



## **Cognitive Reflection Abilities and Accounting Practice: A Two-Way Road of Influences**

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**LEONARDO PORTUGAL BARCELLOS**

**“COGNITIVE REFLECTION ABILITIES AND ACCOUNTING PRACTICE: A  
TWO-WAY ROAD OF INFLUENCES”**


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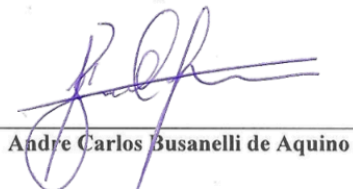
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## **Abstract**

This dissertation paper gathers three studies on the relationship between accounting practice and certified public accountants' (CPAs) cognitive reflection abilities (CR-ability). The first chapter summarizes the three studies, presenting contextual information about how the research ideas and identification strategies relate to my doctoral studies. The study in the second chapter maps Brazilian CPAs' CR-abilities to demographic characteristics, providing not only the foundational insights for the studies in the next chapters but also evidence that male and younger CPAs tend to present higher CR-abilities than female and older CPAs, as well as that employer firm size may determine CR-abilities of preparers and managers. The study in the third chapter applies a quasi-experimental approach to examine whether auditing practice is more likely to prevent CR-abilities decline than financial reports elaboration practice. The paper explores the unique counterfactual opportunity provided by the accounting setting to find that aging leads human beings to adapt information processing strategies towards Type 1 of reasoning in detriment of Type 2. But auditing practice may curb this trend. These findings make several contributions to psychology and accounting fields. The paper in the fourth chapter examines the influence of stable CPAs' individual characteristics, i.e., CR-ability and professional experience in pressured firms, on the professional judgments behind the recognition of assets and cash flows arising from audiovisual content (AV-content). The findings suggest that CR-ability drives differential AV-content assets and cash flows classification at recognition and, ultimately, incomparable financial statements, but professional experience in pressured firms is likely to refrain such differences in the case of assets. Finally, I present my concluding remarks in the fifth chapter.

*Keywords:* cognitive reflection ability, certified public accountants, cognitive aging, professional judgment

## Cognitive Reflection Abilities and Accounting Practice: A Two-Way Road of Influences

### Chapter 1: Introduction

This dissertation paper gathers three studies on the relationship between accounting practice and certified public accountants' (CPAs) cognitive reflection abilities (CR-ability). The data used in all three studies come from a national internet-based survey applied by the Brazilian Institute of CPAs (BICPA) addressing active CPAs. The BICPA agreed to embed the Frederick's (2005) cognitive reflection test (CRT) and some accounting tasks in the questionnaire that yielded the CPAs' Profile, edition 2012/13 (*Pesquisa perfil do profissional da contabilidade 2012/13*) (CFC, 2013).<sup>1</sup>

The first study (see Chapter 2) maps Brazilian CPAs' CR-abilities to demographic characteristics such as gender, age, educational and income levels, career, and employer firm size. The paper's results suggest that selection into accounting career does not attenuate gender differences regarding CR-abilities, contradicting previous conjectures in this direction. Additionally, the findings suggest that aging negatively affects CR-ability and auditors are more reflective than CPAs pursuing other careers. So, the study in Chapter 2 not only fosters a grasp on the data set used in the two following studies but also explores the predictors of CR-ability for professionals who share very similar educational backgrounds. To the best of my knowledge, this is the first study mapping cognitive reflection abilities of individuals within a single profession comprehensively.

The second study (see Chapter 3) was born from both curiosity towards the aging patterns found in the first paper and amazement towards the idea of using quasi-experimental methods to

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<sup>1</sup> The studies in Chapter 3 and Chapter 4 employ subsamples of these respondents tailored in line with the research questions addressed.

identify causal moderation effects. Testable hypotheses on the slower cognitive decline in auditors than in preparers naturally emerged from the combination of the cognitive aging literature with the CPAs routines portrayed by academic and professional papers. Also, I detected an opportunity to add to the existing research from several perspectives. First, there is a dearth of studies addressing aging patterns of CR-ability, which has been shown to be a consequential determinant of judgment and decision-making (JDM). Second, existing research neglects important factors that are likely to bias their findings, such as the educational background heterogeneity and the mismatch between education and career. Third, the accounting setting allows a clearer definition of job complexity than the self-reported rates used in prior studies. Fourth, while previous studies look at cognitive aging at late adulthood, my paper addresses early adulthood. Thus, the study in Chapter 3 applies quasi-experimental contrasts between two branches of a single profession, i.e., preparers and auditors, across age subgroups to examine the effects of job complexity on cognitive aging. The findings support the “use it or lose it” hypothesis, suggesting that auditing practice prevents cognitive aging. The study theorizes that auditing superior demand for engagement in behaviors that inhibit cognitive aging drives the findings. In addition to the contributions to the cognitive aging literature, the study contributes to the accounting profession and research since it presents evidence that older preparers are relatively more susceptible to the biases arising from excessive reliance upon Type 1 of reasoning, which has been shown to be detrimental in several instances.

The third study (see Chapter 4) examines the influence of CPAs’ CR-abilities and professional experience in pressured firms (PEPF) on the classification of assets and cash flows arising from audiovisual content (AV-content) produced by entities that negotiate the related exhibition rights as their principal revenue-producing activities. The paper explores the

overlapping IFRS guidance to AV-content to hypothesize and find that low CR-ability CPAs are likely to jump into first intuitive answers that pop up in mind when classifying AV-content assets and cash flows, while high CR-ability CPAs tend to overcome these intuitive judgments. The results suggest that CPAs use professional experience in listed, large, and(or) audited firms (PEPF) as a cue for engaging in deep reflective reasoning, irrespectively of CR-abilities, when exerting judgment and decision-making (JDM) on financial reporting tasks. It leads low CR-ability CPAs who lack PEPF to decide significantly different from other professionals.

Moreover, the paper in Chapter 4 reports that low CR-ability CPAs faced with the classification of cash flows from the sale of AV-content are more likely than high CR-ability CPAs to neglect information on the entity's principal revenue-producing activity. Thus, low CR-ability CPAs are likely to classify AV-content cash flows as from operating (investing) activities whenever they classify the associated asset as inventory (intangible) because it fits the clear-cut and cohesive instruction of IAS 7. Contrary to the expectations, PEPF seems to be ineffective in providing a cue for reflective reasoning activation in cash flows contexts. These findings are of interest to academics, practitioners, regulators, and standard-setters, responding to a call for research into the potential impacts of professional judgment on financial reports comparability.

In a nutshell, the three studies amounting to this dissertation paper provide a couple of informative pieces of evidence. First, gender imbalances in CR-ability outlive selection into accounting careers. Second, CR-abilities decrease over aging and exerting cognitively demanding jobs such as auditing may slow this process. Third, individual differences in CR-ability drive differential AV-content assets and cash flows classification at recognition and, ultimately, incomparable financial statements, but professional experience in pressured firms is likely to curb such differences in the case of assets.

In agreement with the Ebape's doctoral course regulation, three independent but correlated scientific articles in submission format add up to this dissertation paper. Since the three papers stem from the same data collection, readers will encounter pieces of information that are common to two or even to all the papers, such as collection procedure, CR-ability foundations, CRT, and others. I apologize for the inconvenience, hoping to provide a pleasant reading despite the repetition. The good side is that the structure of this dissertation paper informs the reader about my process of maturation as an independent researcher. Notice that I depart from simple correlational analyses to more sophisticated investigations of causal mechanisms, resembling the sequence in which I got introduced to more refined identification strategies. Likewise, the ideas and theoretical foundations for the second and third papers were heavily influenced by my visiting period at Emory University. It reflects how much I am indebted to the brilliant faculty members who have contributed to my Ph.D. education, especially Ricardo Cardoso, Cesar Zucco, Rafael Goldszmidt, Eduardo Andrade, Fabio Caldieraro, Alexandre Linhares, Thomas Hemmer, Kristy Towry, Kathryn Kadous, Grace Pownall, and Jeffrey Hales.

## **Chapter 2: An Assessment of CPAs' Cognitive Reflection Abilities**

### **Introduction**

We report results of an exploratory analysis of the individual characteristics that predict certified public accountants' (CPAs) cognitive reflection abilities (CR-abilities) measured via Frederick's (2005) cognitive reflection test (CRT). The CRT is a simple three questions test that arises automatic, effortless and usually wrong first answers in mind, but a further conscious and deliberate reasoning effortlessly conducts respondents to correct answers. Social sciences such as economics, finance, and accounting have successfully explored CRT scores as predictors of behavior and decision-making (Bergman, Ellingsen, Johannesson, & Svensson, 2010; Noussair, Trautmann, & van de Kuilen, 2014; Viator, Bagley, Barnes, & Harp, 2014). Oechssler, Roider, and Schmitz (2009) and Hoppe and Kusterer (2011), for instance, present results from laboratory experiments connecting CRT scores to the tendency to follow heuristics and biases in judgment and decision-making (JDM).

Prior research on CR-ability measured by CRT has mostly explored data from college students and heterogeneous professionals (Frederick, 2005; Hoppe & Kusterer, 2011; Oechssler et al., 2009; Moritz, Hill, & Donohue, 2013). Our paper differs from these previous studies to the extent that participants in our study are professionals who share an educational background in the very same area, i.e., accounting. The data from 4,902 Brazilian CPAs (1.6% of the population) was collected via an electronic questionnaire nationally applied by the Brazilian Institute of CPAs (BICPA). Our analysis reveals that male Brazilian CPAs tend to be more reflective than their female counterparts and that CPAs tend to become less reflective and, consequentially, more intuitive as they age. We also present evidence that preparers and managers working for larger companies tend to be less reflective than their counterparts working for smaller firms.

Additionally, our results suggest that auditors' scores on CRT are significantly higher than preparers', analysts', managers' and professors' scores, raising interesting questions for future research.

This paper contributes to both accounting and psychology literature, as well as to practice, especially to those interested in understanding how CR-ability relates to demographic characteristics within the accounting field. Since CR-ability significantly affects JDM quality, as reported in previous studies, the importance of our findings connects to the remarkable role that JDM plays in several fields of accounting activity. For instance, the International Financial Reporting Standards (IFRS) require the disclosure of judgments and estimates that have significant effects on the amounts presented in the financial statements (IASB, 2016a). Accordingly, the training materials prepared by the IFRS Foundation's Education Initiative emphasize the most significant judgments and estimates necessary to correctly applying either Full IFRSs (IASB, 2016b; IFRS Foundation, 2015) or IFRS for SMEs (IASB, 2015). However, as we further discuss throughout the next section, the role of CR-ability on accounting JDM is not limited to the elaboration of financial reports. Rather, CR-ability tends to influence managers' decisions, analysts' recommendations, auditors' reports, and professors' lessons. Hence, once simple demographic characteristics may help to predict CPA's CR-ability, our analyses are likely to forward accounting JDM in a relevant direction.

## **Theoretical Background**

**Accounting practice and cognitive reflection ability.** Accounting research, like many other social fields, recognizes that professionals may incur in biases and heuristics that steer them to unexpected decision-making. Consequently, there exist a growing consensus that

deviations from normative optimal choices are not necessarily driven by greed. Rather, these deviations are often caused by human imperfections (e.g. March & Simon, 1958; Kahneman & Tversky, 1979). Not surprisingly, behavioral research in accounting has acquired a notorious importance (see Birnberg, 2011; Trotman, Tan, & Ang, 2011 for reviews). Such research aims to improve accounting JDM quality by avoiding misleading impacts of factors emerging from task, environment, and personal dimensions on CPAs' performance (Bonner & Lewis, 1991; Libby & Luft, 1993; Bonner, 2008). This literature acknowledges that task complexity and environmental surroundings play a decisive role in JDM in tandem with knowledge, experience, memory retrieval, and abilities in general. We focus on the latter, i.e., general abilities, by exploring the individuals' ability to suppress first impulsive responses to engage in deeper reflection.

The timeline for the cognitive capacities research indicates that, although previous studies had pointed out impulsivity as a cause for low JDM performance (Stanovich & West, 2000; Kahneman, 2003; Hogarth, 2005), scholars lacked a reliable measure for reflection ability. To overcome this issue, Frederick (2005) proposed a three simple questions test named cognitive reflection test (CRT). After exhaustive experimentation, psychology literature has treated CRT as a potent predictor of the tendency to miserly process information (Hoppe & Kusterer, 2011; Toplak, West, & Stanovich, 2011; West, Meserve, & Stanovich, 2012). The CRT scores interpretation relies on dual-process theories, which differentiate Types 1 and 2 of cognition in human beings' information processing (Epstein, Lipson, Holstein, & Huh, 1992; Sloman, 1996; Stanovich & West, 2000). CRT is designed to raise impulsive, fast, effortless, and wrong first answers in respondents' minds, allowing researchers to measure the frequency in which individuals overcome such bad first answers to engage in logical, slow, and conscious deliberate

reasoning. We refer to the number of times that Type 2 prevails. i.e., the sum of correct answers, as CRT score.

Although CRT consists of simple numeric questions, its capacity to measure the individuals' ability to override heuristic processes goes beyond simple correlation with numeracy and general knowledge (Campitelli & Labollita, 2010; Toplak et al., 2011; Moritz et al., 2013). CRT score has been found to be a major determinant of JDM by studies in psychology, economics, and in other related social fields (Cokely & Kelley, 2009; Bergman et al., 2010; West et al., 2012).

The thinking disposition predicted by CRT was of interest to accounting studies preceding Frederick's (2005) CRT, but they usually applied scores on selected elements from Graduate Record Examination (GRE) as a proxy for problem-solving ability (e.g. Bonner & Lewis, 1990; Bonner, Davis, & Jackson, 1992; Bonner & Walker, 1994; Libby & Tan, 1994; Tan & Libby, 1997; Dearman & Shields, 2005). We interpret this trend as a symptom that, because they lacked a reliable and straightforward measure for CR-ability, scholars explored an ill-defined construct for cognitive ability.

Recent accounting studies also support the relevance of both CR-ability and a reliable measure to this construct. For instance, Farrell, Goh, and White (2014) used functional magnetic resonance imaging (fMRI) to provide evidence that brain regions associated with Type 1 of reasoning are more responsive when managers have affective reactions to decision contexts than when they do not. They also show that performance-based contracts do not suppress affective reactions. Rather, these contracts activate additional brain regions associated with Type 2. In turn, Viator et al. (2014) presented experimental evidence that more reflective MBA students (CRT score greater than or equal to 2) are more likely to benefit from feedback than more

intuitive participants. Motivated by recent developments in JDM research, Griffith, Kadous, and Young (2016) propose dual-process theories as a promising framework to examine and improve auditors' judgments. Also, several other recent studies published in top accounting journals suggest that the ability to override first intuitive responses before exerting JDM is determinant in different areas of accounting profession (Brown, 2014; Capps, Koonce, & Petroni, 2016).

In sum, CR-ability seems to be a determinant factor of accounting JDM, especially when considering the current scenario of the global trend towards the IFRS adoption.<sup>2</sup> Notably, major changes emerge in adopter countries such as Brazil and many others, in which the previously enforced accounting standards are based on bright-lines rules influenced by tax authorities (Nobes, 1998; Gray, 1988). As research and practice agree upon, IFRS require a significant portion of judgment from CPAs due to its principles-based approach (Schipper, 2003; Alexander & Jermakovitz, 2006). Hence, a shift from a rules-based system of accounting standards to IFRS is likely to hinge on CPAs capacity to timely activate Type 2 of reasoning. However, CPAs in a number of IFRS adopter countries may be not trained to reflect deeply about judgments and estimates because they have learned in their everyday practice that more important than faithfully represent the substance of transactions is the compliance with detailed codes (Arden, 1997; Colasse, 1997; Hulle, 1997). By mapping Brazilian CPAs' CR-ability over several demographic characteristics, this paper provides preliminary cues on Brazilian CPAs' preparedness to face the large demand for judgment that is likely to arise from IFRS adoption.

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<sup>2</sup> In fact, approximately 120 countries require or permit the adoption of the IFRS for domestic entities, among them European Union's nations and most of the Latin-American, Asian and Oceania countries. The United States has signaled a potential adoption through, for instance, the *Concept Release on Allowing U.S. Issuers to Prepare Financial Statements in Accordance with International Financial Reporting Standards* (SEC, 2007). Nevertheless, the *Work Plan for the Consideration of Incorporating International Financial Reporting Standards into the Financial Reporting System for U.S. Issuers* (SEC, 2012) gave no specific course of action, and there is no estimated date for SEC's decision. Due to the joint efforts made by FASB and IASB to reduce the differences between USGAAP and IFRS, the USGAAP has also become more principles-oriented.

**Cognitive reflection test.** Frederick's (2005) CRT is a criterion to measure how intuitively or reflectively people make decisions. The CRT consists of the three following questions:

1. A bat and a ball cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
3. In a lake, there is a patch of lily pads. Every day, patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

The impulsive and correct answers are:

1. Bat & ball: Impulsive answer: \$10; correct answer: \$ 5.
2. Widgets: Impulsive answer: 100 minutes; correct answer: 5 minutes.
3. Lily pads: Impulsive answer: 24 days; correct answer: 47 days.

The impulsive answers for CRT are attributed to the Type 1 of reasoning because it is the first answer that respondents' minds suggest. Thus, if this immediate tempting answer is not identified being wrong, the Type 2 is not activated. However, if respondent reflectively tests whether the first answer is wrong, the correct answer is very likely to emerge (Toplak et al., 2011). Importantly, the usage of Type 1 or Type 2 of reasoning cannot be considered bad or good. Rather, the quality of judgment and decision-making mostly depends on the context in which each type of cognitive processing is applied. Athletes, cab and bus drivers, and other professionals in jobs requiring fast and repetitive patterns of decision-making are likely to develop accurate Type 1 usage to perform their everyday activities. For instance, an athlete is

likely to rely on Type 2 to adjust a particular movement to improve performance, but after long practice such adjustment will be part of the athlete's Type 1, waiving Type 2 activation. In contrast, workers devoted to professions involving few repetitions are likely to often activate Type 2 as a mean to avoid mistakes.

**Research questions.** In this section, we develop research questions for each of the five CPAs' demographic characteristics examined in this study. Our preference for research questions over directional hypotheses reflects, in most cases, the exploratory nature of this study, as well as the contradictory pieces of evidence from prior research.

**Gender.** Previous studies provide evidence that men score significantly higher than women on CRT (Frederick, 2005; Hoppe & Kusterer, 2011; Oechssler et al., 2009), but none of these studies used participants sharing similar educational backgrounds, working environments, routines, so on. As one may infer from Croson and Gneezy (2009), males and females who are similar regarding CR-ability may jump into accounting career driven by non-observable factors that are correlated with CR-ability (see also Johnson & Powell, 1994; Birley, 1989). If true, this process would cause a balance between male and females CPAs in terms of CR-ability. However, psychology research has shown that CR-ability measured via CRT is a unique construct, uncorrelated with other sorts of thinking disposition that may determine life outcomes such as career choice (Campitelli & Labollita, 2010; Frederick, 2005; Toplak et al., 2011). Given these contradicting pieces of evidence, we raise the first research question.

**RQ1.** Do male and female CPAs differ in terms of CR-ability?

**Age.** Kahneman (2011) points out that performing similar tasks over the years is likely to stimulate individuals to sharpen their intuitive systems, leading them to put aside their reflective

systems. Kahneman's conjecture is in line with cognitive aging research, which has systematically documented that human fluid cognitive abilities (reasoning, memory, and other novel problem-solving capacities) start decaying from early adulthood (Salthouse, 2012; Verhaeghen & Salthouse, 1997). Such decay takes place together with the rise of crystallized cognitive abilities, i.e., knowledge acquired through experience, culture, and education (Salthouse, 2004). It is an adaptive rational response of the human body to save energy since fluid cognitive abilities are significantly more taxing. Nevertheless, we have not found previous empirical findings either on CR-ability aging patterns or cognitive aging among specialized professionals such as CPAs. From this, we state our second research question.

