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## Flypaper Effect and Fiscal Laziness: An Analysis of Municipal Collection Efficiency in Relation to Voluntary Transfers Received

### ABSTRACT

**Objective:** This study aims to analyze to what extent the voluntary transfer of financial resources explains the efficiency in collecting municipal taxes.

**Method:** In order to achieve this objective, the effects of the flypaper effect of voluntary transfers of resources on the efficiency of municipalities in carrying out the expected collections were considered. In other words, the increase in transfers is expected to reduce the municipal effort to collect its revenues and, consequently, decrease the collection efficiency scores. The 399 subjects in Paraná were analyzed in the interstice between 2018 and 2019, using Data Envelopment Analysis (DEA), for measuring efficiency, correlation analysis and Multivariate Regression Test.

**Results:** The set of results found indicate that, in fact, there is an inversely proportional relationship between voluntary transfers received and efficiency in fundraising, consistent with the implications predicted by the flypaper effect.

**Originality/Relevance:** In view of these findings, it is assumed that the article brings innovations regarding the analysis perspective to identify the flypaper effect, in addition to fostering discussions about the consequences that the absence of revenue review may have on the collection of taxes by society.

**Theoretical/methodological contributions:** Furthermore, it should be emphasized that the reflexes inherent to the phenomenon of the flypaper effect are not only related to the values that enter the municipal coffers, but to the efficiency of the entity in collecting these values. This component allows you to evaluate revenues by weighing the inputs needed to earn them.

**Keywords:** Flypaper Effect, Voluntary Transfer of Resources, Data Envelopment Analysis.

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## 1. INTRODUCTION

During the execution of public policies, government entities make use of different devices to raise funds that can support public expenses. Among which, revenues directly collected in the form of taxes and intergovernmental transfers stand out (Vieira et al., 2017; Batóg & Batóg, 2021).

Despite both forms dealing with different means of earning income, the literature perceives the occurrence of a phenomenon arising from the change in the behavior of public revenues as the entity begins to receive transfers. That is, despite having their forecasts increased with voluntary receipts, there is no reduction in the tax burden (Paes & Portugal, 2019; Becker et al., 2020; Pansani et al., 2020).

*Flypaper* effect demonstrates that voluntary transfers received tend to be incorporated into the financial execution of the receiving entity, but without changing revenue estimation methodologies (Silva et al., 2013). It should be noted that the volume of resources in municipal coffers is subject to methodological verification strictly provided for in applicable rules (Giacomoni, 2019), so that its calculation respects technical criteria and avoids political biases.

It should be clarified that such criteria allow the collection of taxes in a volume corresponding to expenses set at a level that avoids the so-called confiscatory effect on personal assets (Pansani et al., 2020). This measure is consistent with the tax principle of non-confiscation, provided for in Item IV of Art. 150 of the Federal Constitution of 1988, which defends reasonableness in the collection of taxes to the extent necessary to cover expenses, preserving the private right to property of the taxpayer (Paes & Portugal, 2019).

From this perspective, the way is opened for evaluations that estimate the efficiency in the collection of municipal taxes. More precisely, the efficiency in realizing revenue must be equivalent to the need to defray expenses (Diniz et al., 2017), under penalty of frustrating the

collection necessary to fund public policies or burdening the taxpayer too much (Pansani et al., 2020).

This does not mean that tax evasion should be encouraged as intergovernmental transfers increase, but it is expected that the technical collection criteria can be revised. Reducing the eventual unreasonable tax burden on society without jeopardizing the financing of public expenses (Diniz et al., 2017).

Still preliminary, aspects related to efficiency in collection are highlighted, such as the initial forecast of revenue compared to actual revenue (Lima, 2018; Bezerra Filho, 2021), as a possible proxy for effort, or fiscal laziness, to maintain the conditions initially planned for collection (Silva et al., 2013; Vieira et al., 2017).

Therefore, it is understood that the present study uses the phenomenon of the flypaper effect as a basis when considering the capacity of voluntary transfers, plus economic, social and demographic factors, to explain the efficiency in tax collection in cities. In other words, it is also expected that larger municipalities, with greater economic development and better social indicators will have better conditions to earn revenue (Guner et al., 2016; Gnanon & Brun, 2018).

From these reflections, concerns arise linked to the behavior of municipal finances after contributions of voluntary resources, especially when considering the distinctions of interregional characteristics, even in the same federative unit. Given this, the present study proposes to analyze to what extent the voluntary transfer of financial resources explains the efficiency in the collection of municipal taxes.

It is understood that this proposal is relevant from different perspectives, especially academically and socially. That is, when considering the theoretical component, the studies advance by relating the reflexes inherent to the phenomenon of the *flypaper effect* not only with

the values that enter the municipal coffers, but also with the efficiency of the entity in collecting these values. In this way, an opportunity is created to investigate new characteristics arising from the *flypaper effect*, offering academic discussion on components not addressed, or treated superficially.

Under the social scope, it is accepted that there is a need to praise measures that expand society's capacity to monitor and question the budgetary and financial execution for the achievement of public policies. In this context, the studies involved in the project demonstrate, through the efficiency of tax collection, the government entity's effort to meet the initially estimated forecasts or even in the recovery of amounts recognized and not collected.

With this information in hand, measures can be taken to preserve the principle of ability to pay. That is, control bodies and society itself become aware of and can discuss how intergovernmental transfers are considered for the composition of amounts available in municipal coffers.

It should be emphasized that the present study is not intended to exhaust the possibilities for measuring collection efficiency, but to open space to discuss its effects after the financial transactions resulting from transfers and economic, social and demographic conditions.

