Transfer Pricing: The Case of Saudi Arabia

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This study examines transfer pricing behaviour for the purpose of shifting profits between national tax jurisdictions with different rates of profit tax in the context of the Saudi oil and gas sector as well as that of several other countries (i.e., Australia, Canada, Czech Republic, France, Korea, Japan, Kuwait, Norway, Poland, Sweden, UK and US). The methodology of the Bartelsman and Beetsma (2003) is proposed as the basis for testing the hypothesis. The results of this study show that the Bartelsman and Beetsma (2003) model when applied to the Saudi Arabia oil and gas sector does not detect transfer pricing behaviour for the purpose of shifting profit. However, the Bartelsman and Beetsma (2003) model when applied to other countries such as Japan, Korea, Norway, Poland, and the United Kingdom does show results that suggests the presence of transfer pricing behaviour for the purpose of shifting profits.

Keywords: Corporate tax rates; Income splitting; transfer pricing

1. The Introduction

The research problem arises from the perspective of national tax authorities when firms that are part of the same MNC group are subject to different rates of profit tax because of their location in different tax jurisdictions (Hoonsawat, 2007). The managements of multinational companies operate internationally and, in this manner, strive to minimise the overall tax payment (liabilities) of the multinational group as a whole, across the countries in which they operate. Apart from developing acceptable tax minimisation strategies for this purpose, various studies have identified management behaviour that is considered by tax authorities to be outside the realm of tax minimisation and into the realm of shifting profits between tax jurisdictions. A range of studies have has identified that the setting of transfer prices has been utilized by management, in such situations as a mechanism, to shift profits from an MNC's operations in high tax jurisdictions to their operations in low tax jurisdictions, as can be seen from a range of studies (Harris et al. 1991; Johnson & Kirsh 1991; Borkowski 1992; Grubert, Goodspeed & Sivenson 1993; Borkowski 1997; Oyelere & Emmanuel 1998; Mehafdi 2000; Eden& Kudrle 2005).

The research question at the center of this study is: Does the management of multinational companies in the Saudi Arabia the oil and gas sector reflect transfer price setting behaviour posited by Bartlesman and Beetsma's (2003) model?. This question will be explored using a number of propositions and hypotheses which are derived from the core objective of this study as follows:

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Proposition a: The management of multinational companies operates in such a fashion so as to minimise the overall tax liability of the multinational company.

Proposition b: The management of multinational companies strives to minimise the overall tax liability of the multinational group as a whole by the use of transfer pricing.

From the above propositions, the following hypotheses are tested in this paper:

Hypothesis a: The management of multinational companies uses transfer pricing to shift profits from their operations in high tax jurisdictions to their operations in low tax jurisdictions.

Hypothesis b: The management of multinational companies in the Saudi Arabian oil and gas sector uses transfer pricing to shift profits from their operations in high tax jurisdictions to their operations in the low tax jurisdiction of Saudi Arabia.

Although there were some studies that centred on the oil sector globally and the issue of transfer pricing, the literature review revealed that there were no studies that dealt with the issue of transfer pricing in relation to the Saudi Arabian oil and gas sector.

The study makes several contributions to the literature. First, it investigates whether the Bartelsman and Beetsma (2003) model detects if the Saudi oil and gas companies may be using transfer pricing in a manner that is consistent with shifting profits from high to low tax jurisdictions. It provides an incremental contribution to the literature on the topic of transfer pricing internationally. Consequently, this study develops an adaptation of the Bartelsman and Beetsma (2003) model to test for the transfer pricing behaviour in the specific field e.g. oil and gas sector. As a consequence this study opens up a line of research to further test the adapted Bartelsman and Beetsma (2003) model for other national tax jurisdictions and thereby provide results that will enable comparisons and further refinement of the model if necessary. This study can be used as a basis for examining and developing further the methodology for identifying and gauging any transfer pricing behaviour with the purpose of shifting profits in relation to the oil and gas sector in other countries..

