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Transfer Pricing Risk Awareness of Multinational Corporations - Evidence from a Global Survey

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Abstract

This paper investigates the transfer pricing risk awareness of multinational firms using cross-sectional data of more than 350 firms located in 24 countries and classified in 12 industries. Moving beyond the sole tax optimization motives of multinational firms, we extend the existing literature by using unique firm-level information such as that the transfer pricing risk awareness is assessed and reported by the person ultimately responsible for transfer pricing. We find that the level of transfer pricing risk awareness of multinational companies predominantly depends on (i) the industry a firm operates in, (ii) a country's risk classification with respect to its transfer pricing regulations (e.g. penalty regimes in case of non-compliance with transfer pricing regulations), (iii) firm size and (iv) the interaction effect of the first two factors. By way of contrast, the time of introduction of transfer pricing regulations and also tax considerations do not seem to play a crucial role for transfer pricing risk perceptions.

Keywords: Transfer pricing; International taxation; Multinational firms; Tax risk management
JEL codes: F23; H25

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1 Introduction

A report published by the U.S. Internal Revenue Service (IRS) in 1998 estimates U.S. losses due to transfer pricing abuses at $2.8bn each year from 1996 to 1998. Another study estimated these losses to be more than $35bn by 1998. And just another and more recent study by Pennsylvania State University suggests that this number may be closer to $53bn. Armed with this information, the IRS has constantly increased its scrutiny towards the transfer pricing setting of multinational taxpayers. In 2003, the IRS and GlaxoSmithKline settled what is known to be the largest tax dispute in history battling over a tax liability of $2.3bn for almost two decades. In a press release in May 2009, the Obama administration outlined a plan to clamp down on deferral and foreign tax credit in an effort to repatriate profits of U.S. multinationals. As part of the President's budget, the IRS would be provided with funds to support the hiring of 800 professionals devoted specifically to international enforcement.

In the last ten or so years, transfer pricing has evolved to one of the most important tax aspects for both multinational enterprises (MNEs) and tax authorities around the globe. Economic reasoning and the economic literature devoted to this area suggest that there is an incentive to underprice intrafirm exports to low tax countries and overprice intrafirm imports from such countries given that the other affiliated transaction party is located in a high(er) tax country.[1] However, it is often neglected that, in practice, stringent transfer pricing regulations and penalty regimes provide disincentives for MNEs to operate under aggressive transfer pricing strategies. Many countries have incorporated statutory transfer pricing regulations in the last few years; the total number of countries with transfer pricing documentation requirements soared from three in 1995 to more than 30 by 2008. Let alone that many of these countries have also introduced penalty regimes in case of non-compliance.

In this paper, we shall incorporate some basic country and industry characteristics likely to affect the transfer pricing behavior of MNEs and analyze their effect on their transfer pricing risk awareness. Our dependent variable – the awareness of transfer pricing as a risk issue – is obtained from a survey of more than 350 MNEs around the world performed by a Big 4 accounting firm, in which the person ultimately responsible for transfer pricing matters was interviewed (i.e. in most cases, the Chief Financial Officer or tax director). Hence, the reported transfer pricing risk awareness is a subjective, professional assessment of a key person in each firm which makes this paper a unique contribution to the existing knowledge on transfer pricing. To preserve

[1] Hines (1997) provides a comprehensive overview of the existing literature of the impact of international tax rules on the financial and investment behavior of MNEs.

confidentiality, firm-level data had to be aggregated such as that the reported transfer pricing risk awareness was summed up for each country × industry combination allowing for a share-based analysis. In our analysis we abstract from using tax differentials as the sole drivers of transfer pricing strategies or intrafirm pricing. Transfer pricing-specific regulations and penalty regimes are taken into consideration to analyze the risk awareness levels of MNEs by industry classification. We will come to the conclusion that the transfer pricing risk awareness depends on the industry classification, the location of the parent company of a MNE as well as firm size.

2 Literature review

The current literature of transfer pricing is comprehensive, both theoretical as well as empirical research. Much of the interest in transfer pricing centers on the behavior of MNEs in response to taxes. Horst (1971) and Copithorne (1971) pioneered in studying the profit-maximizing strategies of MNEs under different tax and tariff rates. Likewise, Harris, Morck and Slemrod (1993) concluded that transfer prices have been considered a means of tax evasion using five-year panel data of U.S. MNEs. More recent literature yields similar results. Clausing (2003) investigated the impact of tax effects on intrafirm trade and found a significant relationship between countries' tax rates and the prices for intercompany transactions based on comprehensive data of U.S. multinationals. Bernard, Jensen and Schott (2006) found that MNEs report different prices depending on whether they engage in third party transactions or related party transactions. And, Huizinga and Laeven (2008) analyzed comprehensive data of the pan-European database Amadeus and found significant evidence of profit shifting within MNEs in Europe.

Besides tax-motivated income shifting of MNEs by means of transfer pricing, tax evasion, optimal income taxation and optimal governmental policy have also played an important role in the current transfer pricing-related literature, particularly in analyzing the optimal governmental response. Kaplow (1990), for example, analyzed the interdependence between optimal taxation and optimal enforcement against the background of minimizing the distortion of behavior of MNE. Elitzur and Mintz (1996), closer on the topic of transfer pricing again, derived a Nash equilibrium in which each government chooses optimal tax rates given the optimal contract between a parent company and its subsidiary. They showed that harmonization in the sense of lower effective tax rates would improve aggregate social welfare. Similarly, Raimondos-Møller and Scharf (2002) considered the possibility that governments can use trans-

fer pricing rules strategically when competing with other governments using a game-theoretical approach.

In sum, tax differentials and tariffs seem to play an overwhelmingly dominant role in the lion's share of publications on transfer pricing. Less so do approaches that analyze industry- and country-specific drivers of transfer pricing strategies which affect the importance of transfer pricing as a tax (risk) issue. This might either be due to a lack of data availability or to the implicitness of the question itself. A survey of a global consultancy (Ernst & Young 2008) found that transfer pricing plays a dominant role among a MNE's tax issues. It is further observed that tax authorities' approach in scrutinizing a MNE's reported taxable income has become more sophisticated and aggressive in recent years, with almost 80 percent of all respondents expecting a transfer pricing audit in the two years. Although the answer might be superficial, the question remains unanswered what drives the dominance of transfer pricing topics within a MNE besides the typical tax optimization motives which have been elaborated in the current literature.

