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A Study on the Accounting Factors Influencing the FIRJAN Municipal Development Index (IFDM) in Brazilian Capitals

Abstract

The impact of public spending on the development of a city can be considered a constant concern for those in charge. In that context, as citizens are obliged to contribute, through taxes, to maintain the municipal administrative structure, this structure takes particular interest in maximizing the human development of society, which can be measured with the help of the FIRJAN Municipal Development Index (IFDM). The aim in this study was to identify the accounting variables that condition the IFDM in Brazilian capitals, with a view to assessing the relevance of the accounting information in that index. Therefore, aspects of accountability and transparency in public management were addressed, as well as the role of accounting disclosure to reduce the information asymmetry that exists in the relation between citizens and elected managers. Concerning the methodological procedures, a panel data model was estimated by crossing the data from the Brazilian capitals' IFDM, which is considered an important public management and democratic accountability tool, for the years 2005 till 2010, using data for 17 accounting variables. The results showed a statistically significant association between the variables Interest and Debt Charges, Capital Expense, Investments, spending on Culture and Social Assistance and Current Transfers on the one hand and the total IFDM of the selected public entities on the other, showing that accounting information is relevant to determine the IFDM of the capitals analyzed. This situation supports the theoretical assertion according to which governmental spending, as registered by accounting, affects city development. Hence, good public account management could culminate in a higher human development level of the cities studied over the years.

Key words: Public Entities. Accountability. IFDM.

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1. Introduction

The State and cities' execution of the activities for which they were created requires the availability of financial resources. In that sense, citizens are called upon to contribute, through compulsory tax payment, in order to maintain the structure of the state and municipal administrative apparatus, as well as to make any investments within their competency area they consider priorities, such as education, health, basic sanitation, transport, infrastructure, public safety, technology and others (Cruz, 2010). At bottom, this tax collection is aimed at supporting spending to maximize the population's wellbeing. In theory, the higher the spending, the higher the level of wellbeing will be (Scarpin, 2006).

In accordance with Santos Filho (2010), traditionally, the growth and development of a society have always been measured based on quantitative economic factors like GDP, per capita GDP, per capita income and investments. Although these indicators could somehow be efficient as a proxy of economic growth, they did not always reflect the society's development level, which normally influences the social wellbeing and quality of life (Santos Filho, 2010). In this context, indicators emerged that are more focused on the social sphere, particularly the Human Development Index (HDI).

In the same sense, Scarpin (2006) emphasizes that the progress of a country or city cannot be measured merely by the money its citizens possess (or lack), but that aspects related to health, quality of medical services and education should also be taken into account, so that these measures should be assessed not just by their availability, but also by their quality. Santana Júnior (2008) adds that, when citizens are obliged to pay taxes, they also start to charge compliance with the social contract from public entities, through their directors and managers. Thus, the citizens aim to guarantee that the resources resulting from their taxes are being employed effectively.

Similarly to what happens in a private, for-profit organization, in the municipal public sphere, although there is no formal owner of the city, different agency conflicts exist. The owner of a city can be considered as its inhabitants, who through free elections choose their mayor, who will administer the city in a given period (Scarpin, 2006). The mayor's interests do not always converge with those of the general population though, a fact that characterizes an agency conflict.

According to Slomski *et al.* (2008), admitting the existence of information asymmetry between agent and principal gives rise to the need to assess whether the agent (public manager) will always make decisions that maximize the interests of the principal (citizens). In line with Scarpin (2006), one of the main interests of the citizens is to maximize the human development of the group, which can be measured through the Municipal Human Development Index (HDI-M) and, similarly, through the FIRJAN Municipal Development Index (IFDM).

Studies that analyze the HDI and link it with accounting/financial aspects are more frequent in the literature than studies on the IFDM, highlighting the work of Anand and Sen (2000), Scarpin (2006) and Ray (2012). Anand and Sen (2000) have analyzed the "Income" component of the Human Development Index, demonstrating bias and punctual inconsistencies in the use of that variable in the model the HDI proposes. The authors proposed some corrections to the method, due to crucial divergences, even in inter-country comparisons, among per capita GDP rankings. Among these modifications, the need for the precise and consistent use of income-related variables and corrections to consider different income distribution scenarios is highlighted.

Scarpin (2006) indicated a mathematical model to determine the future value of the HDI-M for cities in the State of Paraná, based on current accounting data and other variables. The author also analyzed the correlation among the indicators that are part of the HDI-M, checked the relevance of accounting information in the determination of the index, identified the variables related to the HDI-M and measured the time lag between these variables and the index analyzed.

