: the transition to the destination principle creates a radical disconnect between the municipality's spending responsibility and its capacity for organic revenue collection. As Oliveira and Correia (2016) point out, fiscal policy has direct effects on aggregate demand and the provision of welfare, making local budget management a critical factor for territorial development.

It has been demonstrated that Paulínia's "wealth," measured by GDP, is a national-scale variable, while its future revenue, measured by resident income, is a local-scale and limited variable. According to the analysis by Campos Júnior and Lima (2023), the Brazilian tax structure must be evaluated for its impact on income distribution, given the risk of exacerbating disparities where tax-paying capacity is heterogeneous. The approximately eightfold gap between these two indicators represents not only a financial loss but also the breakdown of the causal link that underpinned fiscal federalism for hub municipalities, compromising the financial autonomy indispensable for the self-determination of local governments. As Souza (2003) argues, Brazilian federalism has historically managed distributive conflicts through rules that seek to accommodate regional disparities—a balance that is now threatened by the rigidity of the new tax framework.

The inevitable conclusion is that the destination-based taxation model, by seeking equity through consumption, ends up creating a form of "territorial blindness," ignoring the fact that the public effort to maintain an industrial base thirteen times larger than the national average does not disappear with a change in tax law. Although the reform aims for efficiency and neutrality (COSTA; VIEIRA, 2021; LIMA; LESSA, 2025), the technical complexity inherent in the region continues to require an inelastic expansion of activities and state support to ensure the viability of production and heavy infrastructure (PEACOCK; SCOTT, 2000).

5.2. Contribution to the Reform Debate: The Need for Compensation Criteria

The main contribution of this study to the debate on Constitutional Amendment No. 132/2023 is the call for urgent criteria for the distribution of the IBS that take into account the "Cost of Maintaining the Producing Territory." This is not a call to return to the original model in its purest form, but rather a recognition that the sustainability of strategic hubs requires that a portion of the value added be retained to finance the management of externalities and heavy infrastructure. According to Peacock and Scott (2000), the increase in state activities is an inevitable response to industrial complexity, which validates the need for local financial support proportional to the territory's technical density.

It is proposed that, in the regulation of the IBS, adjustment coefficients be established that take into account the environmental risk and logistical density of municipalities hosting intensive activities. This measure would align the new system with what Rabbani et al. (2024) classify as fiscal and socio-environmental justice, ensuring that the social cost of production is adequately internalized. Without this compensation, the tax system risks creating a predatory effect: by exhausting the financial capacity of cities such as Paulínia, the federation jeopardizes the very efficiency of the infrastructure that supplies the country. As Souza (2003) argues, the stability of the federal pact in a country with a high degree of regional heterogeneity depends on rules that accommodate conflicting territorial demands; therefore, national sustainability cannot be built upon the fiscal insolvency of its most vital production centers.

5.3. Concluding Remarks

Ultimately, the Brazilian Tax Reform represents a step forward in terms of simplification and fairness for citizens and consumers, but it poses an existential challenge for the producing regions. According to Chevalley et al. (2024), although the new system links taxation to environmental protection, the effectiveness of these measures depends on regulations that do not ignore local realities in favor of a purely revenue-driven uniformity. The case of Paulínia serves as a cautionary tale for other Brazilian municipalities with similar profiles, highlighting what Rodden (2002) describes as the dilemma of fiscal federalism: the difficulty of maintaining fiscal discipline and the provision of public goods when revenue bases are centralized or disconnected from local economic dynamics.

The transition to the "consumptive tax base" must be accompanied by a thorough reflection on who will foot the bill for the risks and wear and tear that industrial urban society imposes on the geographical space. As Al Rubaye et al. (2026) argue, indirect fiscal policies must be developed in a way that effectively balances economic, social, and environmental objectives; otherwise, national growth will result in the impoverishment of the regions that sustain the productive infrastructure. The sustainability of strategic hubs, therefore, must not be sacrificed on the altar of tax neutrality, at the risk of promoting a disembodiment of capital which, in the view of Pinto Miranda (2019), relieves the flow of wealth while immobilizing the social and environmental burden in the territory of origin.

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