Catarina Pinto
School of Economics and Management
Universidade do Porto
catarinap1994@gmail.com

Miguel Sousa
School of Economics and Management
Universidade do Porto
msousa@fep.up.pt

Impact of double taxation treaties on cross-border acquisitions

Impacto dos tratados de dupla tributação
nas aquisições transfronteiriças

Catarina Pinto
Miguel Sousa

ABSTRACT

In order to evaluate the impact of Double Taxation Treaties (DTTs) on the Foreign Direct Investment (FDI), we analysed the impact of a DTT implementation on both the number of cross-border acquisitions and the average value of M&A deals between companies from the countries that signed the DTT. Moreover, the impact of DTTs on the takeover bid premiums is analysed in order to access if companies are willing to pay higher premiums after the DTT is implemented and whether the impact on the premium is immediate or gradual. Overall, our findings lead us to conclude that DTTs effectively promote FDI.

Keywords: Double taxation treaties; cross-border acquisitions; takeover bid premiums; foreign direct investment.

RESUMO

Para avaliar o impacto dos Tratados de Dupla Tributação (TDT) sobre o Investimento Direto Estrangeiro (IDE), analisamos o impacto da assinatura de um TDT no número de aquisições transfronteiriças e no valor médio dessas aquisições entre empresas dos países que assinaram a TDT. Além disso, analisamos o impacto da assinatura de um TDT nos prémios pagos pelo adquirente face ao valor de mercado da empresa alvo, com o objetivo de verificar se as empresas adquirente estão dispostas a pagar prémios mais elevados após a assinatura da TDT e se o impacto, a existir, é imediato ou gradual. No geral, os nossos resultados sugerem que os TDT efetivamente promovem o IDE.

Palavras-chave: Tratados de dupla tributação económica; aquisições transfronteiriças; prémios de aquisição; investimento direto estrangeiro.

1. Introduction

In the introduction to its model tax convention, Organization for Economic Co-operation and Development (OECD) emphasises the harmful effects that double taxation has on the movement of capital in the development of inter-country economic relations and the importance of removing obstacles resulting from double taxation (OECD, 2014). In order to solve this problem, OECD developed a model for country-pairs to use in negotiating DTTs which is widely used all around the world.

Despite the efforts made to solve double taxation issues, it is not clear that Double Taxation Treaties (DTTs) have a positive effect on Foreign Direct Investment (FDI). Actually, regarding the effect of DTTs on FDI, the literature is not consensual, as there are empirical studies showing that the effect can be either positive, negative, or null. A possible explanation for the inconsistencies shown by previous literature is the fact that DTTs not only aim to eliminate the double taxation problem in order to facilitate the movement of capital between countries but also intend to prevent tax evasion. The coexistence of different goals may lead to different results in what concerns the effect of DTTs on FDI.

It is also important to notice that DTTs are costly given the duration, labour intensity of the negotiation process, and the effort required to match treaty versions in different languages. Additionally, the provisions in the treaty may conflict with domestic tax law, which has to be adapted as a consequence. Moreover, the potential loss of tax revenue resulting from a DTT must be considered.

Considering jointly DTTs' wide usage and the high costs associated with their implementation, it is very pertinent to examine if DTTs actually fulfil their ultimate goal – stimulate the FDI. Therefore, this study aims to investigate if DTTs have contributed to creating an attractive scenario for a specific type of FDI, the cross-border acquisitions.

To evaluate if DTTs are effectively promoting FDI, four main hypotheses are tested. Firstly, a large sample of deals between companies from countries that signed a DTT was collected to access if the number and the average value of the deals changes after the implementation of a DTT. Assuming that DTTs are effectively promoting FDI, we expected to find an increase in the number and in the value of the deals made after the signature of a DTT. Therefore, we set the following hypotheses:

[H1] The number of cross-border deals, between countries that signed a DTT, increases after the signature of a DTT.

[H2] The average value of the cross-border deals is higher after the signature of a DTT.

Secondly, following Huizinga et al. (2012), that provide empirical evidence showing that additional taxation is fully capitalized into lower takeover bid premiums,[1] and assuming a tax burden resulting from double international taxation, it is expected that less value is created in a cross-border acquisition when a DDT is not implemented. Given that with the implementation of a DTT this tax burden disappears, the present study aims to access if there are observable changes in a cross-border takeover bid premiums after a DTT is implemented. The introduction of bid premiums in our analysis is especially relevant since

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[1] The takeover bid premium represents the difference between the offering price and the estimated value of a company (proxy by the share price before the announcement).

it is the first time that bid premiums are used to measure DTTs' effectiveness. Additionally, this study aims to access if the impact of DTTs on bid premium is immediate or gradual. Therefore, the following hypotheses are tested:

[H3] Companies are willing to pay higher premiums after a DTT is implemented.