This paper proceeds as follows: A literature review is summarised in Section 2; Section 3 discusses methodology and model; Findings are presented in section 4; Section 5 addresses the Summary and Conclusions.

2. Literature Review

Although there are several models that have been developed, such as Silva (1999), Grubert and Mutti (1991), Hines and Rice (1994), Nielsen, Raimondos-Møller, and Schelderup (2001), to identify the use of transfer pricing for the purpose of profit shifting. However, the necessary variables were not available in the Saudi market for the use of such mathematical models as is the case in the US companies.

Silva (1999) described a simple statistical model to predict the arm's length profit margin of a corporate tax payer as a function of the operating expense ratio and random factors, quantified by residual error. The model was validated using data from publicly traded U.S. companies engaged in drugs, toiletry, and cosmetics, and perfumes. The aim of this study was to determine if the same model could be fitted to a set of corresponding data applying to the Sabic Company in the Saudi Arabia between 1999 and 2008. However, the required

variables were not available in the Saudi market for the use of such mathematical models as is the case in the US companies.

A commonly used model of transfer pricing in multinational firms is the model of Grubert and Mutti (1991). This model provides an empirical economic treatment of the issue of transfer pricing and offers quantitative analysis in three areas, including the ability to shift profits between countries with tax gradients, impact of host country taxes and tariffs on distribution of real capital, and influence of tax and tariff policies in international trade patterns. Grubert and Mutti's (1991) model can be used to explain this transfer pricing in terms of effects. This model also does not require complex regression building, but is instead focused on simple microeconomic models and well-known constructions, including profit maximization, demand for capital, and analysis of capital distribution. This makes this model of analysis simple to use and well suited to the overall structure of the current report. However, the required variables were not available in the Saudi market for this model as the case in the US companies.

Hines and Rice's (1994) exhaustive study of the issues involved in the use of tax havens by American companies cited the Grubert and Mutti study as a basis for assertion that tax benefits are one of the most common reasons for the use of transfer pricing and tax havens by American firms. This study provided great insight into the significance of the model's assertions as well as describing how they fit into a greater structure. The results of this study were also used to construct a model to examine transfer pricing in Puerto Rico, which used a structural equation model (SEM) to examine the issue at hand (Grubert & Slemrod, 1998). However, the required variables were not available in the Saudi market for this model as the case in the US companies.

One potential model of transfer pricing that could be used to detect transfer pricing in the financial statements of firms in the oil and gas industry as well as other publicly available information is that described by Nielsen, Raimondos-Møller, and Schelderup (2001). This model examines transfer pricing under market conditions of oligopolistic competition, which makes it appropriate for the current industrial focus. However, the required variables were not available in the Saudi market as is the case in the US companies.

The Bartelsman and Beetsma (2003) model is currently constructed as a time series analysis of a longer time frame, which consists of data ranging from 1979 to 1997. The model was focused on the analysis of data from OECD countries, and as such this was a reliable period of time for which data was available. Additionally, this model did not rely on construction of an understanding of transfer pricing in any particular industry, and as such the data set could be constructed such that the model took into account any number of industries for which there were information for a period of time. This yielded a robust and effective model that provided definite evidence of transfer pricing.

The Bartelsman and Beetsma (2003) model was used in this paper for the following reasons:

- The model examines the available public data at industry level, which is available for most developed, developing, and tax-haven countries;
- The model uses the headline tax rate and reported profit levels within an industry to detect transfer pricing for most developed, developing, and tax-haven countries;

- The model is acknowledged by researchers in the field to reliably identify transfer pricing simply and efficiently.
- A complete description of the model is available for use and adaptation by other researchers.

