

# What is the relationship between diversity and performance? A study about the relationship between the proportion of people with disabilities in the productivity of Brazilian firms

**Luciana Carvalho de Mesquita Ferreira**

*Inspier Institute of Education and Research, Sao Paulo, SP, Brazil*

**Luciano Aversani Rais**

*Santander Asset Management, Sao Paulo, SP, Brazil*

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## Abstract

**Purpose** – This study aims to analyze the relationship between greater participation of people with disabilities in Brazilian firms and productivity as a performance indicator.

**Design/methodology/approach** – To test the relationship between the proportion of PwD and the productivity of Brazilian firms, we used regression analysis with panel data and a dataset of public information from 46 firms for years 2010 and 2011.

**Findings** – There was no statistical evidence stating that a greater proportion of people with disabilities in the workforce has a negative (or positive) relationship with the productivity of Brazilian firms. Conversely, a positive relationship between a greater proportion of people with disabilities and productivity was found amongst firms that present greater social commitment.

**Originality/value** – These results indicate the contingent character associated with diversity management, and that the adoption of social practices by Brazilian firms can be an important mechanism for the management of diversity and inclusion.

**Keywords** – People with disabilities; productivity; social commitment.



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## I Introduction

This purpose of this study is to investigate the relationship between the proportion of people with disabilities among employees and productivity in Brazilian firms. We have chosen an empirical approach based on organizational diversity management studies, because this literature provides us with the central points for our analysis. In addition, we have also sought to provide evidence for certain social aspects related to People with Disabilities (PwD) in Brazil.

Investigating the relationship between firms' productivity and the proportion of employees with disabilities is relevant for two main reasons. Firstly, according to the Annual Report on Social Information (*Relação Anual de Informações Sociais – RAIS*) published by Brazil's Ministry of Labor for the year 2011, around 92% of Brazilian firms do not meet legal requirements for hiring PwD. Secondly, measuring how the proportion of PwD impacts productivity has a relevant macroeconomic impact in terms of organizational management, not to mention an important social contribution, enriching the debate on job market insertion and social inclusion policies.

Organizational theories have neglected the issue of how minorities of all kinds are treated (Oliveira, Goulart, & Fernandes, 2009). On the other hand, the issue has become increasingly important not only because of rights gained by minorities, who have demanded – though not always successfully – equal treatment in different spheres (social, legal and economic), but also due to the population's aging and other demographic changes that are pressuring firms into adopting more inclusive policies (Chang & Tung, 2014). Additionally, as will be shown, a low participation of PwD in the job market is a social hindrance for the country as a whole (Miranda, 2004).

It is estimated that 10% of the world population has some sort of disability (Ribeiro, Engler, Tavares, Ferreira, Gomes & Campos, 2012; & Miranda 2004). In Brazil, that percentage is 23.9%. Of the 45.6 million Brazilians with

disabilities, 12.8% have severe disabilities (Garcia & Maia, 2014). Differences in schooling are also worth noting. While 90.6% of Brazilians over the age of 15 are literate, that percentage drops to 81.7% for Brazilians with disabilities (Instituto Brasileiro de Geografia e Estatística [IBGE], 2010). Only 2.8% of Brazilians who are able-bodied and have no activity limitations have had no schooling, while among people with disabilities that percentage rises to 8.7% (Garcia & Maia, 2014). At the other extreme, while 21.8% of able-bodied Brazilians have a university degree, the same can only be said of 11.7% of Brazilians with disabilities.

Though data on PwD in the job market is scarce and at times unreliable, it is estimated that only 2% of PwD are in the job market and, of these, only 10% are formally employed (Miranda, 2004). Over half of PwD are not considered part of the economically active population, either due to their advanced age (the elderly) or because they are discouraged from seeking employment due to lack of support and/or job offers (Federação Brasileira das Associações de Bancos [FEBRABAN], 2006). The classification of PwD as not being part of the economically active population may be misleading, because only those who are economically active (both employed and actively seeking employment) are included when calculating unemployment rates (Garcia & Maia, 2014). This may generate contradicting conclusions regarding PwD employability, as suggested by an unemployment rate of only 6.2% for PwD (IBGE, 2010).

As will be shown, the obstacles faced by PwD – who must still deal with precarious (if not absent) physical structures and a scarcity of resources – are a result of social interaction. The issues PwD face in the job market all reflect these factors, and are a consequence of them. The frailty of relationships, at times marred by stigma and prejudice (Dwertmann & Boehm, 2016), and the lack of specialized institutions and of accessible physical structures are just a few of the issues at play in PwD insertion in the job market (Carvalho-Freitas & Marques, 2007).

This study seeks to contribute to this discussion by investigating the relationship between the proportion of PwD and productivity in Brazilian firms. Since PwD are affected by negative perceptions of their contributions as a labor force (Stone & Collela, 1996, Dwertmann & Boehm, 2016), this study may offer information revealing possible and undesirable prejudice concerning PwD insertion in the job market. Thus, this study tests hypotheses that seek to evaluate the impact of the proportion of PwD on firm productivity in Brazil.