[H4] Companies are willing to pay higher premiums if a DTT is in force for a longer period of time.

Despite the fact that, to our best knowledge, there is not any other study analysing the impact of DTTs on takeover bid premiums, previous literature already studied the effect of tax treaties on FDI and there is not any agreement among the literature regarding this effect. Some reasons can justify the diversity of conclusions such as the use of different samples, time frames, and estimation methods.

Blonigen and Davies (2002) use ordinary least squares and fixed effects strategy to estimate the effect of DTTs on FDI and find evidence of a negative effect. Also, Egger et al. (2006) find a significant negative impact of newly implemented tax treaties on outward FDI stocks.

Blonigen and Davies (2004) revisit the same research question and focus on U.S. FDI activity between 1980 and 1999. They use a fixed effect strategy and find that the average of new treaty effect is not statistically different from zero, for both inward and outward United States' FDI. Also, Baker (2014) and Coupé et al. (2008) find no evidence of a relationship between DTTs and FDI. Louie and Rousslang (2008) focus on the required rate of returns rather than FDI and find either a negative or no evidence of a relationship between tax treaties and required rate of returns.

In contrast, Barthel et al. (2010) and di Giovanni (2005) find out that DTTs do lead to higher FDI stocks. Barthel et al. (2010) reach the conclusion that DTTs increase the bilateral FDI stock between 27% and 31% using a sample in which both developed and developing countries are broadly represented over a long period of time. Also, di Giovanni (2005) indicates the increasing number of DTTs as an explanatory factor of the increase of mergers and acquisition activity between 1900 and 1999. By focusing on developing countries, Neumayer (2007) concludes that DTTs are only effective in the group of middle income developing countries.

Although our results suggest that the implementation of a DTT does not change the number of cross-border deals within companies from the countries that signed the DTT, the deals carried out after the implementation of a DTT are on average larger than those carried out before and that companies are willing to pay a higher premium – up to 20 p.p. – after a DTT is implemented. These results suggest that indeed that the implementation of a DTTs effectively promote FDI.

After this introduction, this work proceeds as follows. In section 2, the methodology for the current study is presented. Section 3 comprises all aspects related to the data used and the results are shown in section 4. Finally, the main conclusions are presented in section 5.

2. METHODOLOGY

This study uses four different models in order to test the four hypotheses previously presented.

The first two models aim to test if the number [H1] and the average size [H2] of deals increase after the implementation of a DTTs, respectively.

$$N.^o \ of \ Deals_{it} = \beta_0 + \beta_1 DTT\_dummy_{it} + \beta_2 SumGDP_{it} + \varepsilon_{it} \qquad (1)$$
$$Average \ Deal \ Value_{it} = \beta_0 + \beta_1 DTT\_dummy_{it} + \beta_2 SumGDP_{it} + \varepsilon_{it} \qquad (2)$$

These models are similar to models used in previous studies that measure the impact of DTTs on FDI flows (Blonigen and Davies, 2002; Egger et al., 2006; Blonigen and Davies, 2004; Baker, 2014; Coupé et al., 2008; Louie and Rousslang, 2008; Barthel et al., 2010; di Giovanni, 2005; Neumayer, 2007). The number of deals and the deal average value are used as proxies for FDI. Panel data, with fixed effects,[2] was used to estimate the models, using a sample of cross-border deals occurred from 1996 to 2017, between companies from countries that signed a DTT from 2000 to 2015.

The models differ in the dependent variable. In the first model, the dependent variable represents the number of cross-border acquisitions made between the countries of the pair i during the year t, while in the second model the average value of the deals made between the countries of the pair i during the year t is set as the dependent variable.

To estimate the first model, the negative binomial regression is used since we are dealing with count data. The poison regression is also an option to deal with this type of data, however, given the high dispersion of the data, the negative binomial regression works better. In the remaining models estimated, linear regressions were used.

For both models, the explanatory variable of main interest is the existence of a DTT – *DTT_dummy*. This variable is a dummy and it assumes the value 1 when there is a DTT in force between the countries where the deal occurred, and 0 otherwise. The effective date was taken as the reference date rather than the signature date because effectiveness is what matters most to the investors.[3] Our hypotheses [H1] and [H2] are confirmed if both coefficients associated with the variable *DTT_dummy* come out positive.

