Searching for Causal Effects of IFRS Adoption

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Resumo

This research aims to study empirical methodologies that contribute to the identification of causal effects of IFRS adoption. The main challenge of studies about the consequences of adopting the international standards is disentangling the effects of the adoption process from other concurrent factors that also influence the outcomes. Therefore, we evaluate different econometric strategies with different assumptions, seeking to get an approximation of a causal effect of IFRS adoption. We do so exploring how the IFRS adoption influences the difference between the book and market value of firms, which is a basic question on the economic consequences of IFRS adoption. Given the true and fair view concept of IFRS Standards, its adoption represents an important switch from local accounting standards that were substantially based on historical cost to a fair value and market oriented accounting standards. Thus, it is expected an approximation between accounting numbers and market value of firms after the adoption of IFRS. We run our analysis through different specifications of a differences-in-differences setting, incorporating features in order to relax the models' assumptions and, therefore, minimize the effect of confounding factors, to isolate the effect of IFRS. Specifically, we add fixed effects panel data, dynamic GMM panel data and propensity score matching. The results show that as we add more sophisticated techniques, the effect found for the Brazilian case generally decreases, although it remains negative and significant, indicating, that while the effect exists, such strategies are important to moderate it. However, this cannot be seen for the Chilean case, for which neither specification shows significant results. Therefore, the assumptions underlying empirical models are important to evaluate the statistical and economic significance of the effect of accounting harmonization.

Palavras chave: IFRS, Identification strategies, Book and Market values.

1 Introduction

The purpose of this research is to study empirical methodologies that contribute to the identification of causal effects of IFRS adoption. To do so, we establish a basic question of research on the economic consequences of IFRS, which is its effects on the difference between book and market value of firms, and then evaluate different econometric strategies with different assumptions, seeking to contribute for understanding the strengths andlimitations of the numerous studies in the Accounting literature dedicated to the global accounting harmonization lead by the International Accounting Standard Board (IASB).

In recent years a substantial progress has been observed towards the worldwide adoption of a single set of accounting standards, given that several countries are switching from their local GAAP to the International Financial Reporting Standards (IFRS). In short, the financial statements prepared under IFRS Standards should provide useful information to users of financial information about prediction of future cash flows of firms, helping them to make economic decisions (IFRS Foundation, 2016, 2015).

To achieve this purpose, IFRS Standards, as issued by the IASB, are market oriented and also clearly based on fair value accounting. Considering the true and fair view concept of IFRS Standards, that require that all economic events should be faithfully represented in financial statements (Ball, 2006; Martins, Martins, & Martins, 2007), it is expected an approximation between accounting numbers and market values after the adoption of IFRS.

The IFRS adoption represents an important switch from local accounting standards that were substantially based on historical cost (past transactions) to a fair value and market oriented accounting standards that aims to provide useful information about future performance (Hitz, 2007), especially in civil law countries, that tend to be more bank-oriented (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997) and also more conservative. Thus, the hypothesis studied as an example in this research is that IFRS adoption reduces the difference between book and market value of firms.

However, the main challenge of studies about the economic consequences of IFRS adoption is to isolate the effects of the adoption of IFRS Standards from other concurrent factors that also influence the outcomes (Bru¨ggemann, Hitz, & Sellhorn, 2013), so that the source of these effects and the extent to which they can be strictly attributed to IFRS is still not clear. (Christensen, Hail, & Leuz, 2013). To find a causal effect of IFRS adoption is necessary to isolate the adoption process, in order to have a control group. It is particularly difficult, considering that groups of countries have adopted IFRS Standards in the same time.

Such considerations give rise to the need to incorporate identification strategies to IFRS research. Therefore, this research aims mainly to discuss the empirical methodologies that can contribute to the identification of causal effects of the worldwide adoption of IFRS Standards, and not only to provide evidences about the effect of IFRS adoption on the difference between book and market value of firms.

