

Stefano Bonini, Maurizio Dallochio, Philippe Raimbourg, Antonio Salvi

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# Do firms hedge translation risks?



## Stefano Bonini

Stevens Institute of Technology  
School of Business, Hoboken, NJ, USA

## Maurizio Dalocchio

Università Commerciale «Luigi Bocconi»  
Department of Finance  
Via Roentgen 1, 20122, Milan, Italy

## Philippe Raimbourg

Paris IPanthéon-Sorbonne University,  
ESCP-EAP, Finance & Regulation,  
PRISM, Sorbonne Paris, France

## Antonio Salvi

LUM «Jean Monnet» University, Bari, Italy

### Abstract

Using a sample of 622 companies in 25 countries over a four-year period (2003-2006), we investigate the translation risk hedging strategy of multinational companies. We find that a significant percentage of companies (47%) actively manage their translation risk. Hedgers are dominant in northern Europe, whereas non-hedgers prevail in southern Europe, South America and Asia. A credit rating significantly increases the likelihood of initiating and maintaining a hedging policy, as firms try to avoid translation losses that may increase leverage ratios and thus affect their rating. Accounting principles are also important because IFRS adopters hedge more than companies reporting exclusively through national principles. Hedgers adopt a variety of instruments from balance sheet hedging to derivatives. Derivatives are more common among United States GAAP adopters, whereas loans and mixed solutions are preferred among multinationals either adopting IFRS or local accounting principles. Our results show that the translation risk hedging decision is a long-term, persistent choice by companies.

**Keywords:** Translation risk; hedging; derivatives.

**JEL Codes:** F23; G31.

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## 1 Introduction

Exposures to foreign currency typically occur in three distinct forms: transaction, economic and translation exposure. Transaction and economic risks are associated with potential changes in the value of the cash flows of an underlying asset or transaction

*Corresponding author:* Stefano Bonini, sbonini@stevens.edu, Stevens Institute of Technology – School of Business, 1 Castle Point on Hudson, 07030, Hoboken, NJ, USA. Ph. +1 201 216 3528.

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denominated in a foreign currency and originated by fluctuations in the exchange rate. In contrast, translation (or accounting) exposure arises when financial statements of foreign affiliates are restated in the parent's currency for financial statements consolidation purposes<sup>1</sup>. A multinational corporation (MNC) must periodically re-measure all of its global operations into a single currency for reporting purposes. This requires that balance sheets and income statements of all affiliate operations worldwide be translated and consolidated into the currency of the parent company. Imbalances resulting from currency translation can potentially affect either the firm's reported consolidated income or the reported capital base. Therefore, companies exposed to translation risk may engage in translation risk-specific hedging practices. In this paper, we investigate whether firms do actually hedge this risk, and if they do so, what drives the hedging decision and the selection of hedging instruments.

The translation of financial statements of foreign operations or affiliated entities into the parent company currency can be performed in several ways. Under the *current rate method* (the primary one mandated under US GAAP<sup>2</sup> and IFRS<sup>3</sup>), all assets and liabilities, both monetary and non-monetary, are translated at the closing (balance sheet date) rate, which simplifies the process as compared to other methods. Resulting exchange differences should be classified as a separate component of equity (the cumulative translation adjustment, or CTA) of the reporting enterprise until the disposal of the net investment in a foreign entity. This method is closer to the viewpoint of investors, who are generally more sensitive to the current FX rate rather than the historical one. In contrast, under the *temporal method*, the difference between the net income on the balance sheet and the net income on the income statement is recorded on the income statement under foreign exchange gains and losses.

Although it is generally agreed that translation exposure management is of a lesser concern than that of transaction and economic exposure, the question of whether to hedge the translation exposure remains contentious. On the one hand, as suggested by Glaum (1988), it is argued that translation risk does not «render useful information to the corporate financial manager and its application can lead to harmful decisions» and that it is undesirable to spend cash and risk losses to protect against reserve movements («paper profits»). This approach is supported by the findings in Pramborg (2004) showing that translation exposure hedging does not seem to add value to shareholders. On the other hand, translation exposure is claimed to be a non-negligible risk that affects the reserves of a company. Hagelin and Pramborg (2004) show that translation exposure hedging is a risk management strategy worth pursuing because translation exposure approximates the economic exposed value of future cash flows from operations in foreign

<sup>1</sup> Translation risk is accurately defined and disciplined in the leading accounting principles. For example, according to FAS Statement No. 52 (Paragraph 4), «The financial statements of separate entities within an enterprise, which may exist and operate in different economic and currency environments, are consolidated and presented as though they were the financial statements of a single enterprise. Because it is not possible to combine, add, or subtract measurements expressed in different currencies, it is necessary to translate into a single reporting currency those assets, liabilities, revenues, expenses, gains and losses that are measured or denominated in a foreign currency».

<sup>2</sup> SFAS No. 52.

<sup>3</sup> IFRS No. 21.

subsidiaries (i.e., economic exposure). Consequently, translation exposure hedging also reduces economic exposure.

Four arguments are generally put forth to justify the relevance of translation hedging policies. First, the translation exposure may affect companies' reserves and create losses in case of foreign subsidiaries disposal. (Collier *et al.*, 1990; Madura, 2003; Hagelin and Pramborg, 2004). Second, managerial compensation could be based on post-translation financial ratios. During periods of appreciation of the consolidation currency, the managers of subsidiaries may feel that they are being unfairly held accountable for the movement of currencies rather than being held accountable for their ability to manage and grow the operations. Thus, they could embrace an asymmetric attitude to risk, expressed in terms of greater willingness to avoid open net asset exposure in weak currencies than to exploit long net asset exposure in strong currencies (Rodriguez, 1981; Khoury and Chan, 1988; Collier *et al.*, 1990; Hakkarainen *et al.*, 1998). Third, companies may need to protect consolidated reported earnings. In recent years, a number of major multinational firms have discovered that they can protect the reported value of foreign earnings by hedging them, especially for those being obliged to prepare quarterly reports. For example, in 2003, a number of major European multinationals grew increasingly concerned over the depreciation of the dollar. Given the generally significant contribution of profits earned in dollars to total profits, the depreciation of the dollar resulted in the deterioration of reported earnings per share (Dhanani and Groves, 2001; Hagelin, 2003; Nazarboland, 2003). Fourth, MNCs could be interested in preserving the integrity of balance sheet ratios, particularly if the company has to honor financial covenants or other restrictions imposed by creditors. Firms experiencing continuous translation losses may experience deteriorating leverage and profitability ratios. To the extent that this process leads to an increase in the cost of debt financing, it could also affect the value of the firm (Dhanani and Groves, 2001; Hagelin, 2003; Eiteman, Stonehill and Moffet, 2004; Kisgen, 2006; 2007).

In this paper, we try to understand *if, how* and *why* companies hedge translation risk. In doing so, we add to the previous literature in several ways. First, previous research has focused on evidence deriving from either a single country or, at best, only a few countries generally adopting similar accounting principles (see Nazarborland, 2003; Hagelin and Pramborg, 2004; Pramborg, 2004). In this paper, we perform our analysis on a sample of 25 different countries belonging to 4 economic areas and characterized by 4 different accounting rules. Second, the existing literature predominantly uses a single-year analysis. We believe it is relevant to understand not only the static decision of hedging the translation risk but also its inter-temporal evolution. For this reason, our analysis targets a four-year window (2003-2006) that also captures a relevant phenomenon (i.e., the compulsory adoption of the IFRS principles by European companies in 2005). Because information on translation risk hedging cannot be obtained from typical financial data providers, previous research has relied primarily on survey-based data (see Hagelin and Pramborg, 2004; Pramborg, 2004). In our paper, we manually collect and inspect financial statements for 622 companies using a four-year window. Our approach is similar to Clark and Judge (2007) and Bartram *et al.* (2009). However, Clarke and Judge (2007) restrict the analysis only to UK firms during a single year (1995), whereas Bartram *et*

*al.* (2009) only look at the use of financial derivatives from a local perspective during a single-year study.