**RQ2.** Do CPAs' CR-abilities decrease with age?

***Education and income levels.*** Prior studies suggest that CRT scores are uncorrelated with numeracy and general knowledge (Campitelli & Labollita, 2010; Toplak et al., 2011; Moritz et al., 2013). From this, one would straightforwardly infer that educational level is unrelated to CPAs' CR-abilities, but education is likely to affect CR-ability through income level. That is, more educated individuals tend to have larger incomes, whereas larger income individuals tend to have greater and more complex responsibilities. Thus, assuming that high CR-ability individuals are more likely to assume more complex responsibilities and that more complex responsibilities may stimulate CR-ability, we predict that income may work as a mediator for the relationship between educational level and CR-ability. However, we lack identification mechanisms to adequately address this prediction because of the simultaneous causality between the pairs education-income and income-CR-ability. For this reason, we keep the focus of our analyses on correlations between these variables.

**RQ3.** Do educational and income levels affect CPAs' CR-abilities?

**RQ4.** Does the effect of educational level on CPAs' CR-abilities remain after including income level in the model?

***Larger Companies' CPAs.*** Listed, large, and(or) audited firms are likely to experience relative greater pressure arising from high ownership dispersion and high ownership-management segregation (Hope, Langli, & Thomas, 2012). But while one may argue that it tends to lead them to provide high-quality accounting information, a plausible counterargument is that incentives to meet capital market's earnings expectations, as well as equity-based compensation thresholds, tend to push managers to provide low-quality information (Graham, Harvey, & Rajgopal, 2005). Notably, in both theoretical hypotheses, the environmental pressure is likely to lead CPAs who work for public, large, and(or) audited firms (pressured firms) to exert a more careful and holistic consideration of all possible alternatives before jumping into any financial reporting conclusion. From this perspective, we may expect CPAs who work for larger firms to present higher CR-abilities than CPAs who work for smaller firms. However, the organizational structure of such listed, large, and(or) audited firms are likely to be highly departmentalized, leading CPAs to perform repetitive tasks that mostly require Type 1 of reasoning. In this regard, cognitive aging research suggests that such specialized and repetitive labor routine leads people to adapt their information processing strategies accordingly to the demand for cognitive abilities (Mata & Nunes, 2010; Queen & Hess, 2010). In addition, we expect CPAs from small-sized companies to work in a different environment since the lower number of employees is likely to force them to develop a more comprehensive set of tasks, requiring a higher use of CR-ability. Hence,

**RQ5.** Do CPAs who labor for large-sized companies differ from CPAs who labor for small-sized companies in terms of CR-ability?

## Methods

To map CPAs' CR-abilities, we collect CRT scores and demographic characteristics from 4,902 Brazilian CPAs. In this section, we describe the data collection and sampling procedures, as well as the regression models used in our analyses.

**Data collection and sampling.** We collect data through a national survey applied by the BICPA, which allowed us to embed our research questions in an electronic questionnaire delivered via institutional electronic message. Beyond the Frederick's (2005) CRT questions, the participants answered demographic questions such as age, gender, formal instruction level, income, and detailed information about the firm in which they labor.<sup>3</sup>

Table 1. Sample selection.

Total of responses from CPAs:	9,355
(-) CRT inconsistent answers:	(516)
(-) I-1. Lower than 0.10 or higher than 1.10 for Question 1 (bat and ball):	(228)
(-) I-2. Lower than 2 or higher than 96 for Question 2 (lily pads) (A2):	(222)
(-) I-3. Lower than 1 or higher than 500 for Question 3 (machines) (A3):	(210)
(-) Respondents who did not answer the income question:	(49)
(-) Respondents who did not fit in any of the professional segments:	(3,888)
(=) Total of answers considered:	4,902 <sup>b</sup>

According to the CFC database, the population of interest was 302,697 in June 2012, implying that our sample comprises 1.6% of the population of interest (CFC, 2013).

I-1, I-2, and I-3 add up to 516, representing the union of inconsistent answers since some respondents answered inconsistently more than one question.

A total of 9,355 bachelor CPAs answered the questionnaire. As a check against random responses, we eliminated observations containing unreasonable answers for CRT, as well as observations containing incomplete answers for the demographic questions. As a result, the final

<sup>3</sup> In Brazil, CPAs are required by law to have a BICPA license to provide accounting services.

sample comprises 4,902 CPAs (see Table 1), corresponding to 1.6% of the Brazilian CPAs' population, which was 302,697 individuals in June 2012. To our knowledge, ours is the biggest sample of the literature addressing CR-ability. For instance, Frederick (2005) himself surveyed 3,428 individuals.

**The model and variables description.** To map the CR-abilities of the Brazilian CPAs, we explore several participants' individual characteristics besides their CR-abilities measured by CRT. Table 2 presents detailed information on each of the variables of interest.

Table 2. Variables descriptions.

Variable	Measure
CRT Score	The sum of the cognitive reflection test (CRT) hits, where each correct answer adds one point on a scale that varies from 0 to 3. CRT score is our primary dependent variable.
Gender	A categorical (independent) variable which assumes 1 (one) if the participant is a female and 0 (zero) if the participant is a male.
Age	Age of the participants expressed in years.
Highest Education Level	A categorical variable that assumes 1 (one) if the participant completed an MBA or a Ph.D. and 0 (zero) otherwise, i.e., if the participant completed only the bachelor level.
Annual income	A seven-levels categorical variable (until 10.6; 10.6 – 17.7, 17.7 – 35.3; 35.3 – 70.6; 70.6 – 105.9; 105.9 – 176.6, more than 176.6) in USD thousands <sup>1</sup> .
Professional Segment	A five-levels categorical variable: (i) Preparers: CPAs whose main activity consists in elaborating financial reports in private or public owned firms, as well as in governmental institutions. (ii) Auditors: external and internal auditors working for private or public institutions; (iii) Analysts: investment, financial, and credit advisors, as well as tax consultants; (iv) Managers: operational and <i>planning and budgeting</i> managers working for private or public owned firms, or for governmental institutions; (v) Accounting professors.
Larger Companies' Professional	Categorical variable that assumes 1 (one) if the respondent works for a company that meets at least one of the requirements: (i) is listed; (ii) has book value of total assets higher than BRL 240 million or annual revenue higher than BRL 300 million; or (and) (iii) has financial statements audited by independent auditors. The variable assumes 0 (zero) otherwise.

<sup>1</sup> At July 2012 the exchange rate was USD 1 = BRL 2.29.

Besides analyzing simple descriptive statistics, we estimate three different regression models aiming to grasp better how CRT scores correlate with CPAs' demographic characteristics. Given the nature of our data, we use ordered logistic regression (ologit) models. Although the interpretation is not as straightforward as for simple linear models, odds ratio analyses combined with margins analyses provides an informative approach.

Following the intuition borrowed from prior studies on human cognitive abilities, we first estimate a simple model (Model 1) including only gender, age, and education level. Then, we deepen our analysis by including, in Model 2, the variables shaped for CPAs, i.e., professional segment and large company, as well as income intervals. Finally, to further explore how CPAs' cognitive abilities relate to demographic characteristics contingent on the professional segment, we run Model 3 separately for preparers, auditors, analysts, managers, and professors.

$$\text{Cognitive Score} = \alpha_0 + \alpha_1 \text{Gender} + \alpha_2 \text{Age} + \alpha_3 \text{Formal Education Level} + \varepsilon \quad (\text{Model 1})$$

$$\text{Cognitive Score} = \alpha_0 + \alpha_1 \text{Gender} + \alpha_2 \text{Age} + \alpha_3 \text{Formal Education Level} + \alpha_4 \text{Income intervals} + \alpha_5 \text{Professional segment} + \alpha_6 \text{Larger Company's Professional} + \varepsilon \quad (\text{Model 2})$$

$$\text{Cognitive Score} = \alpha_0 + \alpha_1 \text{Gender} + \alpha_2 \text{Age} + \alpha_3 \text{Formal Education Level} + \alpha_4 \text{Income intervals} + \alpha_5 \text{Larger Company's Professional} + \varepsilon \quad (\text{Model 3})$$

## Results

**Descriptive statistics.** Table 3 presents the frequency of correct responses for CRT along with CRT score mean and standard deviation sorted by demographic characteristics of interest. The mean CRT score of Brazilian CPAs (1.55) is slightly higher than the mean CRT score of 313 American supply chain managers employed at Fortune 500 supply-chain-intensive firms from

the USA (1.51), as reported by Moritz et al. (2013). Except for Moritz et al., prior research mostly reports CRT scores from college students (Frederick, 2005; Hoppe & Kusterer, 2011; Oechssler et al., 2009; Toplak et al., 2011). Surprisingly, Brazilian CPAs had higher mean CRT scores than the 3,428 individuals reported by Frederick (2005, Table 1). That is, of the eleven sample populations in Frederick's (2005) study, only the student population from MIT and Princeton University had higher average CRT scores than Brazilian CPAs. In turn, Oechssler et al. (2009) found a striking 2.05 CRT mean for 1,250 individuals (90% of college students) whose mean age was 24 years. Importantly, the mean age of the professionals in our sample is 40 years old and none of them is a college student.

**Multivariate analysis.** Table 4 presents the results of estimations of the three models that we propose. The margin analysis when setting all predictors at mean values suggests that the probabilities of scoring 0, 1, 2, and 3 on CRT are 13, 40, 26, and 21%, respectively. The estimations of the three models do not violate the proportional odds assumption, except the Model 2. We estimate Model 2 using the generalized ordered logistic approach and find similar results. Thus, to facilitate interpretation, we report only the ologit results for Model 2.

**Gender (RQ1).** In line with previous research (Frederick, 2005; Hoppe & Kusterer, 2011; Oechssler et al., 2009), the results suggest that men score significantly higher than women on CRT. The apparent large average difference between males (1.66) and females (1.31) is found significant via ologit estimations. The odds ratio in Model 2 indicates that holding the other covariates constant, the probability of a CPA reaching the higher CRT (3) score is 0.54 times lower if the CPA is a woman. This result hold for all model estimations, except for professors, to which the statistical results indicate that the 0.27 average difference may be only by chance.

Table 3 – Descriptive Statistics: CRT Scores for each CPA group.

CPA groups				Percentage Scoring 0, 1, 2 or 3				n		
				CRT Score		Low			High	
Mean	St. Dev.	0	1	2	3					
Gender	Male	1.66	0.98	11.79	35.46	27.38	25.36	3,367		
	Female	1.31	0.92	17.59	47.10	21.63	13.68	1,535		
Age intervals (years old) <sup>1</sup>	18 - 35	1.59	0.98	12.67	38.65	25.84	22.84	2,202		
	36 - 50	1.55	0.98	13.66	39.49	24.82	22.02	1,998		
	51 - 88	1.45	0.96	16.38	39.46	26.92	17.24	702		
Highest education level	Bachelor	1.50	0.94	14.60	40.76	24.61	20.02	2,068		
	MBA/PhD	1.59	0.98	12.88	37.90	26.29	22.94	2,834		
Annual income (USD 1,000)	until 10.6	1.37	1.00	20.24	41.50	19.64	18.62	494		
	10.6 – 17.7	1.39	0.96	17.87	41.32	24.69	16.12	968		
	17.7 – 35.3	1.52	0.93	11.92	43.02	25.88	19.18	1,611		
	35.3 – 70.6	1.70	0.98	10.71	35.08	27.91	26.31	1,186		
	70.6 – 105.9	1.74	1.01	11.28	32.83	25.81	30.08	399		
	105.9 – 176.6	1.80	1.01	11.11	28.89	28.89	31.11	180		
	> 176.6	1.67	1.07	15.63	31.25	23.44	29.69	64		
Segment	Preparers	1.50	0.97	14.00	42.22	23.68	20.11	1,850		
	Auditors	1.67	1.02	13.41	33.45	25.78	27.35	574		
	Analysts	1.54	0.97	13.81	39.02	26.15	21.03	956		
	Managers	1.59	0.97	12.54	38.15	27.06	22.25	1,308		
	Professors	1.54	0.99	16.36	33.64	29.91	20.09	214		
Larger Company's	No	1.57	0.97	12.90	39.10	26.53	21.47	2,767		
	Yes	1.54	0.99	14.52	39.11	24.36	22.01	2,135		
Total		1.55	0.98	13.61	39.11	25.58	21.71	4,902		

1. Although the age intervals were applied in this table using a range format, age is a quantitative variable.

Table 4 – Coefficients estimated for ordered logistic regression models from Equations 1, 2 and 3.

	Model 1	Model 2	Model 3 Preparers	Model 3 Auditors	Model 3 Analysts	Model 3 Managers	Model 3 Professors
<i>Controls</i>							
Gender	0.49***	0.54***	0.60***	0.44***	0.47***	0.56***	0.66
Age	0.98***	0.97***	0.97***	0.96***	0.98***	0.98***	0.97**
Education level	1.17***	1.01	1.03	0.77	0.97	1.22*	0.72
<i>Main effects</i>							
Larger Co's worker		0.85***	0.80**	1.04	0.97	0.81**	0.51
Income <sup>a</sup>							
10.6 – 17.7		1.13	1.28	0.46**	0.67*	1.86**	1.80
17.7 – 35.3		1.50***	1.63***	0.88	0.86	2.05***	4.87***
35.3 – 70.6		2.22***	2.33***	1.36	1.51*	2.97***	5.56***
70.6 – 105.9		2.47***	2.68***	2.01*	1.76*	2.69***	13.33***
105.9 – 176.6		3.05***	2.02**	2.79**	2.61**	4.21***	-
> 176.6		2.51***	2.48**	3.58*	2.55*	1.13	-
Profess. Segment							
Auditors		1.19**					
Analysts		1.03					
Managers		1.03					
Professors		1.13					
Likelihood Ratio X <sup>2</sup>	180.0***	302.7***	92.8***	69.6***	79.7***	77.2***	29.5***
Pseudo R-square	0.01	0.02	0.02	0.05	0.03	0.02	0.05
N	4,902	4,902	1,850	574	956	1,308	214

\*\*\* p &lt; 0.01; \*\* p &lt; 0.05; \* p &lt; 0.10.

a. Annual income in thousands of USD.

Further, the margin analysis suggests that the probability of scoring zero is 18.1 and 10.7% if the average professional CPA is a female and a male, respectively. The probabilities of scoring 1, 2, and 3 on CRT are 44.9, 22.3, and 14.7% for females and 37.3, 27.9, and 24.1% for males, respectively. Hence, female CPAs are more likely than male CPAs to score zero or 1, and this pattern reverts for scores 2 or 3.

These results are in line with the findings of Frederick (2005), which found a mean CRT score of 1.47 for males and 1.03 for females even after controlling for sampling problems, differences in attention, effort expended to answer, and mathematical ability. Our findings suggest that sharing the same educational background and the same working environment are not enough to equalize females and males CPAs in terms of CR-ability.

***Age (RQ2).*** In line with the descriptive statistics in Table 3, the ologit estimations in Table 4 suggest that older CPAs perform significantly worse than young CPAs. The odds ratios in Table 4 indicate that, for each additional-year-old, the CRT scores of Brazilian CPAs tend to decrease by 0.03, if all other variables are held constant. These results hold across all the models. The margin analysis suggests that, for each incremental-year-old, the probability of an average CPA achieving the maximum score decreases by 0.46%, while the probability of achieving the minimum score increases 0.3% each year added to CPAs age. Notice, however, that one should exert caution with such inference since research on cognitive aging lacks investigations on CR-ability measured by CRT.

***Education and income levels (RQ3 and RQ4).*** The results for Model 1 estimation suggest that CPAs who hold an MBA or(and) a Ph.D. are significantly more likely to achieve

high CRT scores. However, the estimations of Models 2 and 3 reveal that the coefficient for education level is significant only for estimations that do not include income level, supporting the mediating effect of income on the relationship between education and CR-ability. But caution must be exerted to analyzing and making inferences using these results given the endogenous two-way relationship between education and income, as well as between income and CR-ability.

Surprisingly, education level remains marginally significant for managers (Model 3) even after including income variables. This result may indicate that MBA programs may impact managers differently since such programs are often tailored for them.

The findings for income level suggest that high-income CPAs tend to make reflective decisions more frequently than the low-income professionals. Even though we have no theoretical support, we conjecture that it is driven by the fact that positions of greater responsibility tend to be better rewarded. Hence, since professionals in high-responsibility levels are likely to be demanded by more complex JDM, professionals in such jobs tend to be more required in terms CR-ability. In contrast, CPAs in the lower income levels, who probably hold less intensive responsibilities, must develop less complex activities, implying little demand to exert reflection while performing their duties.

***Larger Companies' Professional (RQ5).*** We find evidence that the probability of scoring the highest CRT score is around 0.80 times lower if the CPA works for a larger firm, holding constant the other variables (see Table 4, Model 2). Analyses for professional segments (Model 3) present analogous results for preparers and for managers. For the preparers' subsample, the probability of scoring 3 on CRT is 0.80 times lower if the CPA works for a large company. Similarly, for managers, the probability of getting the highest CRT score is 0.81 times lower for

CPAs who work for large companies. The margin analysis for the whole sample suggests that the probability of getting a score zero is 11.9 and 13.7% for average CPAs who do not work and work for a large company, respectively. This pattern flips when performing a similar analysis for the highest CRT score. The probabilities of scoring 3 on CRT for average CPAs who do not work and do work for large companies 22.0 and 19.2%, respectively. The results are similar for margin analyses performed for the preparers' and managers' subsamples.

This pattern of results is coherent with the idea that large firms are highly departmentalized companies and it may lead CPAs who work for these firms to be less required in terms of CR-ability. The results of the professional segments analyses provide further support for this rationale. That is, preparers and managers seem to be more exposed to the effect of high detailed and repetitive duties, while the work assignments of auditors, analysts, and professors tend to have broader scope even within larger companies. However, as we previously adverted, one should exert caution while making such inferences since cognitive aging research has not addressed CR-ability so far.

***Professional segment results and future research.*** An interesting piece of information in our results is that auditors present the highest average CRT score followed by managers, professors, analysts, and preparers (see Table 3). Besides, inferential outputs from Model 2 depicted in Table 4 point out that, holding the preparers as the reference level, the only statistically significant coefficient is for auditors. The odds ratio analysis indicates that the probability of scoring 3 on CRT is 1.20 times higher if the CPA is an auditor. No other professional category differs significantly from the baseline constituted by preparers (see Table

4, Model 2). Additionally, the CRT score seems less sensitive to income level for auditors than for other professional categories (Model 3).

Several fertile questions for future research arise from these findings. First, do selection processes for audit jobs pick the most skilled professionals regarding CR-ability? Second, do age and gender affect CR-ability differently according to the professional category in which the CPA labors? Third, how does it affect professional judgments?

## **Conclusions**

This paper maps the Brazilian CPAs' CR-abilities measured by Frederick's (2005) CRT. To our knowledge, our study is the first to assess how individual demographic characteristics predict CRT scores looking at professionals who share very similar educational backgrounds and professional experiences. Besides, we use the largest data set that we are aware of.

In spite of the expectation that selection into career together with similar background could lead male and female CPAs to neutralize the gender differences found in previous studies, our findings suggest that male CPAs are more reflective than female CPAs. In other words, male CPAs outperform female CPAs in terms of CRT score. Aligned with prior research on cognitive aging, we present evidence that, CPAs become less reflective as they age. In addition, the results suggest that educational and income levels are positively associated with CR-ability, and that income mediates the relationship between education and CR-ability. However, given the difficulties to set a suitable identification strategy, one should exert caution to make inferences based on such analysis. Interestingly, we find that preparers and managers working for larger companies tend to be less reflective than their counterparts working for smaller firms. As expected, this pattern of results does not hold for auditors, analysts, and professors. Finally, our

results suggest that auditors' CRT scores are significantly higher than preparers', analysts', managers', and professors' scores, raising interesting questions for future research.

This paper contributes not only to the literature in accounting and psychology but also to practitioners interested in understanding how CR-ability relate to demographic characteristics within the accounting field. Since CR-ability significantly affects JDM quality, as reported in previous studies, our findings connect to the remarkable role that JDM plays in several fields of accounting activity.