3 Approach and hypotheses

This paper will undertake a cross-country, cross-industry analysis of Ernst & Young's Global Transfer Pricing Survey 2007-2008 (henceforth "the Survey") with the aim of understanding the transfer pricing risk awareness of MNEs across different countries and industries. Compared to the existing research, this paper is based on a unique data set as it incorporates a worldwide set of MNEs, not limited to a specific region or market. In total, more than 350 parent companies of MNEs in 24 markets (countries) across twelve different industries have been surveyed. The design of the Survey has been developed by Ernst & Young transfer pricing professionals (see Appendix A for detailed information on the methodology of the Survey). To preserve confidentiality, firm-level data was aggregated; that is, firm-level records were summed for each country $\times$ industry combination in which the MNEs operate and twelve parent industry classifications were incorporated. Hence, observations are based on a country $\times$ industry dimension allowing for a share-based analysis of the data.

3.1 Firm-specifics

The twelve subordinate parent industries from the Survey were collapsed to obtain five distinctive groups; namely, commodities, finance, pharmaceutical, resource and telco/media (see Table A1 in the Appendix for further details on the industry classifications). This allows us to control for generic indus-

try characteristics that might play an important role in assessing the risk awareness of MNEs. The final set of observations (i.e. country × industry classifications) summed up to 137 as shown in Table A1 in the Appendix.

Table 1 shows the allocation of MNEs to two revenue clusters. On average, our observations are more or less evenly distributed between small, less visible (less than $5bn in revenues) and large, highly visible (more than $5bn in revenues) firms based on consolidated revenues. Given that half of the firms generate more than $5bn in revenues is a promising piece of information about our sample data such as that the firms in our sample are indeed large multinationals that engage in (significant) cross-border transactions. It should also be noted that the share of large firms is the highest in the finance (more than 60 percent) and resource industries (more than 70 percent). This should not be surprising given the balance sheet data of huge insurance companies or oil and gas giants. Firms operating in the commodities industry are most evenly distributed between the two revenue clusters, whereas the share of huge MNEs in the pharmaceutical and telco/media industry is the lowest. We will resume the disussion on firm size in the course of the empirical analysis in Section 4.

Table 1: MNEs by superordinate industries and revenue cluster

	Revenue cluster		
Industries	**less than $5bn**	**more than $5bn**	**Total**
Commodities	45.3%	54.7%	100.0%
Finance	37.9%	62.1%	100.0%
Resource	26.7%	73.3%	100.0%
Pharmaceuticals	64.7%	35.3%	100.0%
Telco/Media	69.6%	30.4%	100.0%
Average	48.8%	51.2%	

Note: Table 1 shows the allocation of MNEs to two pre-defined revenue clusters. Please note that rows (not columns) sum up to 100 percent. Reference is also made to Table A1 in the Appendix which shows the twelve subordinate parent industries that were collapsed to the above five industry classifications.

Common transfer pricing practice suggests that industries differ in transfer pricing patterns due to market structures, the competitive environment, or merely due to product specifications. For example, the dynamics of competition within the pharmaceutical and biotechnology industry are critically dependent on innovation and new product design and development. Unlike many other industries (e.g. the commodity industry), price plays a rather secondary role in driving increases in demand for prescription drugs; the efficacy of the drugs is the primary demand driver. Continuous investment in research and development (R&D) consequently represents a critical success

factor for companies competing in the ethical pharmaceutical market. However, such investments are becoming increasingly costly and require longer planning horizons. For every 5,000 compounds discovered, only one reaches the market (Standard & Poors 2008). Similarly, fewer than a third of all drugs on the market actually achieve enough commercial success to recoup their R&D investment, the allocation of R&D expenses and hence pure transfer pricing issues should be of eminent importance. This brings us to our first hypothesis:

Hypothesis 1 *Transfer pricing risk awareness differs across industries.*

Descriptively, this hypothesis is also supported by Figure 1 and the summary statistics by industry classification.[2] The transfer pricing risk awareness peaks for MNEs operating in the pharmaceutical industry, whereas the share of MNEs considering transfer pricing the largest risk issue is the lowest for firms in the resource business. Likewise, the highest (lowest) standard deviation in transfer pricing risk awareness is observed by MNEs in the pharmaceutical (resource) industry.

3.2 Transfer pricing regulations

Over the last years, a significant increase in transfer pricing regulations around the world could be observed. In general, these regulations are the legal basis for tax authorities to adjust the income, deductions, credits, or allowances of commonly controlled taxpayers to prevent the evasion of taxes. Along the introduction of transfer pricing documentation requirements, many countries introduced stringent penalties for non-compliance with domestic transfer pricing regulations. In Germany, for example, penalty assessments may amount to up to ten percent of the income adjustment. To account for country-specific transfer pricing regulations, countries have been grouped into "low risk" and "high risk" countries. "High risk" implies that, besides statutory transfer pricing regulations, penalties for non-compliance are incorporated into law.[3] Irrespective of legal transfer pricing documentation requirements, low risk countries are characterized by an absence of penalties (see Table A1 in the Appendix for the grouping of countries).

[2] Due to reader-friendliness, we refrain from reporting the full summary statistics per industry classification. Summary statistics for the full sample are reported in Table 3.

[3] Some research has already been directed to the incentive for a MNE to underreport taxable income and / or shift profits depending on the existence and level of noncompliance penalties and audit frequency. For example, Chander (2004) found a progressive tax function generates stronger incentives for a MNE (or an agent) to underreport income and thereby necessitates more (costly) auditing by the tax authorities, which, in turn, allows them to observe the MNE's actual taxable income.

Table 2: Home country characteristics of MNEs

	Industry cluster					
	Commodities	**Finance**	**Resource**	**Pharmaceuticals**	**Telco/Media**	**Total**
Low risk country	46.8%	45.7%	26.7%	29.4%	30.4%	39.4%
High risk country	53.2%	54.3%	73.3%	70.6%	69.6%	60.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Follower	63.8%	57.1%	66.7%	70.6%	60.9%	62.8%
Pioneer	36.2%	42.9%	33.3%	29.4%	39.1%	37.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Table 2 shows the allocation of MNEs between and within the two categorical country characteristics, high risk vs. low risk countries and pioneer vs. follower countries. Please note that columns (not rows) sum up to 100 percent. For more details please also see the matrix Table A1 in the Appendix which lists the characteristics of the full sample per country × industry combination.

As can be seen from Table 2, more than 60 percent of all observations are located in high risk countries, implying that MNEs in these countries are exposed to stringent transfer pricing documentation requirements and penalty regimes. This particularly relates to MNEs within the resource, media and pharmaceutical industries. MNEs within the commodities and finance industries are almost evenly split between low and high risk countries. Our second hypothesis reads as follows:

Hypothesis 2 *Transfer pricing risk awareness for observations located in high risk countries is different from those located in low risk countries.*

Our data support this hypothesis such as that, on average, MNEs in high risk countries report a higher transfer pricing risk awareness compared to their counterparts in low tax countries (see Figure 1). The standard deviation is also higher in high risk countries and the difference in standard deviation amounts to approximately 45 percent (using low risk countries as the base category).