The control variable *Sum GDP$_{it}$* represents the sum of the nominal GDP per capita of both countries involved in the transaction in the year the transaction occurred and allow to control for macroeconomics condition that can have an impact in the M&A activity. In model (2) we control for serial correlation, and report standard errors that are robust to heteroskedasticity and are clustered at country-pair level.

Regarding the hypotheses [H3] and [H4] – companies are willing to pay higher premiums when there is a DTT implemented and if the change happens immediately or gradually after the DTT is implemented – the model developed by Huizinga et al. (2012) is taken as the

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[2] In the case of model (1) was not possible to perform the Hausman test, but the results were pretty similar if random effects were used. In the case of model (2), according to the Hausman test, fixed effects were not the prefer method only in the regression without any control variable, but the results were very similar if random effects were used. All other cases, Hausman test considered that fixed effects should be used.

[3] As the investors could advance the acquisition to be already installed in a country right after the DTT is implemented, for the sake of robustness, we, alternatively, used in models (1) and (2) a 'DTT-1' dummy that assumes the value 1 if the acquisition occurred after one year before the DTT is implemented, and 0 otherwise.

departure point. By introducing takeover bid premiums in our analysis, we are contributing to the introduction of a new way to measure DTTs' effectiveness.

The following linear regressions models are set:

$$BP_i = \beta_0 + \beta_1 DTT\_dummy_i + \beta_2 SumGDP_i + \beta_3 Mkt\_cap_i +$$
$$\beta_4 MtB_i + \beta_5 DtM_i + \beta_6 \%ofaq_i + \varepsilon_t \qquad (3)$$
$$BP_i = \beta_0 + \beta_1 DTT\_age_i + \beta_2 SumGDP_i + \beta_3 Mkt\_cap_i +$$
$$\beta_4 MtB_i + \beta_5 DtM_i + \beta_6 \%ofaq_i + \varepsilon_t \qquad (4)$$

In both models, *Bid Premium* at the rumoured date is set as the dependent variable. By considering the rumoured date rather than the announced date, the possible effects resulting from speculation before the transaction are mitigated.[4]

The explanatory variable of main interest in the model (3) is the *DTT_dummy* – a dummy and it assumes the value 1 when there is a DTT implemented between the countries where the deal occurred, and 0 otherwise – of a DTT as it is in the models (1) and (2). Considering the hypothesis 3, a positive coefficient indicates that DTTs are promoting FDI while a negative coefficient might indicate that different purposes of DTTs affect negatively FDI.

In model (4), *DTTage* is the variable of main interest and it represents the number of years elapsed between the effective date of the DTT and the transaction date. To compute this regression, only the deals made after the signature of a DTT are taken into account. Considering hypothesis 4, a positive coefficient may indicate that tax reductions and renegotiations of existing treaties have a positive effect on the promotion of FDI.

Regarding the control variables, they do not differ between models and can be divided into three groups: country, target firm and deal variables. The country variable is $Sum\ GDP_i$ as in model (1) and (2).

Regarding target variables – *Mkt_cap*, *MtB* and *DtM* – all use the year before the transaction as the reference. Market Capitalization (*Mkt_cap)* controls for the target size. In most observations, this value was taken directly from Zephyr.[5]

Market to book value (*MtB*), also known as price to book ratio, is used to compare a company's current market price to its book value indicating whether a company is over or under evaluated. A relatively small market-to-book ratio suggests that the target is undervalued and, consequently, it could result in a higher premium. The formula used to obtain it is:

$$MtB = \frac{Market\ Capitalization}{Total\ Assets - Total\ Liabilities}$$

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[4] When rumour date was not available it was assumed that no information was revealed, and the announced date was taken as a proxy.

[5] For observations that Zephyr did not provide this information directly, the following formula was used

$$Market\ Capitalization = \frac{Deal\ equity\ value/\%\ of\ acquisitions}{1 + Bid\ Premium}.$$

DtM is used to access the target financial situation and it measures the total amount of outstanding company debt as a percentage of the firm's total assets. This ratio is an indicator of the company's leverage, which is defined as using debt to purchase assets. In the collection of the values, Amadeus was used when Zephyr did not provide the values.

Finally, *%ofaq* represents the percentage of acquisition.

3. Data

In order to estimate the models presented in the previous section, information regarding several deals was collected. Due to the different variables used in our models, not all the deals were considered in the estimation of all models. As a result, four subsamples are considered according to each model. The selection of the deals was made through several steps, where the 3 first ones are common to all the subsamples. The data, needed to estimate the models, was collected from Zephyr and Amadeus (financial data) and World Bank (nominal GDP data).