Emphasizing accounting for sustainable development, Ray (2012) proposed a redefinition of the HDI, including information on the environment into the traditional index with a view to a more appropriate representation of sustainability. The new index the author developed, called the Environmentally Stressed Human Development Index (ESHDI), indicates the level of strain a country puts on the environment in the economic development process. Cruz (2010), in turn, used the IFDM and the HDI-M as explanatory variables to test the hypothesis that the public management transparency level of the 100 main Brazilian cities in terms of population is positively related with those cities' performance on the same indices.

To achieve the interests of the city's inhabitants, it is the duty of the administrator the population has elected to manage public finance with a view to maximizing development through the resources spent (Scarpin, 2006). In that context, based on the analysis of the IFDM profile and the possible contribution of public accounting to appropriately register public spending levels, the following research question was formulated: what accounting factors condition the IFDM? To answer the research question, the general aim in this study is to identify the accounting variables that condition the IFDM of Brazilian cities, with a view to permitting inferences about the relevance of accounting information in that same index.

As a contribution, the study aims to encourage the elaboration of further knowledge about the impact of public spending on the formation of the IFDM, considering that more studies have adopted the HDI, while additional research to analyze the IFDM is lacking. In addition, the researchers hope to contribute to the direction of public policies towards more efficient resource allocation.

2. Theoretical Platform

2.1. Accountability in Public Entities

In the accounting context, the main goal of information disclosure is to support internal and external users of accounting to make decisions. Thus, the financial statements provide information about companies' equity, financial and economic position (Colauto *et al.*, 2009). The objective of Public Accounting does not escape from this rule, as it is expected to control public equity and render accounts to society. Hence, for Accounting to achieve that goal, an accounting information system needs to be used that permits due support in the decision making process and transparent public spending (Athayde, 2002).

Like in private companies, users' interest in the information public accounting provides are diverse and wide-ranging, as detailed in Figure 1.

Types of Accounting users	Interests of users
Citizens, Taxpayers or Voters	Exercise political participation and social control, supporting the choice and activities of governments that respond to their anxieties;
Suppliers	Decide on sales to the State through knowledge about demand and payment capacity. Monitoring of public calls for tender and payments by public entities;
Unions	Negotiate on remunerations, work conditions and benefits to public servants, retired people and pension holders;
Businessmen	Decide on the going concern of the business, in view of changes in tax burdens and the State's encouragement of economic activities, as well as opportunities to capture employees and directors for their staff;
Investors (private persons or institutions)	Analyze the risk related to the purchase of public debt bonds, among other investment alternatives affected by the State;
NGOs and Associations	Monitor and supervise governmental actions, according to their objectives, and identify cooperation or support areas or centers for their activities;
Political Parties	Support their criticism and governmental proposals (government plans), also through the allocation of public resources to teaching, research and community services;
Researchers and Students	Develop academic-scientific studies about the State, its management and public finance. Locate opportunities and/or the concentration of potential or actual resources detached to the entity;
Credit institutions	Support their decisions about granting credit to the State;
Governments in other spheres or powers	Supervise the use of resources, decisions on technical and financial help, establishment or changes in standards in force;
Foreign governments	Decide on cooperation and financial help, in the form of loans or donations (transfers);
Media (radio, TV and newspapers)	Disseminate news and investigative pieces.

Figure 1. External users of public accounts and summary of their presumed interests.

Source: Adapted from Platt Neto *et al*. (2005).

According to Pablos, Figueroa and Camou (2007), the interpretation of reality that results from the accountability process of public entities can follow two types of logic: the logic of best practices or the logic of the correct. In line with the authors, the logic of best practices is the logic of intelligent action that produces good results; it is the logic of efficacy, of efficiency and effectiveness. The logic of the correct, on the other hand, is the logic of legislation, compliance with methods, standards and applicable rules. The challenge is to make both logics coincide, that is, to make sure that what complies with the rule is, at the same time, what produces results and solves problems. Pablos, Figueroa and Camou (2007) also add the need for a balance and agreement between administrators' discourse and action; between what is said and done. Hence, the task of democratic governments takes form in the development of a political order that balances the two moments and two ways of addressing reality and, to reach this objective, it is fundamental to develop appropriate mechanisms and institutions for accountability, as well as for the deliberation and judgment of government actions and results (Pablos, Figueroa and Camou, 2007).

In this context, information disclosure appears as a highly relevant process, considering its outstanding role in the reduction of the information asymmetry that exists in the relation between society and its elected rulers. Thus, governments are obliged to account for their actions to society, so as to maintain their legitimacy. These governors, in turn, can only be called upon to account for their actions when a publicity and transparency base exists for an informed and alert citizenship. These characteristics take form when there is an institutional structure that is not limited to the review by a single official supervisor, but also permits the actual cooperation of different independent auditors. Hence, the supervisory function is formally performed by the legislatures, but also by the free press, civil organizations, academics, political analysts and interaction among distinct actors in the governmental policy sphere (Pablos, Figueroa and Camou, 2007). This gives rise to the accountability concept, which according to some authors approaches the concept of the obligation to render accounts for

the results achieved in function of the responsibilities deriving from a delegation of power (authority), consequently producing a responsibility, that is, to render accounts for one's performance and results (Corbari, 2004).