To do so we evaluate the adoption of IFRS made by Brazil and Chile in 2010 and

2009, respectively, using different specifications of differences-in-differences models, which is currently one of the main resources to evaluate policies' effects in the applied econometric literature (Angrist & Pischke, 2008) including fixed effects panel data, dynamic generalized method of moments (GMM) panel data and propensity score matching (Heckman, Ichimura, & Todd, 1997; Heckman, Ichimura, & Todd, 1998; Wooldridge, 2010). The results show that as we incorporate features to the model, the effect of IFRS for the Brazilian case decreases, although remaining significant for all specifications, showing how different

specifications with more relaxed assumptions allows to better disentangle the effect of IFRS to other confounding factors. The Chilean case, however, is not that clear, since for it all the specifications resulted in insignificant effect, which gives rises to the need of a future discussion on the differences in accounting practices of Chilean and Brazilian firms previous to IFRS.

The main contribution of this research is present and discuss different empirical strategies for future research on IFRS adoption, highlighting the need for researchers to assess the assumptions underlying their models and how likely it is that they are maintained in the analysis and how its violation could affect the conclusions of such studies.

2 Background

In the last years there has been remarkable progress toward the worldwide adoption of a single set of high quality international accounting standards. Specifically, several countries are switching from their local accounting standards to the International Financial Reporting Standards (IFRS), as issued by the International Accounting Standard Board (IASB). Currently, 144 jurisdictions require the adoption of IFRS Standards for all or almost all their domestic publicly-traded firms and 12 other jurisdictions permit, rather than require, the use of IFRS Standards (IFRS Foundation, 2018).

The role of IFRS Foundation is develop “a single set of high quality, understandable, enforceable and globally accepted financial reporting standards based upon clearly articulated principles” (IFRS Foundation, 2016, p.6). Furthermore, the Constitution of IFRS Foundation also determines that financial reporting should provide information that help investors and other users of financial information to make economic decisions (IFRS Foundation, 2016).

Complementary, the IASB’s Conceptual Framework mentions that the purpose of financial statements is to provide information about the reporting entity that is useful to users of financial information in the prediction of future cash inflows to the entity (IFRS Foundation, 2015). Therefore, IFRS was developed to be a principle based standard and also market-oriented, given the Anglo-Saxon influence. Thus, IFRS Standards intend to provide useful information to capital market users, especially regarding information that help them to predict and assess the future performance of firms.

Given the Anglo-Saxon influence of England and the principle based approach, IFRS Standards are based on the “true and fair view”. Consequently, accounting information should provide a true and fair view of all economic events that occurred during the period. This approach resulted in an approximation between accounting and economics, given that all economic events should be faithfully represented through accounting numbers (Ball, 2006; Martins et al., 2007).

Seeking to achieve its purpose, especially the faithful representation of economic events, IASB is increasingly moving towards the issuance of fair value based accounting standards (Ball, 2006; Cairns, 2006; Hitz, 2007; Hung & Subramanyam, 2007). According to Hitz (2007), the argument is that the fair value measure has the capacity to incorporate in an more efficient manner the market expectation about future cash flows. Similarly, Ball (2006) suggests that fair value accounting incorporates more-timely information about economic gains and losses into the financial statements.

Therefore, the IFRS adoption represents a major change from accounting standards that were substantially based on historical cost in order to record past transactions to a fair value and market oriented financial statements that aims to provide information about future performance of firms (Hitz, 2007). Given this fair value approach, the accounting numbers

based on IFRS Standards should be closer to the market value of firms than prior local accounting standards.

Based on this argument, some paper found that the book value of equity is significantly higher under IFRS Standards than under local GAAP (Hung & Subramanyam, 2007). This increase is a consequence of the fair value approach and also the approximation between accounting numbers and market values. In this context, Pontiff and Schall (1998) found a positive and significant relation between book-to-market ratios and future returns. According to authors, this positive relations is greater as long as the book value of firms provide information for expected future cash flows (Pontiff & Schall, 1998).