In this section, the common steps are presented firstly, followed by a description of each of the subsamples used.

3.1. Sample selection

The first step consisted in the choice of the 10 countries with the highest levels of FDI in the last 20 years. After analysing the data provided by the World Bank regarding FDI, the countries selected were: China, United States, India, Japan, Germany, Russian Federation, Brazil, United Kingdom, France and Indonesia.

The second step was to find out which and how many DTTs were signed by each one of these countries between 2000 and 2015. In order to do this, IBFD Tax Treaties database was used and 308 DTTs were selected. Each of these DTTs corresponds to a pair of countries that signed a treaty during the period considered.

Finally, we selected 45.687 cross-border acquisitions occurred from 1996 to 2017, within the countries of pairs chosen in the second step. Information regarding the deals was collected from Zephyr.

3.2. Number of deals before and after a dtt implementation [h1]

To test if the number of deals changes after the signature of a DTT [H1], the pairs of countries that had either only observations before or after the signature of a DTT were eliminated. This result in a subsample of 155 pairs of countries and 44.913 deals. Among the deals selected, 56% were made after the signature of a DTT.

The deals in our sample occurred from June 4, 1996, to March 30, 2017, and follow the temporal evolution illustrated in Figure 1.

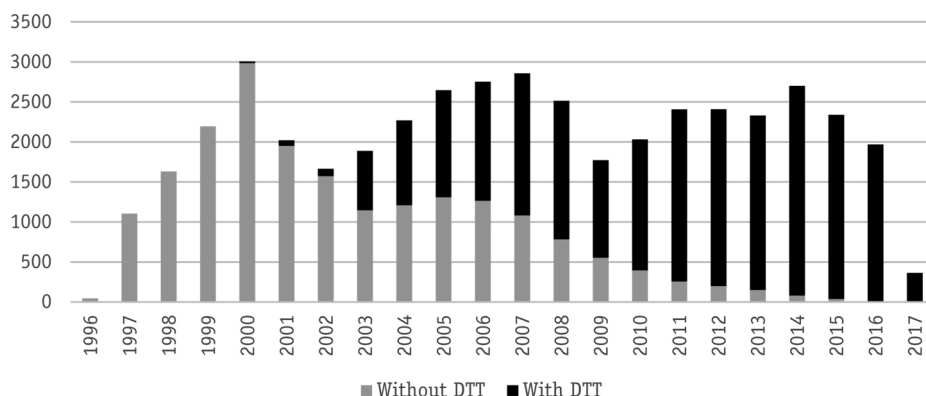Figure 1: Cross-borders deals before and after a DTT is implemented

Figure 2: Distribution per pairs of countries of the sample
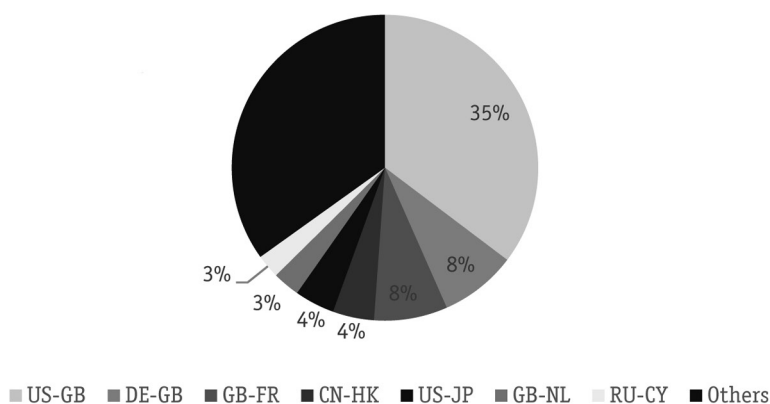
3.3. DEAL VALUE (H2)

The subsample used to test the hypothesis (2) only includes cross-border acquisitions with a known deal value, in a total of 20.982 deals made within 131 pairs of countries. 51% of the deals in this subsample happened after a DTT is implemented. Regarding the deal value, as shown in Table 1, the average (median) deal value made after the implementation of a DTT is around € 235 million (24 million), while before the signature of the DTT is around € 300 million (21 million).

Although the median is lower before the implementation of a DTT, the mean follows the opposite pattern. This discrepancy is due to the presence of 5 (outliers) deals that occurred before a DTT was implemented. By eliminating the 5 deals with the highest values, which corresponds to 0.02% of our sample, we verify that mean becomes higher in the group of deals made after a DTT is implemented. Nonparametric equality-of-medians test and t- test for testing mean differences were used.