Therefore, power, responsibility and the rendering of accounts are interrelated concepts. Without the delegation of power or a certain ability to do things, accountability cannot be required, as it is manifested, justified and complied with through the appropriate rendering of accounts. This rendering of accounts, in turn, involves the disclosure of the public entity's performance, describing and explaining what has been done (Martinez-González; Martí, 2006).

According to Graciliano *et al.* (2010), accountability can be defined as the action of holding public managers permanently responsible in terms of the assessment of compliance/legality, as well as the economy, efficiency, efficacy and effectiveness of the acts practiced as a result of the use of the power they are granted by society. In that context, Nakagawa, Relvas and Dias Filho (2007) defend that the notion of accountability in the public sector can be divided as follows: (a) giving explanations to all citizens, whether they are voters or not; (b) providing further information about relevant facts when necessary; (c) reviewing and, if necessary, revising systems or practices to achieve citizens' expectations, whether these are voters or not; and (d) granting compensations or imposing sanctions.

According to the Federation of Industries of the State of Rio de Janeiro (FIRJAN), one of the advantages of the FIRJAN Municipal Development Index (IFDM) is that it permits the orientation of public actions and the monitoring of its impacts on cities' development, representing an important public management and democratic accountability tool.

2.2. Public Spending and Development

Accounting plays a fundamental role as an instrument to enhance performance in the public sector (Hood, 1991). According to the National Council on Governmental Accounting – NCGA (1982), the general goal of accounting and financial information in public entities is to: (1) provide financial information that is useful for political, economic and social decision making, demonstrating responsibility and good management, and (2) provide information that can be useful for the assessment of organizational performance and actions. In line with Santos Filho (2010), Accounting Applied to the Public Sector permits the disclosure of public spending in different ways, based on various budget rankings (institutional, function, program structure, expense type). Independently of the disclosure form though, it is responsible for appropriately registering the level of this spending.

Based on consolidated accounting data, one can obtain the volume of public resources spent in specific areas, such as administration and planning, education and culture, housing and urbanism, health and sanitation, assistance and social security, transportation, at any aggregation level. One can also identify in accounting terms the amount spent on interests and debt charges, staff and investments in a given city, state, region or country. Accounting also provides information about the revenues public entities have collected, whether these are ranked as current, tax expenses and/or current transfers. In that context, public accounting attempts to achieve its goals of registration, control, transparency, account rendering and information disclosure.

March and Olsen (1995) highlight, however, that public accounting is not just limited to arithmetic operations of the revenues and expenses made, but mainly represents a proposal to construct and explain the political reality. Hence, this is a process to construct reality in which its interpretation is not imposed top-down, so that the ruler's proposal is revised, observed and assessed by other independent actors, who do not necessarily possess the same interests or values.

Public spending and, consequently, public revenues, should therefore not be analyzed as isolated figures beyond a political context, keeping in mind that they affect the development of a city, whether in the reduction of negative external influences or in the matter of public goods (Scarpin, 2006). According to Kon (1997, p. 35), "positive external influences represent savings in the production costs and benefits for the agents who use them, while negative influences or diseconomies are associated with losses, in-

creased costs, disadvantages". In other words, the negative external influences emerge when one party's actions impose costs on the other (Scarpin, 2006).

Scarpin (2006) highlights that the expansion of public spending is related to its role in the production of public goods and the control of external influences in a market economy. In that sense, governmental intervention through public spending is a two-way process. The first is the public good itself, which cannot be made by the market, like in the case of public safety. There are also public goods for the production of positive external influences, like in the case of a vaccination campaign, considering that, when one immunizes the population against a transmissible disease, this comes with a great implicit benefit, which is the safety that the population will not catch the disease (Scarpin, 2006).

Therefore, as a result of the good management of public accounts, including public revenues and spending registered by accounting, cities' human development level tends to increase over the years. As mentioned, public spending and, consequently, affect the development of a city. One of the functions of municipal controllership is the elaboration of information systems to monitor the municipal revenues and expenses. Such information support, according to Scarpin (2006), is fundamental to eliminate the conflicts of interest between society and elected rulers, considering that public managers may have other interests than the maximization of development, such as the plundering of public equity for their own sake, the directing of spending towards political allies, a future reelection or election for other public offices.