This change in the perspective of financial reporting can have major consequences for accounting information, particularly in those countries that accounting standards relied substantially in historical cost. For some countries, such as the United Kingdom, the use of fair value was already permitted in their local accounting standards (UKGAAP) (Cairns, 2006) and, therefore, the effect of IFRS adoption on the difference between book and market values is smaller. However, civil law countries, such as France, Italy, Germany and Latin America countries, have weaker legal protection of investors (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998) and, consequently, smaller capital markets (La Porta et al., 1997). In order to obtain external finance, the firms from these countries rely mainly on bank contracts. Given this bank-orientation, instead of market-orientation, the accounting standards of these countries tend to be more conservative and also substantially based on historical cost.

Finally, it is possible to argue that under local GAAP the difference between book and market value of firms is greater than under IFRS Standards, specially in civil law countries. After IFRS adoption and its concept of faithful representation of economic events, it is expected an approximation between accounting numbers and market values. Therefore, this research proposes the following hypothesis: *IFRS adoption reduces the difference between book and market value of firms*.

3 Data and Methods

We explore the adoption of IFRS made by Brazil, in 2010, and by Chile in 2009. We choose these events in order to have enough periods of time before and after the adoption as well as non-adopter countries to be used as controls in these periods, namely Argentina, Mexico and Peru, who adopted in 2012, and Colombia, who adopted in 2015 (IFRS Foundation, 2018). This setting allows us to search for causal effects building models in a differencesin-differences (DID) setting:

$$BM_{it} = \alpha + \beta_0 Adopt_i + \beta_1 Post_t + \beta_2 Adopt_i \times Post_t + u_{it}, \quad (1)$$

where *BM* is measured as the log of the absolute differences between the book and market value of a firm *i* in the year *t*, *Adopt* is a dummy variable indicating the firms in the group of IFRS adopters and *Post* is a dummy variable indicating the periods after the adoption. The coefficient of interest in a DID model is the interaction (β_2 in equation (1)) which gives the effect of being in the adopter group in the post adoption period on the outcome variable. The causality in such a setting depends on a crucial assumption: parallel trends. β_2 captures the average change in *BM* from the pre to the post adoption period for the adopters relative to the non-adopters. This change can only be considered a causal effect if, and only if the firms in the adopters group have been presenting the same trend in *BM* as the firms in the non adopters group.

If one can assume the existence of parallel trends, no further arguments need to be added to the model and usual ordinary least squares (OLS) solve the problem. So our first specification is equation (1) estimated by OLS. However, if the parallel trends is a too strong assumption, then one can add controls and further specifications to the model. So, we build other seven specifications for equation (1). In equations (2) to (4) we add time-dummies and use fixed effects with panel data and dynamic panel data via generalized method of moments (GMM):

$$BM_{it} = \alpha + \beta_0 Adopt_i + \beta_1 Post_t + \beta_2 Adopt_i \times Post_t + \sum_{j=1}^{t-1} \gamma_j Year + u_{it}, \quad (2)$$

$$BM_{it} = \beta_0 Post_t + \beta_2 Adopt_i \times Post_t + \sum_{j=1}^{t-1} \gamma_j Year + c_i + u_{it}, \quad (3)$$

$$\Delta BM_{it} = \delta \Delta BM_{i,t-1t} + \beta \Delta \left(Adopt_i \times Post_t \right) + \sum_{j=1}^{t-1} \gamma_j Year + \Delta u_{it}, \quad (4)$$

and in equations (5) to (8) we repeat these specifications adding firms' return on equity (ROE) and size as controls:

$$BM_{it} = \alpha + \beta_0 Adopt_i + \beta_1 Post_t + \beta_2 ROE_{it} + \beta_3 Size_{it} + \beta_4 Adopt_i \times Post_t + u_{it}, \quad (5)$$

$$BM_{it} = \alpha + \beta_0 Adopt_i + \beta_1 Post_t + \beta_2 ROE_{it} + \beta_3 Size_{it} + \beta_4 Adopt_i \times Post_t + \sum_{j=1}^{t-1} \gamma_j Year + u_{it}, \quad (6)$$