The elaboration of the article is based on a theoretical framework based on the relationship between the *Flypaper effect* and the principle of non-confiscation. However, the concept of collection efficiency is also discussed. Then, the study presents the applied methodology, with emphasis on the mathematical modeling used to measure the efficiency and the regression analysis. Finally, after carrying out the appropriate analyses, the results are discussed and the conclusions presented.

## 2. THEORETICAL FRAMEWORK

The theoretical subsidy that supports the discussion on screen is based on the phenomenon of the *flypaper effect*, but also deals with efficiency in municipal collection and its relationship with the principle of non-confiscation, in addition to discussing the research hypothesis arising from the problematization of the subject.

### 2.1 Flypaper Effect and the Principle of Prohibition of Confiscation

The *Flypaper Effect* brings with it the idea that resources received through transfers tend to remain in the receiving entity, without necessarily corresponding to a reduction in the tax burden that falls on taxpayers (Diniz et al., 2017). It is a phenomenon that creates a distorted effect on the price of public services. That is, the taxpayer does not precisely know the need to finance public policies, which occurs due to the increase in expenses after receiving transfers and not due to the reduction in the tax burden (Pansani et al., 2020).

Its relationship with the budget forecast lies in the increase in public expenditure and the sharp revision in forecasts of expenditure on public policies, while reductions in the tax burden are not discussed (Becker et al., 2020; Tanjung et al., 2021). This increase in expenses ends up burdening taxpayers who do not have their income increased by reducing the tax burden, which may characterize an infringement of the tax principle of prohibition of confiscation (Paes & Portugal, 2019; Pansani, et al., 2020).

Another possible explanation for this innocuous behavior by the ruler, who seeks to expand his own revenues, is related to the political bias of this measure. That is, there is still a trend of lack of effort on the part of local governments to implement the expected revenue, in view of the political cost of this mechanism. While transferred resources do not have this characteristic and satisfy local demand (Silva et al., 2013; Vieira et al., 2017).

This process of estimating the amounts receivable occurs, at first, during the planning inherent in the Annual Budget Law, through the use of appropriate techniques, the amounts that can be collected for the subsequent year are estimated (Giacomoni, 2021). It should be noted that reviewing revenue realization practices can increase the efficiency with which resources are collected. From this, fiscal equalization based on the non-confiscatory principle in forecasting the resources that funded public policies becomes possible (Silva et al., 2013).

More precisely, transfers reduce the capacity for social oversight, since they are not linked to local collections, which prevents the adequate survey of the ballast used in the execution of public policies. One of the effects of this dynamic is uncertainty about the real need to realize local revenues, opening space for the confiscatory collection of taxes (Vieira et al., 2017).

It is necessary to clarify that in a decentralized system, the transfer represents a tool for reducing regional inequalities and promoting fiscal balance. However, there are indications that this mechanism interferes with fiscal management, efficiency and equity in the provision of public services. In this area, voluntary transfers tend to offer greater autonomy to the local manager in their application, while mandatory transfers aim to improve social indicators and reduce interregional inequalities (Mendes et al., 2018).

It should be noted that regardless of how resources enter the municipal coffers, the objective is to finance public policies. Therefore, if there is a forecast of an increase in intergovernmental transfers, the need for the counterpart in municipal taxes is reduced (Silva, et al., 2013).

In other words, it is clear that the dependence on intergovernmental transfers discourages local tax collection (Vieira et al., 2017). But not only that, studies by Kusuma (2017) also indicate that the increase in the volume of transfers brings with it a reduction in the efficiency of allocation of local taxes, in addition to highlighting a possible relationship with

related to the fiscal dependence of the municipality and, even, increase in municipal corruption due to reduced accountability.

Paes and Portugal (2019) also note that there is a positive correlation between increased transfers and equity income from bank deposit income. That is, the resources received can be applied generating income for the government entity, instead of reducing the tax burden or even being applied in public policies. This practice demonstrates that the tax burden on the taxpayer has become idle to the point of being kept in financial investments, as defined by the *flypaper effect*, to the detriment of the principle of non-confiscation.

Therefore, according to the literature surveyed, dependence on transferring resources reduces the quality of management and increases the inefficiency with which the government entity realizes its revenues (Caetano et al., 2017; Gnangnon & Brun, 2018; Mendes et al., 2018). To mitigate this behavior, a review of municipal tax collection is expected, as these amounts would be beyond what is necessary to meet the demands of public policies (Vieira et al., 2017).

## 2.2 Efficiency in Municipal Collection

Strictly speaking, efficiency can be understood as the ideal systematization between the necessary resources and the results obtained in a given process. That is, when considering an operational flow with inputs (*inputs*), processing or execution and, finally, outputs (*outputs*), efficiency resides in the search for the ideal relationship between these components (Mattos & Terra, 2015).

Faced with the possibility of quantifying the efficiency with which certain agents, also known as Decision-Making Units, carry out their activities, there is room for comparing procedures and institutions (Banker et al., 1984). This allows scales to be created and flows to be reviewed.

In this sense, efficiency can be used to classify performance under the most different aspects, including the execution of public revenues (Mardani et al., 2017). That is, when considering municipal collection as a consequence of the government's need to obtain resources to implement its public policies, some stages become distinct and can be measured in order to compare the efficiency with which different entities collect.

Thus, the procedures for realizing revenue can be divided from planning, which is linked to forecasting resources; the release with the acknowledgment of the right to receive; the collection with the delivery of cash to the collection agent and the collection with the receipt in the municipal coffers (Giacomoni, 2021).