Our results show that approximately half of the companies worldwide (47%) choose to hedge the translation risk. Hedgers are dominant in northern Europe, whereas non-hedgers prevail in southern Europe, South America and Asia. We also find that a key determinant of the hedging decision is the firm's credit rating. Moreover, IFRS adopters hedge more than multinationals that adopt exclusively national principles. With regards to the hedging instruments, the relative majority of companies prefer internal hedging by borrowing in foreign subsidiaries' currencies. Derivatives are more common among US GAAP adopters, whereas loans and mixed solutions are preferred among multinationals adopting either IFRS or local accounting principles. The remainder of this paper is organized as follows: Section 2 summarizes the main results of the literature on hedging translation exposure, Section 3 presents the research design and Section 4 illustrates the main results. Section 5 discusses the managerial implications, and Section 6 concludes.

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## 2 Literature review and research propositions

Modigliani and Miller (1958) show that firm's value and financial policy decisions are unrelated in the absence of market imperfections. However, empirical evidence suggests that firms actively hedge financial risks. The extant theoretical literature argues that corporate hedging is a rational, value-enhancing decision due to different sources of market imperfection.

**Costs of financial distress.** A firm experiencing continual translation losses accumulating in its equity accounts may see deteriorating leverage ratios. To the extent that this leads to (1) a more rapid exhaustion of the borrowing capacity and/or (2) to an increase in the firm's cost of debt, translation exposure may have a negative impact on the value of the firm. If translation losses deteriorate leverage ratios, the probability of default will increase. This, in turn, will lead to an increase in the cost of debt and to a decrease of the value of the firm. The probability of hedging the translation risk should thus be higher for firms with a higher probability of default. Smith and Stulz (1985) provide a complete analysis of the determinants of hedging policies that covers the issues of bankruptcy costs and costs of financial distress.

Following this argument, we conjecture that the translation exposure hedging decision may be correlated to the default risk. Measuring the probability of default with the rating attributed by the two major rating agencies – Standard & Poor's and Moody's – we expect that (1) rated companies hedge more than unrated companies because of their need to preserve adequate financial ratios and (2) low-rated companies hedge more than high-rated companies because of their relatively greater need to preserve adequate financial ratios.

**Underinvestment.** The shareholder-value maximization paradigm suggests that hedging can increase firm value by alleviating the underinvestment problem associated with costly

external financing. Myers (1977) shows that issuances of claims with higher priority than equity create incentives for the firm's equity holders to underinvest. Because firms with more valuable growth opportunities *and* higher leverage are more likely to be affected by the underinvestment problem, these firms are also more likely to hedge. An extensive body of research has tested these two conjectures. Looking at the relationship between growth opportunities and underinvestment, previous studies (see, for example, Smith and Stulz, 1985; Mian, 1996 and Allayannis and Weston, 2002) find limited support for the expected positive relationship. Stulz (1990, 1996) and Froot, Scharfstein and Stein (1993) discuss the relationship between leverage and hedging. The authors show that costly external financing is a market imperfection that makes hedging a value-enhancing strategy. The more leveraged a firm is, the greater the likelihood that managers will forego risky projects even if they could create value. The underinvestment problem theoretically affects all leveraged firms, but it is more serious when firms land in financial distress. Hedging or risk management adds value because it helps ensure that the corporation has sufficient funds available to take advantage of attractive investment opportunities.

Along this line, we argue that hedging the translation risk can help mitigate the underinvestment problem by reducing the cost of obtaining external funds (via the conservation of adequate financial ratios). Accordingly, firms with higher leverage should be more willing to hedge to avoid the consequences of deteriorating financial ratios on the cost of capital. We use the leverage (gearing) ratio defined as the book value of debt divided by the book value of equity<sup>4</sup> to examine the expected positive relationship between the probability of hedging and leverage.

**Accounting principles.** Following Madura (2003), we explore the hypothesis that the hedging decision could be affected by the accounting principles adopted in the consolidated accounts. An MNC's degree of translation exposure could, in fact, be affected by the accounting procedures it uses to translate when consolidating financial statement data. We have grouped the accounting principles into four major groups: national principles, IFRS, US GAAP and mixed (a mix of national principles and IFRS or US GAAP). A related issue is the possible effect of mandatory audit rules prevailing in one country. The quality of the appointed auditor may affect firms' disclosure levels, the transparency and the share-price efficiency. Arguably, translation hedging choices may then be affected by the quality of the audit firm. We use this information to control the accounting principles-related results.

**Other determinants.** Other determinants have been suggested to explain companies' hedging policies. Diamond (1981) shows how hedging makes it possible for investors to evaluate managerial performance more effectively. DeMarzo and Duffie (1991) and Breeden and Viswanathan (1998) also show that hedging is valuable because of information asymmetries between managers and shareholders. Unfortunately, we were not able to effectively test the effects of shareholders composition on the hedging decision because

<sup>4</sup> The use of book value of equity instead of market value is in accordance with Graham and Rogers (2000) and is motivated by our interest in financial rather than economic distress.

data about the composition of shareholders were available only for a few of the countries considered in our sample. Leland (1998) provides a model where hedging increases firm value because it increases the tax benefits from debt. Ross (1997) also models the tax benefits of hedging. However, current translation practices do not affect any item of the income statement (exchange differences are classified as a separate component of equity named the cumulative translation adjustment, or CTA) and are therefore tax-neutral. Because current rate methodologies are adopted in some way by all countries in our sample, we do not test this hypothesis.

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### 3 Sample composition and description

Information on translation risk hedging cannot be obtained from typical financial data providers because accounting entries represented in databases like Datastream or Compustat do not allow to isolate translation-risk specific items and instruments, a common weakness of existing studies on translation risk hedging decisions is the narrow scope of the analysis. Previous research has relied primarily on survey-based data. Nazarborland (2003) focus only on UK companies, whereas Pramborg (2004) and Hagelin and Pramborg (2004) investigate a one-year sample of Swedish firms. Clark and Judge (2007) and Bartram *et al.* (2009) try to offer more general results by hand-collecting information from yearly statements. Unfortunately, their approach restricts the analysis only to UK firms during a single, rather distant year, i.e. 1995.

We believe that these approaches have relevant limitations because companies may be affected in their hedging decision by a large number of determinants that cannot be captured by looking at only one year and/or a single country. Accounting principles, local culture and government rules can all affect the propensity of hedging and the choice of tools, both for standard economic and operating risk and for translation risk. In this paper, we try to provide a broader view on this topic by manually collecting and inspecting complete financial statements (including footnotes) for 622 companies incorporated in the 25 largest stock markets worldwide over a four-years window. This approach allows us to report and use the information officially disclosed by companies about the hedged items and the associated techniques and instruments. As an example, consider the following excerpt from the AGFA 2006 annual report (p. 124): «The Group utilizes US Dollar denominated bank loans in order to hedge the foreign currency exposure of the Group's net investment in its subsidiary in the United States.»

Countries in the sample are representative of five different families of accounting systems, namely, Anglo-American, Nordic, Germanic, Latin and Asian, according to the classification in Radebaugh and Gray (2002). This large scope of representation of accounting standards is important due to the structural disclosure and policy differences across standards as reported in Appendix A1. Similarly, companies in our sample report in 13 different currencies including all five major currencies (i.e., the US dollar, the euro, the British pound, the Japanese yen and the Swiss franc).