Next, we assigned all countries to be either a "pioneer" or a "follower". Pioneer countries are among the top ten countries which have introduced statutory transfer pricing regulations (see Table A1 in the Appendix for the grouping of countries). Among those countries are the United States, which introduced statutory transfer pricing regulations in the early 1990s and has

since refined its regulations by amending and supplementing Section 482 of the IRS Tax Code. Prior to reviewing and auditing a taxpayer, many pioneer countries (e.g. Australia) give consideration to the size and nature of the related-party dealings, the quality of any transfer pricing documentation and whether or not the taxpayer's results appear to be commercially realistic. We expect that these pioneer countries – which are more than just "first movers" – are characterized by relatively experienced tax authorities and extensive transfer pricing regulations. At the same time, we expect that MNEs located in these countries are well aware of their transfer pricing compliance burden and allocate their resources specifically to countries which are experienced in transfer pricing matters.

From the descriptives and Figure 1 it can be seen that the difference in reported transfer pricing risk awareness between MNEs located in pioneer and follower countries is not as high as in the above two categorizations. But, MNEs in pioneer countries do report a slightly higher transfer pricing risk awareness than their counterparts in follower countries. Also, potential interactions with other factors should not be ignored. Hence, we state the last hypothesis as follows:

Hypothesis 3 *Transfer pricing risk awareness for observations located in pioneer countries is different from those located in other countries.*

4 Empirical analysis

4.1 Basic results

As part of the Survey, MNEs were asked to what extent they consider transfer pricing a risk issue. They could choose from three answers: (i) the largest risk issue, (ii) a risk issue but not the largest, and (iii) not a risk issue. For the purpose of this analysis, the dependent variable is defined as a categorical variable reflecting the share of MNEs in a country $\times$ industry that consider transfer pricing the largest risk issue, with the outcome variable coded

- 1 if the share of MNEs considering transfer pricing to be the largest risk issue in a given country-industry classification is nil,
- 2 if the share of MNEs considering transfer pricing to be the largest risk issue in a given country-industry classification is greater than 0 percent but not more than 75 percent, and
- 3 if the share of MNEs considering transfer pricing to be the largest risk issue in a given country-industry classification exceeds 75 percent.

Figure 1 illustrates the transfer pricing risk awareness of MNEs by the aforementioned country and industry characteristics, also taking into consideration potential interaction effects. Table 3 provides the corresponding summary statistics. Taken together, we would like to highlight some interesting characteristics of our data upfront: First, considering main effects, the greatest difference in transfer pricing risk awareness levels is attributable to firm characteristics, i.e. industry and revenue classifications. The difference in transfer pricing risk awareness levels is lower for country characteristics. And, second, turning our attention to interaction effects, we observe some interaction between the industry classifications and revenue clusters as well as the industry classifications and the country risk level. The remaining graphs on interaction effects do not give a clear indication for any systematic interaction.

Table 3: Summary statistics

Variable	**Mean**	**Std.Dev.**	**Min.**	**Max.**
Response variable				
TP risk [3]	1.489	0.719	1	3
Country TP characteristics				
Country risk [2]	0.606	0.490	0	1
Pioneer country [2]	0.372	0.485	0	1
Country tax characteristics				
Tax rate [C]	0.313	0.056	0.125	0.407
Tax differential [C]	0.013	0.056	-0.175	0.107
Tax rate category [3]	2.036	0.635	1	3
Low tax country [2]	0.416	0.495	0	1
High tax country [2]	0.263	0.442	0	1
Firm characteristics				
Industries [5]	2.474	1.515	1	5
Revenue [2]	0.518	0.501	0	1
Observations	137			

Note: Table 3 provides the summary statistics. [C] indicates a continuous variable. All other variables are categorical, whereas the number in parenthesis indicates the levels of a factor. Reference is also made to Table A2 in the Appendix which provides the definition of the variables above.

Empirically, a two-way analysis of variance (ANOVA) is used for analyzing the main effect of our categorical and continuous factors and their associated interaction effect on the response variable (also see Table A2 in the Appendix for the definition of the variables). Our objective is to determine which factors have a (statistically) significant effect on the level of transfer pricing risk awareness and, consequently, find out how much of the variability in the response variable is attributable to each factor. In practice, ANOVA is a very convenient and powerful tool and best suitable in factorial designs. One ad-