In essence, the Bartelsman and Beetsma (2003) model was designed to use an estimate of how much the value added/labour ratio (value-labour), officially reported by tax authorities and national statistics authorities, was lost or deflated by income shifting via transfer pricing. It is assumed that the value-added revenue from production is understated for countries with high tax rates where multinational companies claim lower than market prices for international cross-border business transactions. Conversely, it is assumed that the value-added is overstated for countries with low tax rates where multinational companies claim higher than market prices for cross-border transactions between their related entities. Consequently, the reported value-added statistics are distorted to the extent that the results of the prohibited transfer pricing behaviour are embodied in the reported data.

3. The Methodology and Model

This paper adopts a quantitative approach in testing for transfer pricing behavior that may indicate the shifting of profits between tax jurisdictions with different corporate tax rates, with the focus on the oil and gas sector of Saudi Arabia. In undertaking this study, the Bartelsman and Beetsma model (2003) was employed and tested to determine whether the model can be useful to generate results that indicate the presence of such behaviour in the oil and gas. The study design has also been modified where necessary due to the lack of the appropriate amount of information for the selected countries dealt with in this study. A detailed quantitative analysis of the collected data covering the period from 1999 to 2008 was carried out using SPSS syntax non-linear regression because the Bartelsman-Beetsma equation requires non-linear regression and the assumptions of ordinary least squares (OLS) regression analysis are violated as follow:

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$$V_{ijt} = \left[1 + (c^{csy})^{1/(\rho-1)} \left(\frac{\tilde{r}_{it}}{w_{ijt}} \right)^{\rho/(\rho-1)} \right] \left[1 + \gamma^{cs}(\tau_{it} - \overline{\tau}_{jt}^{\prime}) \right] + \epsilon_{ijt} \qquad (5.4)$$

Second, a statistical model developed from the theoretical model by taking logarithms (log$_{10}$) of both sides, and simplifying, so that j = 1 sector and t = 2 years, as follows:

$$\log V = \frac{1}{\rho-1} \cdot \log C^{csy} + \frac{p}{\rho-1} \cdot \log(1 + \tilde{r}/w) + \log \gamma^{cs} + \log[1 + (\tau - \tilde{\tau})]$$

The regression coefficients are:

β_0 = Constant;
β_1 = Capital-Labor substitution coefficient;
β_2 = The response coefficient for the home country; and
β_3 = Tax Difference coefficient

If the p value (Sig) of the t test statistic is less than .05, and if the 95.0% confidence intervals do not include zero then the regression coefficient is significantly different from zero.

If the p value (Sig) of the t test statistic is greater than .05, and if the 95.0% confidence intervals include zero, then the regression coefficient is not significantly different from zero.

4. Results/ Analysis

The original idea to use linear regression will not be possible because the Bartelsman and Beetsma (2003) model requires non-linear regression. Therefore, the model has been tested as follows:

Examine Bartlesman and Beestma (2003) model and log functions to see if they are correct. The results of of non- linear regression were all numeric failure when taking log value for gamma csy and the assumptions of OLS regression analysis have been seriously violated in order to justify the use of non-linear regression analysis in this paper as follows:

Table 1: Baseline Estimates-CES Production Function

Case	ĉ	ŷ	ℙ	R2	SSE
A: γcs fixed	2.70 (0.34)	-0.0035 (0.0007)	0.025 (0.0092)	0.57	0.11
B: γcs varies over countries	3.57 (0.46)	0.0042 (0.0010)	0.041 (0.0093)	0.59	0.11
C: γcs varies over sectors	2.57 (0.32)	0.0033 (0.0007)	0.021 (0.0093)	0.58	0.11
Notes: (1) standard error are in parentheses, , C estimated of C from (5.2) (average constant), ŷ = estimate of γ from (5.3) (average response coefficient), with variation in stated dimension, ℙ= estimate of p, SSE= standard error of regression; (2) Numbers of observations is 4100; (3) Sample period is 1979-1997.					