The data collection process started when we selected companies included in the large-cap indices of 25 countries: Austria, Australia, Belgium, Brazil, Canada, Denmark,

**Table 1:** Sample Descriptive Statistics

Country	Region	Accounting Principles Family	Index	Companies	%	Observations	%
Australia	Asia	Anglo-American	S&P / ASX20	12	1.93	34	1.80
Austria	Europe	Germanic	ATX 20	21	3.38	56	2.96
Belgium	Europe	Latin	BEL 20	12	1.93	39	2.06
Brazil	South America	Latin	IBrX50	11	1.77	30	1.58
Canada	North America	Anglo-American	S&P / TSX 60	45	7.23	130	6.86
Denmark	Europe	Nordic	OMXC 20	20	3.22	53	2.80
Finland	Europe	Nordic	HEX 25	26	4.18	81	4.28
France	Europe	Latin	CAC40	38	6.11	116	6.12
Germany	Europe	Germanic	DAX 30	28	4.50	95	5.02
Greece	Europe	Latin	ATEX 20	13	2.09	39	2.06
Hong Kong	Asia	Anglo-American	HANG SENG 45	15	2.41	45	2.38
India	Asia	Anglo-American	BSE30	16	2.57	45	2.38
Ireland	Europe	Anglo-American	ISEQ 20	15	2.41	55	2.90
Italy	Europe	Latin	MIB30	19	3.05	52	2.75
Japan	Asia	Asian	TOPIX Core30	26	4.18	68	3.59
Luxembourg	Europe	Germanic	LuxX 11	3	0.48	12	0.63
Mexico	South America	Latin	IPC 35	18	2.89	52	2.75
Netherlands	Europe	Nordic	AEX 25	29	4.66	71	3.75
New Zealand	Asia	Anglo-American	NZSX 50	26	4.18	71	3.75
Portugal	Europe	Latin	PSI 20	17	2.73	41	2.16
Spain	Europe	Latin	IBEX 35	25	4.02	79	4.17
Sweden	Europe	Nordic	OMX 30	21	3.38	75	3.96
Switzerland	Europe	Germanic	SMI 20	17	2.73	62	3.27
UK	Europe	Anglo-American	FTSE 100	72	11.58	233	12.30
USA	North America	Anglo-American	S&P 100	77	12.38	260	13.73
Total			886	622	100.00	1894	100.00

This table reports summary statistics for the sample. The first two columns report the country and its geographical region classification. The third column reports the accounting principles family according to the Radebaugh and Gray (2002) classification. The fourth column reports the country's Large Cap Index name and composition. The fifth and sixth columns report the number of companies included in the index that have been included in the final sample and the percentage distribution on the final sample. The seventh and eighth column report the total number of yearly observation and the percentage distribution on the final sample.

Finland, France, Germany, Greece, Hong Kong, India, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, the UK and the United States. We choose to focus on companies included in large-cap indices for two reasons: first, the larger and more consistent availability of complete financial statements (i.e., including notes to financial statements where information on translation hedging is reported); second, because large-cap companies are more likely to be exposed to international risks, to be rated and to be more financially sophisticated.

From the initial population of 886 companies, we have excluded:

- Financial companies and pure financial holdings. Financial firms have different exposure patterns and measure exposure differently;
- Domestic companies (i.e., companies with less than three foreign subsidiaries or having less than 20% of sales generated in non-functional currencies);
- Companies for which at least one complete annual report (including detailed notes) was not available.

The final sample is shown in Table 1 and includes 1,894 firm-year observations for 622 companies, distributed over the period 2003-2006.



**Table 2:** Yearly distribution and presence in the sample

Panel A		
Year	Observations	%
2003	499	26.35
2004	483	25.50
2005	458	24.18
2006	454	23.97
Total	1894	100.00
Panel B		
Number of years	Companies	%
1	112	18.01
2	86	13.83
3	86	13.83
4	338	54.34
Total	622	100.00

This table shows the yearly distribution of observation and the number of years of presence in the sample of the companies considered in the analysis. PANEL a shows the yearly number of observations and relative frequency on the overall sample. PANEL B shows the number of companies that appear in the sample once (first row), twice (second row), thrice (third row) or appear for all four years (fourth row).

The countries' representation is not uniform; this is due essentially to the different composition of stock-market indices. For example, the US index has 100 constituents, and the United States is the market with the highest representation. On the other end of the spectrum, the Luxembourg LuxX index includes only 11 companies; not surprisingly, this is the least-represented country. Other countries with a remarkable presence are the UK (233 firm-year observations), Canada (130) and France (116). However, the different numerical composition of the country indices has a limited impact on the sample concentration, as the highest frequency of observations is 13% for US data.

Table 2 reports the time characteristics of the sample. The distribution of observations across years is almost uniform, which reduces the risk of year-specific effects on the empirical analysis. In Panel B, we look at the distribution across time of companies in our sample. 388 companies, or over 54% of our sample, are represented for the full length of the sample (i.e., we were able to collect financial information for these companies for all four years). In contrast, we have data for one to three years for 46% of the sample. Because our sample selection process includes companies only if they exceed a threshold with regards to the degree of internationalization, this evidence is not due to the changing nature of companies but to changes in the index constituents year on year.

Because industry-specific factors may affect the sensitivity to the translation risk, we have classified companies in our sample in 11 3-digits SIC codes, which allows us to obtain a balanced but informative industry breakdown that we use for robustness checks. The resulting concentration on a single industry is acceptable given that the most represented industry (Services) makes up about 22% of the sample. Industry distribution is reported in Appendix A-2.

We obtained information on the ratings of the companies included in the sample from Standard & Poor's and Moody's databases. It is common for rated companies to have multiple ratings measuring the risk of individual security issuances (e.g., a specific bond and commercial paper). This evidence may generate a selection bias in our data:

**Table 3:** Sample summary statistics

	Obs.	Mean	St. Dev
ROE	1411	20.40	29.90
ROCE	1820	12.26	13.28
Total Revenues	1864	15,321.40	29,870.84
Operating Profit (%)	1428	13.21	14.04
Foreign revenues (%)	1788	50.58	32.84
Book Value of assets	1836	20,544.82	41,458.04
Book value of equity	1836	6,720.92	12,550.87
Total debt	1867	7,903.30	30,931.92
Capital Gearing (%)	1424	0.40	0.24
Quick ratio	1813	1.08	0.92
Market Value	1854	18,153.90	33,005.46
Free Float	1816	70.59	23.05
Beta	1794	0.96	0.45

This table presents summary statistics on the financial and market data of the companies included in our sample for the full four years of analysis. All measures are company averages. ROE is the return on equity; ROCE is the return on capital employed; Total revenues are the total revenues in million of euros converted in euro at the end-of-year exchange rates; Operating profit is the ratio of operating profit over sales; Foreign revenues is the fraction of revenues generated by foreign operations; Book value of assets, Book value of equity and total debt are in million of euros converted in euro at end-of-year exchange rates; Capital gearing is the ratio of Book value of equity over Total debt; Quick ratio is the ratio of current assets over current liabilities; Market value is the stock market value of equity in million of euros converted in euro at end-of-year exchange rates; Free float is the fraction of equity held by non controlling investors; Beta is the company's equity beta calculated at year end.

because multiple ratings exist simultaneously, choosing a rating associated with a specific security may offer poor or misleading information on the hedging strategy of the company, which encompasses all exposures. For this reason, rating data have been collected at the company level. More specifically, for Standard and Poor's, we have gathered the «issuer credit rating», which is «the current opinion of an obligor's overall financial creditworthiness» (Standard and Poor's, 2008). Similarly, for Moody's, we have adopted the «issuer ratings», which are defined as «opinions of the ability of entities to honor senior unsecured financial obligations and contracts [...] on its general long-term and short-term scales» (Moody's, 2008).

Financial and market data were obtained from Datastream and, where applicable, converted in euro at the end-of-year exchange rate for comparability purposes. While converting accounting data for non-euro based firms can be a source of potential distortion in the data, all our analyses are run using ratios, therefore they should be fairly robust to cross-currencies tests. Table 3 reports summary statistics for our sample.

Companies are characterized by a good profitability and an unsurprising financial consistency, as shown by the high operating profit, ROE and ROCE ratios and by the quick ratio, which hovers well above one. Similarly, average capital gearing and total debt are relatively low, at 40% and 8 billion, respectively. Ownership concentration is limited, with more than 70% of shares freely floating in the market. Companies are generally low to medium risk, with an average beta of 0.96, where beta is obtained from Bloomberg that computes beta through a 52 weeks market model.