Further research should investigate whether the findings of this paper are contingent on cultural or regional aspects. Moreover, a promising avenue is to explore whether CR-ability constitutes a relevant predictor for heuristics and biases in accounting JDM since several compelling empirical research questions arise from this. First, is the interpretation of verbal probabilities (Doupnik & Richter, 2003, 2004; Doupnik & Riccio, 2006) contingent on CPAs' CR-abilities? Second, do the classification of economic events following vague standards (Penno, 2008; Cardoso & Aquino, 2009) hinge on CPAs' CR-abilities? Third, does the ability to interpret graphical information (Cardoso, Leite, & Aquino, 2016) rely on CR-ability?

### Chapter 3: Job Complexity and Cognitive Aging: What Can We Learn from Accounting Practice?

The man whose whole life is spent in performing a few simple operations, of which the effects are perhaps always the same, or very nearly the same, has no occasion to exert his understanding or to exercise his invention in finding out expedients for removing difficulties which never occur. He naturally loses, therefore, the habit of such exertion, and generally becomes as stupid and ignorant as it is possible for a human creature to become.

-Adam Smith, *The Wealth of Nations*, 1776.

#### Introduction

In the 18<sup>th</sup> century classic *The Wealth of Nations*, Adam Smith noted that labor division causes workers to *become* “stupid and ignorant” as a result of the low cognitive exertion required by simple, repetitive, and lasting activities. Research has dramatically polished such rough understanding on the influence of environmental opportunities and constraints on lifespan cognitive development (see Lindenberger, 2014 for a review). According to the prevalent cognitive-enrichment perspective, social engagement, exercising, and other effort-consuming behaviors attenuate the adverse effects of aging on cognitive functioning (Hertzog, Kramer, Wilson, & Lindenberger, 2009).<sup>4</sup> Although psychology research documents extensive evidence supporting such explanation (Schooler, Mulatu, & Oates, 1999; Fisher et al., 2014), this literature neglects not only lifespan changes in the mind functioning explained by dual-process theories

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<sup>4</sup> The cognitive-enrichment perspective is an extension of the hypothesis popularly described by the adage “use it or lose it.” According to this hypothesis, the stimulus generated by exercising the cognitive functions via cognitively demanding tasks preserves one’s mind from aging (Hultsch, Hertzog, Small, & Dixon, 1999; Salthouse, Berish, & Miles, 2002).

but also the methodological threats arising from occupational and educational heterogeneity. In this paper, we explore the uniqueness of the accounting setting along with the prominence of the cognitive reflection ability (CR-ability) to bridge these gaps.<sup>5</sup>

Auditors and preparers are forged in the same furnace, coping with identical environments and requirements during the time they spend in school. We explore the resulting educational homogeneity together with the particularities of the Brazilian context for fresh graduates to predict and find that auditors' and preparers' CR-abilities do not differ at early career stages. However, we rely on the differences in career-specific environmental opportunities and constraints faced by certified public accountants (CPAs) laboring as preparers and auditors to predict and find that cognitive decline over time affects preparers significantly more than auditors. We build on cognitive-enrichment theoretical perspective to reason that the most plausible mechanism to these findings is the fact that auditors' and preparers' careers differ fundamentally in terms of engagement in behaviors that inhibit cognitive aging.

Specifically, preparers usually work within specialized functions (e.g. receivables, payables, taxes, and others), performing repetitive and cyclical tasks for extended periods of time either working for an outsourcing firm or a firm's internal accounting department. In contrast, auditors generally work in different client firms, testing whether clients' control systems are operating effectively and whether clients' financial statements are free from material misstatement. It implies that auditors need to frequently update their perspectives to perform recurrent duties, such as internal controls assessment and substantive procedures adjustments (Trotman, 2014, 203). Besides, a prerequisite for auditing practice is the constant exercise of professional skepticism. The professional skepticism definition as "indicated by auditor

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<sup>5</sup> By cognitive reflection ability, we mean the individual ability to properly activate Type 1 or Type 2 of reasoning as depicted by dual-process theories. We elaborate on these concepts in the next section.

judgments and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor” (Nelson, 2009) gives us a hint of how cognitively demanding it is. Hence, the contrasting demands to which CPAs with similar backgrounds are exposed ground our hypotheses.

To test our hypotheses, we use data collected by the Brazilian Institute of CPAs (BICPA) through a national survey.<sup>6</sup> Among the demographic questions in the internet-based survey, we embedded the CRT, which allows a simple and effective measure of CR-ability (Toplak, West, & Stanovich, 2014). CRT is a performance-based three-question test that measures individuals’ abilities to overcome impulsive, fast, and effortless wrong answers to engage in logical, slow, conscious, and deliberate reasoning that leads to correct answers. The CRT score, i.e., the sum of correct answers, is a potent predictor of decision-making (Oechssler, Roider, & Schmitz, 2009; Hoppe & Kusterer, 2011) and varies irrespectively of intelligence (Toplak, West, & Stanovich, 2011; Liberali et al., 2012; Campitelli & Gerrans, 2014).

Our data consists of responses from 954 CPAs, of which 79 are external auditors, and 875 are preparers. We refer to preparers as the CPAs exclusively committed to preparing financial reports within firms’ internal accounting departments, or within accounting outsourcing firms. To investigate the moderating effect of career on the relationship between aging and CR-ability, we match preparers to auditors within age subgroups (*Juniors*, *Middle*, and *Seniors*), as suggested by Green and Stuart (2014). While the quasi-experimental contrast for CPAs at early career stages suggests non-significant differences between preparers and auditors in terms of CR-ability, similar contrasts for CPAs at later career stages suggest that differences in CR-ability become significant due to the cognitive decay of preparers. These results are robust to several

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<sup>6</sup> The Brazilian Institute of CPAs (*Conselho Federal de Contabilidade – CFC*) is a federal agency whose goal is to guide, regulate, and supervise the practice of the accounting profession in Brazil.

alternative model specifications that control for detail-rich occupational and personal demographics, mitigating selection concerns.

These findings make several contributions. First, to the best of our knowledge, this study is the first to present evidence that aging leads human beings to adapt information processing strategies towards Type 1 of reasoning in detriment of Type 2. It allows us to reconcile a set of conflicting results from prior studies on comparative decision-making performance of young and old adults.

The second contribution of this paper emerges from our quasi-experimental approach, which contrasts cross-sectional CR-ability assessments from auditors and preparers across age subgroups. This research design permits us to rule out concerns related to the response biases that longitudinal assessments of CR-ability are likely to generate. Additionally, the research design enables us to overcome the construct validity issues typical of prior studies assessing job complexity via workers' self-reported rates of complexity for very heterogeneous occupations.

Third, our counterfactual approach disentangles the effects of job complexity from the potential confoundings arising from the mismatch between educational background and career. Unlike prior studies, our design allows us to compare individuals who hold identical backgrounds and perform jobs focused on the very same matter, i.e., financial reports. In addition, we compare auditors and preparers occupying compatible jobs regarding career level and geographical location. It allows us an uncommon counterfactual since treatment (auditors) and control (preparers) groups are strongly balanced across several dimensions unless career.

Finally, our findings are informative to the accounting profession and research in several ways. First, we present evidence that older preparers are susceptible to the biases arising from excessive reliance upon Type 1, and accounting research has shown that such excessive reliance

may be consequential (Farrell, Goh, & White, 2014; Viator, Bagley, Barnes, & Harp, 2014). Second, our findings provide guidance for continuing professional education programs, which should focus on CR-abilities training and maintenance, especially for CPAs responsible for financial reports elaboration. Third, our paper sheds light on a promising avenue for future research on the impacts of preparers' CR-ability decay across aging on professional judgments required by financial reports elaboration.

The rest of this paper is organized into four sections. The next section raise hypotheses grounded on dual-process theories and cognitive aging literature. Then, we present the identification strategies in the third section and the results in the fourth. Finally, we conclude by discussing the practical and theoretical implications of our findings.

## **Hypotheses Development**

**Dual-process theories.** Dual-process theories gather evidence that human beings process information following two different modes. First, the fast, intuitive, affect-based, and autonomous Type 1. Second, the slow, reflective, conscious, and deliberative Type 2 (Epstein, 1994; Evans, 2008). To account for how Type 1 and Type 2 synchronize, we affiliate with the default-interventionist approach (Stanovich, 1999; Kahneman, 2011). According to this approach, Type 1 of processing drafts default intuitive judgments that need to be endorsed by Type 2. Type 1 is constantly ready and running in the same frequency whenever we are awake, whereas Type 2 works in a low-effort mode with only part of its capacity in use. This process is an adaptive effort saving mechanism given that Type 2 relies on taxing working memory processes to decouple complex operations and to generate hypotheses, while Type 1 works

independently of working memory (Evans & Stanovich, 2013).<sup>7</sup> Type 1 continuously generates and submits intuitions that are often sufficiently good to convince Type 2 to endorse them with little or no modification of its capacity in use. However, Type 2 is fully mobilized when an imminent error is detected or when Type 1 is not able to generate intuitions about a target judgment.

It implies that good judgment and decision-making (JDM) is likely to emerge from the balance between Type 1 and Type 2 of information processing. For instance, to apply the algorithms and the methods for basic operations taught in school, a student needs to fully activate Type 2 while learning the arithmetical tools and solving the first practice exercises. But repetitive practice tends to lead the student to master such arithmetical tools to the extent that they become available as Type 1 intuitions. It explains why young students strive to correctly apply procedures for calculations that arise effortlessly in the mind of more experienced students.

Even though Type 1 intuitions as those from basic arithmetic operations allow humans to achieve satisfactory cognitive performances at low levels of effort and time consumption, Type 1 is responsible for systematic and predictable errors. The literature on heuristics and biases documents several cases of individuals jumping into mistaken conclusions in decision-making events to which information is scarce and (or) hard to process.<sup>8</sup> The individual capacity to override these misleading conclusions arising from Type 1 heuristic processes is called cognitive reflection ability (CR-ability). To measure such ability, research has largely used the Frederick's (2005) cognitive reflection test (CRT) (Bergman, Ellingsen, Johannesson, & Svensson, 2010; West, Meserve, & Stanovich, 2012). CRT is a potent predictor of heuristics and biases

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<sup>7</sup> Engle, Tuholski, Laughlin, and Conway (1999) define working memory as a system of processes and stores used to maintain information during processing.

<sup>8</sup> See Kahneman (2011) for a comprehensive review of heuristics and biases, and Griffith, Kadous, and Young (2016) for insights on how dual-process theories relate to auditing judgment and decision-making research.

comprising three simple questions that arise automatic, effortless, and wrong first answers in mind.<sup>9</sup> But a further deliberate reasoning on CRT questions easily leads the respondent to the correct answers independently of numeracy skills (Liberali et al., 2012; Campitelli & Gerrans, 2014). Thus, the CRT score, which ranges from zero to three, assesses the individual ability to overcome the tendency of engaging in the path of least effort that causes Type 2 to endorse poor intuitive answers.

Dual-process studies applying the CR-ability measured by CRT as a right-hand variable are popular not only in psychology literature but also across several related fields, such as economics (Bergman et al. 2010), finance (Noussair, Trautmann, & van de Kuilen, 2014), and accounting (Viator et al., 2014). Still, little is known about lifespan changes in the dynamics of Type 1 and Type 2 described by dual-process theories (Peters, Hess, Västfjäll, & Auman, 2007).<sup>10</sup> To the best of our knowledge, this study is the first to investigate the effects of aging on CRT performance. Thus, to raise our hypotheses, we borrow theoretical underpinnings from the cognitive life-span development literature.

**Cognitive life-span development theories.** Cognitive aging research documents two age-related trends. First, human fluid cognitive abilities – i.e., general problem-solving and reasoning capacities also called novel processing – decline over the lifespan starting from early adulthood. Second, crystallized abilities – i.e., previously learned reasoning and knowledge acquired over experience, culture, and education – increase with age (Salthouse, 2012). Consequently, older adults are more susceptible than younger adults to base their judgments on automatic forms of

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<sup>9</sup> Please refer to the next section for the CRT questions.

<sup>10</sup> Peters et al.'s (2007) review covers “age differences in processes related to decision making that have been well studied in younger adults but little studied in older adults,” focusing on affective information processes. Peters and colleagues point out the lack of tests on whether mind functioning explained by dual-process theories varies along the life span (p. 12).

knowledge, relying more on affective and environmental cues than in complex information that requires effortful reasoning (Besedes et al., 2012; Mata & Nunes, 2010; Mata, Schooler, & Rieskamp, 2007; Queen & Hess, 2010). It suggests that individuals adapt information processing strategies as a function of age, replacing the full activation of Type 2 by experience-based Type 1 problem-solving strategies.

Heckhausen and colleagues reviewed the relevant literature and proposed a further account for such adaptation strategy named motivational theory of life-span development (MTLD) (Heckhausen, Wrosch, & Schulz, 2010). MTLD posits that humans are evolutionarily prompted to strive to control the environment (primary control) and the self (secondary control) to reach their goals. Once one of the central goals of modern society is the professional success, individuals are likely to attempt hard to master career development. But primary control (environment) is tricky in this setting since workers have limited capacity to shape careers' demands. Then, individuals tend to engage in secondary control, regulating their development to meet the job requirements needed to thrive. It entails that motivation toward professional success leads workers to shape their cognitive disposition accordingly.

Hence, while one stream of previous results suggests that aging causes people to adapt their information processing strategies toward Type 1 usage, another stream suggests that developmental goals may shield workers often required to timely activate Type 2 from this trend. Therefore, workers who are frequently exposed to tasks that intensely demand deliberate reasoning are likely to develop and maintain the capacity to accurately activate Type 2 as a mean to succeed in their jobs. Likewise, workers exposed to uniform and repetitive tasks tend to master intuitive Type 1 responses to succeed. In both cases, the development of a set of cognitive skills may come at the expense of the other.

Consistent with this notion, research has shown that working in complex and mentally demanding jobs is associated with a slower cognitive decline over age (Bosma et al., 2003; Andel et al., 2007; Potter, Helms, & Plassman, 2008; Fisher et al., 2014; Smart, Gow, & Deary, 2014). This literature investigates longitudinal datasets from large and influential studies, such as the Swedish Adoption/Twin Study of Aging (Sweden), the Health and Retirement Study (United States), and the Lothian Birth Cohort (Scotland). Although this body of research provides compelling findings, it fails to address three essential factors concerning the investigation of the relationship between job complexity and cognitive decline.

The first factor is the lack of studies on lifespan changes in CR-ability. The dearth of studies on cognitive aging applying measures of CR-ability is surprising not only because such ability has been largely used to successfully predict performance on heuristics-and-biases tasks (Oechssler et al., 2009; Hoppe & Kusterer, 2011), but also because prior studies document conflicting results on how decision-making performance evolve over aging. For instance, older adults are more likely to deviate from optimal choices as the number of alternatives increases (Besedes et al., 2012), and to perform worse on tasks such as *Applying Decision Rules* and *Resistance to Framing* (Bruine de Bruin, Parker, & Fischhoff, 2012). Conversely, older adults are better at resisting to the attraction effect of irrelevant options (Kim & Hasher, 2005) and more likely than younger adults to discontinue investments to avoid the sunk-cost bias (Strough, Mehta, Mcfall, & Schuller, 2008). Our study differs from these prior studies to the extent that, rather than assessing decision-making towards specific tasks, we assess CR-ability via CRT score, which is a powerful predictor of the general tendency to follow heuristics and biases.

In our view, the construct validity of job complexity measures constitutes the second essential factor that the existing research fails to address. Studies often rely on the categorical

coding of heterogeneous occupations to measure job complexity. That is, from self-reported items, researchers extract job complexity factors via factorial analysis; a process susceptible to measurement issues, such as scale reliability, convergent validity, and discriminant validity.<sup>11</sup>

The third factor concerns the neglect of educational background heterogeneity, as well as the potential effects of the mismatch between education and career. For instance, an engineer and a librarian may be susceptible to different cognitive decay rates depending on whether both work for a library or for a software development company. Our study bridges these gaps by capitalizing on the singularity of CPAs' occupations. As we further elaborate in the next section, this singular setting allows us both to hold individuals' educational backgrounds constant and to control for job complexity with relative precision.

**Auditors and preparers: Educational background and career development.** Accounting undergraduate courses in Brazil, as in many other countries, provide a general and uniform academic background independently of the students' intended career. Also, prospective CPAs must pass the very same CPA examination regardless of whether they seek a position as an auditor or as a preparer. In effect, prospective auditors and preparers are likely to be, on average, very similar in terms of cognitive reflection ability (CR-ability) unless if novice CPAs choose and (or) are chosen based on CR-ability. That is, one may argue that a high CR-ability CPA may self-select into audit career because such high CR-ability makes him or her inclined towards cognitively effortful activities. But it's unlikely to be the case since inclination towards effortful

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<sup>11</sup> Measurement issues are usually related to scale reliability (i.e., the proportion of variance attributable to the true score of the factor), convergent validity (i.e., the similarity between measures of theoretically related constructs), and discriminant validity (i.e., the absence of correlation between measures of unrelated constructs) (DeVellis, 2003).

cognitive activities taps into the need for cognition (NFC) construct, which presents weak correlation with the CR-ability measured via CRT as shown by Frederick (2005).

Alternatively, one may argue that audit firms' placements are the most prestigious, especially in international public accounting firms, so that the high demand for such placements is likely to drive more competitive recruiting processes and, consequentially, an imbalance between auditors and preparers new hires that may correlate with CR-abilities. However, although jobs in audit firms tend to be perceived as the most prestigious placements for CPAs in many countries, it is unlikely to be the case in Brazil for several reasons. First, Brazilian public sector jobs pay significantly higher wages than the private sector. Second, social security pension plans for retirees from public sector jobs are substantially more beneficial than those for the private sector (Souza & Medeiros, 2013). Third, Brazilian law protects public sector workers with a comprehensive job stability program (Brasil, 1990). Accordingly, Schmidt, Ott, Santos, and Fernandes (2012) present evidence that public sector jobs are by far the most attracting occupation for Brazilian accounting graduates. Moreover, Schmidt and colleagues document that placements in audit firms are not more appealing for Brazilian graduates than those in outsourcing firms and accounting departments. Data from Brazilian research institutes corroborate these findings, indicating an insignificant difference between the average income of external auditors and preparers either among new hires trainees or more senior levels.<sup>12</sup>

Ultimately, even if the recruitment processes of international public accounting firms are indeed more rigorous and create imbalances between entrant CPAs hired as auditors and entrant CPAs hired as preparers on some dimensions, the related literature suggests that the dimensions in which the imbalances are likely to emerge tend to be orthogonal to CR-ability. Namely, the

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<sup>12</sup> See <http://www.salarios.org.br/#/salariometro>, <http://www.sine.com.br/media-salarial-para-auditor>, and <http://www.sine.com.br/media-salarial-para-contador>.

findings of Campitelli and Labollita (2010) and Cokely and Kelley (2009) support Frederick's (2005) initial evidence that CRT predicts performance in decision-making tasks independently of individual differences in general knowledge. Additionally, Toplak, West, and Stanovich (2011) find that CRT predicts rational thinking performance independently of intelligence, executive functioning, and thinking dispositions. Still, the findings of Liberali et al. (2012) and Campitelli and Gerrans (2014) provide additional support for the claim that CRT assesses a unique individual disposition that is unlikely to be correlated with qualities that recruiters can assess.

Therefore, we expect that entrant auditors will not differ from entrant preparers in terms of cognitive abilities measured by CRT. Formally,

**H1.** Auditors and preparers in their early career stages do not differ in terms of cognitive reflection ability.

Although auditors and preparers follow indistinguishable educational paths in Brazil, very distinct environmental opportunities and constraints define their working lives. Specifically, auditing consists of testing whether clients' control systems are operating effectively and whether clients' financial statements are free of material misstatement. To accomplish these tests, external auditors are expected to apply professional skepticism to perform a number of judgments, such as appraising internal controls and audit risk, outlining and executing sampling plans, adjusting substantive procedures, and reporting the uncertainties (Kida, 1984; Nelson, 2009). Many of these judgments relate to unstructured and complex tasks to which few or no guideline is available (Abdolmohammadi & Wright, 1987). Furthermore, as in many other countries, audit firm rotation is mandatory in Brazil, so that listed firms (listed financial institutions) are required to shift audit firm every five (four) years (Martinez & Bassetti, 2014).