The results of the non- regression showed that all numeric failure when taking log value for gamma csy as follows:

| | 2.7 | -0.0035 | 0.025 | | | | | | | | | |

| | t-tbar | t-tbar | t-tbar | t-tbar | | | | | Note also numeric failure when taking log of |
| | -2 | -1 | 0 | 2 | | | | | -ve value for gamma csy |

r/w	V(t-tbar= -2.00)	V(t-tbar= -1.00)	V(t-tbar= 0.00)	V(t-tbar= 2.00)	ln V(t-tbar= -2.00)	ln V(t-tbar= -1.00)	ln V(t-tbar= 0.00)	ln V(t-tbar= 2.00)	ln V(t-tbar= -2.00)	ln V(t-tbar= -1.00)	ln V(t-tbar= 0.00)	ln V(t-tbar= 2.00)
1	1.371	1.366	1.361	1.352	0.315	0.312	0.308	0.301	#NUM!	#NUM!	#NUM!	#NUM!
5	1.356	1.351	1.346	1.337	0.304	0.301	0.297	0.290	#NUM!	#NUM!	#NUM!	#NUM!
10	1.350	1.345	1.340	1.331	0.300	0.296	0.293	0.286	#NUM!	#NUM!	#NUM!	#NUM!
50	1.336	1.331	1.327	1.317	0.290	0.286	0.283	0.276	#NUM!	#NUM!	#NUM!	#NUM!
100	1.330	1.325	1.321	1.312	0.285	0.282	0.278	0.271	#NUM!	#NUM!	#NUM!	#NUM!
200	1.324	1.320	1.315	1.306	0.281	0.277	0.274	0.267	#NUM!	#NUM!	#NUM!	#NUM!
300	1.321	1.317	1.312	1.303	0.278	0.275	0.272	0.264	#NUM!	#NUM!	#NUM!	#NUM!
500	1.317	1.312	1.308	1.299	0.275	0.272	0.268	0.261	#NUM!	#NUM!	#NUM!	#NUM!

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Even with the removal of logarithms from the modified model, the assumptions of OLS regression analysis had been **seriously violated** using regression analysis based on the least squares method in order to justify the use of non-linear regression analysis in this thesis as follows:

The r^2 value is given in the Model Summary output. The F statistic and p value (Sig) is given in the ANOVA output. P values < .05 indicate a significant regression model.

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Saudi Arabia, Tax Difference, Capital-Labor substitution[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Value-Labor

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.425[a]	.181	.148	3.932369

a. Predictors: (Constant), Saudi Arabia, Tax Difference, Capital-Labor substitution

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	256.028	3	85.343	5.519	.002[a]
	Residual	1159.765	75	15.464		
	Total	1415.793	78			

a. Predictors: (Constant), Saudi Arabia, Tax Difference, Capital-Labor substitution

b. Dependent Variable: Value-Labor

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5.880	.677		8.689	.000	4.532	7.229
	Capital-Labor substitution	-9.481-	10.105	-.103-	-.938-	.351	-29.611-	10.649
	Tax Difference	-15.181-	5.963	-.270-	-2.546-	.013	-27.059-	-3.303-
	Saudi Arabia	-3.972-	1.402	-.312-	-2.833-	.006	-6.764-	-1.179-

a. Dependent Variable: Value-Labor

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The regression statistics are presented in Table 2. β_0 is the intercept or constant corresponding to the constant elasticity of substitution. β_1 is the partial regression coefficient that controls value-labor with respect to capital-labor substitution. β_2 is the response coefficient that controls value-labor with respect to transfer pricing or income shifting in the home country; β_3 is the partial regression coefficient that controls the reduction in value-labor with respect to the tax differences between the home country and foreign countries.