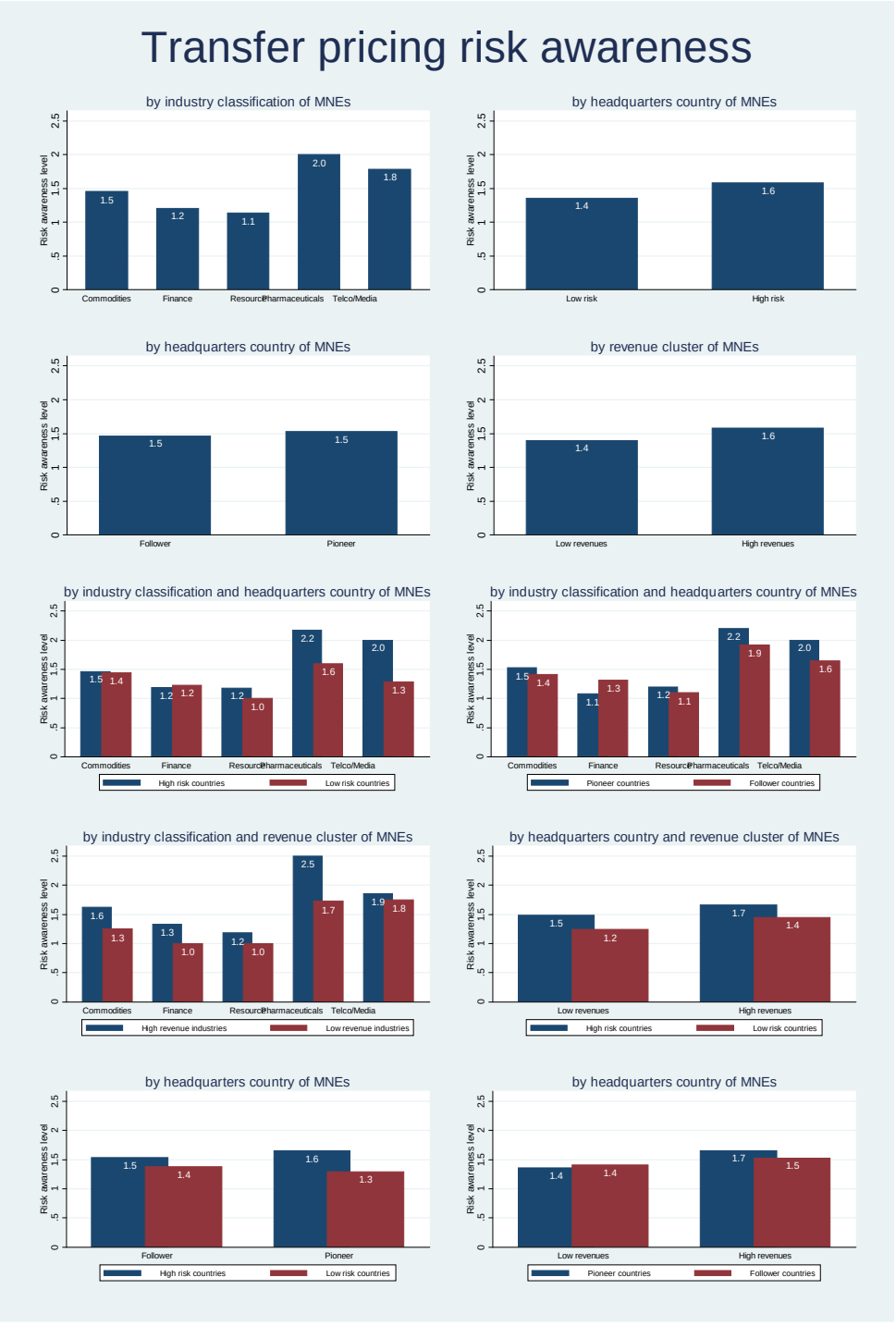

Figure 1: Risk awareness levels by country and industry characteristics

vantage is that it provides some unique and relevant information about how variables interact or combine in the effect they have on a dependent variable.[4] A two-step approach was undertaken to derive our final model: (*i*) we complemented the three factors that test the above hypotheses with factors suggested by the existing literature on transfer pricing (i.e. tax rates, firm size) and (*ii*) we performed multiple one-way ANOVA to study the effect of each single factor on the transfer pricing risk awareness.[5] In doing so, the final ANOVA model also included a revenue cluster for firm size as suggested by the existing literature.[6] It suggests that larger MNEs – controlled for by the factor *revenue* – are more visible to tax authorities (also see Al-Eryani, Alam and Akhter 1990). So, in a nutshell, our two-way ANOVA consisted of ten significance tests: a test for each of the four main effects *industries*, *countryrisk*, *pioneer* and *revenue* as well as a test for each of the six two-way interactions.

The results reported in Table 4 show support for both hypothesis one and two: that is, the categorical variables *industry* and *countryrisk* are highly significant at a one percent and five percent level, respectively.[7] First, this means that the industry a MNE operates in has a significant effect on the awareness of transfer pricing as a risk issue. Based on our model specification, it explains approximately eight percent of the total variance in the transfer pricing risk awareness of MNEs. Using a one-way ANOVA with the factor *industry* further allows us to perform multiple comparison tests to analyze how much of the eight percent variability is attributable to the different industries. Bonferroni, Scheffe and Sidak multiple comparison tests were performed, acknowledging their conservative nature. All three multiple comparison tests yielded very similar results: the transfer pricing risk awareness levels in the pharmaceutical industry is significantly different (i.e. higher) from those reported by MNEs in the commodities, finance and resource industry (see Table A3 in the Ap-

[4] Please note that ANOVA is not a full substitute to a regression. Neither should inferences be drawn solely from the effect size. But, it is a very convenient and powerful tool to learn about the characteristics of data from this comprehensive Survey.

[5] We will further elaborate on the final model in Sections 4.2 and 4.3

[6] Among others, Horst (1972) has shown a positive influence of firm size on foreign direct investments (FDI) and Bernard, Jensen and Schott (2006) found that the price difference between firms arm's-length and related-party prices increases in firm size. Also, considering the period before and after the 1986 Tax Reform Act in the United States, Conover and Nichols' (2000) findings suggest that smaller and/or distressed firms are less likely to shift income through transfer pricing than larger firms.

[7] In a figurative sense, the support for hypothesis two corresponds to the existing literature on the economics of crime. Becker's (1968) main insight is that penalties and fines are a superior enforcement mechanism when compared to more likely detection, since detection through audit is costly. Reference is also made to Sandmo (1981) who explores the relationship between tax evasion, enforcement and optimal tax policy. He finds that penalties are beneficiary to declaring taxable income accurately as long as they are not set to high.

Table 4: Three-way ANOVA output

	SS		**df**	**MS**	**F**	**Pr>F**
Model	22.22	(%)	22	1.01	2.40	0.002
industry	7.57	(%)	4	1.89	4.50	0.002
countryrisk	1.69	(%)	1	1.69	4.01	0.048
countryrisk×*industry*	3.45	(%)	4	0.86	2.05	0.092
revenue	2.77	(%)	1	2.77	6.59	0.012
revenue×*industry*	2.28	(%)	4	0.57	1.35	0.254
revenue×*countryrisk*	0.45	(%)	1	0.45	1.06	0.306
pioneer	0.00	(%)	1	0.00	0.01	0.934
pioneer×*industry*	0.55	(%)	4	0.14	0.33	0.861
pioneer×*countryrisk*	0.08	(%)	1	0.08	0.18	0.668
pioneer×*revenue*	0.19	(%)	1	0.19	0.45	0.502
Residual	48.01	(%)	114	0.42		
Total	70.23	(%)	136	0.52		

Note: Table 4 provides the three-way ANOVA output, which consists of ten significance tests: a test for each of the four main effects and a test for each of the six two-way interactions. "SS" stands for sum of squares. Please note that we used partial sum of squares for our computation which means that we used unique sum of squares that present the contribution of each term to the model including all other terms. Please note that these sum of squares do not exactly add up to the model sum of squares, which is a typical behavior in applying partial sum of squares. "(%)" indicates that the partial sum of squares can be interpretated as the percentage of the total variance in the transfer pricing risk awareness explained by each factor. "df" stands for degrees of freedom. "MS" stands for mean squares that correspond to the partitions of the total variance, defined as SS devided by df. For a definition of the variables used in the final ANOVA model, please also see Table A2 in the Appendix.

pendix for the detailed results). As mentioned before, the allocation of R&D expenses, a large share of intangible property transactions, and sophisticated principal structures are just a few transfer pricing issues to mention. Also, the GlaxoSmithKline case might have also triggered tax authorities worldwide to scrutinize the transfer pricing structure of pharmaceutical companies and put transfer pricing on top of their tax agenda. Besides, the multiple comparison tests also reveal that MNEs in the telco/media industry report a significantly different transfer pricing risk awareness compared to the finance and resource industry. Telco/media MNEs represent a very technology-intensive segment of the economy. In addition, these companies are restricted by a complex regulatory environment. Although the profitability of the industry is largely dependent on the specific products being sold, market players only earn slender margins. Hence, sophisticated and firm transfer pricing planning strategies is consequently a highly complex endeavor.