Table 1: Descriptive statistics [H2]

	Deal Value (M€)				
	Mean	Median	S.D.	Min	Max
Total	267	22	2 454	0	204 730
Without DTT	300	21	3 296	0	204 730
With DTT	235	24	1 164	0	41 174
Difference	-64*	2***			

Note: ***, **, and * denote statistical significance at the 0.01, 0.0 5, and 0.1 levels, respectively.
Source: Own calculations considering information of Zephyr.

3.4. ACQUISITION PREMIUM [H3]

To test if companies are willing to pay higher premiums after a DTT is implemented, only the deals with the bid premium, at the announced date, known were kept. Additionally, the cross-border deals that involved acquisition of less than 5% of the shares were eliminated due to its lack of relevance. The final subsample comprises 137 deals where 74% were made after a DTT is implemented.

When comparing the average deal value of the previous subsample [H2] with the actual subsample [H3], it can be seen that the average deal value of the actual subsample [H3] – € 1.888 million – is higher than the average deal value of the previous subsample [H2] – € 267 million. This is not surprising since it is easier to obtain data for large deals.

Table 2 shows the average and medians of the bid premium at the rumoured date, market capitalization, market to book value and leverage (debt divided by market capitalization).

When testing for the differences on bid premiums between the deals that occurred after DTT is implemented and the deals made before the implementation of a DTT, we can see a positive difference (statistically significant) for both mean and median. These results suggest that after the DTT is implemented the size of deals increase. Nonparametric equality-of-medians test and t-test for testing mean differences were used.

Table 2 – Descriptive Statistics [H3]

|	Total		Without DTT		With DTT		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Deal Value (M€)	1 888	215	711	54	2 296	308	1 585	254***
Bid Premium (%)	54%	36%	30%	18%	62%	42%	32%	24%***
Market Capitalization (M€)	1 693	248	748	72	2 029	409	1 281**	337***
Market to Book Value	7.07	2.37	5.54	1.57	7.61	2.84	2.07	1.27*
Debt/Market Capitalization	3.43	0.30	2.25	0.51	3.84	0.24	1.59	-0.27**
% of acquisition	82%	100%	71%	79%	85%	100%	14%**	21%***

Note: ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.1 levels, respectively.
Source: Own calculations considering information of Zephyr.

3.5. BID PREMIUM EVOLUTION AFTER THE DTT [H4]

Finally, in order to access if the bid premiums change immediately or gradually after the DTT implementation, only the 101 deals made after a DTT is implemented were kept from the previous subsample. Regarding these deals, they happened on average (median) 6.69 (7.00) years after the DTT is implemented and follow the distribution shown in Figure 3.

Figure 3: Number of years after the DTT is implemented

■ [0-3]   ■ [4-6]   ■ [7-9]   ■ [10-12]   ■ [13-15]
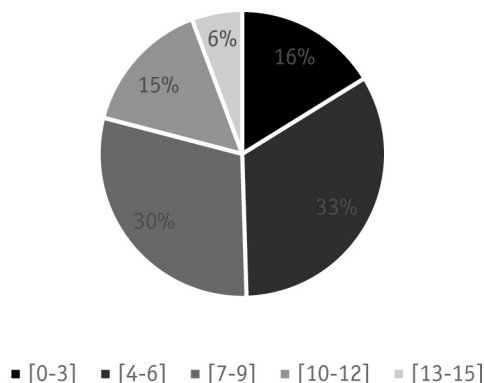
4. Results

In this section, the results are presented according to the hypotheses previously stated.

4.1. Impact of dtt implementation on the number of cross-border deals

To access if the number of deals increases after the signature of a DTT, model (1) is estimated as shown in Table 3. All regressions use panel data, where 155 different pairs of countries that had signed a DTT recently (2000-2015) are observed for the period between 1996 and 2017. The dependent variable is the number of deals made by each of the pairs considered for a given year and the independent variable of main interest is a dummy indicating whether there is a DTT in force. As the investors could advance the acquisition to be already installed in a country right after the DTT is implemented, alternatively we used a 'DTT-1' dummy that assumes the value 1 if the acquisition occurred after one year before the DTT is implemented, and 0 otherwise. The regressions differ regarding the controls used. In the first two, no controls are used, in the third and fourth, the *Sum GDP$_{it}$* is used as the control variable and finally in the last two the natural logarithm of *Sum GDP$_{it}$* is set as the control variables.