Specifically, the forecast corresponds to the estimation of amounts to be collected in the following year, based on technical criteria that involve comparison with amounts previously collected, among others. It should be noted that during the estimation process, several actors involved with the realization of revenues and execution of expenses are invited to participate in the process (Giacomoni, 2021).

In turn, the realization of revenue demonstrates the steps involved with the effective entry of resources into municipal coffers (Lima 2018). At this point, it should be noted that, unlike public expenditure, the revenue stages are not detailed since they have simpler stages that arouse less interest (Giacomoni, 2021). This is why more in-depth monitoring can be hampered.

It should be noted that, although distinct, the steps for realizing revenue are complementary and comparable, given the accounting carried out simultaneously but separately between budgetary and equity accounts. This means that the forecast of resources is lowered as the realized revenue is entered, on the other hand, the balance of resources to be received does not differ when entering into overdue debt (MCASP, 2021).



As for efficiency, from this perspective there is the possibility of comparing the expected revenue with the actual revenue, also called the revenue execution quotient (Lima, 2018). This is a measure corresponding to the indicator that demonstrates compliance with the determinations contained in the Budget Law, especially regarding the possibility of excess revenue, or revenue lower than expected. It should be noted that in reference to the *flypaper effect*, the reduction in efficiency is assumed the lower the ratio between revenue directly collected and transfers received (Diniz et al., 2017).

Therefore, in this context, efficiency in municipal collection can be understood by predicting revenue as an input, while the quotient between collection and transfers correspond to outputs.

In short, efficiency in municipal collection can be evaluated in different ways, which in itself would lead to further studies on its effects for comparison between institutions regarding the procedures involved (Mardani et al., 2017; Lima, 2018). However, such efficiency analyzes also correspond to a component that can be explained by the volume of resources received through intergovernmental transfers (Husuna, 2017).

The relationship between these concepts stems from the understanding that the receipt of resources is exclusively aimed at financing public policies (Giacomoni, 2021). Despite this, according to the concepts arising from the *flypaper effect*, the additional inflow of public resources, through transfers, corresponds to a decrease in the efficiency with which the municipal entity seeks to earn its revenues (Kusuma, 2017; Gnanon & Brun, 2018).

### 2.3 Survey of variables and research hypothesis

Regarding the variables considered in the econometric model, preliminarily, the transfers correspond to the independent variables. According to the classification provided by Lima (2018), transfers can be classified as mandatory and discretionary.

The mandatory ones deal with unconditional transfers, that is, that there is no prerequisite or formality for receipt. In addition, there is no requirement for a counterpart, nor can the funds be set aside by the body responsible for the transfer. In turn, discretionary transfers result from the characteristics inherent to the scope, complexity, diversity and demands of the Brazilian population (Lima, 2018).

This type of transfer encourages the shared use of public instruments and resources to achieve programs or initiatives for the population. Therefore, the decision to transfer occurs voluntarily to achieve a mutual interest. However, for the agreement to be formalized, prerequisites such as the existence of a work plan, disbursement schedule must be addressed (MCASP, 2021).

Regardless of the distinctions between the types of transfers, it is assumed that there is a positive correlation between the volume of resources transferred and the dependence on these values by the municipal entity (Vieira et al., 2017; Paes & Portugal, 2019; Pansani, 2020). This statement is in line with Silva et al., (2013) findings, especially regarding the political bias arising from measures to recover tax credits.

To measure the “*Collection efficiency*”, an endogenous research variable, forecasts of resources to be collected were considered in view of the collections made and transfers received. In this way, the lower the public revenues compared to initial forecasts, the lower the efficiency of municipal collection procedures (Lima, 2018; Bezerra Filho, 2021).

In addition to the independent variables, the study considers certain control variables to mitigate possible alternative explanations. In this sense, taking into account their capacity to stimulate municipal collections, factors related to social, demographic and economic aspects were used (Vieira et al., 2017; Kurniana et al., 2017; Olayungbo & Olayemi, 2018; Batóg & Batóg, 2021). In other words, larger municipalities, with better economic, social and fiscal

indicators tend to have higher collection volumes. These factors were considered in the analysis to control additional explanations for the phenomenon researched on screen.

Therefore, when considering the behavior of the concepts in question, an inversely proportional variation between the “*collection efficiency*” and the transfers received is expected (Kusuma, 2017; Gnanon & Brun, 2018). While in relation to social, economic and fiscal indicators, the relationship must be proportional to the observed efficiency (Mendes et al., 2018). Given the theoretical subsidy arising from the *flypaper* effect and the possible relationship between efficiency in municipal collection and the variables presented, the research hypothesis can be described as follows:

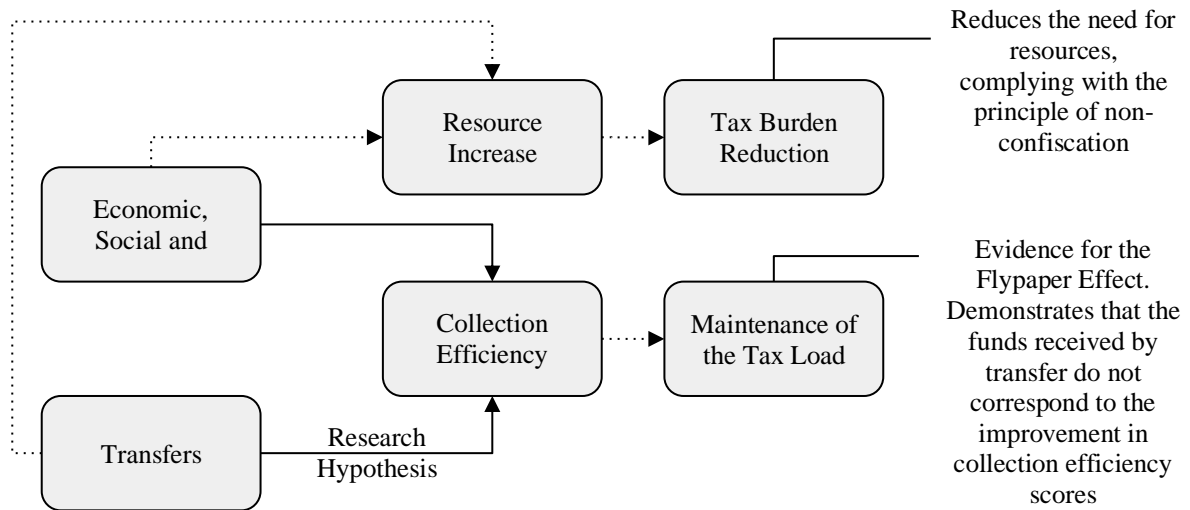
Alternative Hypothesis	The increase in voluntary transfers reduces efficiency
( $H_1$ ):	in municipal collection