2.3. FIRJAN Municipal Development Index (IFDM)

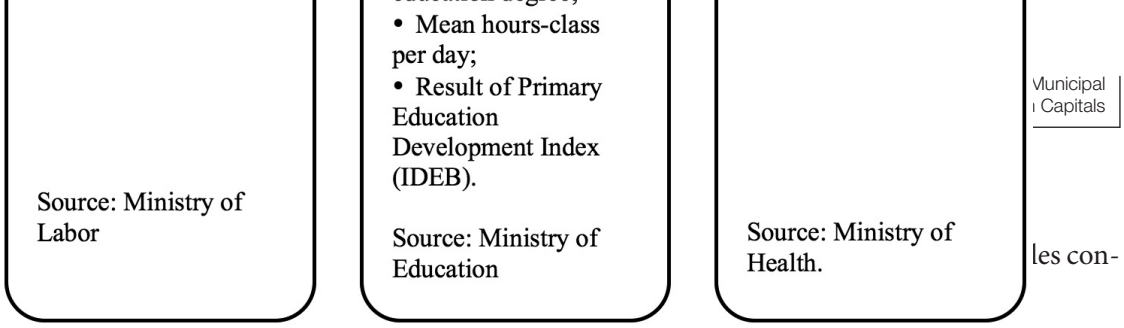
The FIRJAN Municipal Development Index (IFDM) arose from the need to annually monitor the socioeconomic development of a region, in view of the different realities in its smallest federative division: the city (FIRJAN, 2010). With equal weights, the IFDM assesses the three main human development areas: 'Employment and Income', 'Education' and 'Health'. The reading of the results – whether by development areas or by the analysis of the final indices – ranges from 0 to 1, so that indices, closer to 1 indicate higher development levels of the city (FIRJAN, 2010).

Based on this method, the FIRJAN System put forward the following classifications:

a) cities with IFDM between 0 and 0.4: low degree of development;
b) cities with IFDM between 0.4 and 0,6: regular degree of development;
c) cities with IFDM between 0.6 and 0.8: moderate degree of development;
d) cities with IFDM between 0.8 and 1.0: high degree of development.

The index is calculated per year, but only calculations for the years 2000, 2005, 2006, 2007, 2008, 2009 and 2010 are available. As regards the publication of the ranking for 2000, a time lag of eight years is observed, as it was published in 2008 but considered data for 2000. Similarly, the rankings for 2005, 2006, 2007 and 2008 showed a three-year lag, as they were published in 2008, 2009, 2010 and 2011, respectively. Finally, concerning the publication of the rankings for 2009 and 2010, these became available in 2011 and 2012, with a two-year lag.

As highlighted by FIRJAN (2010), these lags derive from the fact that only official statistics are used to calculate the index; hence, in some situations, long periods are needed to join data from the Min-



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sidered

Figure 2. Summary of variables in the calculation of the IFDM.

Source: IFDM 2010. Available from: <www.firjan.org.br>. Accessed on: 23 Sept. 2011.

The first area the IFDM addresses is formal employment and the revenue of the employed population. The IFDM-Employment and Income monitors movements and characteristics of the formal job market, based on the data the Ministry of Labor makes available (FIRJAN, 2010). The second area of the IFDM, Education, represents one of the main pillars for the development of a country. The IFDM-Education was idealized for the supply and quality of primary and preschool education offered in Brazilian cities, in public and private schools, according to the constitutional competences of all cities. It should be highlighted that one can require at least high-quality primary education in all cities, considering that they are not clearly responsible for maintaining secondary education (responsibility of the state) and higher education (FIRJAN, 2010).

The third and final area considered in the IFDM is Health. According to FIRJAN (2010), analyzing health based on the statistics available is a challenge, due to the lack of consensus among researchers about the best indicators of the public service situation. Hence, the IFDM-Health is focused on primary health care and the use of databases experts consider as relevant and reliable, prioritizing data from the Mortality Information Systems (SIM) and the databases on Live Births (Sinasc).

3. Method

3.1. Units of Analysis, Data Collection and Characteristics of Variables

In this descriptive study, documentary analysis and a quantitative approach were used. The research was accomplished by crossing IFDM data for 2005 till 2010, available on the website of FIRJAN, with data for accounting variables from Brazilian companies available on the website of the Brazilian Treasury, using the software *Finanças do Brasil* (FINBRA). The Brazilian Secretary of the Treasury (STN) developed that software to disseminate data on the budget execution of Brazilian cities, including an accounting database that considers the financial years between 1989 and 2011. In this study, data for 2005 till 2010 were used, which were the baseline years considered to calculate the IFDM, while information on the period from 2001 till 2004 was not published on the FIRJAN website.

To achieve the objective, the following hypothesis was tested in the research:

H_1: *The account balances registered by public accounting are explanatory factors associated with the determination of the city's total IFDM.*

This hypothesis was analyzed in the study by Scarpin (2006) of cities in the state of Paraná, but that author used the Education, Longevity and Income dimensions of the Municipal Human Development Index (IDH-M) as the dependent variable. In this study, the decision was made to use the IFDM instead of the IDH-M because the former is annual, while the latter is calculated every decade, based on data from the Population Census, which is currently held in Brazil every ten years (FIRJAN, 2010). Therefore, the IFDM was chosen because it presents more updated data and a larger time series, considering that the

most recent IDH-M ranking of Brazilian cities available in the software Atlas of Human Development in Brazil was held based on information for the year 2000.