Table 3: Impact of DTTs on the Number of Deals

	I	II	III	IV	V	VI
Dependent Variable						
Nº of Deals						
Independent Variables						
DTT_dummy	0.38***		0.05		0.04	
	(0.04)		(0.04)		(0.04)	
DTT-1_dummy		0.08**		-0.14		0.02
		(0.32)		(0.04)		(0.04)
Sum GDP (M$)			15.17***	5.24***		
			(1.03)	(0.93)		
Ln (Sum GDP (M$))					0.78***	0.18***
					(0.05)	(0.05)
Constant	0.24***	1.36***	-0.39***	1.14***	2.89***	1.95***
	(0.05)	(0.00)	(0.07)	(0.06)	(0.18)	(0.16)
N	3 410	2.263	3 410	2 263	3 410	2 263
Wald chi2	97.16***	6.25**	320.83***	38.16***	324.19***	21.19***

Notes: This table reports the negative binomial regression used to test H1. The dependent variable is the annual number of cross-borders deals occurred from 1996 to 2017, between companies from countries that signed a DTT

from 2000 to 2015. The independent variables of main interest are the DTT_dummy and the DTT-1_dummy and these variables assume the value 1 when there is a DTT in force between the countries or after one year before the DTT is in force, respectively, and 0 otherwise. The control variable Sum GDP (and ln (Sum GDP)) represents the sum (and the log of the sum) of the nominal GDP per capita of both countries involved in the transaction in the year the transaction occurred and allow to control for macroeconomics condition that can have impact in the M&A activity. Panel data with fixed effects was used to estimate the model. *, **, and *** denotes statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are in parentheses.

As shown in Table 3, there are no strong evidence that the implementation of a DTT increases the number of cross-border deals. The coefficients associated with *DTT_dummy* and *DTT-1_dummy* in the first two regressions are positive statistically significant (at a 5% level), which may suggest a positive relationship between the implementation of a DTT and the number of cross-border acquisitions. However, when controlled by the macroeconomic variable (sum of nominal GDP per capita of both countries) the relationship disappears as the coefficients associated with our variables of main interest (*DTT_dummy* and *DTT-1_dummy*) are not anymore statistically significant. Consequently, the results suggest that the implementation of a DTT does not influence the number of cross-border acquisitions. This contradicts di Giovanni (2005) who indicates the increasing number of DTTs as an explanatory factor of the increase of mergers and acquisition activity in the 90's.

4.2. IMPACT OF DTTS ON THE AVERAGE DEAL VALUE

Although our previous results suggest that the number of cross-border acquisitions made before and after the implementation of a DTT does not change, if the deals are different in size, the DTT may still effectively promote FDI. To test the hypothesis (H2), 6 new regressions are estimated using as the dependent variable the average deal value.

The results presented in Table 4, show that the coefficients associated with *DTT_dummy* and *DTT-1_dummy*, (our independent variables of main interest) are always positive and statistically significant, which strongly suggest that DTTs do have a positive impact on the average value of the deals practised. The average deal value is estimated to increase up to € 53 million after a DTT is implemented (or € 70 million if take into consideration the year before the DTT implementation).

Table 4: Impact of DTTs on the average deal value

	I	II	III	IV	V	VI
Dependent Variable						
Average Deal Value (M€)						
Independent Variables						
DTT_dummy	29.61*		52.57**		39.78*	
	(15.16)		(24.87)		(34.10)	
DTT-1_dummy		40.73***		70.30**		60.05*
		(15.56)		(35.83)		(31.12)
Sum GDP (M$)			-1 283.54	-1 644.33		
			(1293.00)	(1 527.59)		
Ln (Sum GDP) (Mln US$)					-20.95	-39.56
					(32.60)	(41.38)
Constant	88.32***	81.56***	139.85***	146.16**	14.48	-58.81
	(6.70)	(7.58)	(53.70)	(58.01)	(116.51)	(150.80)
N	2 882	2 882	2 882	2 882	2 882	2 882
F-test	3.81*	6.85***	2.93*	3.33**	1.94	3.49**

Notes: This table reports the ordinary least square regression used to test H2. The dependent variable is the average value of cross-borders deals occurred from 1996 to 2017, between companies from countries that signed a DTT from 2000 to 2015. The independent variable of main interest is the DTT_dummy, and this variable assumes the value 1 when there is a DTT in force between the countries and 0 otherwise. The control variable Sum GDP (and ln (Sum GDP)) represents the sum (and the log of the sum) of the nominal GDP per capita of both countries involved in the transaction in the year the transaction occurred and allow to control for macroeconomics condition that can have impact in the M&A activity. Panel data with fixed effects was used to estimate the model. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Reported standard errors in parentheses are robust to heteroskedasticity and are clustered at country-pair level.