To illustrate, the construction of research, present in Figure 01, demonstrates the relationship between the concepts raised. In this area, it is assumed that economic and social aspects contribute to the explanation of collection efficiency. Still, even with the transfers, if an increase in revenues is not noted, there are indications that the tax burden was maintained, which configures the *flypaper effect*.

In turn, if transfers, combined with economic and social aspects, denote an increase in resources, there is the possibility of revising the tax burden, reducing the need for revenue collected from taxpayers. This movement of revising revenues to expenditure levels meets the principle of non-confiscation, preserving the individual's ability to build assets (Paes, & Portugal, 2019; Pansani et al., 2020).

**Figure 01**

*Relationship between Concepts*



Source: Prepared by the authors

### 3 METHODOLOGICAL OUTLINE

The present research can be classified as descriptive in relation to the objectives, with the use of documentary procedures, whose approach is predominantly quantitative. About the scientific method used, the study analyzes the research problem, arising from a theoretical concept, through a research hypothesis, which is submitted by verification and falsification tests, procedures corresponding to the hypothetical-deductive method (Martins & Theóphilo, 2016).

To verify the research hypothesis, variables related to financial transfers to municipalities were used; economic, social and fiscal indicators; in addition to variables that made it possible to measure the efficiency of tax collection. The variables used are shown in Table 01.

Data collection used reports obtained from the platform of the Instituto Paranaense de Desenvolvimento Econômico e Social (Ipardes, 2022) as the main source, which consolidates information from the physical, economic, social, financial, political and administrative areas of

Paraná municipalities. Likewise, data were obtained from the Municipal Finance platform of the National Treasury Secretariat (Finbra, 2022). The analyzed population corresponds to the 399 municipalities of Paraná during the years 2018 and 2019.

**Table 01**

*Variables Used in the Study*

Variable	Operation	Reference
Updated Revenue Forecast ( <i>Efic_Arrec</i> )	<i>Input</i> into the efficiency model. Adds the values related to the revenue forecast	Kusuma (2017); Diniz, et al. (2017); Lima (2018); Bezerra Filho (2021)
Realized Revenue ( <i>Efic_Arrec</i> )	<i>Output</i> in the efficiency model. Sums up the amounts related to realized revenues, broken down by type of revenue.	
Voluntary Transfers ( <i>Transf_Volunt</i> )	Independent Variable. Comprises increased equity variations arising from voluntary transfers from the Union, states, Federal District, municipalities, including related entities, as well as other entities, of goods and/or values.	Kusuma (2017); Caetano et al (2017); Vieira et al. (2017); Gnanngnon and Brun (2018); Mendes et al. (2018); Countries and Portugal (2019); Pansani et al. (2020)
Transfers from the Municipalities Participation Fund ( <i>Transf_FPM</i> )	Independent Variable. Municipality participation fund transferred by the Union.	
Other Transfers ( <i>Transf_Outras</i> )	Independent Variable. Comprises increased equity variations arising from other transfers from the union, states, Federal District, municipalities, including related entities, of goods and/or values.	
Population Density ( <i>Densid_Demon</i> )	Control Variable. Indicator that shows how the population is distributed across the territory, being determined by the ratio between the population and the area of a given region. The expected relationship is	Kusuma (2017); Vieira et al. (2017)
Employment ( <i>Emp_RAIS</i> )	Control Variable. The number of jobs (jobs) corresponds to the total number of active employment relationships, it is different from the number of people employed, as the same individual may be occupying more than one job on the reference date.	Batóg and Batóg (2021)
Iparde Municipal Performance Index - Education ( <i>IPDM_Educ</i> )	Control Variable. Evaluates enrollment rates, school dropout, age-grade distortion, teachers with higher education and IDEB results.	
Iparde Index of Municipal Performance - Income ( <i>IPDM_Rend</i> )	Control Variable. Variables related to average salary, formal employment and agricultural income are used.	Mendes et al. (2018); Batóg and Batóg (2021)
Iparde Municipal Performance Index - Health ( <i>IPDM_Saud</i> )	Control Variable. It considers the number of prenatal consultations, deaths from preventable causes and deaths from ill-defined causes.	
Estimated Population ( <i>Pop</i> )	Control Variable. Estimation carried out by IBGE on the population residing in a given region.	Kusuma (2017); Vieira et al. (2017)
Active Non-Tax Debt ( <i>Div_Active_NT</i> )	Control Variable. Comprises amounts of registered non-tax active debt credits, derived from customers, realizable in the short term.	Silva et al. (2013); Vieira et al. (2017); Olayungbo and Olayemi (2018);
Tax Credit Receivable ( <i>Cred_Arec</i> )	Control Variable. Comprises amounts related to credits receivable arising from tax increases in equity variations, realizable within 12 months from the date of the statements.	Gnanngnon and Brun (2018)

The choice of the sample is due to the homogeneous characteristics of the municipalities, given that they are subject to the same state department which is assumed to be subject to the same parliamentary arrangements for voluntary transfers. In other words, when using municipalities from the same state, it is expected to reduce any discrepancy between entities that do not share similar conditions for obtaining voluntary resources.