It is presupposed that the replacement of the IDH-M by the IFDM, in function of the latter's more updated information and larger time series, will not impair the analysis of the results, in view of similarities between the two indices and the strong positive correlation between both, according to Table 1.

Table 1
Correlation coefficients (*Pearson*)

	IFDM 2000	IDH-M 2000
IFDM 2000	1,000	
IDH-M 2000	**0,793**	1,000

Source: Elaborated by the authors based on data extracted from STATA®.

According to the research hypothesis, in principle, besides the dependent variable total IFDM, 16 independent variables were selected, previously analyzed in the research by Scarpin (2006). Studies like Ferreira (1996), Devarajan, Swarrop and Zou (1996), Ferreira and Milliagros (1998), Rocha and Giuberti (2007), Ghosh and Gregoriou (2008), among others, explored the effects of public capital on economic growth and/or productivity, but the study by Scarpin (2006) stood out because it enhanced knowledge on the impact of public spending, according to a series of accounting variables, on the formation of the IDH-M, an index that goes beyond the measuring of economic development. Therefore, the research by Scarpin (2006) was chosen as the base for this study. That author also analyzed non-accounting variables but, in this research, these were not taken into account, as the intent was to evaluate the isolated contribution of accounting as a possible conditioning factor of the IFDM. As regards the accounting variables, in the study by Scarpin (2006), only the Tax Revenue and Staff Expenses were significant as explanatory factors of the total IDH-M.

The definitions of the independent variables were taken from the study by Scarpin (2006) and the glossary of the software Tax Situation of your City, developed by the Brazilian Secretary of the Treasury (STN):

- Staff Expense: amount corresponding to expenses of all kinds (including social fees) related to staff, except charges for severance pays resulting from court decisions and related to earlier years;
- Interests and Debt Charges: amount corresponding to the expenses due to interest payments, commissions and other charges related to internal and external, hired and domestic public debt;
- Capital Expense: aimed at forming and/or purchasing a capital good to contribute to the enhancement of the production capacity;
- Investments: groups any and all expenses related to the planning and execution of works, purchase of real estate and plants, equipment and permanent material, the capital constitution or increase of non-commercial or non-financial companies;
- Administration and Planning: corresponds to the sum of expenses on administration, science and technology and special charges (internal and external debt refunding, internal and external debt servicing and transfers);
- Education: corresponds to educational spending, disclosed in function number 12 (education);
- Culture: represents spending on culture, characterized in function number 13 (culture) of the public spending budget;
- Urbanism: presents the city's spending on urbanism, as evidenced in function 15 (urbanism);
- Housing: corresponds to the city's spending on housing, as disclosed in function 16 (housing);
- Health: represents the city's spending on health, characterized in function number 10 (health);
- Sanitation: corresponds to sanitation expenses, represented by function 17 (sanitation);
- Social Welfare: presents the city's spending on welfare, disclosed in function 08 (social welfare);

- Social Security: corresponds to social security spending, characterized in function number 09 (social security) of the public expense budget;
- Transportation: presents the city's spending on transportation, disclosed in function 26 of the public expense budget;
- Current Revenues: refers to the revenues that only increase the State's non-permanent equity, that is, which are depleted within the period of the annual budget law. Includes the following groups: taxes, contributions, equity, agricultural, industrial, services, current transfers, other current revenues.
- Tax Revenues: relates to taxes, fees and contributions collected by the city;
- Current Transfers: correspond to the intergovernmental transfers of the State and the Union, related to state and federal taxes, as well as to the City Participation Fund.

3.2. Analytic Model

The statistical technique used to identify the accounting variables related to the IFDM is panel data regression. This method permits the cross-sectional estimation of regressions over a given time period (time series). Hence, panel data involve a spatial and a temporal dimension. Among the advantages of this type of analysis, the possibility to control for individual heterogeneity and the use of further observations are highlighted, increasing the degrees of freedom and reducing the multicollinearity among the explanatory variables (Hsiao, 1986).

According to Baltagi (2005), however, working with panel data entails the following limitations: (1) data collection problems; (2) distortions resulting from measurement errors; (3) selectivity problems resulting from missing data that cause unbalanced panels; and (4) short dimension of the time series.