$$BM_{it} = \beta_0 Post_t + \beta_1 ROE_{it} + \beta_2 Size_{it} + \beta_3 Adopt_i \times Post_t + \sum_{j=1}^{t-1} \gamma_j Year + c_i + u_{it}, \quad (7)$$

$$\Delta BM_{it} = \delta \Delta BM_{i,t-1t} + \beta_0 \Delta ROE_{it} + \beta_1 \Delta Size_{it} + \beta_2 \Delta \left(Adopt_i \times Post_t \right) + \sum_{j=1}^{t-1} \gamma_j Year + \Delta u_{it}. \quad (8)$$

Equation (2) adds to the basic model simply allowing *BM* to vary over time. The model in equation (3) relaxes part of the parallel trends assumption allowing different trends due to intrinsic (time constant) characteristics of the firms via a fixed-effects panel data estimation. Model (4) adds to model (3) relaxing the strict exogeneity assumption of panel data estimation, replacing it by the sequential exogeneity assumption, which is far more natural. This is achieved via a dynamic model controlling for the previous values of *BM* with a GMM estimation, where the fixed component c_i is eliminated via first differences to accommodate sequential exogeneity. Further, the models in equations (5) to (8) add in their specifications firms' size and ROE as controls.

In these eight models we define the set of controls as all firms in the control countries. That is, all the Brazilian and all the Chilean firms are compared against all the Mexican, Peruvian, Argentine and Colombian firms; so the assumption of parallel trends rely in this quite arbitrary control selection. To improve the likeness between the treatment and control groups we reestimate the models adding the propensity score matching (PSM) (Heckman et al., 1997; Heckman et al., 1998) estimation to the differences-indifferences estimation. While each of these methods are usually applied separately to evaluate treatment effects, the two combined allows to relax parts of the assumption of the two of them. The propensity score matching is used the estimate the non-observed counterfactual, that is, the outcome of the treated in the absence of the treatment. For instance, the DID method allows relaxing the selection on observables assumption to also include time constant unobservables (Menezes Filho, 2012).

The propensity score is the probability of an unit to be treated given a set of variables. In our setting, we use the PSM to select firms in the control countries with similar characteristics, namely, industry, size and ROE, to the firms in the treated countries, using the nearest neighbor method without replacement. In the next section we present the results of our estimations.

4 Results

Since Brazil in Chile adopted the IFRS in different years (2010 and 2009, respectively) and the countries for the control group with a higher number of firms adopted in 2012, we estimated the models separately for the two treated countries using data from 2005 to 2011. Table 1 shows the descriptive statistics by country for the whole period, while table 2 present these statistics for Brazil and Chile separately by the pre and post period of adoption.

Table 1: Descriptive Statistics by Country (2005--2011)

		Mean			Std. Dev.			Min.			Max		
	N	BM	Size	ROE	BM	Size	ROE.	BM	Size	ROE	BM	Size	ROE
AR	484	11.98	13.65	0.02	2.29	2.01	0.88	5.98	9.34	-15.56	18.15	17.98	1.15
BR	1,885	13.15	13.51	0.26	2.13	2.82	11.87	2.94	0.69	-51.42	19.57	20.70	600.13
CL	924	18.05	18.91	0.06	2.06	2.16	1.04	11.68	9.22	-34.78	23.05	23.93	3.31
CO	65	20.25	20.25	0.05	1.66	2.58	0.24	16.82	10.82	-0.92	25.50	25.25	2.12
MX	716	15.12	16.16	0.04	2.26	1.81	1.15	7.72	8.61	-29.19	20.84	20.67	7.45
PE	488	12.46	12.97	0.15	2.21	1.82	0.28	5.74	2.30	-3.40	17.22	18.10	3.42
US	6,719	14.31	15.49	0.20	1.72	1.52	4.54	5.38	6.93	-38.32	19.78	21.89	268.84

AR is Argentina, BR is Brazil, CL is Chile, CO is Colombia, MX is Mexico, and PE is Peru. BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on equity index.