With regards to hypothesis two, our results indicate that the existence of penalty regimes besides statutory transfer pricing regulations systematically

influences the level of transfer pricing risk awareness among MNEs (about two percent of the variability is attributable to this factor). The risk of transfer pricing issues being reviewed and scrutinized under an audit is quite considerable in high risk countries and transfer pricing remains an area of focus for these countries, in particular (Ernst & Young 2008). MNEs located in high risk countries are reportedly well aware of the sophisticated transfer pricing audit approach by the tax authorities in their high risk home countries and of the regular information exchange between tax authorities located in high risk countries. Consequently, transfer pricing risk awareness for MNEs located in high risk countries is significantly higher compared to those located in low risk countries.

Furthermore, we do not find support for hypothesis three. One possible explanation is that countries characterized as followers used the experience of pioneer countries and introduced transfer pricing regulation based on best practice. Likewise, MNEs have adopted similar transfer pricing practices as their counterparts in pioneer countries. Firm size, on the other side, is significant at a one percent level, which confirms the findings of the relevant literature which suggests that large firms are more visible to tax authorities (about three percent in the variability of our dependent variable is explained by firm size). Consequently, their awareness of transfer pricing as a (tax) risk issue is significantly higher.

Last, the interaction term between *industry* and *countryrisk* also proves to be significant at a ten percent level, i.e. industry classification differences in transfer pricing risk awareness depend on the location of the parent company. Almost three percent of the total variability in the transfer pricing risk awareness is explained by this interaction effect. For example, it turns out that when comparing MNEs in the telco/media industry to MNEs in the financial services industry located in high risk countries, a MNE in the telco/media industry reports higher transfer pricing risk awareness than do MNEs in the financial services industry. But, when comparing MNEs in the telco/media industry to those in the financial services industry and all of which are located in low risk countries, we do not observe a significant difference in the transfer pricing risk awareness between these two groups.

4.2 ANOVA assumptions and robustness check

One of the assumptions of ANOVA is that the variances of the dependent variable is the same across the groups being studied. Although ANOVA is relatively robust to violations of the normality and homogeneity of variances assumptions, the results of the analysis may not be trustworthy; that is that

the reported p-value from the significance test may be too liberal (i.e. yielding a higher than expected type I error rate) or too conservative (i.e. yielding a lower than expected type I error rate). Considering our final model as reported in Table 4, there is evidence that the variances differ between the groups defined by *industry* and *countryrisk* based on Bartlett's and Levene's test for equal variances.[8] ANOVA results for the the categorical variables *pioneer* and *revenue* proved to be quite robust. However, we assume that based on the nature of the superordinate industry classifications, a type I error will most likely not inflate (the groups with the higher standard deviation are not the groups with the lower sample size). Regarding *countryrisk*, the group with the higher standard deviation (i.e. high risk countries) also has the higher sample size; hence, we expect ANOVA to be rather conservative (i.e. predicting a higher p-value than the simulation) and assume that the power of ANOVA might be affected.

To corroborate the results of our traditional parametric ANOVA, we also performed a Monte Carlo simulation to assess the significance of our results computed above. The test computes a one-way ANOVA of the transfer pricing risk awareness by our individual independent variables and computes the p-value using the traditional results. Then, based on the number of groups in the independent variables, the sample sizes and the standard deviations are computed to perform the one-way ANOVA simulations. We then compared the nominal p-value from the traditional ANOVA with the p-value computed from the simulations.[9] The simulation reveals that for *countryrisk* the traditional ANOVA reports rather conservative results, whereas for *industries*, *revenue* and *pioneer* ANOVA is rather liberal. In our case, we do not really have to be concerned about conservative results as type I error rates are reduced. However, liberal p-values should be treated with care as they might lead to a higher type I error rate (i.e. a true null hypothesis is incorrectly rejected). However, the results obtained from the Monte Carlo simulation substantiate our traditional ANOVA results such as that we do not find a change in significance such as that a type I or type II error inflates dramatically (see Table A5 in the Appendix for detailed results of the simulations).

We also performed the non-parametric Kruskal-Wallis test, which is based on rank-transformed data. It has often been recommended for use in lieu of

[8] Questioning normality might be a purist issue in our case, which was the reason why we also performed Levene's test as it is less sensitive to departures from normality than Bartlett's test for equal variances.

[9] To make results comparable, our two-way ANOVA reported in Table 4 had to be decomposed into multiple one-way tests analyzing each factor's effect on the transfer pricing risk awareness separately. For further information on the simulation techniques, see Wilcox, Charlin and Thompson (1985).

the ANOVA F-test when assumptions of the parametric procedure are violated (Feir and Toothaker 1974). A Kruskal-Wallis test, however, revealed very similar results (see Table A6 in the Appendix for the detailed results). With the exception of the country risk classification, the significance levels of all relevant variables did not change materially compared to the corresponding one-way ANOVA. With or without ties, we do, however, no longer find evidence to support hypothesis two. One potential explanation is the relatively low power of the non-parametric Kruskal-Wallis test. Or, as Feir and Toothaker (1974) suggest, the ANOVA F-test is the recommended procedure for testing hypotheses, especially at significance level of .01 with a medium sample size.[10] The Kruskal-Wallis test, on the other side, should only be preferred when a researcher is unconcerned with power or has a large total sample size. As our sample size is 137 and power matters in our case, we should tend towards relying on the more powerful ANOVA F-test.

Overall, our sensitivity analysis and robustness checks suggest that our results regarding the three main factors *industry*, *countryrisk* and *pioneer* remain nearly unchanged when using different analysis of variance tests or specifications. The results showed that the parametric ANOVA is rather robust against potential violations of the normality and homogeneity of variances assumptions. Simulating F-tests based on the characteristics of our dependent variables further corroborates our findings regarding our three main hypotheses. Regarding firm size, our results are somewhat ambiguous and change slightly when using either a one-way, two-way ANOVA or the non-parametric Kruskal-Wallis test.

4.3 What about taxes?

There is a topic that we have not discussed so far: the role of taxes. The existing literature rarely misses a chance to emphasize that MNEs set their transfer prices such as that their after-tax profits are maximized (see, for example, Grubert and Mutti 1991). But, what happened to taxes in our model? As mentioned above, we followed a two-step approach in identifying our final model which also took into consideration the tax aspects suggested by the related literature. At the same time, it is essential to understand that due to the specific nature of our dataset (i.e. firm-level data had to be aggregated to twelve subordinate industries to preserve confidentiality) we do not have information about tax rates or tax payments on firm level. So, we had to

[10] Feir and Toothaker's (1974) recommendation is primarily based on the instability of power for the Kruskal-Wallis test.

develop a different approach to include taxes in our model. Finally, we had come up with three common tax proxies:

- corporate statutory tax rates in the parent country of the MNE;
- dummy variables which indicate low tax, moderate tax and high tax countries relative to "the sample world"; and
- tax differentials between the parent country of the MNE and the median tax rate of "the sample world".