## A. Descriptive statistics

Looking at the translation hedging policy, the data reported in Table 4 show that the current method is by far the most common methodology adopted by 94% of the com-

**Table 4:** Translation methodology, hedging decision and hedging instruments

Panel A		
	Obs.	%
Current Method	424	93.39
Temporal method	17	3.74
Mixed	1	0.22
Unspecified	12	2.64
Panel B		
	Obs.	%
No	1009	53.27
Yes	885	46.73
Total	1894	100.00
Panel C		
Hedging instrument	Obs.	%
Loans	321	36.27
Derivatives	170	19.21
Derivatives and loans	256	28.93
Not specified	138	15.59
Total	885	100.00

This table presents summary statistics on the translation methodologies and hedging choices for the firms in our sample. Panel A reports the translation methodology adopted by firms in 2006 Annual Reports. Panel B reports the distribution of the hedging choice for all firms in our sample over the years 2003-2006. Panel C presents the distribution of hedging instrument(s) over the years 2003-2006 for all firms in the sample.

panies, followed by the temporal method adopted by all other companies but one that states the adoption of a «mixed» methodology.

However, this seems not to be a factor in determining the translation risk hedging decision because the majority of companies in the sample (53%) report no translation risk hedging. Companies that choose to remain exposed to translation risk share the view that such an exposure is immaterial and need not be hedged. The remaining 47% of observations are made up of companies that chose to adopt and report a specific policy of managing the accounting exposure. These findings are in line with Nazarboland (2003), who reports that «there exist very big differences as to the degree of importance companies place on hedging translation exposure [...] a great number of corporations are of the view that such an exposure is immaterial and needs not to be hedged». Similar conclusions are reached by Collier *et al.* (1990). These first findings confirm the idea suggested in the literature that hedging translation risk is viewed as undesirable because the cash spent on it and the risk of losses barely compensate reserve movements.

When multinationals decide to hedge translation risk, they must also choose the instruments that they want to use to manage their exposure. Generally, translation risk hedging instruments can be partitioned into three broad categories:

- Loans. A company using loans has the objective of reaching an equal amount of exposed foreign currency assets and liabilities on its consolidated balance sheet. This practice is known as internal or balance sheet hedging, following a standard textbook definition. In fact, Mc Guigan *et al.* (2010) defines internal hedges as follows: «To reduce the potentially wide swings in cash flows and net assets resulting from currency fluctuations, companies use financial hedges and internal hedges. *Internal hedges* may be either operating hedges or balance sheet hedges. Operating hedges [...] In contrast,

balance sheet hedges address primarily translation risk exposure by matching assets and liabilities in various countries and their respective currencies». Accordingly, we will use balance sheet hedging and internal hedging as substitutes throughout the paper. The economic effect of this approach is that any change in exchange rates will affect the value of exposed liabilities in an equal amount but in an opposite direction to the change in value of exposed assets<sup>5</sup>. Balance sheet hedging is achieved by raising ad-hoc loans denominated in the foreign currency to which the company is exposed<sup>6</sup>. Thus, the convenience is provided by the relative borrowing costs (foreign currency borrowing costs *vs.* parent currency borrowing costs). If foreign currency borrowing costs, after adjusting for foreign exchange risk (and assuming that the covered interest parity does not perfectly hold), are higher than parent currency borrowing costs, then balance sheet hedging is costly, and vice versa.

- Derivatives. MNCs can use forward (or futures) contracts to hedge translation exposure. For example, they can sell a currency forward denominated in the same currency as that of the foreign subsidiary reported earnings. By doing so, they generate a cash outflow in that currency to offset the cash inflows received in the same currency.

- A combination of 1 and 2.

Table 4, Panel C reports summary statistics on the hedging instruments adopted by the firms in our sample. From a methodological perspective it is important to highlight that this information has not been obtained from standard balance sheet items but has been pinpointed by inspecting financial statements footnotes. As such we were able to isolate the amount of debt and/or derivatives specifically devoted to translation risk hedging thus avoiding the risk of false identification<sup>7</sup>. The relative majority of companies (36%) choose internal hedging (i.e., they borrow in the currency of the local subsidiaries, whereas only 18% preferred to exclusively use derivatives). Twenty-nine percent of the companies in the sample report the use of a mix of loans and derivatives. It is interesting to note that there are several companies (16% of the sample) that do not disclose the choice of the hedging instrument in their annual reports, although they state having a translation risk hedging policy in place. The preference for internal hedging is in line with Nazarboland (2003), whose findings show that matching overseas assets and borrowings in the relevant currencies (natural hedging) is the most preferred method.

These findings seem to support the intuition in Fink (2003, p. 1): «When it comes to currency risk, companies are going natural. No, that doesn't mean they're exposing themselves completely to risk. They are forsaking derivatives for natural hedges – matching revenues and costs for the same currency or offsetting losses in one currency with gain in another».

<sup>5</sup> It is interesting to note that «complete monetary balance cannot be achieved under the current rate method, because total assets would have to be matched by an equal amount of debt, but the equity section of the balance sheet must still be translated at historic exchange rates.» (Eiteman, Stonehill and Moffett, 2004, p. 283).

<sup>6</sup> These loans are ad-hoc and as such add up to the existing debt denominated in any currency and raised for ordinary financing purposes.

<sup>7</sup> For example falsely attributing foreign currency borrowing reported in balance sheets to translation risk hedging when the rationale for borrowing was actually different, e.g. cheap foreign interest rate and/or the purchase of assets in the foreign currency.

We identify four possible motivations for foreign currency loans vs derivatives hedging preference:

1. Most MNCs have centralized their treasury operations, at least on a regional basis. This allows risk managers to obtain a more accurate picture of the inter-company currency flows and assess the extent of viable natural hedges.

2. The cost of derivatives can become prohibitive if they are used extensively and non-negligible transaction costs are associated with the negotiation of financial derivatives (Nance, Smith and Smithson, 1993). Moreover, organizing the cash management function to include risk management activities involves significant fixed costs (Dolde, 1993 and Wharton/Chase, 1995). Some companies do not want to run the risk that hedging all items with derivatives lead to costs greater than those of un-hedged exposures.

3. There are relevant differences between reporting interest income and expenses and reporting exchange rate gains and losses. Interest income and expenses associated with hedging exposures in the money market are reported with all the other sources of income and expenses of the company. Gains and losses in forward (and other derivatives) contracts are reported with foreign exchange gains and losses – a distinct account. Because we know that managers are reluctant to report «exchange losses» for career concerns (e.g., De Marzo and Duffie, 1995), this may have deterred the use of derivative contracts in many cases.

4. Other derivatives drawbacks include inaccurate earnings forecasts and the risk of imperfect hedging, inadequate forward contracts for some currencies, and tax treatment of gains and losses on forward contracts.

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## 4 Methodology and Results

Our analysis is focused on the translation risk hedging decision of listed companies. Most of the previous literature has investigated the hedging decision as a binary item (hedgers vs. non-hedgers). However, once the decision has been made, different drivers can support the choice of the hedging instrument. Our dataset provides information not only on the hedging decision per se but also on the type of selected hedging strategy. Accordingly, we adopt a standard binomial logistic regression approach when looking at the binary decision of hedging the translation risk and a multinomial logistic regression approach when investigating the hedging strategy adopted.