Our results suggest that in spite of the fact that DTTs are not stimulating the number of deals made, these treaties are actually promoting FDI since larger deals are made after a DTT is implemented and so larger amount of money is being invested in cross-border deals between two countries after they signed a DTT. A possible explanation is that smaller deals are more likely to be justified by tax evasion purposes that tend to more difficult to occur after the implementation of a DTT since tax avoidance is one of the objectives of a DTT implementation. However, larger deals, those that are worth to stimulate, are the ones that tend to rely mostly on synergies and tend to occur more often after a DTT is implemented.

Our results are consistent with Barthel et al. (2010) who conclude that DTTs do lead to higher FDI stocks.

4.3. IMPACT OF DTTS ON BID PREMIUMS

To access if companies pay higher premiums after a DTT is implemented, model (3) was estimated.[6] All the regressions shown in table 5 have in common the dependent variable – *Bid Premium*. However, different explanatory variables are used.

All the regressions estimate a positive and statistically significant (for a significance level of at least 5%) relationship between the implementation of a DTT and the bid premium.

Table 5: Impact of DTTs on bid premium (1)

	I	II	III	IV	V	VI
Dependent Variable						
BP [(+)]						
Independent Variables						
DTT_dummy	15.83***	14.60**	19.65***	11.83**	15.67***	16.86**
	(5.62)	(5.96)	(5.63)	(5.51)	(5.62)	(6.91)
Ln (Sum GDP (M$))		4.39			1.08	2.85
		(7.00)			(7.09)	(7.15)
Ln (Mkt_cap (T€))			-3.91***		-3.74***	-3.56***
			(1.28)		(1.24)	(1.29)
MtB [(+)]			0.99		0.43	0.07
			(0.65)		(0.63)	(0.65)
DtM [(+)]			0.87		3.20	3.24
			(2.85)		(2.78)	(2.91)
%ofaq				27.61***	31.82***	34.12***
				(7.86)	(8.56)	(9.52)
Year fixed effects	Not Included	Not Included	Not Included	Not Included	Not Included	Included
Constant	29.16***	41.31***	70.35***	9.57	48.52	70.73
	(4.82)	(19.98)	(15.96)	(7.25)	(29.08)	(41.22)
N	137	137	137	137	137	137
R^2	0.06	0.06	0.12	0.14	0.22	0.33

Notes: This table reports the ordinary least square regression used to test H3. Bid premium at the rumour date of cross border deals occurred from 1996 to 2017, between companies from countries that signed a DTT from 2000 to 2015, is the dependent variable. The independent variables of main interest are the DTT_dummy and the DTT-1_dummy

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[6] In order to estimate a more robust model, the variables were either winsorized (variables Bid Premium, MtB and DtM) or logarithmized (GDP and MarketCap variables). These transformations limit extreme values of the variables and so reduce the effect of possibly spurious outliers.

and these variables assume the value 1 when there is a DTT in force between the countries or after one year before the DTT is in force, respectively, and 0 otherwise. The control variable ln (Sum GDP) represents the log of the sum of the nominal GDP per capita of both countries involved in the transaction in the year the transaction occurred. Ln (Mkt_cap) is the log of the market capitalization of target company, MtB, represents the market to book value (also known as price to book ratio) of the target company, DtM measures the total amount of outstanding company debt as a percentage of the firm's total assets %ofaq represents the percentage of acquisition. All these variables are in the year before the deal and variables signalling with [+] are winsorized between 0.01 and 0.99 percentiles. Finally, Year_dummy controls for year fixed effects. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are in parentheses.

The regression coefficients associated with *DTT_dummy* vary between 12 to 20 percentage points (p.p.). This strongly suggests that companies are willing to pay higher premiums after a DTT is implemented. High premiums as a result of a DTT are a strong indicator that tax treaties are being effective on the promotion of the FDI. It is possible to argue that due to the elimination of the double taxation burden, companies become willing to pay more to invest abroad.

Our results are also consistent with Huizinga et al. (2012) who provide empirical evidence showing that additional taxation resulting from international double taxation is fully capitalized into lower takeover bid premiums.

Finally, in order to understand if tax reductions and renegotiations of existing DTTs stimulate FDI gradually, only the deals occurred after a DTT is implemented are used in the regressions estimated in Table 6.

