Transfer pricing in the Saudi Arabia Oil and Gas sector

By

Ali Faya Alhassan (BSc, PGDip, MSc)

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ABSTRACT

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; STAN database; transfer pricing; UNSD Statistical Databases; WDI database.
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CHAPTER ONE: INTRODUCTION

1.0: Introduction of the dissertation

The first part of Chapter One briefly discusses the background of the study and the issues leading to the dissertation’s theme involving transfer pricing. The second section presents the purpose of the study. The third section sets out the research question, propositions and hypotheses. The fourth section discusses the reasons for choosing Saudi Arabia for the thesis. Section five presents an overview of the research methodology and design. Section six discusses the contribution of the thesis. This chapter ends with the section that presents an outline of the thesis.

1.1: Background of issues

It is generally understood that multinational companies (MNCs) are organisations that comprise a parent entity, with a branch (es) or division(s) being subsidiaries that engage in economic activities in the form of producing and selling products and/or services in more than one country. MNCs can either be vertically integrated, where subsidiaries produce intermediate inputs that are used by other related subsidiaries to produce the final products, or horizontally integrated, where different subsidiaries produce the same products in different national jurisdictions. On the other hand, MNCs can be both. Because MNCs are integrated organisations, their subsidiaries may engage in a substantial amount of internal trade. The internal price used for any transaction involving the transfer of goods, intangibles or services between subsidiaries is known as the transfer price (OECD 1979).

Transfer pricing can be used domestically when one division of an organisation buys products from other related divisions, and internationally when the other division is situated abroad and the movement of goods, intangibles or services cross national boundaries (Bartelsman & Beetsma 2003). In response, fiscal and government tax authorities have developed complex sets of rules and procedures at both national and international levels designed to regulate MNCs transfer pricing policies. These regulations are simply known as transfer pricing rules (OECD 1979). In a particular tax jurisdiction there is a difference between tax avoidance and tax minimisation that is necessary to recognise. The abuse of transfer pricing does not necessarily mean
that the MNC completely avoids tax. Rather, it transfers profits earned in one tax jurisdiction to a different tax jurisdiction with a lower or nil tax rate. If the former, then the MNC still pays tax, but at a lower rate. In the case of tax avoidance, the company would not be paying any tax on the shifted profit in any jurisdiction.

As cross-border flows of goods, intangibles or services increase, and then the transfer pricing rules become an increasingly important issue for both tax authorities and MNCs. In developing transfer pricing rules, tax authorities of most major countries, such as the UK and US, use guidelines based on the concept of the arm’s length principle, which requires that all MNCs’ transfer pricing activities be priced as if they took place between unrelated parties acting in competitive markets (OECD 1979).

From an economic efficiency perspective, transfer pricing practices are seen to be necessary to efficiently manage the internal markets of MNCs and are additionally used in keeping track of each subsidiary’s performance (Bernard & Genest-Laplante 1995; Cravens 1997).

A potential 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 so doing, 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 in the realm of shifting profits between tax jurisdictions. A range of studies have identified that the setting of transfer prices has been used 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)
Tax legislation for multinational businesses has prompted numerous studies, as it became one of the critical policy issues involving economic globalization. The earlier literature of the 1970s and 1980s tried to provide a theoretical framework for the decision-making of multinational companies operating under different corporate tax rates in various countries. The literature demonstrated that multinational companies could increase their global income by shifting their profits to lower-tax jurisdictions by transfer price manipulation. While it is clear that the mechanism of transfer pricing can serve as an arbitrage device to reduce the tax burden of companies, these studies treated tax policies as exogenous (Organisation for Economic Cooperation and Development 2001).

Transfer pricing guidelines, as issued by the (OECD), specifically provide guidance for firms in OECD member countries for determining transfer prices for products transferred between subsidiaries located in different countries with different tax regimes (OECD 2001). Transfer pricing is defined by the OECD (2001) as the price which is charged for services or goods that are usually exchanged among different units of the same organization (OECD 2001).