The general model for econometric analyses using panel data can be represented in a simplified manner as:

$$y_{it} = \alpha + x_{it}\beta + v_i + \varepsilon_{it}$$

Where:

- i = 1,..., N (represents cross-sectional units);
- t = 1,..., N (indicates the time series);
- y_{it} = indicates the dependent variables;
- α = is the model intercept;
- x_{it} = indicates the independent variables in the model (there are k regressors in x_{it});
- β = represents the estimated angular coefficients for each independent variable; and
- $v_i + \varepsilon_{it}$ = are the model errors. According to Baltagi (2005), v_i is the component that indicates the specific non-observable individual effect, which differs among the units and is invariable over time; while ε_{it} is the component that varies with the units and time, called the "usual" regression error. In this study, it is highlighted that, as each entity "i" has the same number of time data, the panel is balanced.

Three types of panel data models can be listed, which are: pooled regression, fixed effects and random effects. The first presupposes that all coefficients are constant over time and among individuals (represented by Brazilian capitals here). According to Gujarati (2006, p. 517), that is the "simplest and possibly naïve manner" of estimation, as it ignores the space and time dimensions of the combined data and estimated the habitual minimal least squares regression.

The fixed effects model is appropriate in situations in which the specific intercept of the individual can be correlated with one or more regressors. One disadvantage of the fixed effects model is the fact that it consumes a large number of degrees of freedom in case of many cross-sectional units (N), as a signif-

icant number of dummy variables needs to be included (Gujarati, 2006). In addition, this type of model may present multicollinearity.

In the random effects model, it is presupposed that the intercept of an individual unit is a random extraction from a much larger population with a constant mean value. One advantage of the random effects model over the fixed effects model is that the former is economic in degrees of freedom, as no N individual intercepts need to be estimated, but only the mean value of the intercept and its variance (Gujarati, 2006).

Given these estimation possibilities, the question that should be asked is: which model should be used? The estimation of the fixed effects model takes into account the "individuality" of the fixed effects model, which can be considered appropriate for this study. It should be highlighted that, in this case, it is presumed that the angular coefficients are constant, while the intercept varies among the entities, although other possible premises can be found about the intercept, the angular coefficients and the error term in Gujarati (2006). Therefore, to detect the convenience of using the pooled method or the panel model with fixed effects, Chow's test was applied. According to Baltagi (2005), this test assesses whether the individual effects are statistically equal to zero, that is, there are no specific individual effects (pooled hypothesis) versus the alternative hypothesis that these effects are statistically different from zero (fixed effects hypothesis).

The estimation alternative using panel data with random effects is another acceptable option for analysis in this research, considering that this method assumes that all cities included in the sample were taken from a larger universe, which includes all Brazilian cities. Therefore, the Breusch-Pagan test was applied to assess the convenience of using the pooled model or the panel model with random effects. This test assesses whether the variance of the non-observable individual effects is statistically equal to zero (pooled hypothesis) versus the alternative hypothesis that this variance is statistically different from zero (random effects hypothesis). Then, the Hausman test was applied to select which panel data model is the most appropriate: the random effects model (H_0) or the fixed effects model (H_A).

It is highlighted that the panel data model can raise several estimation and inference problems, based on the cross-sectional data (heteroscedasticity) and time series (self-correlation). Thus, to test the heteroscedasticity between the panels, the modified Wald test was applied. This test is part of the test set available in STATA®. Modified Wald statistics are calculated, considering the null hypothesis that the error variance is homoscedastic (Gomes, 2007). To test for the presence of serial self-correlation of the errors, Wooldridge's serial self-correlation test was applied. Wooldridge's test departs from the null hypothesis "presence of serial self-correlation" of higher order, against the "absence of self-correlation".

4. Analysis of Results

In view of the three panel data estimation possibilities, and considering that the three models could be applicable to the study, some steps were followed to decide which model should be used. First, the pooled model and the fixed effects model were estimated. To detect the convenience of using the pooled model or the fixed effects model, Chow's test was employed. The p-value found in the test was 0.0000. Hence, considering $\alpha = 0.05$, H_0 ($p < \alpha$) was rejected, which indicates the convenience of using the fixed effects model.

Then, the random effects model was estimated. To detect the convenience of using the pooled model to the detriment of the random effects model, the Breusch-Pagan test was applied. The p-value found in the test was 0.0000. Hence, considering $\alpha = 0.05$, H_0 ($p < \alpha$) was rejected, which implies the convenience of using the random effects model.

Finally, after verifying the inappropriateness of using the pooled method, in view of the rejection of the null hypothesis in the Chow and Breusch-Pagan tests, Hausman's test was applied to select which of the panel data models would be the most appropriate: the random effects model (H_0) or the fixed effects model (H_A). The p-value found in the test was 0.1482. Hence, considering $\alpha = 0.05$, H_0 ($p > \alpha$) was

not rejected, which implies the convenience of using the random effects model.

After defining the most appropriate panel data estimation model for the study (random effects), Wooldridge's serial self-correlation test was applied to test for the presence of serial self-correlation in the errors. The p-value found was 0.0000, indicating the existence of self-correlation problems. Regarding the presence of heteroscedasticity, the modified Wald test was applied. The p-value found was 1.0000, indicating the non-existence of heteroscedasticity problems.