Thus, auditors' job involves shifting business models, audit risks, work settings, etc. in relatively short intervals.

Therefore, given that external auditors regularly perform complex, unstructured, and dynamic tasks, a large part of the environmental opportunities and constraints of external auditors concentrate on the frequent use of Type 2 of reasoning. As MTLD proposes, professional goals tend to lead auditors to regulate their information processing towards more frequent (than usual) deliberative Type 2 of thinking. Still, like many other decision makers, auditors default to Type 1 processes (Griffith, Kadous, & Young, 2016), but the frequent exertion of Type 2 is likely to shield auditors from aging-related adaptation towards Type 1.

In contrast, CPAs exclusively committed to preparing financial reports, i.e., preparers, tend to be subjected to a dissimilar set of environmental opportunities and constraints either working for outsourcing firms or firms' internal accounting departments. Due to the shortage of research addressing preparers typical work settings, we interviewed experienced Brazilian CPAs as a mean to make sense of the attributions, routines, selection processes, environments, and turnover rates among preparers that match our sample. The interviewees are senior BICPA supervisors for conformity with professional regulation, partners of outsourcing firms, and high-level personnel of firms' internal accounting departments. All of them were blind to our hypotheses. Additionally, we explored several online professional publications from Brazilian National Association of Accounting Outsourcing Firms.<sup>13</sup>

We learned that accounting outsourcing firms in Brazil are commonly departmentalized in human resources and related taxes, corporate taxes related to invoice issuance, and income taxes. All the three departments use to be in charge of financial statements elaboration. Labor divisions by industry-based client portfolio are usual within departments, and specialization is

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<sup>13</sup> See <http://www.fenacon.org.br/multimedia/outras-publicacoes/> to full access to these publications.

highly valued. It entails that rotation within and between departments and functions is rare. The specialization is strengthened by the fact that client firms are unlikely to rotate across outsourcing firms, so that client rotation comes almost exclusively from start-ups and discontinuing firms. Clients of outsourcing firms highly value the preservation of the professionals in charge for their firms. “We create a relationship based on trust,” said one of our interviewees. Fresh graduates and interns are the most typical new hires, and job migration between outsourcing firms is meager.

About firms’ internal accounting departments, we learned that breaking down attributions into specialized routines is common, and specialization is highly valued so that preparers usually perform the very same set of attributions for long periods. For instance, when questioned about employee rotation between functions and departments within-firm, the head of the accounting department of an industry leader company, which is large but non-listed, provided us an interesting answer. He highlighted that there is no mandatory rotation for non-listed firms in Brazil, mentioning that the very same Big-4 firm audits his employer firm at least since he was hired 30 years ago. Then, he pointed out that his subordinates are usually responsible for the same functions for decades, while auditors change constantly. According to him, it generates a disturbing necessity of regularly explaining the same things to different auditors since staff auditors change every year, and partners change at least every five years.

We also learned from the interviews that employee rotation between firms’ internal accounting departments depends on peculiarities such as economic trends, relative remuneration, and career progression opportunities. The new hires for these departments are usually former interns or experienced outsourcing firms’ and accounting departments’ alumnus. Former external

auditors are hired but to a significantly lower extent. One of the interviewees mentioned that former auditors hirings need to be endorsed by the board of directors.<sup>14</sup>

Overall, preparers' tasks in both outsourcing firms and firms' internal accounting departments strongly rest on processing accounting entries, tax planning/calculation, and documental analysis and maintenance.<sup>15</sup> Although these tasks may occasionally require Type 2 of reasoning, it seems that Type 1 is most times not only sufficient but adequate, especially because of the routine nature of the labor and of the high specialization required. Therefore, even though both preparers and auditors use both types of reasoning to perform their everyday tasks, hints from research and practice indicate a career imbalance regarding the demands for each type. In this sense, preparers are not exposed to the high demand for CR-abilities usage that is likely to armor auditors against the aging-related adaptation towards Type 1. Hence,

**H2.** Auditors in middle and senior career stages present higher CR-abilities than preparers in similar career stages.

## Methods

**Data collection and sample selection.** We collected data via a national internet-based survey applied by the Brazilian Institute of CPAs (BICPA). The BICPA agreed to embed the Frederick's (2005) CRT questions in the questionnaire that yielded the CPAs' Profile, edition 2012/13 (*Pesquisa perfil do profissional da contabilidade 2012/13*) (CFC, 2013). A total of 9,389 out of 302,697 registered CPAs replied to the questionnaire, corresponding to a response rate of 3.1%. From this initial sample, we selected 79 CPAs whose principal occupation is

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<sup>14</sup> We discuss the potential effects of these shifts ahead in the conclusion section.

<sup>15</sup> We focus our interviews on CPAs working for private sector firms. They are instructed to base their responses on CPAs exclusively in charge of preparing financial reports (preparers). As we further elaborate in the next section, our dataset allows us to filter out CPAs working for public sector institutions, as well as those in charge of consulting, planning and budgeting, project management, cost analysis, etc.

external auditing, i.e., auditors, and 875 CPAs whose principal occupation is the elaboration of financial statements, i.e., preparers, totaling 954 CPAs. Out of the 875 preparers, 511 work for outsourcing firms, and 364 work for internal accounting departments kept by firms in general.

Besides occupation, we also adopt participants' age as a criterion to select our sample because of the tricky trajectories that CPAs tend to follow during the last years of their working lives. The most threatening trajectory to our study is retirement since the general social welfare policy is mandatory for all Brazilian workers. Under such regime, workers are eligible for social security pensions for retirement after the minimum contribution time of 30 years for women and of 35 years for men (Brasil, 2009). CPAs eligible for retirement may decide on whether to retire or not based on career opportunities and other unobservable variables that may correlate with CR-ability. The threat to our study is that retired CPAs are unlikely to keep active professional license because it's costly. It implies that part of the retired CPAs didn't qualify to respond the BICPA survey because they lacked an active CPA license. Thus, considering that retirement eligibility is extremely rare for CPAs up to 48 years old, we adopt this conservative age boundary to mitigate the effects of selection.<sup>16</sup> We also drop responses from CPAs who skipped or randomly answered one or more of the central questions, such as age and gender.

**Sample description and career level specification.** Figure 1 portrays CPAs' profiles in a nested structure. External auditors in our sample hold positions varying from staff members of small audit firms to partners of international public accounting firms (IPAFs). Likewise, preparers hold positions varying from staff members of small firms to partners or high-level staff of large firms. To unfold this intricate structure, we rank CPAs' careers in three levels following the criteria

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<sup>16</sup> To retire at 48 years old, a woman (man) needs to work uninterruptedly since the age of 18 (13), what is very unlikely for all Brazilian workers, especially for those who take college courses, such as CPAs. In any case, non-reported tests adopting alternative age boundaries yield similar results.

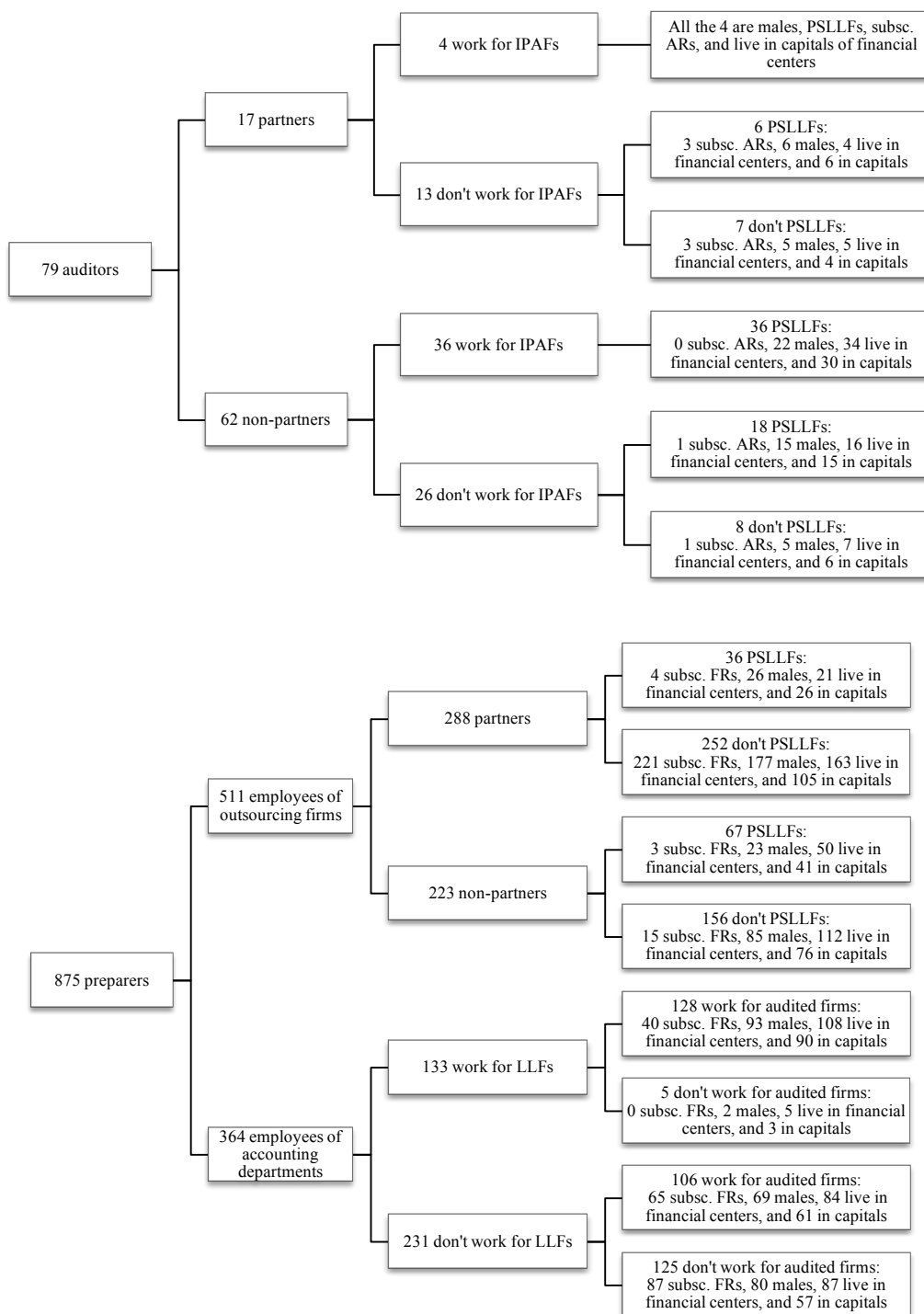
presented in Table 1. The career level covariate enables us to compare preparers and auditors who hold similarly demanding positions. Such covariate is pivotal to our analysis because we hypothesize that the distinct complexity of preparers' and auditors' jobs is the mechanism through which career moderates the relationship between aging and CR-abilities. Thus, we attenuate confoundings arising from comparisons between preparers and auditors who support imbalanced burdens.

To rank career level as described in Table 1, two of the authors independently reviewed the interviews and the theoretical underpinnings before rating in upper, middle, or lower career level each possible combination of the career-related variables in the nested structure depicted in Figure 1. In other words, both raters classified auditors' career level using a spreadsheet split into 48 combinations of the following dimensions: Partner vs. staff member, working for international public accounting firms (IPAF) vs. not, provide service to large or listed firm vs. not, subscribe audit reports (ARs) vs. not, and income level (low, middle, and high). We split preparers who work for outsourcing firms into 24 combinations in a similar spreadsheet, except for the absence of the IPAF dimension and for the replacement of the dimension subscribe ARs by financial reports (FRs). Likewise, we split preparers who work for firms' internal accounting departments into 12 combinations of the following dimensions: Employers' FRs are audited by external auditors vs. are not, subscribe FRs vs. not, and income level. Initial interrater agreement on ratings exceeded 82.1% and the Cohen's kappa, which measures the interrater agreement using random chance as the baseline, is 0.72 ( $p < 0.001$ ). The raters met to resolve the differences.<sup>17</sup>

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<sup>17</sup> The raters agreed that the career level of 15 auditors and 39 preparers are in a sort of gray zone between two of the classifications. There was agreement also on inconsistencies between income level and job information for 20 preparers. The results are identical if we change the classification chosen for gray zone cases and if we exclude participants whose income seems inconsistent.

Figure 1. CPAs' demographics by occupation.



Abbreviations: IPAFs – international public accounting firms; PSLLFs – provide service for large or listed firms; subsc. ARs – subscribe audit reports, and subsc. FRs – subscribe Financial Reports; and LLFs – large or listed firms.

Table 1. Criteria to rank Career Level for auditors and preparers.

Upper-level	Auditors: Partners of IPAFs <sup>Ω</sup> ; High-income* partners of non-IPAFs that provide service to large firms; Partners who subscribe ARs <sup>Ω</sup> of non-IPAFs that provide service to large or listed firms <sup>§</sup> ; High-income staff members of IPAFs; Staff members of IPAFs who subscribe ARs
	Preparers: High-income partners of outsourcing firms that provide service to large or listed firms; Middle-income partners of outsourcing firms that provide service to large or listed firms and subscribe FRs <sup>Ω</sup> ; High- and middle-income Employees of firms' internal accounting departments whose employers' FRs are audited by external auditors.
Middle-level	Auditors: Partners who aren't classified either as Upper-level or as Lower-level; Staff members who aren't classified either as Upper-level or as Lower-level.
	Preparers: Partners and employees of outsourcing firms who aren't classified either as Upper-level or as Lower-level; Employees of firms' accounting departments who aren't classified either as Upper-level or as Lower-level.
Lower-level	Auditors: Low-income partners of non-IPAFs who don't subscribe ARs; Low-income staff members of non-IPAFs that don't provide service to large or listed firms; Staff members of non-IPAFs that don't provide service to large firms and don't subscribe ARs; Low-income staff members of non-IPAFs that provide service to listed or large firms but don't subscribe ARs;
	Preparers: Low-income partners or employees of outsourcing firms who don't subscribe FRs; Low-income employees of outsourcing firms who don't subscribe FRs and work for firms that don't provide service to large or listed firms. Low-income employees of firms' accounting departments whose employers' FRs aren't audited by external auditors.

This table presents the criteria to rank CPAs into Career Levels. To be classified into one of the levels, the CPA needs to meet one of the requisites. The requisites are non-overlapping so that there is no professional on more than one level.

<sup>Ω</sup> Abbreviations: IPAFs – international public accounting firms, ARs – audit reports, and FRs – Financial Reports.

<sup>§</sup> The questionnaire defines large firms as in Brazilian law, i.e., total assets superior to 240 million BRL or annual revenue superior to 300 million BRL) (Brasil, 2007).

\* Income levels in USD (exchange rate as in July 2012, i.e., 1 USD = 2.29 BRL): Low-income – Less than 10,593 annually; Middle-income – Between 10,593 and 35,310 annually; High-income – More than 35,310 annually.

**Research design.** Granted, random assignment of fresh graduates to careers in a longitudinal study would be the best way to assess the moderation effects of CPAs' careers on the relationship between aging and CR-abilities. As it is impractical, our identification strategy consists in using the cross-sectional data described above to contrast preparers to auditors within

age subgroups as Green and Stuart (2014) suggest.<sup>18</sup> We split the sample using the terciles of auditors age to delimit the age subgroups *Juniors* (up to 26 years old), *Middle* (from 27 to 32 years old), and *Seniors* (from 33 to 48 years old). Within each of these age subgroups, we use matching estimators to compare preparers and auditors who are similar regarding gender, age, career level, and geographical location of the workplace.

Our rationale to use these covariate dimensions is, first, that gender (Frederick, 2005) and age (Peters et al., 2007) are relevant determinants of CR-ability. Second, the literature reviewed in the previous section suggests that CR-ability is correlated with individuals' capacity to meet careers' demands and, hence, with career achievements. Third, we take into account the environmental heterogeneity from regional (whether financial center or not) and local (whether state capital or not) dimensions since these variables tend to correlate with financial complexity and job requirements.<sup>19</sup> Therefore, our goal is to generate age subgroups in which the balance between auditors and preparers is as good as random across all these relevant variables. The matching approach allows us to achieve this balance and, in doing so, it eliminates or significantly reduces the ties between career and the control variables. It enhances causal inferences by making estimation far less dependent on modeling choices and specifications.

To match preparers to auditors, we use the Diamond and Sekhon's (2013) genetic search algorithm named Genetic Matching (GenMatch). GenMatch forwards the conventional propensity score method by eliminating the need of manual and iterative propensity score modification to maximize the balance between treatment and control groups. It is possible because GenMatch uses a search algorithm to iteratively check and improve covariate balance,

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<sup>18</sup> Green and Stuart (2014) recommend matching separately within subgroups as the best approach to estimate moderation using advanced causal methods as propensity score matching and its refinements.

<sup>19</sup> Brazil's Southeast and South stand out as the most economically developed regions, while state's capitals invariably concentrate the largest economic centers (IBGE, 2015).

determining a weight to each covariate. This process reduces the chances of a misspecified propensity score model significantly. We also use conventional propensity score techniques such as exact matching and nearest neighbor, but we only report results based on GenMatch since it provides a significantly superior balance. We check balances between auditors and preparers using the Hansen and Bowers' (2008) omnibus test, which provides a single statistic to check if treatment and control groups are statistically identical. We also conduct unreported conventional difference of means tests to double check the balances achieved.

**Dependent variable.** To assess cognitive reflection ability (CR-ability), we use the Frederick's (2005) cognitive reflection test (CRT),<sup>20</sup> which consists of the following three simple questions:

1. A bat and a ball cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Following most research applying CRT, we allow respondents to answer with any number. Correct answers, i.e., 5 cents, 5 minutes, and 47 days, respectively, add to our main dependent variable *CRT\_Score*, which varies from 0 to 3. Wrong answers are discarded, except if they fit the pattern that Frederick (2005) labels intuitive answers, i.e., 10 cents, 100 minutes, and 24 days, respectively. Thus, intuitive answers add to our secondary dependent variable *Intuitive\_Score*, which we borrow from Shenhav, Rand, and Greene (2011). *Intuitive\_Score*

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<sup>20</sup> Please refer to the *Dual-process theories* section for further information on CRT and the related research.

measures the individual tendency to follow first impulsive answers, enabling us to unravel CR-ability from the mere inattention towards an internet-based survey.

**Independent variable and covariates.** The independent variable of interest is *Career*, a categorical variable that assumes 1 if the CPA is an auditor, and 0 otherwise. We specify the covariates previously mentioned in a straightforward manner. *Age* is a quantitative variable expressed in years. *Gender* is a categorical variable that assumes 1 if the CPA is a female, and 0 otherwise. *Career\_Level* contains one binary categorical variable for each of the three levels described in Table 1. *Capital* is a categorical variable that assumes 1 if the CPA lives in one of the 27 Brazilian cities considered state capitals, and 0 otherwise. Finally, *Fin\_Center* is a categorical variable that assumes 1 if the CPA lives in the Southern or Southeastern Brazilian regions.

### **Empirical Results and Supplementary Analysis**

**Empirical results.** Table 2 reports the balance that GenMatch provides across gender, age, career level, and geographical working location. The outputs for the Hansen and Bowers' (2008) omnibus test, as well as the mere visual comparison of means, suggest that auditors and matched preparers are strongly balanced within the age subgroups. Despite such as good as random balance, we adopt the conservative approach suggested by Ho, Imai, King, and Stuart (2007) to estimate causal inferences. That is, we regress *CRT\_Score* (*Intuitive\_Score*) on *Career* controlling for the covariates used to match preparers to auditors. This approach further tests our model specification, since regressions using matched data with and without controlling for covariates provide similar results, as we expected. But given that our dependent variables are

ordinals ranked between 0 (zero) and 3 (three), we estimate the differences between preparers and auditors using Maximum Likelihood via ordered logistic estimation (ologit). Although we discuss the results for this more conservative approach, one may easily deduce OLS coefficients from the difference in means for *CRT\_Score* and *Intuitive\_Score* between auditors and matched preparers.