As we did with all other variables, we ran several one-way tests to analyze the separate effect of the country tax characteristics on the transfer pricing risk awareness. First, we started with the two continuous variables: *taxrate* which stands for the statutory corporate tax rate in each parent country of a MNE and *taxdiff* which is the tax rate difference between the parent country of a MNE and the median tax rate in the sample world. Then, we ran one-way tests with the remaining set of categorical variables, *taxrate_cat*, *lowtax* and *hightax*.[11] The corresponding results are reported in Table A4 in the Appendix. As we can see, neither factor entered our model significantly. In other words, our results indicate that the proxies used for corporate tax rates do not systematically affect the transfer pricing risk awareness level of MNEs.

Similar to above, we also corroborated these findings with a non-parametric alternative to ANOVA (i.e. the Kruskal-Wallis test) and Monte Carlo simulations. As can be seen from Tables A5 and A6 in the Appendix, a potential violation of an ANOVA assumption is not the cause for the insignificance of these factors. All variables regarding country tax characteristics remain insignificant regardless whether we use parametric or non-parametric tests. The differences in p-values computed by the parametric ANOVA and the non-parametric Kruskal-Wallis test are tiny. The Monte Carlo simulations further show that for the low tax dummy ANOVA even provided conservative results, which results in lower type I error rates. For the country tax category and the high tax dummy, the results of the one-way ANOVA were liberal. This, however, is not worrisome as we do not observe a change in significance. Last, replacing firm size by any of the above tax proxies in our final model does also not change the significance level of the country tax factors. Hypotheses one and two above are also not materially affected, the industry classification and

[11] The dummy variable *taxrate_cat* is a three-level dummy which indicates whether the MNE is located in a low, moderate or high tax country, whereas the dummy variable *lowtax* (*hightax*) is a two-level dummy which is coded 1 if a country's tax rate is less (higher) than the lower (upper) quartile of corporate tax rates of the total set of countries. Reference is also made to Table A2 in the Appendix regarding the definition of all variables.

country transfer pricing characteristics remain highly significant and robust against changes in the model specification.

A first explanation for this – maybe unexpected – outcome can be drawn from the descriptives: There is hardly any difference in the transfer pricing risk awareness between MNEs located in low tax, moderate tax or high tax countries. Given that ANOVA is a very powerful test in comparing populations, we just do not observe a significant difference in the populations determined by our tax characteristics. Our second explanation is more intuitive: The transfer pricing risk awareness is an assessment made by a key person ultimately responsible for transfer pricing in a MNE. Given that he is a risk averse manager that considers transfer pricing an essential compliance work to avoid penalties, the existence of penalty regimes in case of non-compliance and tax authorities' aggressiveness are more important and tax rates might only play a secondary (insignificant) role. In this regard, it should not make a difference whether the MNE is located in a high tax or low tax country. So, if our results are not biased, do our results contradict the existing literature? We do not see that our results contradict the findings in the existing literature that after-tax profits are affected by tax rates. Risk sensitivity was observed to be affected by industry effects as well as the country transfer pricing risk classification whereas, in turn, the latter might have been implicitly influenced by tax rates. Imagine, for example, that penalty regimes in a country were introduced because tax authorities in a high tax country frequently observed non-arm's length intercompany prices by MNEs located in that country. Hence, the high risk country became a high risk country because it is a high tax country. This might also explain why we observe some sort of correlation between *hightax* and *countryrisk* (at the five percent level).

5 Conclusion

This paper considers the within and between variance in the transfer pricing risk awareness of MNEs across different countries and industries. Motivated by the existing literature on income shifting, we analyze country- and industry-based determinants of the risk sensitivity for transfer pricing issues reported by the person ultimately responsible for transfer pricing in a MNE. Our results indicate that MNEs in high risk countries report a significantly higher transfer pricing risk awareness than their competitors in low risk countries. Firms operating in the pharmaceutical and telecommunication industry are more risk sensitive than their counterparts operating in other industries. We also find the interaction effect between the transfer pricing country risk classi-

fication and the industry classification to be significant. Regarding the size of a MNE in terms of consolidated revenues, our results are somewhat ambiguous (a one-way ANOVA found insignificant results, whereas results obtained from a two-way ANOVA and the Kruskal-Wallis test suggested that firm size matters). Last, we do not find our proxies of country tax characteristics to significantly affect the transfer pricing risk awareness, although this might have been expected from the existing literature. We present two possible explanations for this conundrum: (*i*) the professional assessment regarding the transfer pricing risk awareness indicates that transfer pricing is seen as a (high risk) compliance work to avoid penalties and (*ii*) tax rate effects are implicitly absorbed by the country transfer pricing risk classification (e.g. as high risk countries are more likely to have stringent transfer pricing regulations).

Based on our results, further research shall incorporate firm-specific determinants to analyze firm-level characteristics (e.g. materiality of intercompany transactions, documentation approach, previous tax audit experience) of transfer pricing behavior. This might also shed more light on the question whether tax optimization objectives and, consequently, income shifting by means of transfer pricing affect the behavior of MNEs. One thing is quite certain though: The determinants behind a firm's sensitivity for transfer pricing issues are far more complex than pure tax optimization theory implies.

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Appendix

The Appendix includes the following additional information:

- Appendix A provides detailed information on the general methodology of Ernst & Young's global transfer pricing survey, the sample selection and the aggregation of data for the purpose of this paper.
- Table A1 lists the final set of MNEs in a country × industry dimension, which also indicates the countries defined as pioneer and / or high risk countries.
- Table A2 provides the definition of the variables.
- Table A3 provides the results of the Bonferroni, Scheffe and Sidak multiple comparison tests.
- Table A4 reports the results of the one-way ANOVA with country tax characteristics as the only factors influencing the transfer pricing risk awareness.
- Table A5 reports the results of the simulation of 5000 ANOVA F-tests. All tests were performed one-way.
- Table A6 reports the results of the non-parametric alternative to ANOVA, the Kruskal-Wallis test. All tests were performed one-way.

Appendix A

General methodology

Since 1995, Ernst & Young has surveyed MNEs on international tax matters, with special emphasis on what continues to be the number one international tax issue of interest to them –transfer pricing. The scope of the biennial transfer pricing research reflects the growing number of countries that devote attention to transfer pricing through increased enforcement and regulatory activity, as well as the diversity of transfer pricing issues facing MNEs. In effect, the 2007/2008 version was comprised of two surveys, one of parent companies interviewed from the MNE headquarters perspective, and one of inbound subsidiaries, interviewed from the local operating company perspective. The data analyzed in this paper is based on the information reported by the MNE headquarters only. It encompassed the same 22 markets (countries) researched in 2005 plus India and China. All surveys were conducted by telephone interview. These interviews were carried out with the person with ultimate responsibility for tax policy and strategy in each organization. Most often this was the tax director, but also included were the Chief Financial Officer or Director of Finance. Interviews were carried out between May and August 2007.