Thus, in function of the self-correlation problems of the model estimated in this study, the methodological procedure used was based on the suggestion by Judge *et al.* (1985 *apud* Bressan, 2009), who indicates the application of the panel data model using Feasible Generalized Least Squares as the alternative that permits estimating panel models in case of self-correlation.

The basic structure of the panel regression model used in this research is as follows:

$$IFDM_{it} = \alpha + \beta PESSOAL_{it} + \beta JUROS + \beta DESPCAP + \beta INV + \beta ADMPLAN + \\ + \beta EDUC_{it} + \beta CULT_{it} + \beta HABIT + \beta URB_{it} + \beta SAUD + \beta SAN_{it} + \beta ASSIST + \\ + \beta PREV_{it} + \beta TRANSP_{it} + \beta RECOR + \beta RECTRIB + \beta TRANSF + v_i + \varepsilon_{it}$$

Where:
i = 1,..., 26 (represents the public entities analyzed);
t = 1,..., 4 (indicates the periods analyzed: 2005 till 2010);
IFDM = total FIRJAN Municipal Development Index (dependent variable in the model);
α = is the model intercept;
β = represents the estimated angular coefficients for each independent variable;
The variables described next serve as the independent variables in the model:
PESSOAL = Staff Expense;
JUROS = Interests and debt charges;
DESPCAP = Capital Expense;
INV = Investments;
ADMPLAN = spending on Administration and Planning;
EDUC = spending on Education;
CULT = spending on Culture;
HABIT = spending on Housing;
URB = spending on Urbanism;
SAUD = spending on Health;
SAN = spending on Sanitation;
ASSIST = spending on Welfare;
PREV = spending on Social Security;
TRANSP = spending on Transportation;
RECOR = Current Revenues;
RECTRIB = Tax Revenues;
TRANSF = Current Transfers, and;
$v_i + \varepsilon_{it}$ representing the model errors.

The results of the estimated panel data model, using Feasible Generalized Least Squares (FGLS), are described in Table 2.

Table 2
Conditioning accounting variables of IFDM of the 26 capitals analyzed in the study

IFDM	Coefficients	Standard error	P-value

PESSOAL	1.64e-11	2.00e-11	0.413
JUROS	**-4.66e-10**	**1.24e-10**	**0.000**
DESPCAP	**-1.19e-10**	**3.86e-11**	**0.002**
INV	**1.37e-10**	**5.60e-11**	**0.015**
ADM	1.95e-11	5.16e-11	0.706
EDUC	5.67e-11	7.44e-11	0.446
CULT	**5.76e-10**	**2.19e-10**	**0.009**
HABIT	1.11e-10	1.13e-10	0.326
URB	-8.43e-13	3.55e-11	0.981
SAUD	3.83e-11	4.06e-11	0.345
SAN	-3.75e-11	6.10e-11	0.539
ASSIST	**-5.23e-10**	**2.08e-10**	**0.012**
PREV	-1.74e-11	2.44e-11	0.475
TRANSP	3.99e-11	7.64e-11	0.601
RECOR	5.05e-11	2.89e-11	0.080
RECTRIB	4.61e-11	4.36e-11	0.291
TRANSF	**-1.17e-10**	**4.01e-11**	**0.004**
Constante	0.7701048	0.0080919	0.000
Nº Obs: 156			Nº groups: 26
Obs.: Estimation using FGLS, assuming the self-correlation problem detected through the operating procedures.			

Source: Elaborated by the authors based on data extracted from STATA®.

The analysis of the model estimation results shown in Table 2 reveals six statistically significant accounting variables as explanatory factors of the total IFDM, as the β related to these variables (Interests and Debt Charges, Capital Expense, Investments, spending on Culture and Social Welfare and Current Transfers) showed p-values below the established α (α = 0.05).

The first statistically significant accounting variable refers to spending on Interests and Debt Charges, showing a negative association between this spending and the total IFDM of the entities analyzed. Hence, the fact that the city allocates amounts to the payment of interests, amounts that could be invested in areas like health, education and employment, tends to worsen the city's human development, measured with the help of the FIRJAN Municipal Development Index in this study.

The second accounting variable that is considered significant as an explanatory factor of the total IFDM is related to Capital Expense which, as mentioned, is aimed at constituting or acquiring a capital good to contribute to the enhancement of the productive capacity. Initially, a positive association was expected between capital expenses and the IFDM, as public spending on capital increases the physical capital inventory, which in principle would further productivity and promote growth (Rocha; Giuberti, 2007). The relation found was negative though. One possible explanation for this situation is the theoretical model proposed by Devarajan, Swarrop & Zou (1996), according to which spending that is normally considered productive can become unproductive in case of excesses. That would be the case for capital spending for example. According to the authors, developing countries allocated their public spending wrongly, privileging capital spending to the detriment of current expenses, while developed countries did the opposite. Consequently, surplus capital spending in developing countries made them unproductive in the margin. The study by Ghosh and Gregoriou (2008) supports this assertion. In the analysis of 15 developing countries, the authors found that current expenses positively affect growth, while capital spending has a negative effect.