In turn, to achieve the research objective, different statistical and mathematical procedures were used. At first, the collected data were tabulated and the scarce missing data were treated through linear interpolation with the aid of the tool proposed by Moritz and Bartz-Beielstein (2017). Then, any *outliers* were adjusted to the mean, according to the procedure implemented by Komsta (2022).

In possession of a balanced database, the following research procedures were defined in Table 02.

**Table 02**

*Research Procedures*

<b>goal</b>	<b>Procedure</b>	<b>Reference</b>
Measuring Efficiency	Data Envelopment Analysis (DEA-BCC-in)	Banker et al. (1984); Ehrgottz, Holder and Nohadani (2018); Bogetoft and Otto (2022)
Analyze the characteristics of the variables	Descriptive Statistics, Central Tendency, Interquartile Distribution, Correlation Analysis	Fávero and Belfiore (2017)
Analyze the relationship between variables	Multivariate Regression Test	Fávero and Belfiore (2017)
Test the Regression Diagnostics	Normality of Residues	Zeileis and Hothorn (2002)
	Heteroscedasticity	Gross and Ligges (2015)
	Multicollinearity	Fox and Weisberg (2019)
	Autocorrelation of Residuals	Gross and Ligges (2015)

Source: Prepared by the authors

As foreseen in the research procedures present in Table 02, the analyzes begin by measuring efficiency, through Data Envelopment Analysis (Banker et al., 1984; Mattos & Terra, 2015). This procedure allows the extraction of scores, even though the variables include scale variations.

It is a non-parametric methodology that evaluates the process of transforming *input* into *outputs*, so that it is possible to create an optimal efficiency frontier between these sets of variables. In this process, each evaluated unit is called Decision-Making Unit (DMU). In each of these units, the *input* and *output variables are analyzed* to determine the DMU efficiency scores (Mattos & Terra, 2015; Bogetoft & Otto, 2022).

In possession of the efficiency scores, an endogenous research variable, it is possible to analyze its relationship with the transfers received, also considering social, economic and fiscal aspects of the municipalities of Paraná. To this end, multiple regression analysis is used to measure the extent to which this set of independent and control variables explains the variance found in the efficiency scores (Fávero & Belfiore, 2017).

It is assumed that based on the results found, it is possible to establish a relationship between efficiency in municipal collection and transfers of resources to municipalities (Kusuma, 2017; Gnanon & Brun, 2018). More precisely, when considering the *flypaper* effect, it is expected that the increase in the volume of transfers behaves inversely proportional to the efficiency with which municipalities collect resources, especially due to the dependence created in the municipalities by these transfers (Vieira, 2017; Paes & Portugal, 2019; Pansani, 2020).

#### 4 PRESENTATION OF RESULTS

Preliminarily, in order to obtain the dependent variable, research object of the study on screen, the Data Envelopment Analysis was performed, by the method that considers the scale variation with orientation to input, BCC - *in* method. This means that the measurement of efficiency supports possible distortions arising from the characteristics of the variables, in addition to assuming that the revenue forecast is reduced as transfers are received.

**Table 03***Highest Efficiency Scores*

County	Score 2018	County	Score 2019
Curitiba	1.0000	New Alliance of Ivaí	1.0000
Iracema do Oeste	0.8371	Miraselva	0.8689
Southern Diamond	0.8101	Bela Vista da Caroba	0.8649
Bela Vista da Caroba	0.8020	Santa Cecilia do Pavao	0.8494
Rio Bom	0.7974	Iracema do Oeste	0.8480
Iguatu	0.7882	Salto do Itararé	0.8281
Godoy Moreira	0.7793	Santa Inês	0.8048
Miraselva	0.7684	Good Jesus from the South	0.7912
Saint Anthony of Caiua	0.7641	Southern Diamond	0.7793
Salto do Itararé	0.7612	cherry trees	0.7711

Source: Prepared by the authors

It should be noted that, from Table 03, according to the *input orientation*, the municipalities with the highest collection compared to the initial forecast are highlighted. That is, if the quotient between the forecast and the realized revenue is applied, values close to 1 tend to be the most efficient.

Among the scores found for the 399 municipalities under analysis, some remained among the best scores in both exercises, which underscores the collection efficiency of these locations. These results were used for a descriptive evaluation of the population in question.

This descriptive analysis of the data aimed to understand the behavior of the population. For this purpose, metrics related to data centrality, dispersion and interquartile distribution were used, as shown in Table 04. In addition, correlation analysis was also performed to test the behavior.

At first, based on the centrality of the data, it is noted that the mean and median values are not approximate, which indicates a possible asymmetry in the distribution of the population. This is also noted by the distances between the 3rd quartile and the maximum values, which reinforces that part of the data is concentrated in the last 25% of the distribution.

These indications of lack of centrality were not received as determinants for discarding statistical tests that assume the presence of parametric data. But, strictly speaking, they reiterate



the need to verify compliance with the assumptions of the regression provided for in the research protocol (Fávero & Belfiore, 2017).