Our first hypothesis predicts that auditors and preparers in early career stages, i.e., *Juniors*, do not differ in terms of cognitive reflection ability (CR-ability). The descriptive statistics for *CRT\_Score* of auditors and matched preparers in *Juniors* columns of Table 2 along with ologit estimations support hypothesis 1 ( $p = 0.99$ ). The very close mean *Intuitive\_Score* for auditors and matched preparers within the *Juniors* subgroup provide additional support for hypothesis 1, and ologit estimations confirm that the means are not significantly different ( $p = 0.85$ ). Additionally, margin analysis for the *Juniors* subgroup reveals insignificant differences in the probability of getting each of the possible scores on CRT, i.e., the probabilities of scoring 0, 1, 2, and 3 are 5, 30, 34, and 31%, respectively, for both preparers and auditors.

Our second hypothesis purposes that auditors in middle and senior career stages present higher CR-ability than preparers in similar career stages because while auditors' activities promote CR-ability preservation, preparers' activities are not able to elicit similar effects. Descriptive statistics for *Middle* CPAs in Table 2 along with regression estimates supports this hypothesis. While the difference in means reaches 0.37, the ologit outputs suggest that, for CPAs in the *Middle* subgroup, an auditor is 2.16 times more likely to get a maximum CRT score than a preparer ( $p = 0.06$ ). The margin analysis indicates that the probabilities of middle-level preparers scoring 0, 1, 2, and 3 on CRT are 16, 44, 22, and 18%, respectively.

Table 2. Descriptive statistics before and after matching partitioned by career and age subgroup.

	<i>Juniors (age ≤ 26)</i>			<i>Middle (27 ≤ age ≤ 32)</i>			<i>Seniors (33 ≤ age ≤ 48)</i>		
	Auditors	Preparers	Matched Preparers	Auditors	Preparers	Matched Preparers	Auditors	Preparers	Matched Preparers
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
CRT_Score	1.92 (0.88)	1.57 (0.95)	1.85 (1.02)	1.81 (0.90)	1.47 (1.00)	1.44 (1.05)	1.83 (0.93)	1.45 (0.94)	1.35 (0.93)
Intuitive_Score	0.71 (0.81)	1.00 (0.81)	0.74 (0.73)	0.77 (0.71)	1.07 (0.91)	1.13 (0.95)	0.86 (0.95)	1.10 (0.87)	1.15 (0.86)
Gender	0.29 (0.46)	0.36 (0.48)	0.29 (0.46)	0.23 (0.43)	0.40 (0.49)	0.23 (0.42)	0.31 (0.47)	0.35 (0.48)	0.32 (0.47)
Age	24.25 (1.07)	24.57 (1.37)	24.37 (0.96)	28.92 (1.65)	29.50 (1.76)	28.95 (1.76)	39.20 (5.17)	40.12 (4.73)	38.85 (4.74)
Career level									
Upper	0.00 (0.00)	0.02 (0.15)	0.00 (0.00)	0.04 (0.20)	0.12 (0.32)	0.04 (0.19)	0.24 (0.44)	0.17 (0.38)	0.24 (0.43)
Middle	0.37 (0.49)	0.47 (0.50)	0.37 (0.49)	0.73 (0.45)	0.54 (0.50)	0.73 (0.45)	0.45 (0.51)	0.64 (0.48)	0.45 (0.50)
Lower	0.63 (0.49)	0.51 (0.50)	0.63 (0.49)	0.23 (0.43)	0.34 (0.48)	0.23 (0.42)	0.31 (0.47)	0.18 (0.39)	0.31 (0.47)
State_Capital	0.75 (0.44)	0.55 (0.50)	0.75 (0.44)	0.85 (0.37)	0.53 (0.50)	0.85 (0.36)	0.86 (0.35)	0.51 (0.50)	0.86 (0.35)
Fin_Center	0.92 (0.28)	0.61 (0.49)	0.92 (0.28)	0.85 (0.37)	0.70 (0.46)	0.85 (0.36)	0.90 (0.31)	0.76 (0.43)	0.90 (0.31)
H&B (2008)	-	$\chi^2 = 16.3$ p < 0.05	$\chi^2 = 0.03$ p = 0.999	-	$\chi^2 = 22.7$ p < 0.001	$\chi^2 = 0.003$ p = 0.999	-	$\chi^2 = 23.2$ p < .001	$\chi^2 = 0.16$ p = 0.999
n	24	123	46	26	260	84	29	492	94

This table presents means and standard deviations for dependent variables and covariates partitioned by age subgroups, *Juniors*, *Middle*, and *Seniors*, and by career. Within each age subgroup, we present descriptive statistics for auditors and preparers. The columns *Preparers* report information for all preparers by age subgroup, while the columns *Matched preparers* report information for stratified preparers. The dependent variable *CRT\_Score* (*Intuitive\_Score*) is defined as the sum of correct (intuitive) answers for CRT. The covariates *Gender*, *State\_Capital*, and *Fin\_Center* are categorical variables indicating CPAs' sex, whether CPAs' work location is a capital of a Brazilian state, and whether CPAs' work location is in one of the Brazilian financial centers in Southern or Southeastern regions. *Age* is a quantitative variable expressing CPAs' age in years. Career level contains one categorical variable for each of the three levels described in Table 1. The Table reports the statistics for the Hansen and Bowers' (2008) (H&B (2008)) omnibus test, which checks the balance between auditors and preparers within each age subgroup is means. H&B (2008) provides a single statistic to check the balance between auditors and preparers before and after matching. The null hypothesis is that groups are equal concerning all covariates taken together.

These probabilities move to 8, 33, 27, and 32%, respectively, when looking at middle-level auditors. The analysis of *Intuitive\_Score* for middle-level CPAs also corroborate hypothesis 2, since the mean *Intuitive\_Score* is 0.36 higher for preparers, and this difference is marginally significant ( $p = 0.08$ ).

The results for senior-level CPAs provide additional support for Hypothesis 2, as suggests the large difference in *CRT\_Score* means between auditors and matched preparers reported in Table 2 for *Seniors*, i.e., 0.48. The ologit estimates indicate that a senior auditor is 3.2 times more likely to get a maximum CRT score than a senior preparer ( $p < 0.01$ ). Besides, the probabilities of senior preparers scoring 0, 1, 2, and 3 on CRT are 15, 48, 27, and 10%, respectively. The probabilities for senior auditors are respectively 5, 30, 39, and 26%. The results for *Intuitive\_Score* extend the support for hypothesis 2, since the mean score for preparers is 0.29 higher than the mean score for auditors, and this difference is marginally significant ( $p = 0.08$ ).

**Supplementary analysis.** The use of quasi-experimental contrasts to ground the claim on dissimilar CR-ability preservation over aging as a function of accounting career is susceptible to reasoned criticisms. Although we acknowledge that our study has several limitations, in this section we elucidate the methodological choices that we face and present further evidence supporting our findings. Concerning the methodological choices, one may argue that the moderated regression approach using the moderator *Career\*Age* would provide more compelling results at lower sophistication costs. We see two reasons to refute this argument. The first is that the moderated regression approach would imply the assumption that CR-ability develops linearly across aging, what we consider unlikely to be the case since existing research suggests that environmental opportunities and constraints shape CR-ability. Particularly, occupying leadership

positions is usually both more complex and more cognitively demanding, and such positions are more likely at more senior levels. Thus, given that senior CPAs are likely to occupy leadership positions, we expect a noisy development of CR-ability across aging. It conceivably drives not only a violation of the regression linearity assumption but also heterogeneous ties across aging between the independent variable of interest career and covariates such career level. Our approach significantly alleviates such concerns.

Our second reason to refute the argument supporting the moderated regression approach is that it would be hard to convince the readers, and even ourselves, that we picked the right model specification rather than the model specification that fits our hypotheses. This potential model dependence leads us to opt for matching, which is consensually the best approach for such circumstances (Ho et al., 2007; Morgan & Winship, 2007). The preprocessing procedure described in the Methods section allows us to break the link between *Career* and the covariates *Gender*, *Age*, *Career level*, *Capital*, and *Fin\_Center*. As a result, our parametric estimates are far less dependent on modeling and specification.

Still, one may argue that we picked a convenient set of variables to match our sample, and that, in doing so, we simply transfer the dependence from one sort of specification to another. To rule out this argument, we run several alternative specifications besides the one reported in the previous section, which we consider the most in line with our theory. Table 3 describes three of the alternative matching specifications to which our results are robust. All the alternative specifications provide similar results independent of the matching approach (GenMatch, propensity score via nearest neighbor, and propensity score via exact matching). The results are also robust to alternative age delimiters to data selection, and age subgroups boundaries.

Table 3. Alternative matching specifications.

		$Career = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 SimpCareerLevel_i + \beta_4 SateCapital_i + \beta_5 FinCenter_i + \varepsilon_i$
<b>Alternative A</b>	Simplified Career level:	<p>Upper-level auditors:</p> <p>Partners of audit firms who subscribe ARs, except low-income auditors; Partners of audit firms who have an annual income higher than USD 17,655.</p> <p>Upper-level preparers:</p> <p>Partners of outsourcing firms who subscribe FRs and have an annual income higher than USD 17,655; Employees of accounting departments of large and audited firms who subscribe FRs and have annual income higher than USD 17,655.</p> <p>Middle-level CPAs (auditors and preparers): CPAs who aren't classified either as Upper-level or as Lower-level.</p> <p>Lower-level CPAs (auditors and preparers): Low-income (annual income less than USD 10,593).</p>
	Simplified Career Level	
		$Career = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 OversimpCareerLev_i + \beta_4 SateCapital_i + \beta_5 FinCenter_i + \varepsilon_i$
<b>Alternative B</b>	Oversimplified Career level:	<p>Upper-level auditors:</p> <p>Subscribe ARs and provide service for large firms, except low-income CPAs.</p> <p>Upper-level preparers:</p> <p>Subscribe FRs and provide service for large and audited firms, except low-income CPAs.</p> <p>Middle-level CPAs (auditors and preparers): CPAs who aren't classified either as Upper-level or as Lower-level.</p> <p>Lower-level CPAs (auditors and preparers): Low-income (annual income less than USD 17,655).</p>
	Oversimplified Career Level	
		$Career = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Income_i + \beta_4 Subsc_i + \beta_5 SateCapital_i + \beta_6 FinCenter_i + \varepsilon_i$
<b>Alternative C</b>	Income comprises four sequential categorical variables, one for each of the following annual income ranges *:	<ol style="list-style-type: none"> <li>1. Until 10,593;</li> <li>2. 10,593 – 17,655;</li> <li>3. 17,655 – 35,310;</li> <li>4. More than 35,310.</li> </ol>
	Income + Subscribe	<p>Subscribe (<i>Subsc</i>) is a categorical variable that assumes 1 if the CPA subscribes the Financial (Audit) Report, 0 otherwise.</p>

This Table presents the alternative matching specifications that we used to estimate the moderation effect of career on the relationship between aging and cognitive reflection ability. All the specifications provide similar results. The covariates *Gender*, *StateCapital*, and *FinCenter* are categorical variables indicating CPAs' sex, whether CPAs' work location is a capital of a Brazilian state, and whether CPAs' work location is in one of the Brazilian financial centers in Southern or Southeastern regions. *Age* is a quantitative variable expressing CPAs' age in years. Career is a categorical variable that assumes 1 if the CPA is an auditor, 0 if the CPA is a preparer.

\* Income ranges are expressed in USD (exchange rate as in July 2012, i.e., 1 USD = 2.29 BRL).

Another potential criticism that we are subject to regards the fact that the *Junior* age subgroup has a lower number of preparers than the other two age subgroups. From this, one may argue that, in the *Juniors* age subgroup, the absence of statistically significant difference between auditors and matched preparers is driven by the low statistical power rather than by the

hypothesized reasons. To alleviate such concern, we raise the superior age boundary to 27 years old, obtaining similar results to a sample of 30 auditors and 67 preparers matched out of 168 preparers in this age subgroup. In a further test, we raise the superior age boundary to 29 years old for the *Juniors* age subgroup but only for preparers. We still find no differences in CR-ability of junior preparers and auditors by matching 165 preparers, out of 232, to the 24 auditors originally in the *Juniors* subgroup. To run the latter analysis, we waive the *Age* variable from the matching estimator, but estimate the ologit model including *Age* and all other covariates to estimate the difference between auditors and preparers in terms of CR-ability.

## Discussion and Conclusions

Sanitation, medicine, and other modern advancements have significantly extended human life span, but the additional lifetime granted by these improvements are of little or no value if old adults are not able to maintain strong decision-making abilities until the very end of life. Concurrently, the trend towards smaller and geographically dispersed families along with the increasingly complex contemporary societies substantially raise the demands for old adults' ability to perform good decision-making. In this paper, we present evidence that CR-ability, which is a powerful predictor of good decision-making, declines with age since the early adulthood; however, working in a complex and mentally demanding job such as auditing mitigates such CR-ability decline trend.

Our findings suggest that aging leads individuals to adapt information processing strategies towards the prevalence of Type 1 experience-based automatic reasoning in detriment of Type 2 deliberate processes. Such findings help us to reconcile the conflicting results from studies addressing differences in decision-making performance between younger and older

adults. For instance, our results provide a further explanation for Besedes' et al. (2012) findings. They find that older adults are more likely than younger adults to deviate from optimal choices as the increasing number of alternatives hampers decision-making. A plausible mechanism is that Type 1 prevalence leads older adults to weigh heavier the dimensions that pop up first in mind, neglecting important dimensions to a balanced decision-making. In contrast, younger adults are more likely to rely on mindful consideration of all the available dimensions, following a Type 2 process intensive in working memory usage. A similar explanation seems to apply to the findings of Bruine de Bruin et al. (2012).

Interestingly, Type 1 prevalence at advanced ages seems also to explain older adults' superior performance. For instance, Strough et al. (2008) suggest that older adults' positivity leads them to avoid the sunk-cost bias to a larger extent than younger adults, who often present more negative views. In turn, Peters et al. (2007) presume that old adults' positivity is explained by an age-related inclination towards Type 1, which leads older adults to excessively rely on affect-based reasoning. Our results strengthen Peters and colleagues' view since we present evidence that individuals adapt information processing strategies in favor of Type 1 as they age. Consistently, evidence from Kim and Hasher (2005) corroborate the notion that older adults' decision-making tends to outperform younger adults' whenever Type 1 experience-based reasoning is the best approach to the task.

Reconciling these findings was possible because, to the best of our knowledge, our study is the first to investigate lifespan changes in CR-ability. But our contribution extends beyond that. An important contribution of our study emerges from our quasi-experimental approach that contrasts cross-sectional CR-ability assessments from auditors and preparers across age subgroups. It allows us not only to rule out the measurement concerns arising from longitudinal

measures of CR-ability but also to lessen issues related to the construct validity of job complexity measures. Regarding the former, participants periodically answering CRT or similarly tricky questions would probably trigger response biases driven by participants' guesses on researchers' interests. About the latter, previous studies often rely on self-reported assessments of job complexity from active and retired workers from a myriad of heterogeneous occupations. It possibly hinders the extraction of a reliable factor for the job complexity construct. We alleviate such concern by comparing workers from a single complex job related to financial reports to peers from a single less complex job related to the very same matter.

This counterfactual approach represents another differential of our research. Previous research addressing the beneficial effects of job complexity on cognitive aging mostly relies on longitudinal assessments of workers to whom there is no information on how career match to educational backgrounds. It may introduce biases since there is no evidence on whether cognitive decline is orthogonal to the match between background and career. For instance, an engineer assigned to a relatively simple job such as cataloging and maintaining a large variety of engineering related files may be subject to a rate of cognitive decline that differs significantly from the rate of a librarian performing the very same task. Our design allows us to compare individuals who not only hold indistinguishable backgrounds but also perform jobs focused on the very same matter, i.e., financial reports. Still, we go further by comparing auditors and preparers within compatible jobs in terms of career level and geographical location. Such strategy allows us an uncommon balance between treatment (auditors) and control (preparers) groups.

A further contribution to the cognitive aging literature relies on the fact that our findings provide additional support for the differential preservation hypothesis. That is, research has cast

doubt on whether mental activity during earlier life leads to higher levels of cognitive functioning all over life (preserved differentiation), or current mental activity also plays a role in determining cognitive functioning preservation (differential preservation) (Salthouse, 2006; Salthouse, Berish, & Miles, 2002). Our results suggest that CR-ability development over early adulthood is a function of job current environmental opportunities and constraints, meaning that cognitive decay starts from the late twenties for those who don't keep constant mental exertion independently of the preceding requirement levels.

Finally, our findings are also in the interest of the accounting profession once we present evidence that older preparers are susceptible to all sort of biases arising from excessive reliance upon Type 1. Consistently, Farrell, Goh, and White (2014) and Viator et al. (2014) present evidence that proper Type 2 activation is consequential for accounting related decision-making. Taken together these findings strengthen the emphasis on continuing professional education. Specifically, our findings suggest that professional education programs should focus on CR-abilities maintenance and enhancement with a particular concentration on CPAs responsible for financial reports elaboration. Future accounting research may play a crucial role by mapping the impacts of preparers' CR-ability decay over aging on financial reporting judgment and decision-making. Results in this field would contribute not only to shape specific training programs but also to provide auditors and users of financial reports a guidance on the potential consequences of low CR-ability on financial statements. This research is especially timely given the recent global move towards more principle-based accounting standards, according to which professional judgment and decision-making are crucial (Agoglia, Douppnik, & Tsakumis, 2011).

In spite of these contributions, our paper is subject to limitations that go beyond the innate constraints of every quasi-experimental research design. For instance, our dataset lacks

detail-rich information on CPAs' experience. It forces us to assume that there is no imbalance between preparers and auditors in terms of the age at which they first start in the respective career and, also, that there are insignificant moves between the careers of interest. We alleviate the former concern by matching preparers to auditors on several different specifications of career level, implying that eventual late entrants to one career are likely to be compared with late entrants to the other. The latter concern seems trickier since excessive moves between careers would introduce noise in our analyses and, in the worst case, drive our results if low CR-ability CPAs end up fired from audit firms and hired by outsourcing firms or firms' internal accounting departments. However, our interviewees gave us a sense that such moves are very scarce in both directions. Besides, CR-ability theory reviewed in the second section of this paper in tandem with the support for Hypothesis 1 informs us that human resources policies are unlikely to be correlated with CPAs' CR-abilities.

## **Chapter 4: Do Professional Judgments Impact Financial Reports Comparability under IFRS? The Effects of Cognitive Ability and Work Experience**

### **Introduction**

Endorsed by research evidence, supporters of International Financial Reporting Standards (IFRS) argue that besides adding to cross-country comparability (IASB 2006), IFRS enhance financial information relevance (Barth, Landsman, & Lang, 2008; ICAS 2010) and inhibit transaction structuring (AAA FASB 2003; Ewert & Wagenhofer, 2005; Nelson, Elliott, & Tarpley 2002). Enthusiasts of more principles-based (in opposition to rules-based) accounting standards attribute these IFRS advantages to its emphasis on the underlying economics and the business models of reporting entities at the expense of rigid formats. However, standard setters and accounting scholars advert that the resulting need for judgment to apply vague commands may damage financial reports' comparability, rising extraction costs (FASB, 2002; Schipper, 2003; Nelson, 2003; Nobes, 2005). Despite multiple warnings in this respect, little is known about the underlying factors driving the judgments required by more principle-based accounting standards, and whether these factors cause incomparable financial statements.