Table 2: Descriptive Statistics by Country and Adoption Period (2005--2011)

			Mean			Std. Dev.			Min.			Max.		
		N	BM	Size	ROE	BM	Size	ROE	BM	Size	ROE	BM	Size	ROE
Pre	BR	1,306	13.09	13.39	0.02	2.16	2.77	1.90	2.94	0.69	-51.42	19.57	20.38	16.32
Post	BR	579	17.92	18.94	0.04	1.96	1.98	1.41	11.76	9.54	-34.78	22.78	23.77	3.31
Pre	CL	490	20.25	20.25	0.05	1.66	2.58	0.24	16.82	10.82	-0.92	25.50	25.25	2.12
Post	CL	434	15.12	16.16	0.04	2.26	1.81	1.15	7.72	8.61	-29.19	20.84	20.67	7.45

BR is Brazil and CL is Chile. BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on equity index.

4.1 Differences-in-differences models

Table 3 present the results of estimation of models (1) to (8) for the Brazilian case. From it, one can see the negative and significant effect prevails in every estimation, but it tends to decrease the more features are added to the model. This suggests the omitted factors in the OLS models are positively correlated to the IFRS adoption and as they are controlled for in the Panel and GMM estimations one can see the residual effect attributed to the IFRS adoption with less confounding effects decreasing, but still remaining significant.

One interest result is given by the dummy identifying Brazilian firms. They are significant and negative in the first four models, showing Brazilian firms have, on average, lower levels of difference between book and market values of the Argentine, Colombian, Mexican and Peruvian firms when not controlling by ROE and size. However, when we control for these variables, the difference is no longer significant. This indicates that the difference between book and market value are strong dependent on these firms' characteristics, especially size, which looses significance only in the GMM estimation. This indicates how important it is to control for firms' characteristics when evaluating IFRS adoption effects.

Table 3: Differences-in-Differences for the Brazilian Adoption

	Dependent variable:							
	BM							
	OLS	OLS	Panel	GMM	OLS	OLS	Panel	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Brazil	-0.416***	-0.422***			0.089	0.090		
	(0.101)	(0.101)			(0.056)	(0.055)		
Post	0.691***				0.035			
	(0.158)				(0.073)			
BM_{t-1}				-0.002				0.006
				(0.068)				(0.065)
ROE					0.074	0.063	0.025**	0.020***
					(0.068)	(0.066)	(0.011)	(0.007)
Size					0.957***	0.963***	0.477***	0.044
					(0.012)	(0.012)	(0.090)	(0.141)
Brazil * Post	-0.491***	-0.493***	-0.194**	-0.348***	-0.218**	-0.226**	-0.258***	-0.357***
	(0.189)	(0.189)	(0.088)	(0.127)	(0.102)	(0.101)	(0.086)	(0.127)
Constant	13.508***	13.266***			-0.975***	-1.241***		
	(0.082)	(0.145)			(0.200)	(0.211)		
Fixed Effects	No	No	Yes	No	No	No	Yes	No
First Diff.	No	No	No	Yes	No	No	No	Yes
Time Dummies	No	Yes	Yes	No	No	Yes	Yes	No
Industry Eff.	No	No	No	Yes	No	No	No	Yes
Observations	3,638	3,638	3,638	1,502	3,634	3,634	3,634	1,502
R^2	0.019	0.024	0.089		0.711	0.720	0.109	
Adjusted R^2	0.018	0.021	-0.159		0.709	0.718	-0.135	
F Statistic	23.633***	10.920***	39.900***		403.965***	343.674***	38.628***	
Sargan Test				102.28***				100.83***
Wald Test (1)				9.47***				11.48***
Wald Test (2)				90.51***				88.58***

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses. The Wald Test (1) refers to the joint significance of the models' coefficients while the Wald Test (2) refers to the joint significance of the models' time dummies.