## **2 Research context: insertion of people with disabilities in the job market**

### **2.1 Persons with disabilities: legal aspects**

According to the World Health Organization (1980), a disability is the impairment of one or more of the individual's functions, the loss or anomaly of a psychological, physiological or anatomical structure or function. For legal purposes, in Brazil, this definition must be broadened so that individuals can be correctly contemplated by the law and access due rights and treatments. In Brazil, the first political framework to include a specific device for these individuals was the 1988 Constitution (Ribeiro et al., 2012). Under the Brazilian legal framework, two international norms (Convention 159/83 of the ILO and the Inter-American Convention on the Elimination of All Forms of Discrimination Against Persons with Disabilities) were widely debated and ratified. This gave them the status of National Law – Decree 3956, 9 October 2001 (Ministry of Labor and Employment). The following legal definition was extracted from these conventions: “a physical, mental, sensory or multiple limitation that incapacitates the person for the exercise of normal life activities and that, due to this incapacitation, the individual faces difficulty being socially included” (*Decree 5962, 2004*).

From a social point of view, this represented institutional progress, although ideally inclusion

would be carried out in a discretionary fashion, without the need for State intervention. Still, many positions are filled by people with “mild” disabilities, excluding those with more severe ones (FEBRABAN, 2006). However, what makes PwD employability so difficult that it requires legal coercion? We will now analyze the social aspects that lead to discrimination against people with disabilities.

### **2.2 People with disabilities: social aspects**

All social interactions are complex, because they can threaten stability and generate conflicts, be they explicit or not (Glat, 1995). When individuals face a person with a disability, they often find it hard to know how to treat that person, how to pay them proper attention, how to guide them or be guided by them (Omote, 1994; Glat, 1995; & Amaral, 1992). The person with a disability can generate a wide range of feelings, such as repulsion, discomfort, and guilt, among others (Stone & Colella, 1996). These feelings, even if at times unconscious and even if involuntary, have significant effects on the acceptance and inclusion of people with disabilities within society as a whole, as well as within firms.

The problem of social interaction is a two-way street. These relationships are mediated by affective and cognitive variables which make the environment even more complex (Stone & Colella, 1996). Even in developed countries with stronger formal and informal institutions, social interactions are marked by implicit stigma, stereotypes and prejudices, making contact between able-bodied people and people with disabilities just as fragile as in developing countries (DiTomaso, Post & Parks-Yancy, 2007). In effect, social interactions must be addressed systematically (Stone & Colella, 1996) and firms have to take on their social role in order to facilitate the work of tearing down these barriers (Carvalho-Freitas & Marques, 2007 & Oliveira, Junior e Fernandes, 2009).

### 2.3 People with disabilities: job market

Data on PwD in the job market in Brazil is precarious and unreliable. Nonetheless, and even when considering more advanced economies, studies suggest that professional development opportunities are extremely limited for PwD. One study carried out in the USA based on data such as low participation in the economically active population, positions with no growth perspective and lack of social interaction in the work environment show some of the factors which affect treatment of PwD in firms (Stone & Colella, 1996). Just as individuals have difficulty dealing with PwD, firms are not necessarily prepared to welcome them, which negatively impacts their employability. Job market issues are a consequence of a society that is unprepared to accept differences (Amaral, 1992; Glat, 1995), and this is also reflected in the job market, “merely” an extension of a bigger problem.

Some researchers have therefore started to discuss PwD discrimination and productivity in the job market. In a study conducted in the USA, Greenwood and Johnson (1987) argue that people’s perceptions of PwD, such as low performance, higher absenteeism, lack of labor skills, high costs of adapting the work environment and high turnover are factors that lead to a lower PwD productivity when compared with able-bodied workers. Contrary to this vision, qualitative studies were conducted to verify managers’ perception of PwD performance. At DuPont, researchers followed 1452 PwD and concluded that, for 91% of interviewed supervisors, PwD productivity is higher than, or equal to, that of able-bodied workers in terms of performance (Nathanson, 1977). A case study carried out in a large Brazilian firm – with over 1000 employees with disabilities – showed similar

results (Carvalho-Freitas, 2009), corroborating this view. Another study, carried out with 227 students specialized in Business, showed that around 81% disagree with the expectation that PwD performance/work quality is worse than, or inferior to, that of others and, additionally, disagree that hiring PwD can compromise firms’ competitiveness (Nepomuceno & Carvalho-Freitas, 2008).