Under these assumptions, we estimated the following models:

Logistic regression:

$$(1) \quad p_i = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_{1i} + \dots + \beta_k x_{ki})}}$$

Multinomial logistic regression:

$$(2) \quad P\{y_i = j\} = \frac{e^{(x_i \beta_j)}}{1 + \sum_j e^{(x_i \beta_j)}}$$

**Table 5:** Degree of persistency of the hedging decision

	2004 Hedge	2005 Hedge	2006 Hedge	2006 Hedge	ALL Hedge	IFRS Hedge
Intercept	-1.396*** (0.159)	-1.381*** (0.167)	-1.704*** (0.198)	-1.031*** (0.172)	-1.827*** (0.177)	-0.807*** (0.223)
Hedge 2003	2.915*** (0.242)		2.589*** (0.270)		2.634*** (0.364)	
Hedge 2004		2.773*** (0.243)				
Hedge 2005			3.715*** (0.301)			
Hedge 2006					3.837*** (0.268)	
N	453	425	388	336	504	195
Pseudo R <sup>2</sup>	0.299	0.278	0.433	0.245	0.446	0.250
Count R <sup>2</sup>	0.810	0.800	0.863	0.780	0.869	0.762
Chi <sup>2</sup>	187.3***	163.4***	233.01***	113.97***	311.38***	65.81***

This table shows the results from binary logistic regressions of the probability of hedging the translation risk in one year, conditional on being already hedged in the previous year(s). The analysis covers the period 2003-2006. The first column, for example, shows the probability of confirming the choice of hedging the exposure in 2004, knowing that in 2003 the company had already decided to hedge. The second, third, and fourth columns show similar comparisons regarding 2005 vs. 2004, 2006 vs. 2005 and 2006 vs. 2003, respectively. The fifth column shows the comparison of the each year's observation with the previous year's. Finally, the last column shows the probability of hedging of companies adopting the IFRS in 2006 but other principles in 2003. Robust standard errors are reported below each coefficient (in parentheses). Statistical significance is denoted by \*, \*\*, and \*\*\* to represent 10%, 5%, and 1% significance, respectively.

where for the  $i$ -th observation,  $y_i$  is the observed outcome and  $X_i$  is a vector of explanatory variables  $x_i$ . The unknown parameters  $\beta_j$  are maximum likelihood estimators.

## A. Persistency

As a first step in our logistic analysis, we have investigated the «degree of persistence» of the hedging decision (i.e., whether the decision to hedge tends to be temporary – and thus volatile – or persistent over time). The results in Table 5 show that the hedging decision is remarkably stable, as measured by the probability of hedging at  $t + 1$  conditional on hedging at  $t = 0$ , suggesting a significant stickiness over time of hedging policies<sup>8</sup>.

This finding suggests that multinationals interested in translation exposure also choose to manage it because they have long-term or strategic objectives around which their policy is set.

We have then examined whether the adoption of the IFRS in the European Union affects the hedging propensity of companies. The first year of compulsory adoption of the IFRS by the European companies was 2005. This changeover represents a unique opportunity for checking whether the change of accounting principles can change the attitude of companies toward the management of financial risks. The timeframe of our sample allows a comparison between the pre-adoption year of the IFRS (2003) and the post-adoption year (2006). Accordingly, we have compared the sub-sample of 147 companies that adopted the IFRS in 2006 while at the same time adopting other principles in 2003. The final column in Table 5 reports the outcome of this analysis; similar to the results obtained with the entire sample, the adoption of the IFRS does not seem to have

<sup>8</sup> The strong persistence of the hedging decision in our sample implies less of a need to use panel data analysis because the additional information provided by the analysis of the time effects of the sample is limited.

**Table 6:** Hedging decision by accounting system and geographical area

Panel A								
	1	2	3	4	5			
Intercept	-0.511*** (0.113)	-0.258*** (0.089)	-0.155* (0.086)	0.017 (0.093)	-0.123 (0.083)			
AngloAmerican	0.716*** (0.165)							
Nordic		0.467** (0.224)						
Germanic			-0.262 (0.262)					
Latin				-0.865*** (0.201)				
Asian					-2.922*** (1.027)			
N	610	610	610	610	610			
Pseudo R <sup>2</sup>	0.023	0.005	0.001	0.023	0.023			
Count R <sup>2</sup>	0.592	0.562	0.546	0.552	0.546			
Chi <sup>2</sup>	18.94***	4.39**	1.01	19.57***	19.42***			
Panel B								
	1	2	3	4	5	6	7	8
Intercept	-0.271*** (0.091)	-0.139* (0.083)	-0.524*** (0.133)	-0.524*** (0.094)	-0.005 (0.103)	-0.121 (0.110)	-0.089 (0.084)	-0.197** (0.083)
North America	0.338* (0.204)							
South America		-1.981*** (0.617)						
Europe			0.519*** (0.168)					
North Europe				1.515*** (0.217)				
South Europe					-0.519*** (0.168)			
Euro Area						-0.181 (0.163)		
Asia							-1.564*** (0.374)	
Oceania								-0.121 (0.339)
N	617	617	617	617	617	617	617	617
Pseudo R <sup>2</sup>	0.003	0.019	0.011	0.065	0.011	0.001	0.027	0.000
Count R <sup>2</sup>	0.558	0.551	0.551	0.650	0.551	0.551	0.551	0.551
Chi <sup>2</sup>	2.75*	16.16***	9.62***	54.73***	9.62***	1.24	22.93***	0.130

This table shows the results of a set of binary logistic regressions estimating the probability of hedging the translation risk at the last available year as a function of accounting systems according to Radebaugh and Gray (2002) and of geographical areas. Panel A reports estimates for the effect of the accounting systems defined in Radebaugh and Gray (2002) and reported in Table A1. Panel B reports estimates for the different geographical areas. Each region is a dummy variable that assumes a value of 1 if single observations belong to the specified area, 0 elsewhere. North America includes USA and Canada. South America includes Brazil and Mexico. Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, Switzerland, UK. Asia includes Hong Kong, India and Japan. Oceania includes Australia and New Zealand. North Europe includes Finland, Ireland, Sweden, UK. South Europe includes all countries of Europe except countries of North Europe. Robust standard errors are reported below each coefficient (in parentheses). Statistical significance is denoted by \*, \*\*, and \*\*\* to represent 10%, 5%, and 1% significance, respectively.

changed the attitude of MNCs toward the management of accounting risk. These findings reinforce the idea that the hedging decision is a long-term strategic decision that is mainly taken for «structural» reasons, rather than being a decision affected by contingent events.

In Table 6, we investigate the possible existence of effects originated by the accounting standards families defined in Table A1 or by regional characteristics running regressions

on the 5 accounting families and the 8 regions in our sample. We also run single country regressions and report them in Appendix A-3.

Our findings show that the probability of hedging is sharply unevenly distributed. On one hand, Anglo-american and Nordic systems show a positive effect on the likelihood of hedging while Latin and Asian systems do have a negative effect. However, there are significant, within-accounting-family differences as, for instance, Oceanic countries that fall in the Anglo-american family do not have any significant impact on the likelihood of hedging. Similarly countries in the Nordic family have inconsistent behaviors with Netherlands for instance, showing a negative effect on hedging that is more aligned with that of Southern European countries that adopt either Latin or Germanic systems that have a negative effect on the likelihood of hedging. The regional level regressions in Panel B seem to offer a more consistent evidence. We record a positive effect in northern European countries (i.e. Finland, Sweden, UK and Ireland) that is aligned with the estimates for Anglo-american and Nordic accounting systems but more homogeneous as a result. Southern Europe as well seem to be more adequately grouped and shows a negative effect. The Asian group is negative and lead by the strong negative effect of Japan and the insignificance of HK and India. South America and North America show opposite estimates as expected given the prevalence of Latin accounting systems in southern American countries. This evidence suggests that the effects on the hedging decision of the accounting standards seem to be more accurately captured at the country level and, more strongly so at the regional level rather than by a broader accounting system family grouping approach as in Radebaugh and Gray (2002). For this reason in the following tests, we will adopt the regional grouping as one of the fixed-effects control and introduce an independent variable represented by the adoption of national accounting principles to control for accounting-principles-related effects. Finally, we have also examined the probability of hedging conditional on the annual volatility of the functional currencies<sup>9</sup> but results do not exhibit any statistically significant relationship.

## B. Hedging and rating

In Table 7, we report the results for a set of univariate and multivariate logistic regressions testing the effects of rating on the hedging propensity of multinational companies.