Table 2: Multiple linear regression statistics

Country	β_0	β_1	β_2	β_3	F	p	R^2
Australia	6.194	-19.978-	-3.324-	-13.432-	3.917	.012	10.1
Canada	6.008	-17.997-	-1.967-	-11.117-	3.018	.035	7.2
Czech republic	5.512	-14.418-	2.117	-11.050-	3.047	.034	7.3
France	6.049	-18.532-	-2.176-	11.430-	3.131	.031	7.6
Korea	5.814	-16.269-	-.797-	-12.269-	2.635	.056	5.9
Japan	6.095	-19.928-	-1.724-	-10.591-	2.878	.042	6.7
Kuwait	5.798	-19.196-	2.154	-15.716-	2.743	.049	6.3
Norway	4.284	-1.092-	9.495	-8.009-	17.02	.000	38.1
Poland	5.772	-13.856-	-2.267-	-15.796-	3.039	.034	7.3
Saudi Arabia	5.880	-9.481-	-3.972-	-15.181	5.519	.002	14.8
Sweden	6.556	-25.492-	-4.442-	-14.556	4.813	.004	12.8
UK	5.594	-27.356-	10.137	-9.291-	23.30	.000	46.2
USA	5.831	-17.732-	.020	-12.489-	2.568	.061	5.7

All of the regression models were not statistically significant except UK and Norway, indicated by low values of the ANOVA F statistic with p values < .001. The r^2 values indicated that between 5.7 % and 46.2 % of the variance in the labor-value ratio was explained by the models. It is concluded that dependent and independent variables for the 13 countries were not good fit to the linear model. The response coefficients β_2 represent the most important statistical parameters with respect to the potential effects of country specific transfer pricing on the variance in the value-labor ratio. The values of the response coefficients are sorted into order of magnitude with their precision expressed as 95% confidence intervals in Table 3.

Table 3: Precision of the response coefficients expressed as 95% confidence intervals

Country	β₂ Transfer pricing response coefficient	95 % confidence interval	
		Lower Bound	Upper bound
Australia	-3.324- *	-6.780-	0.133
Canada	-1.967- *	-5.508-	1.573
Czech	2.117 *	-1.579-	5.812
France	-2.176- *	-5.679-	1.326
Korea	-.797- *	-4.505-	2.910
Japan	-1.724- *	-5.464-	2.017
Kuwait	2.154 *	-4.071-	8.380
Norway	9.495	6.478	12.511
poland	-2.267- *	-6.254-	1.720
Saudi Arabia	-3.972-	-6.764-	-1.179-
Sweden	-4.442-	-8.022-	-0.862-
UK	10.137	7.449	12.826
USA	.020 *	-3.663-	3.703
* Not significantly different from zero at the .05 level			

4.1 Examination of the Fit of the Model:

The assumptions of OLS regression analysis had been seriously violated in order to justify the use of non-linear regression analysis. Table 4 reports the baseline estimate results of the selected countries. In this case an appropriate to use nonlinear regression analysis in this study.

Table 4: Baseline estimates of individual countries – CES production function

Parameter estimates					
Parameter	**Estimate**	**Std. Error**	**p-value**	**95 % confidence interval**	
				Lower Bound	**Upper bound**
p	.328	.046	0.0000001	.236	.420
gamma	2.067	.785	0.0000001	.499	3.634
Australia_c	2.010	.479	0.0000001	1.053	2.967
Canada_c	2.084	.450	0.0000001	1.185	2.984
Czech_c	1.246	.431	0.0000001	.385	2.108
France_c	2.000	.431	0.0000001	1.138	2.862
Korea_c	.979	.182	0.0000001	.616	1.341
Japan_c	2.373	.556	0.0000001	1.261	3.485
Kuwait_c	4.872	2.096	0.0000001	.685	9.058
Norway_c	1.296	.552	0.0000001	.194	2.398
poland_c	.842	.193	0.0000001	.457	1.227
Saudi Arabia_c	3.296	1.094	0.0000001	1.110	5.483
Sweden_c	4.672	1.675	0.0000001	1.325	8.019
UK_c	.398	.097	0.0000001	.204	.591
USA_c	1.397	.261	0.0000001	.876	1.917
Notes: (1) P (constant) =estimated of P, c (constant elasticity of substitution) =estimated of C for each country. Gamma (γ^{cs}) =estimated of the average of transfer pricing response coefficient for all countries, Std.Error=standard error of regression; (2) Number of observations is 79 cases; (3) sample period is 1999-2008; and P-values c >= 0; p >= .0000001.					