Data on pay is also unclear. Some studies reveal that PwD wages are lower, while others reveal the opposite. In Brazil, official data presents contradictions: data extracted from the RAIS (Ministério do Trabalho e Emprego [MTE], 2011) shows that PwD average wages are higher, while data from the Demographic Census shows the opposite (see Table 1). It is worth noting that these two sets of data are not directly comparable, since RAIS data includes only those who are formally employed. According to a study by Longhi, Nicolleti and Platt (2012), there is ample evidence that average PwD salaries are lower than that of able-bodied people. In fact, some authors have shown that the degree of disability significantly impacts wages. Based on data extracted from a study on income and job market participation carried out by the US government between 1992 and 1993 (*Panels of the Survey of Income and Program Participation – SIPP*), Kruse (1997) classified PwD according to their degree of disability and concluded that the pay gap is higher for people with more severe disabilities. The same results were found by Garcia and Maia (2014), who state that the average monthly wage was R\$ 985.4 for people with severe disabilities, R\$ 1250.30 for people with activity limitations and R\$ 1331.70 for people with no disabilities or activity limitations whatsoever.

**Table 1**  
**All workers and workers with disabilities in 2010**

	Number of workers			Average monthly wage		
	Total	PwDs	PwDs/Total	Total	PwDs	PwDs/Total
RAIS	44,068,355	306,013	0.7%	R\$ 1,297	R\$ 1,423	109.6%
IBGE	82,894,200	3,662,824	4.4%	R\$ 1,145	R\$ 834	72.8%

Note: Adapted from the “*Demographic Census*”, from IBGE, 2010 and from “*Relação Anual de Informações Sociais – RAIS 2010*” by the Brazilian Labor Ministry, MTE, 2011.

Some researchers interested in the topic further investigated whether the pay gap was a consequence of a possible difference in PwD work productivity when compared with able-bodied people. According to a study by Baldwin and Johnson (1994) based on data from the USA, half of the pay gap is attributable to discrimination and the other half to other characteristics associated with productivity. Likewise, Malo and Pagán (2012) used data from 11 European countries and estimated which components could explain the pay gap. For PwD whose limitations do not interfere with everyday activities, there is no evidence of a pay gap in most countries. According to this study, even if discrimination is present and can explain part of the pay gap, most of the variation can be attributed to differences in productivity between PwD and able-bodied workers. Lastly, Longhi, Nicolletti and Platt (2012) suggest that pay differences are substantially smaller when the analysis controls for education, age, occupation and firm characteristics.

#### 2.4 Theoretical framework and hypotheses: diversity and performance

As we discussed in the previous section, PwD insertion in the Brazilian job market depends, among other factors, on firms' central role as part of a solution to a problem made relevant not only because of PwD representativity but also because of important demographic trends related to population aging (Chang & Tung, 2014). Lower fertility rates, higher life expectancy and lower mortality rates point to an increase in the dependency ratio. These factors put a strain on the pension system, pressuring people into

working later in life and intensifying competition in the job market. In this context, a greater and better understanding of PwD participation in firms helps us design public and private social inclusion policies for PwD. The literature on diversity in firms is a productive theoretical perspective for this study's goals. As we will see, several studies in the field of diversity show that the relationship between diversity and organizational productivity is far from definitive (Avery, 2011; Guillaume, Dawson, Woods, Sacramento & West, 2013). Specifically, these authors state that this relationship is contingent upon several factors and that, therefore, the impact of diversity on an organization's performance depends on moderators and mediators that help explain the relationship (Gilbert & Stead, 1999).

#### 2.5 The relationship between productivity and proportion of people with disabilities

The literature on organizational diversity in firms is a productive theoretical perspective for this study. The diverse studies from this literature aid in understanding the phenomenon we are interested in studying – namely, the relationship between organizational productivity and the proportion of PwD employees in Brazilian firms –, because a significant portion of this literature is dedicated to discussing the relationship between greater diversity in firms and its impact on several indicators of organizational performance (Williams & O'Reilly, 1998). Diversity is defined as the amount of differences among members of a social unit (Harrison & Sin, 2006). This amount can vary according to the attributes of interest, some of which are easily

observable, such as age and sex, and others less so, such as education, experience or personality traits (Williams & O'Reilly, 1998 & Harrison & Sin, 2006). In fact, any characteristic that stands out in a given situation can be used as a basis for categorization and, as such, evoke biases, stereotypes and prejudices that may lead to worse social processes and negative effects on performance. It is worth noting these impacts are not restricted to job situations (Williams & O'Reilly, 1998). For this study, the focus is on diversity introduced into firms through a larger presence of PwD, a category that is even more sensible, when compared, for example, with experience or education (Stone & Colella, 1996 e Markel & Barclay, 2007).

This study only discusses the relationship between greater diversity – in terms of a larger presence of PwD among employees – and firms' productivity and cannot, therefore, be viewed as a study on inclusion. While diversity deals with differences brought into the organizational environment by members of groups with different identities, inclusion also addresses to what extent these individuals are involved in the decision processes of organizations (Harrison & Sin, 2006; Roberson, 2006). Thus, even if the empirical tests carried out in this study can show that higher proportions of PwD among employees do not have a negative impact, and even if that impact is positive, this does not mean that firms with a more diverse workforce are also more inclusive. While diversity concerns organizational demographics, inclusion concerns removing obstacles to participation in the organization (Roberson, 2006).