**Table 04**

*Descriptive Statistics*

	mine	1st Qtl	Average	median	Pad Dev.	CV	3rd quarter	Max
Effective_Arrec	0	0	0	0	0	1	0	1
Densid_Demon	-248,332	1744	781,181	2,884	22,067,512	28	6,546	623,382,811
Emp_RAIS	124	724	831,370	1,385	23,485,296	28	3,780	663,433,626
IPDM_Educ	8	7,480	1,047,253	8,397	29,583,735	28	8,953	835,707,779
IPDM_Rend	36	3,784	564,967	4,228	15,959,693	28	4,753	450,843,664
IPDM_Health	1	7,762	1,054,135	8,479	29,778,135	28	8,953	841,199,373
Pop	1,331	4,978	327,824	9,720	9,260,659	28	18,832	261,603,375
Transfer_Volunt	162	708,374	24,578,869	1,990,790	108,914,990	4	6,285,935	938,606,633
Transfer_Others	-4,123,745	813,369	9,854,042	1,702,371	76,234,261	8	3,477,531	968,748,667
Transfer_FPM	10,907,189	75,511,309	453,679	820,442,628	7,440,975	16	1,510,226,144	142,102,231
Div_Activ_NT	-25,260	33,985	30,163,984	203,894	128,303,800	4	1,270,571	967,111,333
Cred_Arec	-16,205,117	325,799	27,994,868	1,810,915	122,703,092	4	9,815,712	975,973,333

**Note:** CV - Coefficient of Variation; Mean, Standard Deviation and Maximum values presented in millions

Source: Prepared by the authors

Still under this perspective, the indicators related to data dispersion present considerably high values, in terms of the Coefficient of Variation, together with the control variables. On the other hand, the independent variables were more contained, with the exception of “*Tranf\_FPM*”. This result may be related to the misshapen characteristics of the municipalities of Paraná, which have heterogeneous characteristics. While resource transfers do not follow these disparities.

These previous results can be complemented by means of a Pearson correlation analysis, which considers the quantitative data and establishes whether the behaviors are proportional, in addition to the significance of the results. In this sense, in order to find possible evidence of correlation between efficiency in municipal collection and other exogenous variables, Table 05 was prepared.

**Table 05**

*Pearson correlation*

Variable	a	b	c	d	e	f	g	h	i	j	k
a	1.00										
b	-0.14***	1.00									
c	-0.09***	0.78***	1.00								
d	0.03	0.00	0.05	1.00							
e	-0.51***	0.18***	0.23***	0.26***	1.00						
f	0.10***	0.01	0.03	0.31***	0.06	1.00					
g	-0.20***	0.79***	0.97***	0.03	0.29***	0.01	1.00				
h	-0.15***	0.01	0.07**	0.06	0.13***	0.04	0.10***	1.00***			
i	-0.20***	0.41***	0.44***	0.03	0.22***	-0.04	0.46***	0.25***	1.00		
j	-0.41***	0.74***	0.81***	0.02	0.36***	-0.02	0.88***	0.10***	0.43***	1.00	
k	-0.07**	0.16***	0.24***	0.04	0.14***	0.02	0.29***	0.16***	0.23***	0.20***	1.00
l	-0.22***	0.11***	0.22***	0.06*	0.28***	-0.05	0.32***	0.14***	0.33***	0.36***	0.20***

**Note:** *Efic\_Arrec*="a"; *Densid\_Demon*="b"; *Emp\_RAIS*="c"; *IPDM\_Educ*="d"; *IPDM\_Rend*="e"; *IPMC\_Saud*="f"; *pop*="g"; *Transf\_Volunt*="h"; *Transf\_Outras*="i"; *Transf\_FPM*="j"; *Div\_Enable\_NT*="k"; *Cred\_Arec*="l"; Significance at the level of \*0.1 \*\*0.05 \*\*\*0.01

Source: Prepared by the authors

It should be noted that, at this moment, only the dependent variable was the object of analysis, in strict attention to the research question. That said, it should be noted that only the result related to the variable “*IPDM\_Educ*” will not be evaluated in this analysis, since it did not present the expected minimum significance.

In turn, regarding the variables related to resource transfers, it should be noted that the data behaved as predicted by the literature review (Kusuma, 2017; Gnanon & Brun, 2018). That is, there is an inversely proportional correlation between transfers received and efficiency in fundraising. This result reiterates the understanding of the reduction in municipal effort to collect resources when an increase in resource transfers is perceived (Paes & Portugal, 2019).

More precisely, when observing the behavior of lines “h”, “i” and “j”, in relation to column “a”, it is assumed that efficiency in municipal collection is reduced as voluntary transfers, transfers to the Fund of Participation of Municipalities and other transfers received by municipalities increase (Silva et al., 2013; Gnanon & Brun, 2018).

It should also be noted that, broadly speaking, the other variables also showed results that were inversely proportional to the collection efficiency, with the exception of “*IPMC\_Saud*” ( $p(0.0958)$ ,  $p\text{-value} = 0.0067$ ). This indicates that more populous municipalities,

with higher income, demographic density and jobs, are less efficient in fundraising. In other words, there is a lower demand for resources in municipalities that have presented minimally satisfactory indicators for the population (Batóg & Batóg, 2021), which reinforces the possibility of the flypaper effect.

## 5 DISCUSSION OF THE RESULTS

However, for a more precise analysis of the extent to which voluntary transfer explains efficiency in tax collection, a multiple regression test is necessary, as shown in Table 06.