In this paper, we examine the influence of stable individual differences on how certified professional accountants (CPAs) perform two relevant judgments, namely, the classification at recognition of audiovisual content (AV-content) assets produced by entities whose principal revenue-producing activities are exhibiting the AV-content and negotiating the exhibition rights, and the classification of the cash flows from the sales of such assets. We focus on the financial statements presentation of assets and cash flows arising from AV-content because these are items to which IFRS provide overlapping and imprecise guidance. Specifically, AV-content assets usually meet the requirements of two different classifications under IFRS. First, they meet the

criteria of International Accounting Standard 38 – *Intangible Assets* (IAS 38) for classification as intangible assets, i.e., identifiable non-monetary items that lack physical substance. Second, they meet the criteria of International Accounting Standard 2 – *Inventories* (IAS 2) for classification as inventories, i.e., items held for sale in the ordinary course of business. Additionally, since negotiating AV-content exhibition rights constitutes the entities' principal revenue-producing activity, the related cash flows meet the criteria of the International Accounting Standard 7 – *Statement of Cash Flows* (IAS 7) to classify as from operating activities. But IAS 7 also provides a more clear-cut guidance based on the cohesiveness with the asset classification, implying that CPAs may classify these cash flows as from investing activities (IASB, 2016c; IASB, 2016d; IASB, 2016e).

We assume that a CPA faced with such overlapping guidance must engage in a deep reflective reasoning to integrate all the alternative classifications into a reasonable representation of the economic reality. That is, to overcome the tendency to jump into the immediate classification that pops up in mind, we predict that one needs to immerse in conscious deliberation on all possible options. For this reason, cognitive reflection ability (CR-ability) is likely to constitute a relevant determinant of the classification of ill-defined assets and cash flows such as those arising from AV-content. CR-ability is a powerful predictor of judgment and decision-making (JDM) that relates to the tendency of performing informed, slow, and deliberate reasoning that leads to holistic answers even when attractive, shallow, and fast answers are readily available (Epstein, 1994; Evans 2008).

Consistent with this notion, we predict and find that low CR-ability CPAs are relatively more likely to jump into the first classifications for AV-content assets that pop up in their minds even when definitions for both possible classifications are readily available. In contrast, high

CR-ability CPAs are relatively more likely to surmount the first impulsive answer, weighing the two possible asset classifications, intangible and inventories, equally in an expression of uncertainty towards the overlapping guidance. Likewise, we predict and find that low CR-ability CPAs are relatively more likely to comply with the bright line guidance of IAS 7 to classify the cash flows from the sale of AV-content assets. In other words, low CR-ability CPAs tend to bypass the information that the sale of exhibition rights constitutes the entity's principal revenue-producing activity, classifying AV-content cash flows as from operating (investing) activities whenever they classify the associated asset as inventory (intangible) because it fits the clear-cut instruction of IAS 7. In turn, high CR-ability CPAs tend to holistically evaluate the circumstance, pondering the information on the entity's main operational activities. This integrated reasoning leads them to classify the cash flows from the sale of AV-related assets as from the operating activities irrespective of the uncertainty towards the assets classification.

Additionally, we investigate the effects of CPAs' professional experience in pressured firms (PEPF) on AV-content assets and cash flows classifications. We hypothesize and find that CPAs who hold professional experience in firms that are subject to high external pressure around financial reports are more likely to similarly weight the two possible classifications for AV-content assets than CPAs who don't hold experience in such pressured firms. We conjecture that high burden on financial reporting matters drives pressured firms' CPAs to engage in deep reflective reasoning when facing tasks such as the classification of vaguely defined assets. We rely on *demand hypothesis* (Hope, Thomas, & Vyas, 2013) and on *opportunistic behavior hypothesis* (Graham, Harvey, & Rajgopal 2005) to argue that CPAs working for pressured firms are pushed either to provide high-quality financial reports or to manipulate financial information. In both cases, CPAs need to carefully reason about financial reports decisions. Thus, professional

experiences in pressured firms tend to lead CPAs to confront tasks requiring decision-making on financial reporting as a prompt to activate the reflective mode of reasoning. Even though we predict PEPF to be equally informative to the classification of the cash flows from the sale of AV-content exhibition rights, we don't find evidence that CPAs who lack PEPF are more likely to jump into the clear-cut cohesive guidance provided by IAS 7.

To test these predictions, we use data collected by the Brazilian Institute of CPAs (BICPA) through a national survey.<sup>21</sup> Among the demographic questions in the internet-based survey, we embedded our assets and cash flows classifications task. The task consists in expressing the level of agreement, in six-point Likert scale items, with the classification of AV-content assets as inventories, as property, plant, and equipment (PPE), and as intangible. In a similar fashion, follow-up questions ask the participants to express their level of agreement with the classification of the associated cash flows as from the operating, investing, and financing activities. We provide participants with summarized IFRS guidance on the task topics. We also embedded the cognitive reflection test (CRT) in the BICPA survey. CRT is a performance-based three-question test that allows a simple and effective measure of CR-ability (Toplak, West, & Stanovich, 2014). The CRT score, i.e., the sum of correct answers, is a potent predictor of decision-making (Oechssler, Roider, & Schmitz, 2009; Hoppe & Kusterer, 2011) that varies irrespectively of intelligence (Toplak, West, & Stanovich, 2011; Liberali et al., 2012; Campitelli & Gerrans, 2014). Our data consists of responses from 331 CPAs, of which 41 are external auditors and 290 are preparers, i.e., CPAs exclusively committed to financial reports elaboration within firms' internal accounting departments (122 CPAs), or within accounting outsourcing firms (168 CPAs).

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<sup>21</sup> The Brazilian Institute of CPAs (*Conselho Federal de Contabilidade – CFC*) is a federal agency whose goal is to guide, regulate, and supervise the practice of the accounting profession in Brazil.

The results suggest that both CR-ability and PEPF influence how CPAs classify assets and cash flows arising from economic events to which accounting standards provide overlapping guidance, such as AV-content. Also, PEPF curbs differential judgments driven by CR-ability imbalances by leading CPAs to cue financial reporting environment as a red flag for deliberative reasoning usage. Moreover, low CR-ability CPAs differ significantly from other CPAs when classifying AV-content cash flows under IFRS, but only low CR-ability CPAs who lack PEPF differ when classifying AV-content assets under IFRS. These findings are of interest to academics, practitioners, regulators, and standard-setters, since our study responds to a call for research looking at the impacts of professional judgment on assets and cash flows recognition and, ultimately, on financial reports comparability. For instance, FASB (2002) expresses its regulatory apprehension in the sense that a principles-based approach “could lead to situations in which professional judgments, made in good faith, result in different interpretations of similar transactions and events, raising concerns about comparability.” Accounting scholars raise similar concerns, e.g., Schipper (2003), Nelson (2003), and Nobes (2005).

This paper also sheds light on one of the topics outlined by the IASB’s discussion paper entitled *Preliminary Views on Financial Statement Presentation* (IASB, 2008), which is part of a joint project with the FASB. Particularly, the IASB’s (2008) topic to which our finds relate addresses the difficulty to map transactions into the same classification across financial statements. Our results suggest that CPAs rely on CR-ability to overcome the impulsive tendency to neglect entity’s principal revenue-producing activity when classifying cash flows from the sale of AV-content exhibition rights. That is, low CR-ability CPAs are more likely to classify AV-content cash flows cohesively with the classification attributed to the respective asset, i.e., operating activities matching inventories and investing activities matching intangible. On the

other hand, high CR-ability CPAs are more likely to classify AV-content cash flows as from operating activity consistently with the notion that the sale of exhibition rights constitutes the entity's main operational activity irrespective of the uncertainties surrounding the assets classification.

Finally, our findings are informative to the standard-setting efforts for consistent financial reporting quality across public and private firms, as well as across large-, medium-, and small-sized entities. We compare CPAs who share similar educational backgrounds but differ in terms of professional experience in public, large, and audited firms. Our results provide evidence of distinct decision-making patterns between CPAs who hold PEPF and those who don't. That is, while the latter group relies on CR-ability to process financial reporting judgments required by more principles-based accounting standards, the former seems to use financial reporting subjects as a cue for deliberative reasoning. These results suggest that IFRS training materials such as those intended for Small and Medium-sized Entities (SMEs) should focus on fostering decision-making cues to help SMEs' CPAs to identify instances in which IFRS provide vague coverage to economic events. Additional training addressing these circumstances would be helpful towards reaching the global comparability goal stated by IFRS Foundation (2013).<sup>22</sup>

The remainder of this paper presents the theoretical background for our hypotheses in the next section, our methodological approach in the third section, and the results of our empirical analyses in the fourth section. We conclude with a brief discussion of our findings and avenues for future research.

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<sup>22</sup> See <http://www.ifrs.org/IFRS-for-SMEs/Pages/Training-Modules.aspx> for further information.

## Hypotheses Development

**Principles-oriented accounting standards and imprecise guidance.** The increasing dynamism and competitiveness of the current business context require firms to continuously innovate not only towards flawless operational processes to manufacture and sell their products and services but also towards optimal financial engineering to make these activities increasingly profitable (Ball, 2006). This differentiation-seeking model creates an additional challenge since firms need to faithfully communicate their financial positions via general-purpose financial statements whose formats are set by overarching accounting standards. Paradoxically, such overarching nature of the accounting standards is intended to break the differentiation-related complexity by fitting similar economic events into the same accounts and dissimilar economic events into distinct accounts. It aims to reduce extraction costs and, then, improve capital allocation by ensuring both between-firm comparability and within-firm consistency. However, the rapid economic shifts that mark the current differentiation-seeking society seem to impair the standard-setters' ability to cover the spectrum of economic events with encompassing accounting standards.

When addressing these standard-setters' challenges, scholars and professionals have focused on the ideal point in the fictitious continuum between principles- and rules-only guidance to optimize accounting information usefulness (AAA FASC, 2003; Nelson, 2003; Schipper, 2003). But although the literature locates IFRS closer to the principles-only extreme than US GAAP, both accounting standards are principles-based filled with exception rules, and the constituents of both standards-setters, IASB and FASB, pressure for bright-line rules on vaguely covered items. The central differences are that FASB has been historically more responsive to such pressures than IASB (Taub, 2014), and IASB has had significantly less time

to accrete rules (Nelson, 2003). Thus, even though the SEC report issued in July 2003 (SEC, 2003) signals a move towards a more principles-oriented standard-setting activity, US GAAP still carries a set of detailed rules as a heritage.

The case of audiovisual content (AV-content) produced by entities that negotiate the related exhibition rights as their principal revenue-producing activities illustrates the IFRS and US GAAP locations on the continuum between principles- and rules-only standards. While IFRS adopters are required to use judgment to decide on the overlapping guidance provided by IAS 2, IAS 38, and IAS 7 to classify assets and cash flows arising from AV-content, US GAAP adopters comply with the specific guidance provided by the SOP 00-2 (AICPA, 2000). Anecdotal evidence from firms in this industry suggests that such unbalanced amount of guidance is consequential. Among IFRS adopters, *BBC* (United Kingdom) classifies the costs incurred with AV-content as inventories within current assets, whereas *Rai* (Italy) classifies similar costs as intangible assets (non-current asset). Still, *Globo* (Brazil) and *Vivendi* (France) split similar costs between current and non-current assets with no mention to the classification attributed to these items at the recognition, i.e., whether intangible or inventories. Interestingly, *BBC* “writes off” such costs on the first transmission, *Rai* “amortizes” these costs over the period of their estimated useful life if they are repeated-use shows (e.g. TV drama and Rai Cinema) or over a single year if they are one-time-use shows (e.g., sports events), *Vivendi* “expenses” over AV-contents broadcasting period, and *Globo* “amortizes” when the shows are exhibited. In contrast, *Comcast* and *Time Warner* (USA) recognize similar costs as non-current assets apart from intangible assets and “amortize” the capitalized costs based on the proportion of the estimated cash flows (*Comcast*) or revenue (*Time Warner*) that has been realized. Despite the many criteria to account for AV-content assets, the six analyzed companies recognize the related

revenue in the first line of the income statement and the cash flows from the sale of exhibition rights as from operating activities.<sup>23</sup>

This analysis suggests that the overlapping guidance provided by IFRS on AV-content indeed rises extraction costs. For instance, a user of accounting information interested in one or any subgroup of the four firms (*BBC*, *Rai*, *Globo*, and *Vivendi*) would probably spend a significant amount of time to grasp (if so) the accounting treatment for (and the underlying economics of) the company's primary operational activities.

Penno (2008, 345) provides an account for decision-making under circumstances such as those faced by BBC's, Rai's, Globo's, and Vivendi's CPAs. Notably, IAS 2 and IAS 38 specify two different sets of properties to define inventories and intangible assets, respectively, but AV-content matches properties from both sets. Penno suggests that such overlap may lead CPAs to list members of each category as a mean to identify the category with the highest number of members resembling AV-content. However, items resembling AV-content, such as software whose rights of downloading and updating are commercialized, also fall into the overlap between inventories and intangible assets. Thus, given the hurdle to apply the solution suggested by Penno, we assume that CPAs confronted with such circumstances are likely to exert judgment to pick the classification that best describes the essence of the transactions that they purport to represent in financial statements. In the next section, we explore how CR-ability is likely to inform the overlap between IAS 2 and IAS 38 in the particular case of assets and cash flows arising from AV-content.

**Judgments on audiovisual content and cognitive reflection abilities.** AV-content produced by entities that negotiate the related exhibition rights as their principal revenue-producing activities

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<sup>23</sup> Peculiarly, *Rai* classifies cash outflows related to AV-content costs as investing activities.

meet the requirements for both classifications under IFRS inventories and intangible. First, because the license rights to exhibit the produced films are held for sale in the ordinary course of business, AV-content meets the criteria of IAS 2 for recognition as inventories (IASB, 2016d). Second, because AV-content assets are identifiable non-monetary items without physical substance, they meet the criteria of IAS 38 for recognition as intangible assets (IASB, 2016c). Interestingly, even though IAS 38 excludes “intangible assets held by an entity for sale in the ordinary course of business” from its scope (see paragraph 3a), the very same IAS 38 lists “motion picture films” as an example of intangible asset (see paragraph 9). Such illustration seems plausible since the ordinary activities of most AV-content producers (if not all) involve both the exhibition of internally generated films (intangible-like asset) and the sale of exhibition rights (inventory-like asset).

For this reason, we argue that a rational and informed decision on the classification of AV-content under the above circumstances must weigh the guidance of both IAS 2 and IAS 38. However, research has shown that human decision-making systematically deviates from rational choice and that frequently the cause of such deviations dwells on information processing issues (Simon, 1955; Kahneman, 2011). In the case of AV-content, the decision maker’s information processing is likely to stick to the classification that pops up in mind rapidly and effortlessly, i.e., the classification that is easier to recollect due to familiarity, saliency, or recency. Decision-makers need to engage in a further reasoning while approaching AV-content to realize that an alternative classification also fits the case. Thus, AV-content classification is likely to hinge on CPAs’ ability to overcome immediate attractive answers that are often wrong to immerse in a more labored sort of thinking. Psychology research usually designates this ability cognitive reflection ability (CR-ability).

CR-ability consists in the individual capacity to properly use Type 1 and Type 2 of reasoning. Type 1 provides fast, intuitive, and autonomous thoughts that fit circumstances in which responses acquired over experience are adequate. In turn, Type 2 provides slow, reflective, and conscious reasoning useful when individuals lack experience and when an intuitive response is identified as a poor one (Epstein, 1994; Evans, 2008). Type 1 works in tandem with Type 2 following what psychology research calls default-interventionist model of information processing (Stanovich, 1999; Kahneman, 2011). It entails that Type 1 of processing is continually generating intuitive judgments while we are awake and Type 2 needs to endorse these intuitive judgments. But Type 2 works in a low-effort mode with only part of its capacity in use. If Type 1 generates a convincing intuition, Type 2 endorses it with little or no modification of its capacity in use. However, Type 2 is fully mobilized when an imminent error is identified or when Type 1 is not able to generate intuitions about a specific judgment. This process reflects an adaptive energy-saving mechanism since Type 2 relies on taxing working memory, while Type 1 works independently of working memory (Evans & Stanovich, 2013). Although in several instances Type 1 intuitions enable good decision-making at low levels of effort and time consumption, systematic errors emerge from individuals who waive the full activation of Type 2 to engage in the rule of least effort, jumping into conclusions even when facing situations of scarce or hard-to-process information. In this paper, we refer as low CR-ability CPAs the CPAs who are prone to engage in such path of least effort and as high CR-ability CPAs the CPAs who are prone to avoid this misleading course of action.

In the specific context of AV-content classification at recognition, we expect that low CR-ability CPAs will rely on Type 1 of reasoning to jump into the first option that arises in their minds for AV-content in an expression of certainty towards one of the possible classifications. In

contrast, high CR-ability CPAs will engage in reflective Type 2 of reasoning that leads them to similarly weigh the two possible classifications in an expression of uncertainty towards the task.

Formally,

**H1a.** Low CR-ability CPAs will express higher certainty to classify assets arising from AV-content into one of the possible classifications than high CR-ability CPAs.

The overlapping guidance provided by IFRS for the classification of assets stemming from AV-content also implies imprecise guidance for the classification of the cash flows from the sale of such AV-content exhibition rights. Specifically, IAS 7 establishes that “cash flows from operating activities are primarily derived from the principal revenue-producing activities of the entity,” pointing out the “cash receipts from the sale of goods” as an example of such cash flows (paragraph 14). Similarly, IAS 7 defines “disposal of long-term assets” as cash flows from investing activities, indicating cash receipts from sales of intangible assets as an example of cash flows from investing activities (IASB, 2016e). Thus, classifying cash flows from the sale of exhibition rights as from the operating activities represents the rational choice, irrespective of the asset classification, because the principal revenue-producing activities of the firms in the scope of our study are the production and negotiation of AV-content exhibition rights.

However, low CR-ability CPAs are likely to follow the effortless Type 1 answer that shows up in their minds, which we predict to be the classification that matches the associated asset. That is, low CR-ability CPAs that classified AV-content assets as inventories (intangible assets) are relatively more likely to classify the cash flows from the sale of the related exhibition rights as from the operating (investing) activities. We conjecture that it occurs because the matching between the assets originating the cash flows and the IAS 7 examples lists tends to be firstly and easily processed in mind, whereas the information on the principal revenue-producing

activities tends to require a higher order thinking. In contrast, high CR-ability CPAs are likely to override the immediate cohesive Type 1 answer by engaging in a thorough Type 2 of thinking that leads them to reason that the sale of AV-content exhibition rights constitutes the entity's principal revenue-producing activities. Therefore,

**H1b.** Low CR-ability CPAs are more likely to classify the cash flows from the sale of AV-content exhibition rights in a cohesive manner than high CR-ability CPAs.

**Experience in pressured firms and cognitive effort.** Accounting research documents two conflicting sets of arguments suggesting that either public or private firms have greater incentives to enhance financial reporting quality. On the one hand, the *demand hypothesis* predicts that public firms have higher incentives to provide high-quality accounting information because public firms experience relative greater pressure from high ownership dispersion and high ownership-management segregation (Hope et al., 2013). Consistently, similar pressure for high-quality information is likely to emerge from the intensive monitoring to which large (Hribar & Nichols, 2007) and audited (Becker, DeFond, Jambalvo, & Subramanyam, 1998) firms are subject. An additional reason for the imbalanced pressure for information is that the central goal of private firms' accounting systems consists of meeting tax reporting conformity since their major capital providers often have unrestricted access to corporate information, especially when they hold management positions (Chen, Hope, Li, & Wang, 2011).

In turn, the *opportunistic behavior hypothesis* predicts that public firms have low incentives to provide high-quality accounting information because their managers tend to manipulate financial information as a mean to meet equity-based compensation thresholds and capital market's earnings expectations. Because private firms' managers lack similar incentives,

they are less likely to engage in manipulation and more likely to report high-quality financial information (Graham, Harvey, & Rajgopal, 2005).