Column 1 shows the likelihood of hedging conditional to the company being rated. The parameter sign is positive and strongly significant, indicating that credit ratings do affect the propensity of MNCs to hedge. In particular, rated companies are 33% more likely than non-rated companies to hedge the translation risk. We believe that this result can be at least partially explained; rated MNCs are strongly interested in controlling the gearing ratio because this ratio is a key element driving the rating agencies' final opinion, and it is well known that the equity component of the gearing ratio is likely to be affected

<sup>9</sup> The analysis of volatility considered 13 currencies: the Brazilian real, the Japanese yen, the Mexican peso, the New Zealand dollar, the Indian rupee, the euro, the American dollar, the Australian dollar, the Swiss franc, the Hong Kong dollar, the Canadian dollar, the British pound and the Swedish krone.



**Table 7:** Hedging and rating

	Hedge		Derivatives and loans vs. loans		Derivatives vs. loans		Derivatives vs. Derivatives and loans	
Intercept	-0.306*** (0.078)	-0.833*** (0.169)	-0.543*** (0.141)	0.087*** (0.417)	-1.063*** (0.169)	0.223 (0.387)	-0.519*** (0.184)	0.310 (0.397)
Rated	0.283*** (0.097)		0.510*** (0.177)		0.666*** (0.205)		0.155 (0.218)	
Rating grade		0.927*** (0.180)		0.057 (0.431)		-0.671* (0.406)		-0.728* (0.415)
N	1885	1200	745	479	745	479	745	479
Pseudo R <sup>2</sup>	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Count R <sup>2</sup>	0.531	0.547						
Chi <sup>2</sup>	8.58***	28.42***	14.09***	3.8	14.09***	3.8	14.09***	3.8

This table reports univariate binary logistic regressions of the hedging decisions and the choice of hedging tools. The first column tests the likelihood of hedging the translation risk conditional on the existence of debt rating and, for rated companies, on the level of rating. The second, third and fourth columns tests the selection of hedging instruments conditional on the existence of a rating and, for rated companies, on the level of rating. Rated is a dummy variable that assumes value of 1 if the company is rated, 0 otherwise. Rating grade is a dummy variable equal to 1 if the company's rating is investment grade and 0 otherwise. For multinomial regressions the categories are derivatives, loans and derivatives and loans. The baseline for each regression is the missing category. Robust standard errors are reported in parentheses. Statistical significance is denoted by \*, \*\*, and \*\*\* to represent 10%, 5%, and 1% significance, respectively.

by translation risk. Standard & Poor's (2006, p. 25), for example: «attaches great importance to management's philosophies and policies involving financial risk. A surprising number of companies have not given this question serious thought, much less reached strong conclusions [...] Even companies that have set goals may not have the wherewithal, discipline, or management commitment to achieve these objectives. A company's leverage goals, for example, need to be viewed in the context of its past record and the financial dynamics affecting the business». The need for controlling leverage could conversely be less relevant for unrated companies because credit quality assessment in private markets may be less strictly related to the current and future level of the gearing ratio.

Because having a rating affects the probability of engaging in translation risk hedging, it is reasonable to expect that the rating quality may affect the probability of engaging in hedging policies. In particular, losing the investment grade rating has a profound impact on the cost and availability of debt; therefore, we expect that investment-grade rated companies may have a higher incentive in hedging to avoid downgrades. Results show that the choice of hedging is strongly influenced by the level of rating: when companies are rated as investment grade, the likelihood of hedging sharply jumps by 150%.

Columns 3 to 8 test the effects of rating and of the rating level on the selection hedging instruments. The existence of rating is positively correlated with the adoption of more sophisticated hedging techniques involving the use of derivatives. In particular, derivatives are about 90% more likely to be used alone and 70% more likely to be used jointly with debt-based hedging if a company is rated. In contrast to previous results, the level of rating has a limited and inconclusive impact on the choice of hedging instruments.

### C. Companies' characteristics

In Table 8, we present the results for a large set of multinomial logistic regressions jointly testing different possible drivers of the hedging decision.

**Table 8:** Hedging decision: multivariate binary logistic regressions

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Intercept	-1.756*** (0.468)	-1.667*** (0.488)	-2.341*** (0.530)	-2.519*** (0.573)	-3.009*** (0.649)	-1.714*** (0.506)	-2.997*** (0.653)	-2.577*** (0.765)	-3.358*** (0.904)	-2.852*** (0.743)	-2.890*** (1.001)
ROE	0.004 (0.004)	0.005 (0.004)	0.004 (0.004)	0.003 (0.004)	0.004 (0.004)	0.004 (0.004)	0.003 (0.004)	-0.002 (0.004)	-0.003 (0.004)	0.002 (0.004)	-0.004 (0.004)
ROCE	0.005 (0.008)	0.001 (0.008)	0.006 (0.008)	0.005 (0.008)	0.002 (0.008)	0.005 (0.008)	0.006 (0.008)	0.027** (0.012)	0.034*** (0.013)	0.006 (0.008)	0.033** (0.013)
Operating Profit (%)	0.011* (0.006)	0.012* (0.006)	0.012* (0.006)	0.015** (0.006)	0.019*** (0.007)	0.011* (0.006)	0.016** (0.007)	0.016** (0.008)	0.020** (0.009)	0.018*** (0.007)	0.023** (0.009)
Foreign Revenues (%)	0.013*** (0.002)	0.013*** (0.002)	0.014*** (0.002)	0.014*** (0.002)	0.014*** (0.003)	0.013*** (0.002)	0.015*** (0.003)	0.017*** (0.003)	0.017*** (0.003)	0.0140*** (0.003)	0.016*** (0.003)
Capital Gearing	1.811*** (0.353)	1.616*** (0.360)	1.865*** (0.355)	1.741*** (0.373)	1.602*** (0.382)	1.795*** (0.360)	1.736*** (0.381)	2.355*** (0.478)	2.593*** (0.522)	1.669*** (0.383)	2.448*** (0.532)
Quick ratio	-0.173** (0.086)	-0.108 (0.089)	-0.180** (0.087)	-0.148* (0.088)	-0.0807 (0.093)	-0.173** (0.086)	-0.157* (0.089)	-0.0481 (0.127)	0.0114 (0.137)	-0.147* (0.089)	0.0655 (0.140)
ln(MarketCap)	0.013 (0.043)	0.006 (0.048)	0.042 (0.045)	0.035 (0.045)	0.041 (0.052)	0.006 (0.051)	0.047 (0.054)	-0.029 (0.069)	-0.006 (0.076)	0.029 (0.057)	-0.032 (0.080)
Free Float	0.010*** (0.003)	0.012*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.014*** (0.003)	0.010*** (0.003)	0.011*** (0.003)	0.005 (0.004)	0.003 (0.004)	0.012*** (0.004)	0.004 (0.004)
Beta	-0.619*** (0.139)	-0.663*** (0.141)	-0.597*** (0.140)	-0.628*** (0.156)	-0.688*** (0.161)	-0.622*** (0.140)	-0.607*** (0.158)	-0.357** (0.176)	-0.474** (0.203)	-0.609*** (0.159)	-0.474** (0.207)
Rating						0.0346 (0.155)	0.103 (0.161)			0.131 (0.164)	
Rating Grade								0.722*** (0.242)	0.658*** (0.249)		0.640** (0.254)
Audit Main										-0.166 (0.126)	-0.447*** (0.163)
IFRS										0.170 (0.190)	0.117 (0.222)
National accounting principles										-0.179 (0.216)	-0.349 (0.259)
Other accounting principles										0.0274 (0.245)	0.152 (0.294)
Industry dummies	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	YES
Year dummies	NO	NO	YES	NO	YES	NO	YES	NO	YES	YES	YES
Region dummies	NO	YES	NO	NO	YES	NO	NO	NO	NO	NO	NO
N	1241	1241	1241	1241	1241	1241	1241	779	779	1241	779
Pseudo R <sup>2</sup>	0.065	0.087	0.068	0.084	0.113	0.065	0.088	0.077	0.101	0.092	0.113
Count R <sup>2</sup>	0.637	0.652	0.623	0.649	0.655	0.634	0.642	0.638	0.643	0.638	0.662
Chi <sup>2</sup>	111.3***	150.3***	118.0***	144.7***	193.6***	111.4***	151.8***	83.53***	109.6***	157.5***	122.3***