Sample selection

The sample was originally drawn from Dun & Bradstreet, a provider of international and U.S. business credit information and credit reports, and matched with contact information by Ernst & Young. Some markets were augmented using local Ernst & Young lists, ensuring that all companies conformed to the overall specification criteria (see below). All companies were first qualified for inclusion, and any that failed to meet the qualification criteria were screened out at the start of the interview. The final sample can be described as all global ultimates of MNEs (i.e. the company is headquartered in that market, not a subsidiary) which meet the following criteria:

- If the global ultimate is in the U.S. or Canada, it should have revenue of at least $500m and have affiliates / subsidiaries on at least two continents besides North America (e.g. Europe and South America, Africa and Australia, etc.). If the list of companies with revenue higher than $500m is short, the list will be completed with the next largest companies with the global ultimate in that country (i.e. starting at $499m revenue).

- If the global ultimate is in one of the Asian markets, including India, it should have revenue of at least $250m and have affiliates/subsidiaries on at least two continents besides Asia. If the list of companies with revenue higher than $250m is short, the list will be completed with the next largest companies with the global ultimate in that country (i.e. starting at $249m revenue). As the fieldwork for China yielded fewer parent companies than subsidiaries, the data contained in the country-specific findings for China are based upon a sample composed exclusively of subsidiaries based in that country.

- If the global ultimate is in one of the European markets, it should have affiliates/subsidiaries in at least five other countries (the five or more other countries can be anywhere in the world). If the list of companies that fit this criteria is short, the list will be completed with companies with subsidiaries in four and then, if necessary, three other countries.

- If the global ultimate is in Latin America, Australia, or New Zealand, it should have affiliates/subsidiaries in at least two other continents (e.g. Europe and Asia, Europe and North America, etc.). If necessary, the lists will be completed with the largest companies with subsidiaries on only one other continent.

Based on the above, a total of 368 MNEs around the world have reported detailed information on their transfer pricing behavior for the 2007/2008 version of the global transfer pricing survey. Table A1 in the Appendix lists the respondents in a two dimensional country $\times$ industry matrix. In sum, the final set included twelve different parent industries and 24 different countries:

- **Countries:** Argentina, Australia, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Korea (Republic of), Mexico, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States

- **Industries:** Asset Management, Automotive, Banking & Capital Markets, Biotechnology, Consumer Products, Insurance, Media & Entertainment, Oil & Gas, Pharmaceuticals, Real Estate, Telecommunication and Utilities

Aggregation of data and definition of variables

For the purpose of this empirical analysis, firm-level data had to be aggregated to industry-level data such as that one observation reflects one unique country $\times$ industry combination.

Question: To what extent do you consider transfer pricing to be a risk issue?

	No. of MNEs (abs.)	**No. of MNEs** (rel.)
The largest risk issue	8	47.1%
A risk issue, but no the largest	9	52.9%
Not a risk issue	0	0.0%
Don't know/not stated	0	0.0%

Note: As reported by MNEs in the consumer products industry in the U.S.

Considering, for example, the MNEs operating in the consumer products industry in the United States, 47.1 percent report transfer pricing to be the largest risk issue, whereas 52.9 percent consider transfer pricing a risk issue, but not the largest. So, the observation "United States × consumer products" is characterized as shown in the table above. It is needless to say that, if applicable, the answer "don't know/not stated" did not enter the base when determining the share of an individual answer as this category invalidates models for ordinal outcomes. As not all country × industry combinations had MNEs taking part in the Survey, we were left with a final set of 137 observations; that is all cells in Table A1 that are non-zero.

Table A 1: Location and industry classification of MNEs

	Commodities				**Finance**			**Resource**	**Pharma**		**Telco/Media**		
	Automotive	Consumer Products	Real Estate	Utilities	Asset Management	Banking & Capital Markets	Insurance	Oil & Gas	Biotechnology	Pharmaceuticals	Media & Entertainment	Telecommunication	Total
Argentina [H]	0	7	0	0	1	2	0	2	1	2	0	0	15
Australia [H] [P]	0	4	4	1	0	3	0	5	0	1	2	1	21
Belgium	0	2	0	1	0	3	0	0	0	1	0	2	9
Brazil [P]	3	3	0	0	0	1	1	3	0	0	0	0	11
Canada [H]	2	3	0	0	0	0	1	4	1	0	1	0	12
China [H] [P]	0	0	0	0	0	0	0	1	0	0	0	0	1
Denmark [H]	1	5	0	0	0	3	0	1	2	2	1	1	16
Finland	0	8	0	1	0	1	0	0	1	0	1	0	12
France [P]	3	7	0	4	0	2	1	0	0	0	1	0	18
Germany [H]	5	10	0	0	0	0	0	0	0	1	0	0	16
India [H]	2	1	0	0	0	0	1	1	0	0	0	1	6
Ireland	0	5	1	0	0	0	0	0	0	0	0	1	7
Italy [P]	2	7	0	0	0	2	1	0	0	3	0	0	15
Japan	6	2	0	0	0	0	1	3	0	2	0	1	15
Korea, Rep. of [H] [P]	6	8	0	0	0	3	0	2	0	0	1	1	21
Mexico [H] [P]	0	9	1	1	1	3	1	0	1	0	1	1	19
Netherlands	1	7	2	1	0	2	1	1	0	0	0	0	15
New Zealand [P]	0	7	0	0	0	0	0	0	0	0	0	0	7

Table A 1: Location and industry classification of MNEs

	Commodities				**Finance**			**Resource**	**Pharma**		**Telco/Media**		
	Automotive	Consumer Products	Real Estate	Utilities	Asset Management	Banking & Capital Markets	Insurance	Oil & Gas	Biotechnology	Pharmaceuticals	Media & Entertainment	Telecommunication	Total
Norway [H]	1	2	1	0	1	0	0	4	0	1	1	1	12
Spain [H]	2	3	0	3	0	1	0	1	0	0	0	0	10
Sweden	1	4	1	0	0	4	0	1	0	0	2	1	14
Switzerland	0	6	0	1	0	2	0	0	0	3	0	0	12
United Kingdom [H]	1	12	0	0	0	5	2	2	0	1	6	2	31
United States [H] [P]	5	17	0	3	0	5	2	5	5	4	3	4	53
Total	41	139	10	16	3	42	12	36	11	21	20	17	368

Note: [H] indicates a high risk country, [P] indicates a pioneer country.