Both theoretical hypotheses *demand* and *opportunistic behavior* support the claim that external pressure leads CPAs who work for public, large, and(or) audited firms, which we define as pressured firms, to exert a more careful and holistic consideration of all possible alternatives before jumping into any financial reporting conclusion. These CPAs are likely to daily experience environments in which a lazy Type 2 that endorses poor intuitive answers towards financial reporting is too costly either because of potential sanctions from investors, creditors, and auditors or because of lost opportunities of meeting corporate goals. Thus, as Kahneman (2011, 185) implies, professional experience in pressured firms is likely to lead CPAs to use financial reporting environment as a cue to fully activate Type 2 of reasoning to process information. In contrast, CPAs who lack experience in pressured firms are likely to lack such red flag system that alarms the need of Type 2 usage to decide on economic items imprecisely covered by accounting standards. Therefore, we predict a main effect of professional experience in pressured firms (PEPF) reducing certainty towards AV-content assets classification. We also predict an ordinal interaction so that CPAs devoid of protection against misleading Type 1 classifications, i.e., low CR-ability CPAs who lack experience in pressured firms, will express a significantly higher certainty than CPAs who hold at least one of the protections. Formally,

**H2a.** CPAs who lack professional experience in pressured firms will express higher certainty to classify assets arising from AV-content into one of the possible classifications than CPAs who hold professional experience in pressured firms.

**H3a.** Low CR-ability CPAs who lack professional experience in pressured firms will express higher certainty to classify assets arising from AV-content into one of the possible classifications than the pool of the remaining CPAs.

Likewise, we predict a main effect of professional experience in pressured firms on the cohesiveness to which CPAs classify the cash flows from the sale of AV-content assets. We name cohesiveness the extent to which CPAs take into account the classification that they assigned to assets when classifying the cash flows from the sale of these assets. In this sense, we expect that CPAs who hold PEPF will also use the red flag system alarms set up in their minds while working under pressure to holistically evaluate that the sale of exhibition rights constitutes the principal revenue-producing activities of AV-content producers. It tends to prevent these CPAs from following the effortless Type 1 answer towards the cohesive classification. Consistent with what we hypothesize to assets classification, we predict an ordinal interaction to the extent that low CR-ability CPAs who lack experience in pressured firms are more likely to be exposed to misleading cohesive classification than CPAs in other conditions. Hence,

**H2b.** CPAs who lack professional experience in pressured firms are more likely to classify the cash flows from the sale of AV-content exhibition rights in a cohesive manner with the associated assets classifications than CPAs who hold experience in pressured firms.

**H3b.** Low CR-ability CPAs who lack professional experience in pressured firms are more likely to classify the cash flows from the sale of AV-content exhibition rights in a cohesive manner with the respective assets classifications than the pool of remaining CPAs.

## Methods

**Data collection and sampling.** We embedded our research instrument in a national web-based survey administered by the Brazilian Institute of CPAs' (BICPA) intended to collect data for the publication entitled Brazilian CPAs' Profile – edition 2012/13 (*Pesquisa perfil do profissional da contabilidade 2012/13*) (CFC, 2013). A total of 9,389 out of 302,697 CPAs replied to the survey (response rate of 3.1%), and 1,257 were assigned to reply our tasks on assets and cash flows classifications. We dropped responses from 602 CPAs whose principal occupation was neither external auditing (auditors) nor elaboration of financial statements (preparers). We also dropped responses from 58 CPAs employed by non-profitable or state-owned entities, and from 21 CPAs who missed or randomly answered to one or more of the questions of interest. This process results in 576 useful responses; however, as we further explain ahead, we apply a filter against random responses to our asset and cash flows classification task. This process leads us to retain responses from 331 CPAs, where 41 work as external auditors, 168 work as preparers of outsourcing firms, and 122 work as preparers of internal accounting departments kept by firms in general.

**Task overview and dependent variables.** Participants were recruited via BICPA electronic messages sent to all the 302,697 CPAs holding active licenses. The messages contained the web link to the questionnaire and a kind message encouraging participation. Within the questionnaire, we positioned the assets and cash flows classification tasks apart from the CR-ability assessment test<sup>24</sup> between blocks of demographic questions. Before starting the assets and cash flows tasks, participants learned that the task consisted in interpreting concepts and definitions of accounting standards adopted in Brazil. Participants reviewed short versions of connected IFRS guidance to

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<sup>24</sup> We discuss the cognitive reflection test (CRT) in the next section.

which they could return at any time. Next, they read instructions on how they should express the extent to which they agree with each of the classifications in six-point Likert scales varying from 0 – *Strongly Disagree* to 5 – *Strongly Agree*.<sup>25</sup> Figure 1 displays the task questions.

The first four questions in Figure 1 address elementary topics that require basic knowledge of financial reporting and low cognitive effort since clear-cut IFRS guidance for these questions was readily available. We use such simple questions to filter out CPAs who either randomly answered the research instrument or lack knowledge on the fundamentals of financial reporting.<sup>26</sup> That is, we retain in the sample 331 participants who strongly agreed with classification as inventories, operating activity, PPE, and investing activity in the questions 1 to 4, respectively, and strongly disagreed with all other alternative classifications. We use responses to questions 5 and 6 to outline the measures for our primary dependent variables, i.e., *Certainty* and *Cohesiveness*.

We measure *Certainty*, i.e., the certainty expressed by CPAs when classifying the asset arising from AV-content, as the difference between the first- and the second-best option chosen. For instance, if a respondent selects 5 – *Strongly agree* for *Intangible asset* and 0 – *Strongly disagree* for the remaining classifications, this respondent will score the maximum *Certainty*, i.e., 5 (five). However, if a respondent chooses 3 (three) for both *Inventories* and *Intangible* and 0 (zero) for *PPE*, this respondent will score the minimum *Certainty*, i.e., 0 (zero).

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<sup>25</sup> We opt for an even number of response categories to avoid biases since we deem mid-point responses as meaningless in the context of assets and cash flows classification.

<sup>26</sup> Although we are not able to assert, we attribute mistaken responses mostly to time constraints since the CPAs in our sample are licensed and active professionals. In addition, we design the assets and cash flows classifications as mandatory questions, what may favor random responses.



In turn, we measure *Cohesiveness*, i.e., the cohesion to which respondents classify cash flows from the sale of assets *vis-à-vis* the classification of the associated assets, by summing up the absolute values of the differences between the parallel assets and cash flows classifications. In other words, we first subtract the category number selected for operating activities from the category number selected for inventories. Second, we subtract the category number selected for investing activities from the category number selected for PPE. Third, we subtract the category number selected for investing activities from the category number selected for intangible. Then, we reverse-code the sum of the absolute value of these differences to obtain our *Cohesiveness* scale, which varies from 0 (zero) to 15 (fifteen). For instance, suppose that the CPA who expressed the highest *Certainty* in the example above selected 5 (five) for cash flows from investing activities and 0 (zero) for the remaining options, while the CPA who expressed the lowest *Certainty* selected 5 (five) for cash flows from operating activities and 0 (zero) for the remaining options. In this case, the former CPA would score *Cohesiveness* 15 (fifteen) and the latter 10 (ten).

**Independent variables and covariates.** We focus our analyses on two independent variables, *CR-ability* and *Professional Experience in Pressured Firms (PEPF)*. CR-ability refers to the individual capacity to refrain from going along with misleading intuitive Type 1 answers by engaging in deep reflective Type 2 of reasoning. To measure CR-ability, we apply Frederick's (2005) cognitive reflection test (CRT). CRT is popular across several research fields (Bergman, Ellingsen, Johannesson, & Svensson, 2010; Noussair, Trautmann, & van de Kuilen, 2014) due to its simplicity and its precision to predict heuristics and biases (Oechssler et al., 2009; Hoppe & Kusterer, 2011). CRT consists of three simple questions that elicit automatic, effortless, and

wrong Type 1 answers in mind. But one may easily make it, providing correct Type 2 answers by employing a deeper cognitive effort on processing the questions. The CRT questions are:

1. A bat and a ball cost \$1.10. The bat costs \$1.00 more than the ball. How much does the ball cost?
2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

As in most of the related research, CRT questions are open-ended, and the correct answers for the CRT questions are 5 cents, 5 minutes, and 47 days, respectively. We calculate the independent variable *CR-ability* by adding the number of hits so that *CR-ability* varies from 0 (zero) to 3 (three).

Our second independent variable of interest is *PEPF*, which refers to whether CPAs hold professional experiences in firms theoretically more pressured by investors, creditors, auditors, and regulators. We measure *PEPF* as a categorical variable that assumes 1 if the CPA works for (provides service for) a listed firm, a large firm, or a firm audited by external auditors, and 0 otherwise. While Clor-Proell and Maines (2014) assume that public vs. private employer firms determine the level of care and cognitive effort that preparers exhibit towards financial information, we extend the operationalization of this construct since CPA's working for large and(or) audited firms are likely to be subject to similar pressure. Such extension is especially informative when using Brazilian CPAs as participants because the Brazilian law enforces additional requirements such as external auditing for large firms, which the law defines as those

presenting total assets superior to 240 million BRL or annual revenue superior to 300 million BRL (Brasil, 2007).

Importantly, since the random assignment of participants to the conditions of our 4 (*CR-ability*) x 2 (*PEPF*) research design is impractical, our study relies on measured variables to implement our hypothesis tests in spite of the serious harm that it implies to any causal claim of our findings. One may argue that it is feasible to induce PEPF by manipulating the surroundings of the accounting-related decision-making. Nevertheless, we share with Libby, Bloomfield, and Nelson (2002) and Clor-Proell and Maines (2014) the belief that the experiences that professional participants hold in pressured firms constitute the primary determinant of JDM towards the sort of task that we explore. That is, we believe that inducing participants into *PEPF* conditions would severely damage the study's construct validity.

Because we are interested in the effects of two measured variables on *Certainty* and *Cohesiveness*, we use a set of additional covariates to control for the effects of other potentially correlated variables. First, *Career* is a categorical variable that assumes 1 if the CPA is an auditor, and 0 otherwise. Second, *Gender* is a categorical variable that assumes 1 if the CPA is a female, and 0 otherwise. Third, *Age* is a quantitative variable expressed in years. Fourth, *Capital* is a categorical variable that assumes 1 if the CPA lives in one of the 27 Brazilian cities considered state capitals, and 0 otherwise. Finally, *Financial Center* is a categorical variable that assumes 1 if the CPA lives in the Southern or Southeastern Brazilian regions.<sup>27</sup>

## Empirical Results and Supplementary Analysis

**Hypothesis tests.** We investigate whether CPAs' cognitive reflection abilities (CR-ability) influence AV-content assets and cash flows classifications at recognition under IFRS. Further,

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<sup>27</sup> Brazil's Southeast and South stand out as the most economically developed regions, while state's capitals invariably concentrate the largest economic centers (IBGE, 2015).

we examine the extent to which professional experience in pressured firms (PEPF) enables CPAs to face financial reporting subjects as a hint to deeply focus on the decision-making under scrutiny irrespective of the individual inclination to engage in focused Type 2 of reasoning. Next, we check the effects of an ordinal interaction so that low CR-ability CPAs who lack professional experience in pressured firms are likely to express assets and cash flows classifications significantly different from other CPAs.

H1a predicts that low CR-ability CPAs will express higher certainty to classify AV-content assets into one of the possible classifications than high CR-ability CPAs, while H2a predicts that CPAs who lack PEPF will express higher certainty to classify AV-content assets into one of the possible classifications than CPAs who hold PEPF. To test these hypotheses, we estimate an analysis of covariance (ANCOVA) using *Certainty* as a dependent variable, *CR-ability* and *PEPF* as independent variables of interest, and *Profession*, *Gender*, *Age*, *Capital*, and *Financial Center* as covariates. We report the descriptive statistics in Table 1, Panel A, and the main results in Table 1, Panel B. The significant main effects of *CR-ability* and *PEPF* depicted in Table 1, Panel B, are consistent with H1a and H2a, respectively. However, notice in Figure 1, Panel A, that certainty towards AV-content assets is flat across the three lowest CR-ability levels. *Certainty* plummets for those who score the maximum CRT score, i.e., 3. The planned contrasts for the main effects of CR-ability in Table 1, Panel C, confirm this trend, i.e., high CR-ability CPAs (CRT score equals 3) expressed a significant lower Certainty towards the classification of AV-content assets than low CR-ability CPAs (CRT score between 0 and 2).<sup>28</sup>

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<sup>28</sup> In Table 1, Panel C, we report a contrast between CPAs who scored 3 in CRT and the remaining CPAs collapsed, i.e., +1 +1 +1 -3 for CPAs who scored 0, 1, 2, and 3 in CRT, respectively. The contrast between CPAs who scored 2 and 3 and CPAs who scored 0 and 1 in CRT is marginally significant ( $F_{1,321} = 3.46$ ,  $p = 0.064$ ). Contrasts between CPAs who scored 3 in CRT and each of the three other groups are also significant (+1 0 0 -1, 0 +1 0 -1, and 0 0 +1 -1), but contrasts between CPAs who scored 0, 1, and 2 are not significant (+1 -1 0 0, +1 0 -1 0, and 0 +1 -1 0).

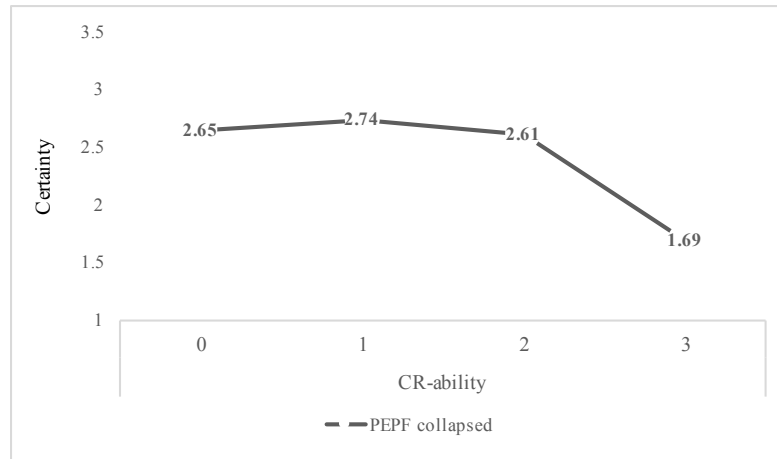
Table 1. Analysis of the certainty towards AV-content assets classification (H1a, H2a, and H3a).

Panel A. Summary statistics for <i>Certainty</i> .					
	CR-Ability				
	0	1	2	3	
Hold PEPF	2.44	2.33	2.29	1.59	
	[2.00]	[1.00]	[2.5]	[0.00]	
	(2.53)	(2.42)	(2.32)	(2.09)	
	n = 16	n = 52	n = 48	n = 32	
Don't hold PEPF	2.81	2.99	2.97	1.83	
	[3.00]	[5.00]	[4.00]	[0.00]	
	(2.27)	(2.33)	(2.32)	(2.21)	
	n = 21	n = 86	n = 35	n = 41	
Panel B. Analysis of Covariance (ANCOVA) for <i>Certainty</i> .					
Source	Partial Sum of Squares	df	Mean Square	F	p
CR-ability (H1a)	53.88	3	18.0	3.41	0.018
PEPF (H2a)	21.28	1	21.3	4.04	0.045
Career	1.03	1	1.03	0.19	0.659
Gender	8.89	1	8.89	1.69	0.195
Age	7.13	1	7.13	1.35	0.245
Capital	16.64	1	16.64	3.16	0.076
Financial Center	4.76	1	4.76	0.90	0.34
Error	1689.20	321	5.26		
Panel C. Planned contrasts					
Source	Partial Sum of Squares	df	Mean Square	F	p
<i>Main effect</i>					
CR-ability					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	47.41	1	47.41	9.01	0.003
<i>Simple effects</i>					
CR-ability for CPAs who don't hold PEPF					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	44.84	1	44.84	8.98	0.003
CR-ability for CPAs who hold PEPF					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	8.15	1	8.15	1.48	0.226
<i>Ordinal interaction (H3a)</i>					
Contrast: +3 for both conditions of low CR-ability (CRT score 0 or 1) and don't hold PEPF, -1 for remaining conditions	43.36	1	43.36	8.24	0.004

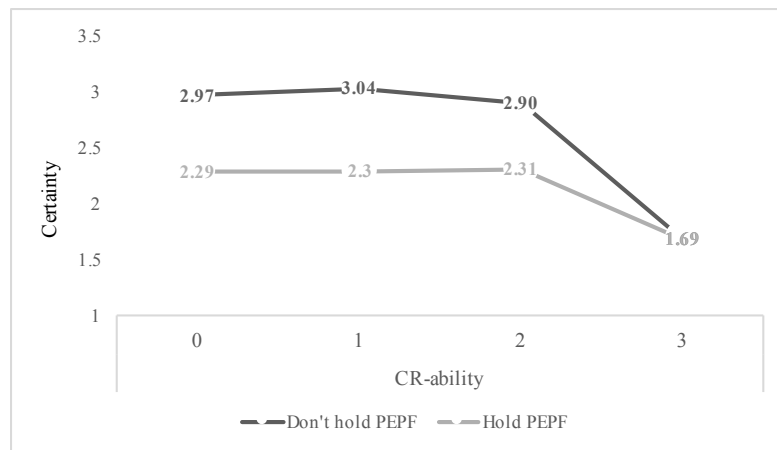
*Certainty* equals the category number for the first-best AV-content asset classification minus the category number for the second-best classification. *CR-ability* is a measured variable that assumes the participant score for cognitive reflection test. *PEPF* is a dichotomic variable that assumes 1 (one) if the CPA holds professional experience in pressured firms.

Figure 1. Margin analysis of the effects of *CR-ability* on *Certainty*.

Panel A. Main effect of *CR-ability* on *Certainty* (See Table 1 Panel B).



Panel B. Simple effects of *CR-ability* on *Certainty* (See Table 1 Panel C).



See Table 1 notes for details about the dependent variable *Certainty* and the factors *CR-ability* and *PEPF*.

H3a predicts that low CR-ability CPAs who lack PEPF are likely to express higher certainty towards one of the possible classifications for AV-content assets than the pool of the remaining CPAs. To test this hypothesis, we estimate the difference between CPAs who scored 0 and 1 in CRT and don't hold PEPF and the remaining CPAs. In other words, we collapsed the two cells in the top-left of Figure 1, Panel B, and contrasted against the remaining cells using

weights +3 for each of the two top-left cells and -1 for the others. The significant results for this ordinal interaction in Table 1, Panel C, are consistent with H3a.<sup>29</sup> In addition, the simple effects result in Table 1, Panel C, suggests that CR-ability is determinant for certainty towards AV-content assets classification for CPAs who lack PEPF, but not for professionals who hold PEPF.

H1b predicts that low CR-ability CPAs are more likely than high CR-ability CPAs to cohesively classify the cash flows from the sale of AV-content assets, weighing heavier the classification expressed for AV-content assets than the fact that the entity's principal revenue-producing activities are the production and sale of AV-content. Analogously, H2b predicts that CPAs who lack PEPF are more likely than CPAs who hold PEPF to weigh heavier the classification expressed to AV-content assets than the entity's principal revenue-producing activities. To test these hypotheses, we estimate an ANCOVA of *CR-ability* and *PEPF* on *Cohesiveness*, controlling for *Career*, *Gender*, *Age*, *Capital*, and *Financial Center*. The descriptive statistics in Table 2, Panel A, and the ANCOVA estimates in Table 2, Panel B, support H2a, but not H2b. The planned contrasts for the main effects of *CR-ability* on *Cohesiveness* in Table 2, Panel C, and in Figure 2, Panel A, suggest that CPAs who score 0, 1, or 2 in CRT are more likely to classify cash flows from the sale of AV-content assets cohesively than CPAs who score 3, the maximum CRT.<sup>30</sup>

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<sup>29</sup> Our results are robust to a contrast specification that considers low CR-ability CPAs as those who scored 0, 1, or 2 in CRT. For this case, we use contrasts weights +5 for each of the three top-left cells in Figure 1, Panel B, and -3 for the remaining ( $F_{1,321} = 10.49$ ,  $p = 0.001$ ).