This table reports multivariate binary logistic regressions of the probability of hedging the translation risk on a number of explanatory variables and controls. Independent variables are defined as follows: ROE is the return on equity; ROCE is the return on capital employed; Total revenues are the total revenues in million of euros converted in euro at the end-of-year exchange rates; Operating profit is the ratio of operating profit over sales; Foreign revenues is the fraction of revenues generated by foreign operations; Capitalgearing is the ratio of Bookvalue of equity over Total debt; Quick ratio is the ratio of current assets over current liabilities; Market value is the stockmarket value of equity in million of euros converted in euro at end-of-year exchange rates; Free float is the fraction of equity held by non controlling investors; Beta is the company's equity beta calculated the last trading day of each year on the previous 52 weeks; Rating is a dummy variable taking the value of 1 if the company is rated by any rating agency and 0 otherwise; Rating grade is a dummy variable taking the value of 1 if the company's rating is investment grade and 0 if it is speculative grade; Audit main is a dummy variable taking the value of 1 if the company's auditing firm is one of the top-four; IFRS is a dummy variable taking the value of 1 if the company reports under IFRS principles and 0 otherwise; National is a dummy variable taking the value of 1 if the company reports under national accounting principles; Other accounting principles is a dummy variable taking the value of 1 if the company reports doesn't report under IFRS, national or US accounting principles. In models including these variables (10 and 11) the baseline case is US accounting principles. Industry, Year and Region dummies control for Industry, Year and World Region (i.e. North and South Europe, US, South America, North America, Oceania) effects. Robust standard errors are reported in parentheses. Significance at 10%, 5% and 1% level is denoted by \*, \*\*, and \*\*\* respectively.

Not surprisingly, the amount of foreign currency denominated revenues increases the hedging propensity in response to the increasing exposure to translation risk. In particular, for a 1% increase in foreign revenues vs. domestic currency denominated revenues, the likelihood of introducing translation risk hedging policies increases by about 2%. Similarly, the higher the fragmentation of the ownership, measured by the free-float variable, the higher the propensity of hedging. When ownership is significantly dispersed, it is likely that managers focus on price stabilization objectives. In this respect, reducing exposure to translation risk helps prevent extraordinary fluctuations in EPS due to swings in currency rates. A notable result is that the capital gearing parameter is large, positive and significant across all model specifications. We explain this result as follows: fluctuations in returns impact the riskiness of financing sources. Because debt financing costs are most often a function of one or more performance covenants that are likely to be affected by translation risk, managers will find it optimal to introduce risk management policies to prevent excessive fluctuations. This interpretation is supported by the positive and significant parameter of the rating grade dummy variable that also confirms previous univariate results reported in Table 7.

Additional company characteristics play a smaller role in determining the hedging decision, with the exception of operating profits that positively affect translation risk policies. Results are robust to several model specifications, although the economic effect is more limited. The relatively low relevance of firms' business characteristics suggests that the hedging decision is mainly driven by a strategic approach to liabilities management, which is conditional on the company structure more than by the short-term profitability and liquidity of the company.

The audit control variable indicates that hedging is more likely for companies that are not audited by a top-four auditing firm. The parameter is always negative, but it is significant only on the subsample of rated companies, which may suggest that because rated companies are strongly focused on maintaining the rating level and top audit companies may impose a more stringent treatment of hedging-related items, rated companies may trade off the stabilization effect of translation risk hedging with the potential cost of impairment of hedging positions.

In Table 9, we present tests of the selection of hedging instruments.

Interestingly, operating profits are important in the selection of the hedging tool following the inception of a translation risk management policy. In particular, the higher the level of operating profits, the higher will be the likelihood of selecting loans as a hedging technique as opposed to derivatives, either in isolation or jointly with loans. This interpretation is supported by the evidence that the estimated parameters for operating profits as a determinant of the choice between derivatives and a combination of derivatives and loans are significant and positive, which suggests that loans are strongly preferred when the operating performance of companies is better.

Accounting principles are an important determinant of the hedging strategy: derivatives are more widespread among companies reporting according to US principles, whereas IFRS adopters are significantly more likely to use loans.

As previously observed for the hedging decision, the risk level of the company is an important factor in the selection of hedging instruments. We believe that the same in-

**Table 9:** Hedging instruments: multivariate multinomial logistic regressions

	Derivatives and loans vs. loans		Derivatives vs. loans		Derivatives vs. Derivatives and loans	
Intercept	0.956 (1.535)	2.989 (2.171)	0.800 (1.779)	4.275* (2.368)	-0.156 (1.686)	1.286 (2.165)
ROE	-0.004 (0.005)	-0.002 (0.006)	-0.004 (0.007)	0.000 (0.006)	-0.001 (0.006)	0.002 (0.006)
ROCE	0.0108 (0.013)	-0.003 (0.025)	0.007 (0.019)	-0.003 (0.026)	-0.004 (0.018)	-0.000 (0.025)
Operating Profit (%)	-0.049*** (0.015)	-0.064*** (0.023)	-0.028 (0.018)	-0.054** (0.024)	0.021 (0.018)	0.010 (0.023)
Foreign Revenues (%)	0.008 (0.005)	0.0143* (0.007)	-0.002 (0.006)	-0.003 (0.008)	-0.011* (0.006)	-0.017** (0.007)
Capital Gearing	-0.111 (0.700)	0.374 (0.915)	-0.301 (0.794)	-0.0730 (1.003)	-0.189 (0.768)	-0.447 (0.918)
Quick ratio	-0.009 (0.205)	0.209 (0.291)	-0.053 (0.228)	0.081 (0.321)	-0.044 (0.245)	-0.129 (0.289)
ln(MarketCap)	0.166 (0.117)	-0.004 (0.169)	0.255* (0.131)	0.018 (0.175)	0.089 (0.129)	0.022 (0.162)
Free Float	0.0128* (0.007)	0.009 (0.010)	-0.006 (0.008)	-0.003 (0.011)	-0.019** (0.008)	-0.012 (0.010)
Beta	-2.001*** (0.344)	-2.198*** (0.484)	-1.921*** (0.387)	-2.195*** (0.528)	0.081 (0.367)	0.003 (0.458)
Rating	0.644** (0.309)		0.776** (0.356)		0.131 (0.360)	
Rating Grade		0.694 (0.651)		0.0957 (0.652)		-0.598 (0.630)
Audit Main	0.208 (0.246)	0.502 (0.349)	0.357 (0.282)	0.344 (0.377)	0.150 (0.267)	-0.158 (0.332)
IFRS	-1.108** (0.445)	-1.395*** (0.522)	-1.521*** (0.456)	-1.838*** (0.533)	-0.413 (0.391)	-0.443 (0.447)
National accounting principles	-1.577*** (0.510)	-2.452*** (0.657)	-1.848*** (0.538)	-2.251*** (0.657)	-0.271 (0.511)	0.201 (0.626)
Other accounting principles	-1.250** (0.527)	-1.418** (0.663)	-2.024*** (0.597)	-1.796** (0.715)	-0.774 (0.564)	-0.378 (0.637)
Industry dummies	YES	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES	YES
N	501	296	501	296	501	296
Pseudo R <sup>2</sup>	0.152	0.174	0.152	0.174	0.152	0.174
Chi <sup>2</sup>	163.1***	112.7***	163.1***	112.7***	163.1***	112.7***