The third significant accounting variable was related to Investments, presupposing that higher spending on the planning and execution of works, the acquisition of real estate and plants, equipment and permanent material tend to culminate in the better development of the city.

As regards spending on Culture, it is highlighted that expenses related to this function, in accor-

dance with Teixeira (2002), are part of the group of social expenses, which represent a direct benefit to society. In line with Rezende (2001), social spending contributes to the formation of citizenship and community development, encouraging and committing to the formation of people, providing wellbeing and quality of life to society. The Culture variable presented a positive behavior as an explanatory variable of the analyzed entities' total IFDM, as expected, considering that higher social spending comes with a trend towards better human development.

The Social Welfare variable was also significant as an explanatory variable of the studied public entities' total IFDM. Considering that Social Welfare spending serves distribution purposes and that expenses related to this function are part of the social spending group, according to the classification by Rezende (2001) or of social expenses according to Teixeira (2002), a positive association was expected between this variable and the IFDM, which was not observed. In that sense, the negative association found may signal the exhaustion of welfarism, so that investments in the qualification of the population, for example, could be more efficient in the search to enhance the IFDM.

Finally, concerning the variable Current Transfers, a negative association with the IFDM was verified. Hence, the more dependent on transfers from the Union or the States, the lesser the city's development tends to be. This result is similar to the findings of the *Instituto Paranaense de Desenvolvimento Econômico e Social* (IPARDES), in a study carried out in 2004, based on the IDH-M for 2000 in the State of Paraná. According to that research, cities with the smallest IDH-M also displayed a strong relation of dependency on federal transfers, mainly based on the City Participation Fund. In Paraná, out of 288 cities with a lower IDH-M than that of the country, for 223 this type of transfer was the main source of income. This dependence indicates a weak tax collection (IPTU, ISS, improvement taxes and contribution) and ICMS generation ability – taxes that guarantee greater financial autonomy to the cities (IPARES, 2003).

If α were set at 10%, the Current Revenues variable would be considered significant as an explanatory variable of the total IFDM in the capital analyzed, indicating that the collection of higher amounts in current revenues tends to entail better human development in the city, maximizing the population's wellbeing.

5. Conclusions

The impact of public spending on the development of a city can be considered a constant concern for those in charge. In combination with economic growth, other aspects of human development are involved, such as health and education. The FIRJAN Municipal Development Index (IFDM), similarly to the Human Development Index (HDI), attempts to capture these three dimensions of a population's socioeconomic development.

In that context, the general aim in this study was to identify the accounting variables that condition the total IFDM of Brazilian capitals, with a view to permitting inferences about the relevance of accounting information in that index. Therefore, data for the total IFDM between 2005 and 2010 were crossed with data for accounting variables in Brazilian capitals available on the website of the Brazilian Treasury to develop a descriptive study with documentary analysis and a quantitative approach.

Using a panel data model with random effects, it could be established among the selected accounting variables which of them truly condition the total IFDM of the 26 Brazilian capitals under analysis. Thus, a positive and statistically significant association (considering $\alpha = 0.05$) was found between the variables Investments and spending on Culture and the total IFDM of the selected public entities, inferring that, the higher the spending on these functions, the greater the human development of that city.

The variables Interests and Debt Charges, Capital Expense and Social Welfare spending were also significant as explanatory factors of the entities' IFDM, but with a negative signal. This means that, the higher the spending on these account groups, the lower the city's development tends to be. Finally, the more dependent on Current Transfers, the lesser the city's development tends to be.

Therefore, it is observed that accounting information, and more specifically the variables Interests

and Debt Charges, Capital Expense, Investments, spending on Culture and Social Welfare, Current Transfers (considering α = 0.05) and Current Revenues (considering α = 0.10) are relevant in the determination of the analyzed capitals' IFDM, in line with the theoretical assertion according to which the public spending registered by accounting affect a city's development. Hence, good management of these accounts could culminate in an increased human development level of the cities studied over the years.

As a research limitation, it is highlighted that the situational diagnosis was focused on Brazilian capitals selected by convenience, so that the results cannot be generalized to the other cities in the Federation. For the sake of further research, the following is suggested: develop further analyses to verify whether the impact of the accounting variables on the total IFDM of Brazilian capitals continues to behave similarly; to verify the impact of the accounting variables on the IFDM, separately considering the dimensions Employment & Income, Education and Health; study the theme in other Federal units; and estimate a new model with non-accounting control variables.

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