Table A 2: Definition of variables

Variable	Definition
Country TP characteristics	
High risk country [2]	Dummy variable indicating that a country has statutory transfer pricing regulations (e.g. legal documentation requirements, guidance on the application of transfer pricing methods, etc.) and penalty regimes in case of non-compliance [1=yes, 0=no]. *Source:* Ernst & Young's audit risk tool, interviews with Ernst & Young transfer pricing professionals.
Pioneer country [2]	Dummy variable indicating that a country was among the top ten countries that introduced statutory transfer pricing regulations [1=yes, 0=no]. *Source:* Deloitte (2008)
Country tax characteristics	
Tax rate [C]	Continuous variable giving the statutory corporate tax rate in the parent country of the MNE in 2007. *Source:* KPMG (2008)
Tax differential [C]	Continuous variable defined as the difference between the statutory corporate tax rate of a MNE and the median statutory corporate tax rates of the countries in our full sample. A negative difference indicates that tax rate in the MNE's home country is below the median tax rate in the "rest of the world".
Tax rate category [3]	Dummy variable indicating whether corporate tax rate is below, within or above the interquartile range (Q1=0.2800, median=0.3275, Q3=0.3500) of the full set of countries [1=below, 2=within, 3=above]. *Source:* KPMG (2008)
Low tax country [2]	Dummy variable indicating whether corporate tax rate is below the interquartile range (Q1=0.2800, median=0.3275, Q3=0.3500) of the full set of countries [1=yes, 0=no]. *Source:* KPMG (2008)
High tax country [2]	Dummy variable indicating whether corporate tax rate is above the interquartile range (Q1=0.2800, median=0.3275, Q3=0.3500) of the full set of countries [1=yes, 0=no]. *Source:* KPMG (2008)
Firm characteristics	
Industries [5]	Dummy variable indicating the superordinate industry classification as shown in Table A1 [1=Commodities, 2=Finance, 3=Resource, 4=Pharmaceuticals, 5=Telco/Media].
Revenue [2]	Dummy variable indicating that large MNEs of annual revenues of more than $5bn operate in this country × industry classification [1=yes, 0=no].

Note: [X] indicates the number of categories of a dummy variable. [C] stands for continuous variable.

Table A 3: Multiple comparison tests

	Commodities			**Finance**			**Resource**			**Pharmaceuticals**		
	Bonferroni	Scheffe	Sidak	Bonferroni	Scheffe	Sidak	Bonferroni	Scheffe	Sidak	Bonferroni	Scheffe	Sidak
Finance	-.2459	-.2459	-.2459									
	(1.000)	(0.643)	(0.706)									
Resource	-.3195	-.3195	-.3195	-.0735	-.0735	-.0735						
	(1.000)	(0.620)	(0.675)	(1.000)	(0.998)	(1.000)						
Pharmaceuticals	.5472**	.5472*	.5472**	.7931***	.7931***	.7931***	.8667***	.8667**	.8667***			
	(0.041)	(0.080)	(0.040)	(0.002)	0.006)	(0.002)	(0.004)	(0.013)	(0.004)			
Telco/Media	.3298	.3298	.3298	.5757**	.5757*	.5757**	.6493**	.6493*	.6493**	-.2174	-.2174	-.2174
	(0.513)	(0.428)	(0.410)	(0.026)	(0.057)	(0.026)	(0.042)	(0.082)	(0.041)	(1.000)	(0.906)	(0.977)

Note: p-values in parenthesis, with * p¡0.10, ** p¡0.05, *** p¡0.01

Table A 4: One-way ANOVA outputs for country tax characteristics

	SS	**df**	**MS**	**F**	**Pr>F**
Country tax characteristics					
Tax rate [C]	.790	1	.790	1.54	.2175
Tax differential [C]	.790	1	.790	1.54	.2175
Tax rate category [3]	.802	2	.802	4.01	.4632
Low tax [2]	.074	1	.074	0.14	.7073
High tax [2]	.800	1	.800	1.55	.2146

Note: All tests run one-way. "SS" stands for partial sum of squares, "df" stands for degrees of freedom and "ms" stands for mean sum of squares. [C] indicates a continuous variable and [X] gives the number of levels of a dummy variable.

Table A 5: Robustness checks: 5000 ANOVA F-Test simulations

	df		**p-value**		**Diff.**
	Between	Within	Nominal	Simulated	
Country TP characteristics					
Country risk	1	135	.0713	.0566	.0147
Pioneer country	1	135	.6145	.6232	-.0087
Country tax characteristics					
Tax rate category	2	134	.4632	.4638	-.0006
Low tax country	1	135	.7073	.6914	.0159
High tax country	1	135	.2146	.2368	-.0222
Firm characteristics					
Industries	4	132	.0002	.0030	-.0028
Revenue	1	135	.1358	.1378	-.0020

Note: All tests run one-way, i.e. nominal p-value does not necessarily equal the one reported in Table 4. A positive difference indicates conservative ANOVA results. The test does not run with continuous variables.

Table A 6: Robustness checks: Kruskal-Wallis tests

	Kruskal-Wallis test			**ANOVA**	**Diff.**
	df	χ^2	Pr>χ^2	Pr>F	
Country TP characteristics					
Country risk	1	1.337	.2476	.0713	-.1763
Pioneer country	1	.249	.6180	.6145	-.0035
Country tax characteristics					
Tax rate	17	19.794	.2849	.2175	-.0674
Tax differential	17	19.794	.2849	.2175	-.0674
Tax rate category	2	1.335	.5129	.4632	-.0497
Low tax country	1	.786	.8760	.7073	-.1687
High tax country	1	.593	.2511	.2146	-.0365
Firm characteristics					
Industries	4	11.156	.0249	.0002	-.0247
Revenue	1	3.273	.0704	.1358	.0654

Note: All tests run one-way, i.e. p-value does not necessarily equal the one reported in Table 4. A positive difference indicates conservative ANOVA results.

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Transfer Pricing Risk Awareness of Multinational Corporations - Evidence from a Global Survey

Abstract

This paper investigates the transfer pricing risk awareness of multinational firms using cross-sectional data of more than 350 firms located in 24 countries and classified in 12 industries. Moving beyond the sole tax optimization motives of multinational firms, we extend the existing literature by using unique firm-level information such as that the transfer pricing risk awareness is assessed and reported by the person ultimately responsible for transfer pricing. We find that the level of transfer pricing risk awareness of multinational companies predominantly depends on (i) the industry a firm operates in, (ii) a country's risk classification with respect to its transfer pricing regulations (e.g. penalty regimes in case of non-compliance with transfer pricing regulations), (iii) firm size and (iv) the interaction effect of the first two factors. By way of contrast, the time of introduction of transfer pricing regulations and also tax considerations do not seem to play a crucial role for transfer pricing risk perceptions.

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