The estimation of the average sensitivity of transfer pricing response coefficient for all selected countries' gamma (γ), is positive and highly significant. If the sensitivity estimate is negative the interpretation is that the value-added revenue from production is understated for countries with high tax rates where multinational companies claim lower than market prices for international cross-border business transactions. Conversely, if the sensitivity estimate is positive the interpretationis that the value-added is overstated for countries with low tax rates where multinational companies claim higher than market prices for cross-border transactions between their related entities. Consequently, the reported value-added statistics are distorted to the extent that the results of the prohibited transfer pricing behaviour are embodied in the reported data. As a result, the standard errors for several countries (i.e., Kuwait, Saudi Arabia and Sweden) were extremely large compared to the other selected countries. The estimate of the mark-up price from the capital-labour ratio C and the estimate of P respectively are both significantly positive. The regression model was a good fit to the data with R^2 = 96.5% with P-values c > 0.0000001. This means a large portion of the variance in the value-labour ratio was explained by the model.

4.2 The Cross-Section Regression Diagnostics

A more negative/ positive the (t-t) bar value (tax difference between the home country and foreign countries) will lead to a decrease in the predicted value-labour by model and the residual error (ε). In addition, the increases in the values of capital-labour substitution lead to a decline in the values of in the predicted value-labour by model. This is consistent with the findings of the Bartelsman and Beetsma (2003) model and with the figure of the predicted value-labour by model.

Table 5 shows the observed value-labour versus the value-labour predicted by the model, the residual error, tax difference, capital-labor substitution, and percentage difference for Saudi Arabia over the period from 1999 to 2008.

Table 5: Predicted value-labour by Bartelsman and Beetsma model versus actual value-labour ratio and residual error, tax difference, capital-labor substitution and percentage change for Saudi Arabia over the period 1999 to 2008.

Country	Year	The observed value-labour	T-Tbar	r_w	The value-labour predicted by the model	The residual error ε	Error as % difference from predicted value
	1999	1.2	0.078036	0.1	1.77	-0.57	32.2 % less
	2000	1.83	0.093858	0.151	1.7	-0.52	30.4 % less
	2001	1.221	-0.04832	0.047	1.58	-0.36	22.7 % less
	2002	1.227	-0.044	0.035	1.7	-0.47	27.8 % less
Saudi Arabia	2003	1.556	-0.042	0.032	1.74	-0.18	10.6 % less
	2004	1.885	-0.030	0.036	1.75	0.14	7.7 % higher
	2005	2.063	-0.02636	0.085	1.48	0.58	39.4 % higher
	2006	2.073	-0.12403	0.109	1.12	0.96	85.1 % higher
	2007	2.165	-0.12402	0.123	1.09	1.07	98.6% higher
	2008	1.785	-0.08453	0.134	1.2	0.59	48.8 % higher

The residual error (ε), which may be positive or negative, represents the difference between the value-labour predicted by the model and the observed value-labour used to construct the model. The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 1999 to 2003). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2004 to 2008). The cross-section regression