**Table 06**

### Regression Analysis

	Coefficient	Standard Error	T-Value	P-value
intercept	6,376e-01	6,290e-02	10,137	< 0.0000***
Densid_Demon	7,194e-05	4.103e-05	1,753	= 0.0799*
Emp_RAIS	7,786e-06	7,468e-07	10,427	< 0.0000***
IPDM_Educ	1748e-01	6,173e-02	2,832	= 0.0047**
IPDM_Rend	-9.315e-01	7,239e-02	-12,868	< 0.0000***
IPDM_Health	1,314e-01	6,198e-02	2,121	= 0.0342*
Pop	-2,258e-06	3,698e-07	-6,106	< 0.0000***
Transfer_Others	-2,389e-09	8,479e-10	-2,818	= 0.0049**
Transfer_Volunt	-1,065e-09	5,701e-10	-1,869	= 0.0620*
Transfer_FPM	-8,390e-09	8,684e-10	-9,661	< 0.0000***
Div_Activ_NT	1,805e-10	1,273e-10	1,418	= 0.1565
Cred_Arec	6,241e-10	1,675e-10	3,726	< 0.0002***
Test F	F (11;786) = 71.66, p-value < 0.0000***			
R <sup>2</sup>	0.5007			
Adjusted R <sup>2</sup>	0.4937			
Shapiro-France	W = 0.96042, p-value = 0.0000			
Harrison-McCabe	HMC = 0.46352, p-value = 0.0660			
Goldfeld-Quandt	GQ (387) = 1.1623, p-value = 0.0698			
Durbin-Watson	DW = 2.0082, p-value = 0.5347			
VIF	<i>Densid_Demon</i>	<i>Emp_RAIS</i>	<i>IPDM_Educ</i>	<i>IPDM_Rend</i>
	3.1135	26.3718	1.2201	1.3271
	<i>IPDM_Health</i>	<i>Pop</i>	<i>Transfer_Others</i>	<i>Transfer_Volunt</i>
	1.1223	38.9434	1.4675	1.1082
	<i>Transfer_FPM</i>	<i>Div_Activ_NT</i>	<i>Cred_Arec</i>	
	5.8280	1.2060	1.5018	

Equation can be translated as follows  $Efic\_Arrec_i = \alpha_i + \beta_1 Densid\_Demon_i + \beta_2 Emp\_RAIS_i + \beta_3 IPDM\_Educ_i + \beta_4 IPDM\_Rend_i + \beta_5 IPDM\_Saud_i + \beta_6 Pop_i + \beta_7 Transf\_Others_i + \beta_8 Transf\_Volunt_i + \beta_9 Transfer\_FPM_i + \beta_{10} Div\_Active\_NT_i + \beta_{11} Cred\_Arec_i + \epsilon$ ; The regression diagnostic tests were performed using Shapiro-Francia (normality of residuals), Harrison-McCabe and Goldfeld-Quandt (homoscedasticity), Durbin-Watson (autocorrelation of residuals) and the Variance Inflation Factor (VIF) for verify the presence of multicollinearity (Fávero & Belfiore, 2017); Significance at the level of \*0.1 \*\*0.05 \*\*\*0.01.

The regression test demonstrates that, considering the transfers and the control variables, it is possible to explain approximately 50% of the variance found in the collection efficiency of the municipalities. This value is lower than expected but does not detract from the explanatory capacity of the econometric model. Furthermore, considering the objective of the research, only the analysis on the  $R^2$  would be insufficient to determine the relationship between the variables.

Therefore, the analysis of the results is based on other factors, such as the signs of the regression coefficients, in addition to the previously performed correlation test. From this perspective, in all cases the transfers showed significant results with a negative sign in relation to collection efficiency. That is, this situation reinforces the understanding that the increase in transfers partially explains the efficiency of municipalities to raise funds (Kusuma, 2017), which does not allow refuting the research hypothesis.

It is also observed that the other control variables were also significant for the composition of the result. This reiterates the need to consider social, fiscal and economic aspects when forecasting municipal revenues (Mendes et al., 2018; Vieira et al., 2017). Therefore, taking into account the relevant analyzes of the relationship between the collection efficiency and the control variables used, evidence is recognized that the effort to realize the expected revenue needs to be revised according to the transfers received, under penalty of confiscating the assets of the taxpayer for unnecessary revenue (Silva et al., 2013; Pansani et al., 2020).

Or else, if the predicted values persist, without the collection being carried out, there may be revenue frustration, which may jeopardize the execution of public policies (Vieira et al., 2017). Given these conditions, after reviewing revenues from receipt of transfers, an adjustment of revenues is expected, so that government actions are preserved without unnecessarily burdening the contribution (Paes & Portugal, 2019).

Regarding the econometric model, it should be noted that statistical significance is noted according to the *F test* (71.66, *p-value* < 0.0000), in addition to having satisfactorily met the assumptions of the regression. With the exception of normality in the residuals, which was corrected after verifying the distribution of normality through graphical analysis of the histogram of the residuals.

Having considered the robustness of the model and the correspondence of results between the regression test and the correlation analysis, it is necessary to conclude that the research findings are in line with the evidence of the flypaper effect, especially regarding the impact of transfers on the *municipal* effort for tax collection (Kusuma, 2017). This is an understanding that receiving non-mandatory transfers reduces the need for the government entity to maintain incentives for collection, but it also does not indicate that forecasts on the taxes to be collected will be revised, which opens up space for the existence of confiscation of assets of the taxpayer (Paes & Portugal, 2019).

More precisely, the results found are consistent with the research hypothesis. This means that it was not possible to refute the understanding that the increase in voluntary transfers makes the municipality dependent and reduces its ability to earn the constitutionally foreseen revenues (Paes & Portugal, 2019; Pansani et al., 2020). However, according to the studies by Guner (et al., 2016) and Gnangnon, and Brun (2018), the lack of efficiency in tax collection cannot be set aside from economic problems, such as the level of jobs, income and debt, given that the reduction in revenues may result from or imply a reduction in local economic growth.