Table 4 shows the same estimations for the Chilean case. Differently from the Brazilian case, none of the interactions are statistically significant, indicating the adoption of IFRS did not had any effect on the difference between the book and market value of Chilean firms.

Table 4: Differences-in-Differences for the Chilean Adoption

	Dependent variable:							
	BM							
	OLS	OLS	Panel	GMM	OLS	OLS	Panel	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Chile	4.407***	4.410***			0.265***	0.253***		
	(0.128)	(0.128)			(0.096)	(0.096)		
Post	0.438***				0.013			
	(0.142)				(0.064)			
BM_{t-1}				-0.121				-0.117
				(0.094)				(0.093)
ROE					0.079	0.076	0.033***	0.015
					(0.081)	(0.073)	(0.011)	(0.018)
Size					0.965***	0.967***	0.574***	-0.013
					(0.013)	(0.013)	(0.105)	(0.171)
Chile * Post	-0.151	-0.182	0.080	-0.073	0.070	0.060	0.057	-0.068
	(0.197)	(0.197)	(0.097)	(0.153)	(0.114)	(0.113)	(0.094)	(0.152)
Constant	13.511***	13.338***			-1.072***	-1.237***		
	(0.093)	(0.163)			(0.205)	(0.219)		
Fixed Effects	No	No	Yes	No	No	No	Yes	No
First Diff.	No	No	No	Yes	No	No	No	Yes
Time Dummies	No	Yes	Yes	No	No	Yes	Yes	No
Industry Eff.	No	No	No	Yes	No	No	No	Yes
Observations	2,677	2,677	2,677	1,070	2,673	2,673	2,673	1,070
R^2	0.378	0.382	0.092		0.844	0.846	0.124	
Adjusted R^2	0.378	0.380	-0.151		0.843	0.845	-0.111	
F Statistic	542.427***	205.924***	30.529***		683.300***	560.855***	33.239***	
Sargan Test				62.10***				61.54***
Wald Test (1)				1.75***				2.70***
Wald Test (2)				65.44***				62.06***

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses. The Wald Test (1) refers to the joint significance of the models' coefficients while the Wald Test (2) refers to the joint significance of the models' time dummies.

It is also worth mentioning that the role of the control variables for Chile is similar to the Brazilian case, that is, as we improve controlling by ROE and size, the differences between book and market value decrease. This result may be due to differences in the accounting practices between Brazil and Chile before IFRS adoption. To understand this difference, this issue must be further investigated. Further, differently from the Brazilian

firms, the Chilean firms have, on average, higher differences between their book and market values than the Argentine, Colombian, Mexican and Peruvian firms.

4.2 Differences-in-differences with propensity score matching models

The first step of combining the PSM models is running a logit model to calculate the probability of a firm being in the treated group given a set of observable variables, which we defined as ROE, size and industry. Tables 5 and 6 show the results of these models to match the Brazilian and the Chilean adopters, respectively. It is interesting to see the importance of firms' size in the analysis, which shows larger firms have lower probability to be Brazilian but have higher probability to be Chilean.

Table 5: Logit results for calculating the Propensity Scores to match the Brazilian Adopters

	Dependent variable:						
	Group: Brazilian Firms						
	2005	2006	2007	2008	2009	2010	2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Size	-0.150***	-0.124**	-0.102**	-0.166***	-0.117***	-0.207***	-0.204***
	(0.046)	(0.049)	(0.046)	(0.045)	(0.041)	(0.048)	(0.041)
ROE	-0.184	-0.034	0.230	0.007	-0.034	-0.034	0.123
	(0.144)	(0.071)	(0.358)	(0.036)	(0.093)	(0.037)	(0.101)
Constant	-0.557	-0.161	0.241	1.121	0.483	1.918**	1.899**
	(1.195)	(1.002)	(0.841)	(0.828)	(0.800)	(0.884)	(0.774)
Observations	469	473	553	552	586	540	584
Log Likelihood	-293.417	-304.363	-358.273	-348.875	-376.690	-337.537	-366.810
Akaike Inf. Crit.	624.835	646.727	756.546	737.751	793.380	715.074	773.619

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses.