diagnostics show that the residual error (ε) changes from negative (years 1999 to 2003) to positive (years 2004 to 2008). The predicted value–labour did not decrease over the period 2001-2005 possibly due to the value the capital-labour substitution in Saudi Arabia (r/ w) in 1999 and 2000 with positive t-t bar. The capital-labour substitution (r/ w) in 1999 and 2000 was compared with the value–labour in 2002 to 2005 and it was found that the values increased. Therefore, a more negative/ positive the (t-t) bar value (tax difference between the home country and foreign countries) will lead to a decrease in the predicted value-labour by model and the residual error (ε) (years 2005, 2006, 2007, and 2008). In addition, the increases in the values of capital-labour substitution lead to a decline in the values of in the predicted value-labour by model. This is consistent with the findings of the Bartelsman and Beetsma (2003) model and with the figure of the predicted value-labour by model of this study, but in (years 1999 to 2004) it was not reflected in the predicted values due to the value the capital-labour substitution in Saudi Arabia due to a significant change in the corporate tax policy in Saudi Arabia over the period from 1999 to 2008 with the headline corporate tax rates of companies being reduced significantly in two stages. In the period from 1999 to 2000 the tax rate was 45%. In the period from 2001 to 2005 the tax rate fell to 30%. In the period from 2006 to 2008, the tax rate fell to 20% as shown in (KPMG 2009).

Table 6: Comparison percentage change between the actual value-labour vs. predicted for all models

Country	(a) Error as percentage difference from actual value-labour ratio	(b) Error as percentage difference from predicted value-labour ratio	(C) Error as percentage difference from predicted value-labour: the actual value-labour ratio
Australia	66.3 %	7.8 %	11.8 %
Canada	39.3 %	5.1 %	12.9 %
Czech Republic	44.9 %	11.7 %	26.1 %
France	40.7 %	14.8 %	36.4 %
Japan	26.6 %	19.8 %	74.4 %
Korea	26.3 %	16.7 %	63.5 %
Kuwait	15.3%	40.3 %	263.3 %
Norway	30.8 %	30.9 %	100.3 %
Poland	50.1 %	32.1 %	64.1 %
Saudi Arabia	45.4 %	38.4 %	84.6 %
Sweden	48.5 %	21.4 %	44.1 %
United Kingdom	24.03 %	14.8 %	61.6 %
United States	55.5 %	4.09 %	7.4 %

Table 6 shows comparison percentage change between the actual value-labour vs. predicted for all models**.** Column (a) displays error as percentage differences from actual value-labour ratio for this study for all selected grouping countries. Column (b) displays error as percentage difference from predicted value-labour ratio for this studyfor all selected grouping countries. Column (c) shows error as percentage difference from predicted value-labour to the actual value-labour ratio for this study for this study for all selected grouping countries. For example, in Saudi Arabia, the percentage of predicted value-labour ratio 38.4 %compared to the percentage of actual value-labour ratio 45.4 %. To calculate error as percentage difference from predicted value-labour to the actual value-labour ratio for this study in the column (c) as follow: (error as percentage difference from predicted value-labour ratio for this study column (b) /as percentage difference from actual value-labour ratio for this study column (a) * 100%). Therefore, error as percentage difference from predicted value-labour to the actual value-labour ratio for this study in in Saudi Arabia column (c) = 7.8/66.3 x 100% = **84.6 %.**

In the columns (b), the differences between the value of the largest and smallest value from predicted value-labour ratio for all selected grouping countries for this study calculated as follows: (a) finding the difference between the two numbers (subtraction). (b) Writing the answer as a fraction over the larger number (c) multiplying (b) by 100 (percentage). For example, the value-labour predicted by the model in Saudi Arabia in this study over the period from 1999 to 2008 Table 3=[1.77–1.09] / 1.77 = 0.384*100 = **38.4 %.** Error as percentage difference from predicted value-labour ratio for the Bartelsman and Beetsma (2003) from our dataset = [1.33 – 1.31] / 1.33 = 0.015*100 = **1.5 %.**

These ratios incolumn (c) (error as percentage difference from predicted value-labour: the actual value-labour ratio) are considered good indicator wheneverthe percentage change of predicted value-labour for this study is compared to the actual value-labour ratio closeto100% in the same direction, with the exception of Saudi Arabia and Kuwait (opposite direction).