This table reports multivariate multinomial logistic regressions of the selection of the hedging instruments on a number of explanatory variables and controls. The dependent variable categories are derivatives, loans and derivatives and loans. The baseline for each regression is the missing category. The independent variables are defined as follows: ROE is the return on equity; ROCE is the return on capital employed; Operating profit is the ratio of operating profit over sales; Foreign revenues is the fraction of revenues generated by foreign operations; Capital gearing is the ratio of Book value of equity over Total debt; Quick ratio is the ratio of current assets over current liabilities; ln(Market cap) is the natural logarithm of the market value of equity in million of euros converted in euro at end-of-year exchange rates; Free float is the fraction of equity held by non controlling investors; Beta is the company's equity beta calculated the last trading day of each year on the previous 52 weeks; Rated is a dummy variable that assumes value of 1 if the company is rated, 0 otherwise. Rating grade is a dummy variable equal to 1 if the company's rating is investment grade and 0 otherwise. The first, third and fifth columns report tests controlling for the existence of a rating while the second, fourth and sixth columns control for the level of rating for rated companies; Audit main is a dummy variable taking the value of 1 if the company's auditing firm is one of the top-four; IFRS is a dummy variable taking the value of 1 if the company reports under IFRS principles and 0 otherwise; National is a dummy variable taking the value of 1 if the company reports under national accounting principles; Other accounting principles is a dummy variable taking the value of 1 if the company reports doesn't report under IFRS, national or US accounting principles. Robust standard errors are reported in parentheses. Statistical significance is denoted by \*, \*\*, and \*\*\* to represent 10%, 5%, and 1% significance, respectively.

interpretation applies: if a company is risky, it will possibly avoid introducing additional volatility by engaging in hedging practices, and if they do, they will try to select the least volatile approach (i.e., debt).

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## 5 Managerial implications

As discussed above, there is no consensus on whether the translation risk should be hedged. Empirical evidence shows that the actual behavior of companies is similarly mixed, with a substantial equilibrium between hedgers and non-hedgers. On the one hand, the rationale for the hedging choice can be given by the necessity of preserving the current rating. Because translation risk can affect the quality and level of several financial key measures, these companies may opt for hedging the risk. This is consistent with the idea that the cost of debt is affected by a deterioration of the rating determined by adverse exchange rate dynamics and may therefore have some consequences on corporate financial decisions. On the other hand, the attention toward preserving the desired level of rating may also show another signal that financial flexibility is valuable to firms (as originally suggested by Donaldson, 1969 and Myers, 1977). Furthermore, it is worth noting that hedging companies prefer internal hedging that could be interpreted as an attempt to «minimize» the cost of hedging this type of risk, as this cost is paid up-front in exchange for a future, uncertain benefit. By borrowing in local currencies, companies are likely trying to minimize the impact on profitability due to higher financial charges that also include the cost of financial derivatives traded with the purpose of hedging the translation risk. Conversely, companies leaving translation risk un-hedged may have a lesser need to preserve financial flexibility as guaranteed by the desired level of rating. For such companies, the cost of hedging the translation risk is not counterbalanced by the expected benefits. A rival explanation may be related to companies' and investors' sophistication. Our results have shown that companies in southern Europe, Japan and South America are less likely to hedge than their American, British and northern European counterparts. The latter countries have historically tapped markets with less sophisticated financial securities and almost no derivatives for reasons related to the legal environment (La Porta *et al.*, 1997, 1998) and the intrinsic level of development of financial markets (Rajan and Zingales, 2003). Accordingly, they have a reduced attitude toward raising capital abroad or introducing derivatives in their structure. However, several studies show that there is a strong tendency to convergence in global financial markets (Kho *et al.*, 2009). In this spirit, it should be reasonable to observe a surge in translation risk hedging in those companies in the future.

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## 6 Conclusions

In this study, we investigate the behavior of MNCs toward managing and hedging translation exposure. We collect annual reports and financial statements for a large sample of companies from 25 countries over a four-year horizon to identify whether this type of foreign currency exposure is economically relevant, and if so, which instruments and techniques, either internal or external, were adopted. Our results show that large differences exist among the corporations in the degree of importance they place on hedging translation exposure and the approach towards hedging. First, translation exposure is not uniformly considered a significant risk, with only 46% of the companies in our sample

reporting the hedging of such a risk. This result is consistent with the conclusion suggested by Joseph (2000) that «firms place more emphasis on transaction exposure and economic exposure and much less on translation exposure». However, this figure varies significantly across countries and is conditional on the prevailing accounting rules. Second, looking at hedgers, we find evidence of the absence of a common approach for managing and hedging translation exposure. Companies that adopt a «hedge policy» employ a wide range of different methods, including internal and external hedging techniques, to cope with this type of exposure. However, matching foreign subsidiaries assets and/or foreign subsidiaries capital employed and borrowings in the relevant currencies (natural hedging) is the preferred method. For example, setting a centralized treasury function could be a simpler (and probably cost-effective) way of mitigating the effects of currency translation exposure. Furthermore, the common use of matching techniques indicates that corporations are more concerned with their net asset translation risk exposure than earnings exposure. This is consistent with a previous study on the subject (Marshall, 2000).

Third, as far as accounting standards are concerned, companies adopting similar accounting standards seem to follow a highly uniform policy. However, different accounting standards produce sharp differences in policies. Finally, significant differences exist in practices toward managing and hedging translation exposure among companies belonging to the same industry, indicating the absence of an «industry» regularity or common practice driving hedging decisions. This is consistent with previous research suggesting that hedging practices are not necessarily linked to any industry's common factor; rather, hedging practices are a highly firm-specific activity. Further analysis is needed, however, to better understand the effect of borrowing constraints and the impact of the existing legal environment on the translation risk hedging decision and to provide additional evidence on the effect of recent accounting changes on corporate hedging policies. We leave these questions for future research.

**Table A1:** Accounting systems classification according to Radebaugh and Gray (2002)

Accounting systems	Main characteristics	Countries in the sample
Anglo-American	Non-conservative, highly transparent	Australia, Canada, Hong Kong, India, Ireland, New Zealand, United Kingdom, United States
Nordic	Less conservative and more transparent than Germanic and Latin countries, but not as much as Anglo-American	Denmark, Finland, Netherlands, Sweden
Germanic	Influence of company law and taxation	Austria, Germany, Luxembourg, Switzerland
Latin	Conservative and secretive	Belgium, Brasil, France, Greece, Italy, Mexico, Portugal, Spain
Asian	Conservative and secretive	Japan

**Table A2:** Sample composition by industry

	Number of observations	%
Basic Material	295	15.58
Capital Goods	169	8.92
Conglomerates	67	3.54
Consumer Cyclical	137	7.23
Consumer Non-Cyclical	208	10.98
Energy	103	5.44
Healthcare	144	7.60
Services	422	22.28
Technology	188	9.93
Transportation	50	2.64
Utilities	111	5.86
Total	1,894	100.00

This table presents the industry composition of companies in our sample obtained by clustering industries according to 3 digits SIC code.

**Table A3:** Hedging decision by country

	Hedge		Hedge
Canada	0.462 (-0.312)	Italy	-2.736*** (1.031)
USA	0.203 (0.247)	Luxembourg	0.02 (0.250)
Brazil	-2.016* (1.057)	Netherlands	-0.003 (0.382)
Mexico	-1.915** (0.754)	Portugal	-1.367** (0.641)
Austria	-0.735 (0.490)	Spain	-0.038 (0.411)
Belgium	-0.134 (0.591)	Sweden	1.159** (0.490)
Denmark	-0.207 (0.464)	Switzerland	0.834 (0.514)
Finland	0.877** (0.420)	UK	1.526*** (0.291)
France	0.218 (0.335)	Hong Kong	0.347 (0.524)
Germany	-0.932** (0.444)	Japan	-3.087*** (1.023)
Greece	-1.018 (0.663)	Australia	0.209 (0.583)
Ireland	1.245** (0.590)	New Zealand	-0.277 (0.411)

This table shows the results of a set of binary logistic regressions estimating the probability of hedging the translation risk as a function of the country of origin. The single countries listed in the table are dummy variables that assume value 1 when the specific country is considered, 0 otherwise. Estimates for India are not computed due to lack of variation in the data. Intercepts and goodness of fit measures are omitted for presentation purposes. Robust standard errors are reported below each coefficient (in parentheses). Statistical significance is denoted by \*, \*\*, and \*\*\* to represent 10%, 5%, and 1% significance, respectively.

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