Several studies have investigated the relationship between diversity and performance. Their results show a diverse range of results, given the great variation both in attributes that generate diversity (for example, race, sex, education, among others) and performance indicators (ROE, ROA, Tobin q, among others) (DiTomaso, Post & Parks-Yancy, 2007; & Herring, 2009). If, from an empirical standpoint, the many variables help explain results, from a theoretical standpoint, one

can also understand why a greater diversity can have both positive and negative impacts. On the one hand, insofar as greater diversity introduces multiple points of view, one can expect greater effectiveness in decision-making processes, creativity and innovation to positively impact a firm's performance (Richard, 2000, Richard, Murthi & Ismail, 2007 & Garnero, Kampelmann & Rycx, 2014). On the other hand, greater diversity may negatively impact organizational performance because it may lead to a greater potential for conflicts, lower efficiency and less integration and cohesion among individuals (Richard, 2000, Richard, Murthi & Ismail, 2007 & Garnero, Kampelmann & Rycx, 2014). Thus, studies that sought to understand the relationship between diversity and performance have had ambiguous results.

As we have already mentioned, the attribute that generates diversity may explain why these results are not definitive. Consequently, the literature on diversity advises against generalizing results and that comparisons of studies parsimoniously take into account the attribute that generates diversity (Garnero, et al., 2014). As the focus of this study is the diversity introduced by PwD, the scarcity of studies that empirically test the relationship between a higher presence of PwD in firms and firm productivity is notable. Though some studies discuss the relationship between the presence of PwD and performance, their focus is usually on individual or group performance, such as in Baumgartner, Bohm and Dwertmann (2014). Though other researchers have shown interest in understanding how a greater presence of PwD occurs at the organizational level, these are mostly conceptual and theoretical studies that ponder factors that influence how PwD are treated within the organizational environment (Stone & Colella, 1996), obstacles faced by these individuals (Kulkarni & Lengnick-Hall, 2013), and possible personnel management strategies for managing PwD within organizations (Lengnick-Hall, Gaunt & Kulkarni, 2008). As a whole, these studies show how the presence of PwD in firms is marked by

prejudice, stigma and even repulsion, largely generating the perception that a higher proportion of PwD in firms generates a negative impact.

In Brazil, researchers interested in the theme have had the same focus. For example, Carvalho-Freitas and Marques (2007), Nepomuceno and Carvalho-Freitas (2008), Ribeiro and Carneiro (2009) and Carvalho-Freitas (2013) discuss how perceptions, stereotypes and prejudices impact the insertion of PwD into organizations. In addition to these studies, there are also five case studies that discuss personnel management practices for ensuring PwD's insertion in the job market but which do not seek to test the relationship between this insertion and organization performance (Carvalho-Freitas, 2009; Marques, Carvalho-Freitas, Morais & Almeida, 2010; Campos, Vasconcellos & Kruglianskas, 2013; Assis & Carvalho-Freitas, 2014; Maia & Carvalho-Freitas, 2015).

As a whole, these studies suggest that, due to a collective perception at times consciously or unconsciously influenced by prejudices and stigma, PwD are less capable (Stone & Colella, 1996) and introduce additional costs to the extent that they demand adaptations and accessibility (Assis & Carvalho-Freitas, 2014; Maia & Carvalho-Freitas, 2015). Thus, considering the studies we have described, one would expect firms that concentrate a higher proportion of PwD among their employees to have lower productivity:

**H1:** The higher the proportion of PwD among its employees, the lower a firm's productivity.

## 2.6 Firms' social action as a moderating factor

The literature on diversity indicates that the relationship between diversity and performance is dependent on other organizational and/or contextual factors (Roberson, 2006, Richard et al., 2007 and Guillaume et al., 2013). According to this literature, organizational factors such as culture, strategy and climate function as

moderators of the relationship between diversity and performance. Gilbert and Stead (1999) show how organizations that have diversity management practices are more capable of attracting and retaining minorities and how this translates into greater competitiveness. Richard (2000) shows that greater racial diversity has no direct relationship with performance, but, in firms that adopt growth strategies, the relationship is positive. Further, Avery (2011), Guillaume et al (2013), Garnero et al. (2014) and Dwertmann and Boehm (2016) show that, in organizations with a more inclusive organizational climate, diversity is positively related to performance.

We argue that firms' engagement in social action is an additional moderating factor that may affect the relationship between a higher proportion of PwD and productivity. Firms' growing concern with sustainability (social and environmental) creates room for diversity management to be perceived as an opportunity for action and greater social involvement (Markel & Barclay, 2009; Carvalho-Freitas & Marques, 2010). Insofar as corporate social actions are contingent upon context and considering the prevalence of PwD in the Brazilian population, it is possible that firms that are more engaged in social action are more involved with affirmative actions geared toward PwD. In this study, we believe that, by hiring PwD, firms may signal a greater engagement in social action. More than that, we believe that firms more highly engaged with social action may be more efficient in managing resources so as to establish a positive relationship between the social and financial dimensions of performance. Therefore,

**H2:** The relationship between the proportion of PwD and a firm's productivity is moderated by engagement in social action: a higher proportion of PwD is positively related to productivity in firms that are more engaged in social action.