Table 7 illustrates is that only 5 of the 13 countries consistent with the Bartlesman and Beetsma (2003) methodology. The Bartelsman and Beetsma (2003) method Imposes that every increase in the variable (t-t) bar value (tax difference between the home country and foreign countries) (negative or positive) and the variable capital-labour substitution leads to a decrease lead to a decline in the values of in the predicted value-labour by model. The second column shows the percentage change between predicted value-labour and the actual value-labour ratio, which was used as an indicator to see the countries that are consistent with the Bartelsman and Beetsma (2003) model.

Table 7: Identifies the countries that are either consistent and or inconsistent with the Bartlesman and Beetsma (2003) methodology

Country	% change	Consistent and or Inconsistent	Deviation from Bartlesman and Beetsma model
Australia	11.8 %	Inconsistent	% change far from the 100 %
Canada	12.9 %	Inconsistent	% change far from the 100 %
Czech Republic	26.1 %	Inconsistent	% change far from the 100 %
France	36.4 %	Inconsistent	% change far from the 100 %
Japan	74.4 %	Consistent	% change close to the 100 %
Korea	63.5 %	Consistent	% change close to the 100 %
* Kuwait	263.3 %	Inconsistent	% change far from the 100 % (opposite direction)
Norway	100.3 %	Consistent	% change close to the 100 %
Poland	64.1 %	Consistent	% change close to the 100 %
* Saudi Arabia	84.6 %	Inconsistent	% change far from the 100 % (opposite direction)
Sweden	44.1 %	Inconsistent	% change far from the 100 %
United Kingdom	61.6 %	Consistent	% change close to the 100 %
United States	7.4 %	Inconsistent	% change far from the 100 %

5. Summary and Conclusions

The assumptions of OLS regression analysis had been seriously violated in order to justify the use of non-linear regression analysis. Table 5 reports the baseline estimate results of the selected countries. In this case an appropriate to use nonlinear regression analysis in this study.

The results of this study show that the Bartelsman and Beetsma (2003) model when applied to the Saudi Arabia oil and gas sector does not detect transfer pricing behaviour for the purpose of shifting profit. These findings suggest that the results do not support the hypothesis (i.e. transfer prices are not used to shift profits to Saudi Arabia's lower tax jurisdiction). However, the Bartelsman and Beetsma (2003) model when applied to other countries such as Japan, Korea, Norway, Poland, and the United Kingdom does show results that suggests the presence of transfer pricing behaviour for the purpose of shifting profits.

In relation to this study the specific results of the regression diagnostics show the existence of differences between the actual value-labour ratio versus the predicted value-

labour by Bartelsman and Beetsma (2003) model, as shown in Table **6**. The value-labour figures predicted by the model are inflated compared to the actual value-labour figures during the period from 1999 to 2003, whilst the value-labour figures predicted by the model are deflated compared to the actual value-labour figures during the period from 2004 to 2008. These findings suggest that the results of this thesis do not support hypothesis (b), that is, the results do not detect that transfer pricing in Saudi Arabia's oil and gas sector is used to shift profits to Saudi Arabia's lower tax jurisdiction.

However, the results of this paper should not be interpreted as meaning that profit shifting behaviour in the oil and gas sector of Saudi Arabia does not take place, just that it was not detected by the adapted Bartelsman and Beetsma (2003) model that relied entirely on the examination of publicly available data.

Given that the Bartlesman and Beetsma (2003) model has been shown to be rigorous and robust in application to other sectors and in other countries, the implication arises whether the adaptation of the model is insufficient to be able to detect the behaviour being tested, or that the type of available public data is in itself inadequate in its content and form to be able to detect from it the behaviour being tested for. Sections Three and Four of this study set out the adaptation of the model in a manner that retained the conceptual rigour and robustness necessary to generate reliable results for the sector being examined. To this extent the adapted model can be used as a basis for other studies in the same and related sectors in other countries. As a consequence this study opens up a line of research to further test the adapted Bartelsman and Beetsma (2003) model for other national tax jurisdictions and thereby provide results that will enable comparisons and further refinement of the model, if necessary. This study can be used as a basis for the oil and gas sector in other countries.

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