Table 6: Logit results for calculating the Propensity Scores to match the Chilean Adopters

	Dependent variable:						
	Group: Chilean Firms						
	2005	2006	2007	2008	2009	2010	2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Size	0.757***	1.126***	1.096***	0.983***	1.074***	1.195***	0.672***
	(0.083)	(0.123)	(0.119)	(0.110)	(0.115)	(0.130)	(0.069)
ROE	0.155	-0.135	-0.168	1.038	-0.539	-0.412	-0.158
	(0.513)	(0.426)	(0.241)	(0.822)	(0.565)	(0.626)	(0.532)
Constant	-11.592***	-18.370***	-17.538***	-16.046***	-17.876***	-19.853***	-10.976***
	(1.396)	(2.189)	(2.064)	(1.951)	(2.089)	(2.351)	(1.278)
Observations	372	371	381	352	407	377	413
Log Likelihood	-128.502	-97.777	-95.449	-93.791	-105.938	-101.001	-156.506
Akaike Inf. Crit.	295.004	233.555	228.898	225.582	249.877	240.002	351.013

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses.

With the logit results, the match is defined searching the firm in the control group with the most similar propensity score as each firm in the treated group (nearest neighbor method), so that we have many firms in the control groups as many firms in the treated group. With this definition we, then, rerun the analysis in the previous section using the groups of firms defined in the PSM analysis.

Table 7: Differences-in-Differences with Propensity Score Matching for the Brazilian Adoption

	Dependent variable:							
	BM							
	OLS	OLS	Panel	GMM	OLS	OLS	Panel	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Brazil	-0.738***	-0.738***			0.305***	0.316***		
	(0.098)	(0.098)			(0.060)	(0.060)		
Post	0.692***				0.073			
	(0.158)				(0.074)			
BM_{t-1}				0.039				0.038
				(0.076)				(0.074)
ROE					0.048*	0.041	0.023*	0.016*
					(0.027)	(0.026)	(0.013)	(0.010)
Size					0.899***	0.904***	0.378***	-0.046
					(0.014)	(0.014)	(0.095)	(0.125)
Brazil * Post	-0.573***	-0.573***	-0.161*	-0.307**	-0.169	-0.166	-0.188**	-0.304**
	(0.188)	(0.188)	(0.092)	(0.135)	(0.110)	(0.109)	(0.090)	(0.134)
Constant	13.493***	13.351***			-0.067	-0.373		
	(0.081)	(0.141)			(0.218)	(0.228)		
Fixed Effects	No	No	Yes	No	No	No	Yes	No
First Diff.	No	No	No	Yes	No	No	No	Yes
Time Dummies	No	Yes	Yes	No	No	Yes	Yes	No
Industry Eff.	No	No	No	Yes	No	No	No	Yes
Observations	3,522	3,522	3,522	786	3,522	3,522	3,522	786
R^2	0.039	0.042	0.087		0.681	0.689	0.102	
Adjusted R^2	0.038	0.040	-0.177		0.679	0.686	-0.159	
F Statistic	47.905***	19.330***	37.356***		339.678***	286.416***	34.457***	
Sargan Test				77.35***				76.27***
Wald Test (1)				5.37*				7.38
Wald Test (2)				82.10***				81.30***

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses. The Wald Test (1) refers to the joint significance of the models' coefficients while the Wald Test (2) refers to the joint significance of the models' time dummies.

Table 7 presents the results for the Brazilian adopters. As one could infer from the previous analysis where is possible to see the influence of the firms' characteristics, specially size, the matching changes the DID coefficients, even altering some models' significance, although they all remain negative. It is interesting to see the GMM models are the ones with lower differences in the coefficients between tables 3 and 7, as expected, since in these models we control for the previous levels of *BM* making the influence of other variables less salient.