### 3 Data and methods

This study seeks to test the relationship between the proportion of PwD and productivity in Brazilian firms. According to Hypothesis 1, it is expected that the higher the proportion of PwD, the lower the firm's productivity. On the other hand, according to Hypothesis 2, it is expected that this relationship becomes positive for those firms more involved with social issues. In order to test these hypotheses, this study uses information from Brazilian firms, as described below.

#### 3.1 Data and sample

The data used in this study are public and are available in the Bloomberg Terminal. Initially, we collected data from over 400 publicly traded Brazilian firms for the years 2006 to 2012 (all firms listed in the São Paulo Stock Exchange). However, most of these firms did not (and still do not) have information on employees with disabilities, which substantially reduced the sample and years to be included in the analysis. The final sample consists of information from 46 firms for the years 2010 and 2011, approximately 10% of the original sample. The sample was thus selected based on (1) public availability of data and (2) representativity of the firms in the local market (when added, the total assets of the 46 firms surpassed R\$3.1 billion in 2010).

#### 3.2 Variables and analytical approach

*Dependent variable* Productivity is an organizational phenomenon that takes place at the firm level, at which contributions from individuals or groups cannot be separated from the firm's entire value creation process (Garnero et al., 2014). Thus, productivity is how much revenue each employee generates, on average, for the firm. In this metric, no distinction is made between recurring and non-recurring revenues – it refers to total revenue. Therefore, a firm's productivity is its total revenue divided by the total number of employees, as per Richard et al. (2007).

*Independent variables* In order to test the relationship between the proportion of PwD

and firm productivity, we used the *percentage of people with some disability among all employees*. This measure was extracted from the Bloomberg database, which does not draw a distinction between different degrees of severity of disabilities. In order to capture *firms' engagement in social action*, we created a dummy variable called GRI, which has value 1 when the firm is a signatory to the guidelines and reporting model of the Global Reporting Initiative (GRI). The GRI is an internationally recognized model of sustainability reporting. It is released by firms themselves and, within it, one can verify economic, financial, social and environmental impacts of their everyday activities. Additionally, it presents aspects referring to sustainability governance, commitment and strategy. In Brazil, there is no obligation for publicly traded firms to release sustainability reports. This is, therefore, a Social Responsibility action that goes beyond legal requirements. Adherence to the GRI will be used as a proxy for firms that better manage personnel (including PwD), among other stakeholders and the environment.

*Control variables* Microeconomic theory shows that productivity can be increasing or decreasing depending on a firm's degree of development. Bigger firms tend to have decreasing marginal productivity because they are in more developed stages (Varian, 2006). Since firm size can therefore affect productivity, we used total assets as a measure for *firm size*. The total number of employees could also have been used. However, this could have created additional multicollinearity problems since this number is part of another variable in the model. Since the correlation between total number of employees and total assets was high (approximately 0.7), we chose to use only total assets. It is worth noting that there is an expectation that in larger firms there is less social interaction, in addition to a higher capacity for managing diversity (Garnero et al., 2014). Thus, it makes sense to include firm size as a control variable with regard to the independent variable as well. We also included a control variable identified as CAPEX. CAPEX is



a measure of investment related to firm operation. Investment is known to be a fundamental aspect in increasing firm productivity, since it brings in new technologies, as well as improving quality of products and services. We also included a variable of return on equity, ROE, a measure widely used by investors because it improves the degree of comparability between firms and also because it is a measure of maximization of returns to shareholders which therefore, like CAPEX, may affect the model's dependent variable. Lastly, due to heterogeneous characteristics according to *economic activity sector*, the model further

includes a categorical variable that classifies firms as belonging to consumer, industry, financial and other sectors (which includes all remaining sectors). This classification was also extracted from Bloomberg.

### 3.3 Statistical models

In order to test the relationship between the proportion of PwD and productivity of Brazilian firms, we chose a panel data analysis (OLS, with 90% significance). Table 2 has descriptive statistics and the correlation between variables included in the study.

**Table 2**  
**Description of statistics and correlation between variables**

	Mean	Standard Deviation	1	2	3	4
1. Productivity*	1.22	1.13				
2. CAPEX**	2.233.96	10.741.49	0.20			
3. Total Assets**	74.32	205.11	0.05	0.38		
4. ROE	17.62	14.51	0.22	-0.05	0.03	
5. PwD	2;30	1.46	0.03	-0.11	-0.03	0.08

Note: \* in millions (R\$) and \*\* in billions (R\$)

Twenty nine firms in the sample released the GRI report in 2010. In 2011, that number dropped to 28. It is worth noting that only two of the firms in the sample met the minimum legal requirements<sup>1</sup> for employing PwD in 2010 and only one additional firm met the requirement in 2011. This means that although some firms in the sample are engaged in social action (as signaled by the sustainability report), a large number of firms do not comply with the law. This information is in agreement with findings presented in the literature review and is corroborated by Ribeiro and Carneiro (2009).