In turn, it is pertinent to bring to the discussion the aspects inherent to the principle of non-confiscation. Bearing in mind that an eventual resumption of collections should be associated with reviewing the need for voluntary transfers, so that public revenues are strictly

corresponding to the demand for public policies (Silva et al., 2013; Vieira et al., 2017; Pansani et al., 2020).

It should be emphasized that the control variables were essential for the interpretation of the results. In other words, based on the significance of these variables in the econometric model, it is not possible to dissociate the behavior of collections, given the economic and social conditions present in the region (Vieira et al., 2017; Kurniana et al., 2017; Olayungbo & Olayemi, 2018; Batóg & Batóg, 2021). Therefore, by including these variables in the study, possible alternative explanations are considered, preserving the interpretation of the research hypothesis.

## 6 CONCLUSIONS

The present study aims to analyze to what extent the voluntary transfer of financial resources explains the efficiency in the collection of municipal taxes. To this end, it is assumed that the transfer of federal and state resources to municipal entities reduces the effort to achieve the revenue forecasts foreseen in the initial budget, which is consistent with the characteristics of the flypaper effect.

The tools that allowed achieving the proposed objective predominantly involved quantitative analyzes through the measurement of efficiency, descriptive and correlation analyses, in addition to the regression test. The results found correspond to the research hypothesis, indicating that there is indeed a significant relationship between non-mandatory transfers and the efficiency with which resources are collected.

It should be noted that the relationship found was inversely proportional, which was expected according to the *flypaper effect*. That is, the transfers do not change the initial forecasts, which causes a direct effect on the quotient between forecasted and realized

resources. This reflection is conditioned to the frustration of revenues, or even with the maintenance of revenues that burden the taxpayer.

Furthermore, control variables were used to mitigate possible alternative explanations for the phenomenon found. They are not objects of in-depth analysis in the present study, but it is demonstrated that they contribute to expanding the explanatory capacity of the econometric model. These are economic, social and fiscal variables related to the evaluated municipalities.

Having considered the results found, it is pertinent to highlight the expected contributions. In this sense, regarding the *flypaper effect*, the foundation of the discussions raised, the study innovates by using a new perspective, still related to municipal revenues, but with an emphasis on the efficiency with which the government entity seeks to carry out its collections. This understanding makes it possible for a new bias to be observed, not only regarding the amounts themselves, but regarding the government entity's effort to comply with the expected collections after receiving transfers.

Furthermore, in the social area, discussions are fostered on the effects of the absence of reviews of government revenues in relation to transfers received. More precisely, the confiscatory effect of revenues to be collected that have already been remedied through voluntary transfers needs to be debated and control measures implemented.

Given the context in which voluntary transfers occur, especially regarding the necessary parliamentary support, the study has territorial limitations in its sample. However, studies that assess inter-regional discrepancies in the results found cannot be ruled out. In this area, it is suggested that future research investigate whether there are distinctions in the reduction of efficiency between regions, its possible causes and consequences for the local population.

Another limitation that deserves to be highlighted refers to the absence of a more elastic time frame. If new researchers find ways to extend the study to new exercises, changes in the behavior of transfers between governments may eventually be investigated.

As previously mentioned, the study on screen does not exhaust the debates on the subject, on the contrary, given the originality of the approach, it is expected that new research can continue the theme, especially due to the possibility of investigating the most prominent consequences of the flypaper effect resulting *from* the voluntary transfers. Research in other states or with other variables, such as the stock of revenues in overdue debt, which may increase the explanatory capacity of the econometric model are also plausible.

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## *O Efeito Flypaper e a Preguiça Fiscal: Uma Análise da Eficiência de Arrecadação Municipal em Relação às Transferências Voluntárias Recebidas*

### **Resumo**

**Objetivo:** Este estudo visa analisar em que medida a transferência voluntária de recursos financeiros explica a eficiência na arrecadação de tributos municipais.

**Método:** Para atingir esse objetivo foram considerados os reflexos do efeito flypaper das transferências voluntárias de recursos sobre a eficiência dos municípios para realizar as arrecadações previstas. Em outras palavras, é esperado que o aumento das transferências reduza o esforço municipal para recolher suas receitas e, conseqüentemente, diminua os escores de eficiência de arrecadação. Foram analisados os 399 municípios paranaenses no interstício entre 2018 e 2019, mediante Análise Envoltória de Dados (DEA), para mensuração de eficiência, análise de correlação e Teste de Regressão Multivariada.

**Resultados:** O conjunto dos resultados encontrados indicam que de fato existe uma relação inversamente proporcional entre as transferências voluntárias recebidas e a eficiência na arrecadação de recursos, condizente com as implicações previstas pelo efeito flypaper.

**Originalidade/Relevância:** Diante desses achados, assume-se que o artigo traz inovações acerca da perspectiva de análise para identificação do efeito flypaper, além de fomentar discussões sobre os reflexos que a ausência de revisão das receitas pode ter sobre o recolhimento de tributos pela sociedade.

**Contribuições teóricas/metodológicas:** Ademais, acentue-se que os reflexos inerentes ao fenômeno do efeito flypaper não são relacionados apenas com os valores que ingressam aos cofres municipais, mas sim com a eficiência do ente em arrecadar esses valores. Este componente permite avaliar receitas ponderando os inputs necessários para auferi-las.

**Palavras-Chave:** Efeito Flypaper, Transferência Voluntária de Recursos, Análise Envoltória de Dados.

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