Table 8: Differences-in-Differences with Propensity Score Matching for the Chilean Adoption

	Dependent variable:							
	BM							
	OLS	OLS	Panel	GMM	OLS	OLS	Panel	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Chile	2.628***	2.628***			0.318***	0.296***		
	(0.141)	(0.141)			(0.103)	(0.103)		
Post	(0.141)	(0.141)			(0.103)	(0.103)		
	(0.141)	(0.141)			(0.103)	(0.103)		
BM_{t-1}				-0.107				-0.113
				(0.123)				(0.123)
ROE					0.095	0.097	0.033	0.021
					(0.567)	(0.548)	(0.021)	(0.015)
Size					0.906***	0.913***	0.340***	-0.042
					(0.018)	(0.018)	(0.116)	(0.283)
Chile * Post	0.174	0.174	0.177	-0.154	0.163	0.162	0.166	-0.137
	(0.215)	(0.215)	(0.108)	(0.190)	(0.129)	(0.128)	(0.106)	(0.189)
Constant	15.290***	15.174***			-0.202	-0.358		
	(0.109)	(0.182)			(0.298)	(0.309)		
Fixed Effects	No	No	Yes	No	No	No	Yes	No
First Diff.	No	No	No	Yes	No	No	No	Yes
Time Dummies	No	Yes	Yes	No	No	Yes	Yes	No
Industry Eff.	No	No	No	Yes	No	No	No	Yes
Observations	1,848	1,848	1,848	398	1,848	1,848	1,848	398
R^2	0.261	0.263	0.094		0.754	0.758	0.105	
Adjusted R^2	0.259	0.260	-0.160		0.752	0.755	-0.147	
F Statistic	216.628***	82.163***	21.269***		295.299***	238.368***	18.753***	
Sargan Test				70.50***				70.09***
Wald Test (1)				1.23				3.38
Wald Test (2)				51.50***				49.99***

Note: *p<0.1; **p<0.05; ***p<0.01

BM is the log-distance between the book and market values, Size is the logarithm of total assets, and ROE is the return on the equity index. Clustered standard errors are shown between parentheses. The Wald Test (1) refers to the joint significance of the models' coefficients while the Wald Test (2) refers to

the joint significance of the models' time dummies.

For the Chilean case, analyzing the differences between tables 4 and 8 it is also possible to see some differences due to the matching. However, we must first note that the absence of IFRS effects for Chile is not due to the lower ability to control for firms characteristics, which should be minimized with the matching procedure, since the interaction in all models is still not significant. This result reiterates the need for further investigation on the origins of the differences between the book and market values in Chile. However, it is important to emphasize that analyze the effect of IFRS on the differences between book and market value is not the main objective of this research, but rather to discuss and evaluate different strategies to search for causal effects of IFRS adoption.

5 Concluding Remarks

This research aimed to discuss empirical modelings for studying the effects of IFRS adoption. To do so, we studied the effect of the adoption made by Brazil and Chile in 2010 and 2009, respectively, on the difference between firms' book and market value. The IFRS adoptions by civil law countries usually represents a shift from local accounting standards substantially based on historical cost to more market oriented accounting practices (Hitz, 2007), so adopting the international standards is expected to make accounting numbers more similar to market valuations. Therefore, we developed several specifications of differences-in-differences models to evaluate this issue.

In the analysis we start with a basic OLS differences-in-differences estimations and then incorporate other features in order to relax the models' assumptions and, therefore, minimize the effect of confounding factors, to isolate the effect of IFRS. Specifically, we add fixed effects panel data, dynamic GMM panel data and propensity score matching. The results show that as we add more sophisticated techniques, the effect found for the Brazilian case generally decreases (though remaining negative and significant), indicating, first, that such strategies are important to moderate the effect, and, ultimately, that the effect do exist. However, this cannot be seen for the Chilean case, for which neither specification shows significant results. Therefore, the assumptions underlying empirical models are important to evaluate the statistical and economic significance of the effect of accounting harmonization.

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