Through panel data, we estimated four models in order to verify the impact on productivity of a firm having a higher percentage of PwD among employees and better personnel management. The first model includes only the control variables and therefore excludes the variables of interest. The second model includes only the percentage of PwD while the second

model also includes the variable GRI. Lastly, the fourth model includes the interaction between both variables.

## 4 Results

This study's primary goal is to empirically observe the relationship between the proportion of PwD among employees and productivity in Brazilian firms. The results of the empirical tests can be found in Table 3.

Hypothesis 1 states that a higher proportion of PwD among employees would lead to lower productivity in the firm. When including only the variable of interest PwD (model 2), we are unable to say this is a valid relationship. Including the PwD variable slightly increased the adjusted R<sup>2</sup> when compared with model 1, but the variable was not statistically significant. Therefore, based on model 2, we cannot conclude whether the relationship between the proportion of PwD and firm productivity is positive or negative.

**Table 3**  
**Results of the OLS regression (panel data)**

Productivity	Model 1		Model 2		Model 3		Model 4	
PwD	-		0.74936		0.08318		0.18938	**
	-		(0.54146)		(0.05111)		(0.07721)	
GRI	-		-		0.52769	***	0.94219	***
	-		-		(0.15562)		(0.27507)	
CAPEX (R\$ bi)	0.01591		0.17598	**	0.01659	**	0.01667	**
	(0.00832)		(0.00836)		(0.00789)		(0.00778)	
ROE	0.03057	***	0.02967	***	0.02743	***	0.02727	***
	(0.00604)		(0.00605)		(0.00574)		(0.00566)	
Total Assets (R\$ bi)	-0.00021		-0.00029		-0.00061		-0.00071	
	(0.00055)		(0.00055)		(0.00053)		(0.00052)	
Consumer	-1.54443	***	-1.55099	***	-1.47891	***	-1.43797	***
	(0.26201)		(0.26180)		(0.24700)		(0.24469)	
Industry	-0.94833	***	-1.04153	***	-1.29153	***	-1.16657	***
	(0.30974)		(0.31536)		(0.30633)		(0.30992)	
Financial	0.07031		0.13268		0.15547		0.26887	
	(0.31126)		(0.31286)		(0.29505)		(0.29767)	
Interaction: GRI x PwD	-		-		-		-0.18544	*
	-		-		-		(0.10212)	
Constant	-0.48854	***	-0.64919	***	-0.92070	***	-1.17459	***
	(0.12939)		(0.17332)		(0.18197)		(0.22753)	
$R^2$	0.389		0.402		0.475		0.496	
Adjusted $R^2$	0.346		0.353		0.425		0.440	

Note: Standard errors between parentheses; \*p <0.10; \*\*p <0.05; \*\*\*p <0.01

Hypothesis 2 states that firms with greater engagement in social action (represented here by releasing the GRI sustainability report as a proxy) show greater productivity, due to greater engagement in social action. In this case, we were

able to observe a positive relationship between firm productivity and greater engagement in social action (model 3). The GRI dummy coefficient (0.52769) is positive and highly statistically significant. Therefore, model 3 shows a greater

productivity of firms that have higher engagement in social action. However, the PwD variable is also not significant in this model. In order to verify whether the inclusion of the PwD and GRI variables enhances the results of the regression, models 3 and 4 were compared with model 1, which does not include those variables. When a variable with explanatory power is included in a regression, the adjusted R<sup>2</sup> should increase – which did happen. After removing the PwD and GRI variables and the interaction between them, the adjusted R<sup>2</sup> fell from 0.440 (model 4) or 0.425 (model 3) to 0.346 (model 1). This shows these variables have explanatory power.

The model which includes GRI and PwD (model 3) and the model which includes the interaction between GRI and PwD (model 4) show positive coefficients for the PwD variable. Just as in model 2, model 3 does not allow us to draw any conclusions regarding the impact of PwD on firm productivity because the variable's p-value was high. However, the variable was statistically significant in model 4 (p-value of 0.016).

In order to verify the real impact of the PwD and GRI variables on productivity, model 4 included the interaction between them. The result of this interaction was statistically significant. Including the PwDxGRI interaction did not alter the coefficients' signs when compared with models 1, 2 and 3 and increased the adjusted R<sup>2</sup> to 0.440. In model 4, the variable PwD became statistically significant. In order to analyze whether the impact of this variable is positive, as the coefficient (0.18938) indicates, one needs to analyze it alongside PwDxGRI interaction.

The interaction between GRI and PwD was statistically significant and had a negative coefficient (-0.18544). We must derive the equation in order to verify the final joint impact of the variables of interest.