Table 6: Impact of DTTs on bid premiums (2)

	I	II	III	IV	V	VI
Dependent Variable						
BP [1]						
Independent Variables						
DTTage	0.51	0.03	0.71	-0.07	0.21	-0.60
	(0.83)	(0.92)	(0.85)	(0.83)	(0.89)	(1.17)
Ln (Sum GDP (M$))		11.03			2.24	12.73
		(9.30)			(10.53)	(11.96)
Ln (Mkt_cap (T€))			-3.71**		-3.82***	-3.9***
			(1.43)		(1.39)	(1.45)
MtB [1]			0.55		0.14	-0.40
			(0.77)		(0.76)	(0.79)
DtM [1]			-1.42		0.25	1.54
			(3.46)		(3.40)	(3.56)
%ofaq				27.33***	30.01**	3.56**
				(9.89)	(11.48)	(11.95)

Year fixed effects	Not Included	Not Included	Not Included	Not Included	Not Included	Included
Constant	41.55***	72.27***	86.24***	22.12***	71.50	79.03
	(6.22)	(26.63)	(19.01)	(9.26)	(39.62)	(79.03)
N	101	101	101	101	101	101
R^2	0.00	0.02	19.01	0.08	0.15	0.25

Notes: This table reports the ordinary least square regression used to test H4. Bid premium at the rumour date of cross border deals occurred from 1996 to 2017, between companies from countries that signed a DTT from 2000 to 2015 is the dependent variable. The independent variable of main interest is the DTTage and it represents the number of years elapsed between the effective date of the DTT and the transaction date. The control variable ln (Sum GDP) represents the log of the sum of the nominal GDP per capita of both countries involved in the transaction in the year the transaction occurred. Ln (Mkt_cap) is the log of the market capitalization of target company, MtB, represents the market to book value (also known as price to book ratio) of the target company, DtM measures the total amount of outstanding company debt as a percentage of the firm's total assets %ofaq represents the percentage of acquisition. All these variables are in the year before the deal and variables signalling with [+] are winsorized between 0.01 and 0.99 percentiles. Finally, Year_dummy controls for year fixed effects. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Standard errors are in parentheses.

Contrary to our expectations, our results do not show any evidence of a positive relationship between our explanatory variable of main interest – *DTTage* – and the bid premiums practised. Actually, the coefficients associated with *DTTage* are not statistically significant in all the regressions estimated. This might suggest that tax reductions and renegotiations do not have any gradual effect on FDI but instead do have an immediate effect which is consistent with Davies (2003a). The author concludes that renegotiations do not have a robust positive impact on FDI.

Nevertheless, our results lead us to conclude that companies are willing to make larger deals and to pay higher premiums after the signature of a DTT which indicates that DTTs are an effective tool on the stimulation of FDI.

5. CONCLUSIONS

The objective of this research was to study the impact of DTTs on FDI, more specifically on cross-border acquisitions. There are 3 main reasons for justifying the importance of studying the real impact of DTTs. First, DTTs are widely used all around the world and its importance has increased in the last decades. Second, the implementation of DTT forces countries to incur in various costs. And, finally, there is a lack of agreement among the literature regarding their effectiveness in promoting FDI.

The current study starts by replicating previous studies that analysed the impact of DTTs on the FDI flows, using both the number and the average value of deals practised between two countries as proxies for FDI flows. Moreover, it introduces a new way to measure the impact of DTTs – through takeover bid premiums. Jointly considering double taxation as a driver of lower takeover bid premiums and DTTs as a powerful tool in solving the double

taxation problem, we expected to find positive impact of DTTs on the premiums practised. Furthermore, assuming FDI is stimulated by sequential tax reductions either specified in the treaties or achieved through renegotiations, we aimed to find a positive and gradual relationship between the treaties' age and the premiums practised.

When replicating previous studies, our results suggest that the implementation of a DTT does not change the number of cross-border deals within companies from the countries that signed the DTT. However, our results suggest that deals carried out after the implementation of a DTT is on average larger than those carried out before. Consequently, our findings suggest that DTTs effectively promote FDI. Lower value deals may be (at least partially) justified by tax evasion purposes are more difficult to occur after the implementation of a DTT. However, larger value deals, those that are worth to stimulate, occur more often.

Regarding the bid premiums, the results suggest that companies are willing to pay a higher premium – up to 20 p.p. – after a DTT is implemented. This reinforces the idea that DTTs are effectively promoting FDI. Nevertheless, we conclude that the years elapsed between the effective date of a DTT and the transaction date do not affect the bid premiums.

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