<sup>30</sup> We report in Table 2, Panel C, a contrast between CPAs who scored 3 in CRT and the remaining CPAs collapsed, i.e., +1 +1 +1 -3 for CPAs who scored 0, 1, 2, and 3 in CRT, respectively. The contrast between CPAs who scored 0 and 1 in CRT and CPAs who scored 2 and 3, i.e., +1 +1 -1 -1, is also significant ( $F_{1,321} = 6.36$ ,  $p = 0.012$ ). Results for the remaining contrasts are in line with our theory.

Table 2. Analysis of cohesiveness towards AV-content cash flows classification (H1b, H2b, and H3b).

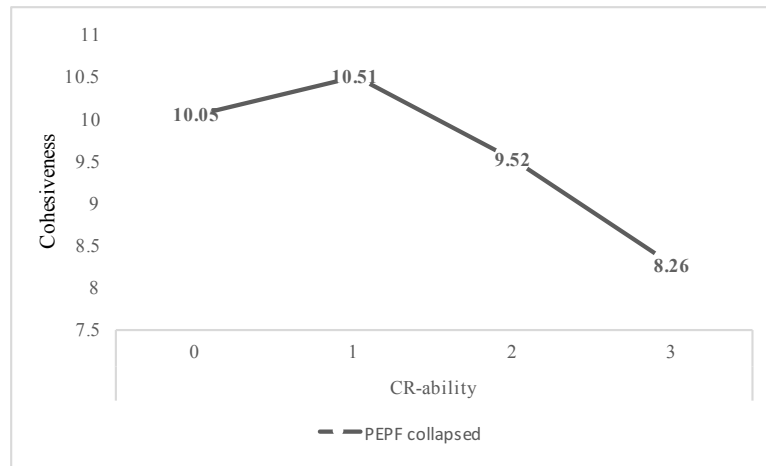
Panel A. Summary statistics for <i>Cohesiveness</i> .					
	CR-Ability				
	0	1	2	3	
Hold PEPF	10.56	10.50	9.27	7.78	
	[10.50]	[10.00]	[10.00]	[5.00]	
	(4.00)	(4.14)	(4.30)	(3.97)	
	n = 16	n = 52	n = 48	n = 32	
Don't hold PEPF	9.86	10.53	9.83	8.51	
	[10.00]	[11.00]	[10.00]	[6.00]	
	(4.40)	(4.57)	(4.74)	(4.27)	
	n = 21	n = 86	n = 35	n = 41	
Panel B. Analysis of Covariance (ANCOVA) for <i>Cohesiveness</i> .					
Source	Partial Sum of Squares	df	Mean Square	F	p
CR-ability (H1b)	234.58	3	78.19	4.12	0.007
PEPF (H2b)	11.10	1	11.10	0.59	0.445
Career	0.04	1	0.04	0.19	0.963
Gender	0.01	1	0.01	1.69	0.986
Age	0.71	1	0.71	1.35	0.846
Capital	53.16	1	53.16	2.80	0.095
Financial Center	0.06	1	0.06	0.00	0.955
Error	6087.21	321	18.96		
Panel C. Planned contrasts					
Source	Partial Sum of Squares	df	Mean Square	F	p
<i>Main effect</i>					
CR-ability					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	155.88	1	155.88	8.22	0.004
<i>Simple effects</i>					
CR-ability for CPAs who don't hold PEPF					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	115.80	1	115.80	3.69	0.056
CR-ability for CPAs who hold PEPF					
Contrast: -3 for CR-ability equal to 3 and +1 for remaining conditions	99.32	1	99.32	4.88	0.029
<i>Ordinal interaction (H3b)</i>					
Contrast: +3 for both conditions of low CR-ability (CRT score 0 or 1) and don't hold PEPF, -1 for remaining conditions	116.43	1	116.43	6.14	0.014
Residuals between-cells variance	216.09	5	43.22	2.28	0.047*
<i>Cohesiveness</i> equals the reverse-code of the sum of the absolute differences between the category number that the CPA participants choose for each possible classification for AV-content assets and the correspondent classification for cash flows					

(operating activities or investing activities), according to IAS 7. CR-ability is a measured variable that assumes the participant score for cognitive reflection test. PEPF is a dichotomic variable that refers to professional experience in pressured firms.

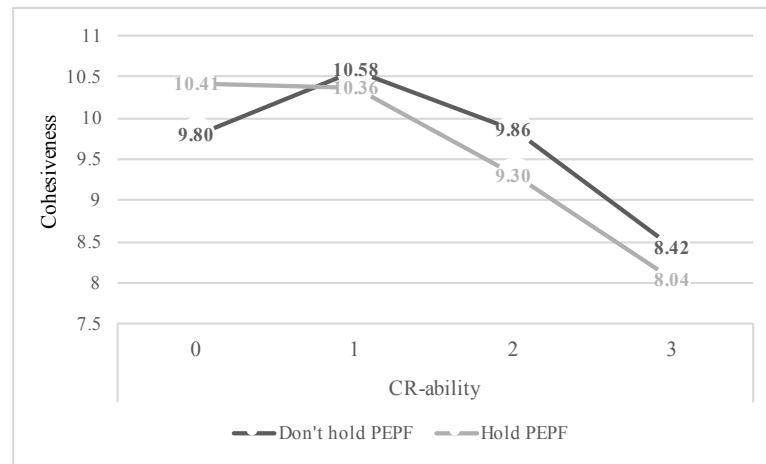
\* Even though the contrast analysis supports the ordinal interaction hypothesized in H3b, the shape of the cell means does not match this pattern (see Figure 2 panel B). To address this, we follow the approach suggested by Guggenmos, Piercey, and Agoglia (2016) by testing whether an additional effect among the six cells to which we assign weights of -1 is driving the results. The rejection of the null hypothesis at .05 level suggests that there is something else driving the results. We also calculate the effect size suggested by Guggenmos et al. (2016) since the F-test is not free of flaws for this sort of analysis. The analysis of the effect size suggests that 85% of the between-cells variance is not explained by the theorized contrast.

Figure 2. Margin analysis of the effects of *CR-ability* on *Cohesiveness*.

Panel A. Main effect of *CR-ability* on *Cohesiveness* (See Table 2 Panel B).



Panel B. Simple effects of *CR-ability* on *Cohesiveness* (See Table 2 Panel B).



See Table 2 notes for details about the dependent variable *Cohesiveness* and the factors *CR-ability* and *PEPF*.

H3b predicts that low CR-ability CPAs who lack PEPF are more likely to follow the classification attributed to AV-content assets to classify the cash flows from the sale of such assets than the pool of the remaining CPAs. To test this hypothesis, we estimate the difference between the cohesiveness expressed by low CR-ability CPAs (scores 0 or 1 on CRT) who lack PEPF (weights +3) and the remaining cells (weights -1). Although the results in Table 2, Panel C, suggest that the ordinal interaction predicted in H3b is significant at .05 level, the pattern of cell means in Figure 2, Panel B, does not match our predictions. We investigate this discrepancy by following the approach suggested by Guggenmos, Piercey, and Agoglia (2016), finding a significant result for the residual between-cells variance test (see Table 2, Panel C). From this, we conclude that even taking into account that the average variance of the two cells with weights +3 is greater than the average variance of the remaining cells, there still is an effect among the cells of weight -1 that is likely to cause the cells averages to deviate from the expected pattern. Additionally, the effect size suggests that 85% of the systematic variance is not explained by the contrast, i.e., the size of the contrast effect is significantly lower than the remaining between-cells variance.

Consistent with the lack of support for H2b, the simple effects result in Table 2, Panel C, suggests that CR-ability is determinant for cohesiveness towards AV-content assets classification for both CPAs who lack PEPF and CPAs who hold PEPF.

**Supplementary analysis.** The analysis based on a measured factor (CR-ability) and an observed factor (PEPF) and the consequential absence of random assignment into conditions are likely to raise legitimate concerns about our causal claims. Although controlling for CPA's demographic characteristics reduces the chances of omitted-variable bias, it is not sufficient to

rule out unobservable correlated effects. We acknowledge this weakness of our analyses, which is a consequence of our choice for strong construct validity at the cost of internal validity in this difficult tradeoff to address our research questions. To further mitigate the chances of omitted-variable bias, we added a set of additional covariates in our ANCOVA model, but the effects remain robust. The set of additional covariates includes proxies for responsibility and experience. First, *Subscribe* is a categorical variable that assumes 1 if the CPA subscribes the financial (auditing) report, and 0 otherwise. Second, *Partner* is a categorical variable that assumes 1 if the CPA is a partner of an audit (outsourcing) firm, and 0 otherwise. Third, *High-Income* is a categorical variable that assumes 1 if the CPA has an annual income higher than USD 17,655, which is calibrated according to the standards found by BICPA for Brazilian CPAs.

To mitigate potential concerns about our dependent variable *Cohesiveness*, we design a dichotomic variable to capture CPAs' probability of picking intangible as the first-best classification for AV-content assets and, simultaneously, cash flows from the operating activities as the first-best classification for AV-content cash flows. Consistent with our theory, the results suggest that high CR-ability CPAs are significantly more likely to classify assets and cash flows following this non-cohesive approach than low CR-ability CPAs. Additionally, to mitigate the concerns towards the use of *Certainty*, a discrete variable varying from 0 to 5, as the dependent variable in an ANCOVA estimation, we run ordered logistic regressions to estimate the effects of CR-ability and PEPF on *Certainty*, which is a more conservative approach. The results for this alternative specification are qualitatively similar but hard to interpret in a straightforward manner as for ANCOVA.

Given our focus on the operationalization of the factors driving CPAs' certainty towards AV-content assets classification and CPA's cohesiveness towards the associated cash flows, we

further stress the construct validity of CR-ability and PEPF. Concerning CR-ability, psychology research has extensively tested CRT, presenting evidence that CRT scores constitute a reliable and unique measure (Campitelli & Gerrans, 2014; Liberali et al., 2011; Toplak et al., 2011). To rule out potential arguments that mere inattention towards the BICPA web-based survey drives our results, we capitalize on the open-ended CRT design to select answers fitting the pattern that Frederick (2005) labels as intuitive answers to build the secondary factor *Intuitive Score*. This measure, borrowed from Shenhav, Rand, and Greene (2011), is calculated as the sum of the intuitive answers, i.e., 10 cents, 100 minutes, and 24 days for the first, second, and third CRT questions, respectively. The results of the estimations replacing CR-ability by the *Intuitive Score* are noisier but fully consistent with our theory.

Regarding PEPF, whose measurement relies on self-reported information about firms employing our respondents at the time of the BICPA survey, one may raise concerns about its reliability because of two sorts of measurement error. First, CPAs who hold previous experience in pressured firms but was not working for one at the time of the survey (false negative). Second, CPAs who lack previous experiences in pressured firms but have been just admitted by one (false positive). We believe that false negative cases are unlikely since CPAs with experience in public, large, and audited firms tend to be highly demanded by similar firms because of experience and training issues. The case of false positives seems to be related to professional experience duration, which tends to be partially controlled by the covariate *Age* in our estimations.

Finally, we run our analyses for alternative sampling specifications. Our results are robust to more rigorous sampling criteria, such as the one that only considers responses from the 273 CPAs who correctly respond the clear-cut filter questions and, additionally, correctly attributes

the lowest score for PPE when classifying AV-content assets and the lowest score for financing activities when classifying AV-content cash flows. Also, the results are robust to more flexible sampling, such as including respondents who failed the clear-cut questions used as a filter, summing up 576 respondents as in the original sample.

## **Discussion and Conclusions**

In this paper, we present evidence that low CR-ability CPAs are relatively more likely to jump into one of the possible classifications, expressing higher certainty towards recognition of AV-content assets as inventories or as intangible. In contrast, high CR-ability CPAs are relatively more likely to identify imprecision in the overlapping IFRS guidance to AV-content assets by expressing uncertainty towards balance sheet classifications. Our findings suggest that CPAs need a top CR-ability, i.e., CRT score equals 3, to be able to identify uncertainty surrounding AV-content assets classification, but PEPF may work as a surrogate for CR-ability since the simple effect of CR-ability on Certainty is observed for CPAs who lack PEPF but not for those who hold PEPF. That is, given that PEPF enhances CPAs' chances of identifying imprecision in the ill-defined IFRS guidance for AV-content assets, we infer that PEPF leads CPAs to use financial reporting environment as a red flag to fully activate Type 2 of reasoning irrespective of their CR-abilities.

Additionally, we present evidence of a spillover effect of the overlapping IFRS guidance for AV-content assets on the classification of the cash flows from the sales of the exhibition rights associated with such assets. Specifically, our findings suggest that Type 1 intuitive reasoning prevalent in low CR-ability CPAs is likely to lead these CPAs to stick with the classification attributed to AV-content assets when classifying the cash flows from the sale of

such assets because this is the first piece of information arising in their minds. Consequently, low CR-ability CPAs tend to classify the cash flows as from operating (investing) activities whenever they classify the related AV-content assets as inventories (intangible). In contrast, high CR-ability CPAs are less likely to stick with the cohesive classification. We conjecture that it happens because high CR-ability CPAs tend to engage in a holistic evaluation of the items' underlying economics, concluding that the classification of the AV-content cash flows as from operating activities best represents the substance of the transaction since the sale of AV-content exhibition rights is the entity's principal revenue-producing activity. However, the results do not support our prediction about the main effect of PEPF on Cohesiveness. Unlikely the effects on AV-content assets classification, PEPF does not work as a cue for reflective reasoning in JDM towards cash flows classification. Further, we find that both CPAs who hold PEPF and those who lack PEPF rely on CR-ability to override the attractive cash flow cohesive classification.

Our paper adds to the scant literature on the effects of professional judgment on assets and cash flows recognition and, ultimately, on financial reports comparability under IFRS. We examine how basic individual differences largely explored in many academic fields, i.e., CR-ability and professional experience, drive financial reporting judgments. Our findings suggest that CR-ability is unlikely to drive significant differences in assets recognition among pressured firms since CPAs who work for these firms seem to use financial reporting environment as a cue for engaging in a more deliberate type of reasoning. Such deliberate reasoning leads them to identify uncertainties arising from the overlapping guidance provided by more principles-based accounting standards. However, our results indicate that CPAs' professional experience in pressured firms is not sufficient to curb misleading judgments on cash flows classification among low CR-ability CPAs.

Therefore, considering that accounting standards can afford comparability if (and only if) preparers independently presented with a given economic event are likely to account for such event in a similar fashion whenever they follow the same accounting standards, our findings suggest that IFRS guidance for AV-content assets is likely to grant comparability for pressured entities, but not for non-pressured entities. Thus, enhancing CPAs' CR-ability or developing a red flag mechanism in CPAs' minds to activate Type 2 of reasoning may represent fertile courses of action for IFRS training materials and education initiatives. These remedies would probably favor the achievement of the IFRS Foundation's (2013) objective towards SMEs' financial statements that are comparable from one IFRS adopter country to the other.

In line with the view expressed by the IASB's (2008) discussion paper, our results suggest that IFRS guidance for AV-content cash flows is unlikely to grant consistent presentation across financial statements. That is, events recognized in financial statements are not classified in the same way in each of the statements, hampering users to connect information in one statement to the other statements. We present evidence that economic events associated with the principal revenue-producing activity such as AV-content may simultaneously occupy the first line of the income statement and the cash flows from the investing activities. And, notably, it hinges on CPAs' CR-abilities. Hence, users of accounting information are likely to depend on adjustments to financial reports not only to correct for judgments that impair cross-firm comparisons but also to find consistency between firms' individual statements.

Potential limitations of our study provide promising opportunities for future research. First, we explore the effects of trait-like individual differences on assets and cash flows classification in financial statements, and it implies a tricky tradeoff to our research design between construct validity and internal validity. Since we opted for focusing on the former,

future research should delve into the effects of state-like individual differences on financial reporting professional judgment. State-like individual differences allow researchers to manipulate the factors of interest and to randomly assign participants to conditions, mitigating internal validity concerns.

Second, although the large dataset of CPAs who share similar backgrounds that we explore represents a strength of our research, it is possible that our findings constitute a Brazil-specific phenomenon, or maybe extensible only to countries facing similar conditions. Particularly, Brazil adopted IFRS four years before our data collection and its superseded accounting standards used to be significantly influenced by fiscal rules. Therefore, it is conceivable that CPAs such as our Brazilian participants need a greater period to turn the judgments towards IFRS a Type 1 process through practice, as Kahneman (2011, 22) suggests. That is, the four years' lapse may have been insufficient for Brazilian CPAs turn the effortful reasoning required by IFRS into Type 1 heuristic processes. Future research should explore whether the effects of CR-ability on professional judgments fade away over time as CPAs become familiarized with IFRS and whether similar results are observable in different countries.

Third, while our study investigates the effects of individual differences on judgments under IFRS from a preparer perspective, the effects of individual differences on judgments under IFRS from an investor perspective remain an open question. Future research should look at the impacts of individual differences on information processing of less sophisticated users of accounting information when exposed to situations in which they are expected to compare financial reports elaborated under overlapping accounting standards, such IFRS for AV-contents.

Finally, although the decision-making processes followed by the actual CPAs participating in our study are likely to bring into play the incentives associated with their

professional experiences, our approach does not enable any conclusion on how CR-abilities interact with the managerial incentives theorized by Dye (2002) to pick the accounting classifications that maximize CPAs utilities. Future research may explore the interplay between CR-abilities and managerial incentives to uncover whether CPAs use managerial incentives as a cue to fully activate Type 2 of reasoning to a similar extent to how they use professional experience in pressured firms.

## **Chapter 5: Concluding Remarks**

The chapters above demonstrate that the studies gathered in this dissertation paper add to psychology and accounting fields from both theoretical and practical perspectives. However, notice that the combined contribution from these studies seems to be greater than the sum of their parts in isolation.

For instance, the first study (see Chapter 2) comprehensively maps Brazilian CPAs' CR-abilities to several demographic characteristics, presenting evidence that female CPAs are more susceptible to the biases emerging from excessive reliance on Type 1 of reasoning than male CPAs. The findings suggest that these biases are more likely to affect older CPAs and CPAs working as preparers and managers for larger firms. Also, auditors are, on average, less likely than CPAs working in other career branches to follow Type 1 biases.

In turn, the third study (see Chapter 4) presents evidence that low CR-ability CPAs are relatively more likely to jump into one of the possible classifications, expressing higher certainty towards recognition of AV-content assets as inventories or as intangible. Still, the findings suggest that low CR-ability CPAs are relatively more likely to classify the cash flows from the sale of such assets cohesively, i.e., as from operating (investing) activities whenever they classify the related AV-content assets as inventories (intangible).

Taken together, the takeaways from the studies in the chapters 2 and 4 provide a roadmap for auditors, regulators, and other accounting information users to predict and explain financial reporting content based on the individual in charge of elaborating the financial statements. Such roadmap also contributes to IFRS training materials and education initiatives of local regulators since they are enabled to address the groups of CPAs most exposed to the risks of Type 1 biases.

These efforts are likely to work as a shortcut towards financial statements that are comparable from one IFRS adopter country to the other.

In a similar fashion, the arrangement between the studies in the chapters 3 and 4 is likely to provide a further understanding of how the adaptation towards the prevalence of Type 1 of reasoning with age may impact preparers' JDM. Thus, besides being useful for auditors, regulators, and other accounting information users, the resulting piece of knowledge from the combination of chapters 3 and 4 may inform firms' internal accounting departments and outsourcing firms on how financial statements elaborated under IFRS are likely to hinge on age. Notice that different reports may emerge even from small age differences among preparers, i.e., between preparers in their early adulthood (twenties) and preparers in slightly more late adulthood (forties). Educational initiatives may also benefit from this bundle of findings.

Therefore, this dissertation paper is of interest not only to accounting and psychology research but also to practitioners from many different areas, such as auditors, regulators, standard-setters, educators, preparers, and investors interested in understanding a bit further how accounting practice and CR-abilities affect each other in a two-way road of influences.

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