Assuming the regression equation is a function f (GRI, PwD):

$$\text{LN (Productivity)} = f(\text{GRI, PwD})$$

That is:

$$\text{Productivity} = e^{f(\text{GRI, PwD})}$$

For GRI = 0:

$$\text{Productivity} = e^{f(0, \text{PwD})} = e^{f(\text{PwD})}$$

$$\frac{\partial \text{Productivity}}{\partial \text{PwD}} = e^{f(\text{PwD})} * 0.18$$

By definition, the dependent variable productivity (total revenue/total number of employees) is always greater than zero, therefore:  $e^{f(\text{PwD})} > 0$ . Therefore, when a firm does not adhere to GRI, having a higher proportion of PwD always generates a positive impact on its productivity, unlike what was predicted in Hypothesis 1.

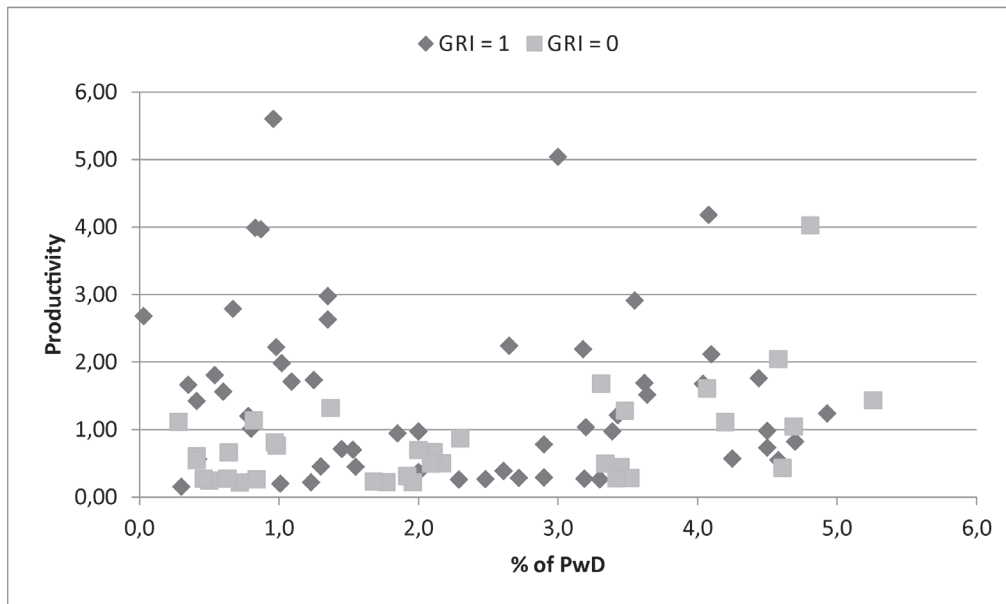
For GRI = 1:

$$\text{Productivity} = e^{f(\text{GRI, PwD})}$$

$$\frac{\partial \text{Productivity}}{\partial \text{PwD}} = e^{f(\text{GRI, PwD})} * (0.94 - 0.18 * \text{PwD})$$

By definition, the dependent variable productivity (total revenue/total number of employees) is always greater than zero, therefore:  $e^{f(\text{GRI, PwD})} > 0$ . Therefore, from a certain percentage on, the proportion of PwD affects productivity in a different way. The percentage of PwD has a positive impact on productivity when the second term of the equation ( $0.94 - 0.18 * \text{PwD}$ ) is higher than zero. Resolving this inequation, we conclude that, when the firm adheres to GRI, the impact of having a higher proportion of PwD on productivity is positive when the percentage of PwD among employees is lower than 5.2%.

The Figure 1 illustrates the discussion concerning this interaction:



**Figure 1.** Interaction between PwD and GRI

Thus, the result of this study, based on model 4, contradicts Hypothesis 1. Model 4 shows that an increase in the proportion of PwD among employees may have a positive or negative impact on firm productivity. The impact may be positive when the firm does not adhere to GRI or when the firm adheres to GRI and the percentage of PwD is lower than 5.2%.

We also observed that the higher the ROE (0.027), the higher the firm productivity. The ROE coefficient is positive and statistically significant. Therefore, there is a positive relationship between return to shareholders and productivity. Total Assets (-0.00071) was not statistically significant. As we discussed previously, we expected that, for firms at more advanced stages, marginal productivity would be lower. However, possible limitations to microeconomic theory, such as perfect market hypotheses and information asymmetry, rendered this analysis inconclusive. The CAPEX variable (0.01667) showed that firms that invest more have higher productivity. The variable is statistically significant and has a positive coefficient.

The analysis of the sectoral dummies showed that firms from consumer (-1.43797) and industry (-1.16657) sectors had lower productivity, with statistical significance.

A possible explanation may lie in the strong retraction the Brazilian economy suffered in 2011, coupled with high inflation and infrastructure bottlenecks, after a sharp increase in the GDP in 2010, which, in turn, had made up for part of the damage done by the 2008 financial crisis which started with Lehman Brothers' bankruptcy. In the case of the industry sector, we further note a drop in global consumption and strong appreciation of the Real throughout the 2000s and 2010s, leading to a retraction in exports and reducing local industry's competitiveness. For firms from the financial sector, no conclusions may be drawn, since the p-value did not indicate statistical significance.

## 5 Final considerations

The issue of PwD presence among firm employees is far from resolved. As we have shown, even when faced with legal requirements, Brazilian firms fail to allocate a sufficient percentage of positions to PwD. A fundamental step in advancing studies on PwD in the job market is to broaden databases. This study's first limitation lies precisely in this: the small number of firms that publish and release information about the number of PwD among their employees. Not only

is it difficult to find any data on this issue, we also need to advance regarding the types and severity of disabilities. PwD are treated as if they all had the same needs, something that is far from true, given the many types of disabilities that exist. When discussed as a whole, a significant portion of studies suggests that PwD have lower productivity. Contrary to the hypothesis we tested, this study found no statistical significance to state that a higher proportion of PwD negatively impacts firm productivity.

When looking only at the percentage of PwD among firm employees (model 2), this study found no statistical significance to conclude whether there is a direct relationship between PwD and firm productivity. After including the proxy for engagement in social action (model 3), represented by the GRI, no relationship between PwD and productivity was clear. Therefore, though there is no statistical significance to state that the relationship is positive, our results do not show that the relationship is negative – as was supposed in Hypothesis 1 – either. After including interaction between PwD and sustainability practices (model 4), results show that an increase in the proportion of PwD among employees can have a positive impact on firm productivity. This happens when the firm does not adhere to GRI or when the firm adheres to GRI and the percentage of PwD among employees is lower than 5.2%. When the percentage is higher than 5.2% and the firm adheres to GRI, the impact on productivity becomes negative.

In Brazil, studies on PwD's insertion in firms are limited because they are largely case studies. Without gathering more and better evidence (data that is more reliable and complete), one cannot construct a solid database that enables studies that can support public policy and private affirmative action. Perhaps the first step is to make it mandatory for firms to map out and publicly release complete data on PwD (function, type of disability, severity of disability, among other characteristics) and other minorities. Without adequate social mapping of PwD in Brazil, it is difficult to find alternatives for implementing

public policy, as well as following their evolution and results from a firm management standpoint.

Prejudice, though present and an important factor in this context (Stone & Colella, 1996), is only one part of a bigger problem which involves society as a whole, including firms. Firms are crucial in making sure that inclusion takes place with the minimum amount of friction, by promoting diversity, disseminating inclusion programs and funding social projects.

There are efforts currently under way to understand and measure the benefits of adopting corporate social actions. Several factors make most analyses inconclusive. However, this study showed an important quantitative relationship between higher engagement in social action and productivity, using the GRI as a proxy for best practices. This result has important organizational implications. The scarcity of capital (and often other production factors) make productivity an extremely relevant management tool, one that is directly connected with revenue and costs. Thus, the relationship between productivity and social responsibility, based on this study's results, shows an important evolution and may be an important way for firms to set themselves apart from others. We must, however, note the limitations of the GRI as a proxy for best practices. Among the limitations to the exclusive use of the GRI for this purpose, some data in the report may be incomplete, or some firms may release other types of sustainability reports and are thus characterized as not having adopted these practices. Therefore, GRI is an imperfect proxy, but appropriate for this study's goals. Future studies may verify other metrics for addressing best practices and an inclusive climate. The biggest hindrance is the difficulty in finding this information for small and mid-sized firms (most firms cannot dedicate resources to this end), since even among large firms the number of adherents is low.

This study contributes to the literature on diversity, providing evidence of the relationship between proportion of PwD and productivity, as well as engagement in social action as a moderator of this relationship. Results suggest that there is

an important relationship between engagement in social action and managing PwD. Therefore, we recommend that more research be carried out on this topic in order to investigate how PwD management can be, at once, good for firms and good for the Brazilian society.

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#### About the authors:

**1. Luciana Carvalho de Mesquita Ferreira**, PhD in Business Administration from the Erasmus University, Rotterdam School of Management, Netherlands. E-mail: [lucianacmf@insper.edu.br](mailto:lucianacmf@insper.edu.br)

**2. Luciano Aversani Rais**, MSc in Business Administration from the Insper Institute of Education and Research. E-mail: [luciano\\_rais@yahoo.com.br](mailto:luciano_rais@yahoo.com.br)



**Contribution of each authors:**

<b>Contribution</b>	<b>Luciana Ferreira</b>	<b>Luciano Rais</b>
1. Definition of research problem	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√
3. Development of theoretical propositions (theoretical Work)	NA	NA
4. Theoretical foundation/ Literature review	√	√
5. Definition of methodological procedures	√	√
6. Data collection		√
7. Statistical analysis		√
8. Analysis and interpretation of data	√	√
9. Critical revision of the manuscript	√	
10. Manuscript Writing	√	√
11. Other (please specify which)		

**Note**

<sup>1</sup> Law 8,213, which establishes a minimum percentage of employees with disabilities for companies with 100 employees or more. (Translator's note)