OECD is a prominent international advisory body comprised of member governments of the major trading nations of the world which presently has 34 participating members\(^1\). In line with its mission of promoting sound economic growth, the expansion of world trade and the provision of a world-wide consensus on the pricing of international intra-firm transactions, the OECD issued a guideline statement in 1995 (OECD 1995). Since then, the guidelines have been used by taxation authorities in most countries as the basis for regulating the transfer pricing behaviour of international intra-firm transactions.

\(^1\) Current membership: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
The "arm's length" principle has been defined in paragraph 1 of Article 9 of the 1963 OECD Model Tax of the OECD Convention (that remains current to the present time) as:

[When] conditions are made or imposed between… two (associated) enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profit which would, but for those conditions, have accrued to one of those enterprises, but by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly.

By looking to adjust profits by reference to the conditions which would have been obtained between independent enterprises in comparable transactions and comparable circumstances, the OECD's “arm’s length” principle follows the approach of treating the members of an MNE group as operating as separate entities rather than as inseparable parts of a single unified business. Because the separate entity approach treats the members of an MNE group as if they were independent entities, attention is focused on the nature of the dealings between those members (OECD 1963).

Since transfer pricing is an important international tax issue facing multinational businesses, the same Article 9 of the 1963 OECD Guidelines states that:

Two entities are associated if one of the enterprises participates directly or indirectly in the management, control or capital of the other, or if the same persons participate directly or indirectly in the management, control or capital of both enterprises.

Furthermore, Article 9 also sets out the meaning of the “arm’s length” principle as follows:

The members of a multinational group as… separate entities rather than as inseparable parts of a single unified business. [It] seeks to adjust the allocation of profits between group members by reference to the conditions
which would have been obtained between independent enterprises in 
comparable transactions and comparable circumstances.

In addition, Article 9 of the same OECD Guidelines also sets out the scope of power of a national tax authority which identifies unacceptable transfer price setting behaviour. Such a national tax authority may:

“For the purpose of calculating tax liabilities, rewrite the accounts of the associated enterprises if, as a result of the special relations between the enterprises, the accounts do not show the true taxable profits arising in that state”.

The Guidelines seek to ensure that the prices used for intra-firm trade are based on those used between unrelated parties. This means that if two associated companies trade with each other, they should look for a pair of unrelated companies which carry out comparable transactions in the open market and use the same price as that charged between the unrelated companies. By so doing, they have applied the “arm’s length” principle to their own transactions.

The US government has been leading transfer pricing discussions in the OECD. The OECD has made several proposals for better managing transfer pricing challenges, one being the Model Tax Convention on income and capital. This Model sets out a suggested tax treaty between two countries that can be voluntarily adopted or modified for their needs. It is not legally binding on OECD member countries. The first draft was published in 1963, and the Committee on Fiscal Affairs accepted it in 1977. Since then, the contents of the Model have been periodically updated (OECD 2001).

National tax rate differentials may encourage the management of MNCs to take advantage of lower tax rates in one tax jurisdiction by shifting profits through the mechanism of a transfer pricing from a higher tax jurisdiction (Biswas 2001). National governments aware of this behavioural feature have embarked on tax policies that attempt to prevent such practices by directly enacting legislation against such
practises backed by substantial penalties, as well as indirectly reducing the perceived incentive for business by reducing the tax differentials through changes to tax policies. The latter approach represents, in effect, tax competition between national jurisdictions, that at times develops beyond the transfer price into the broader objective of encouraging businesses to locate (or re-locate) their operations to lower tax jurisdictions, which brings the benefit of drawing jobs and economic growth from one tax jurisdiction to another (Biswas 2001). Of course, once a business has located (or re-located) in the lower tax jurisdiction, the setting of transfer prices should not become an issue for that national tax authority until it is used to shift profits to an even lower national tax jurisdiction elsewhere. In contrast, for the national tax jurisdiction from which profits are shifted the manipulation of transfer pricing becomes a genuine issue, the more so where the amounts of lost taxation revenue are significant.

One study in the United Kingdom by Hoi Ki Ho (2008) has examined the use of international transfer pricing in intra-group transactions of multinationals from the perspective of international business. Specifically, this study addresses the issue of how and why Anglo-multinational companies (e.g., US-based and Australia-based) and Asian multinational companies (e.g., Hong Kong-based and Singapore-based) choose their international transfer pricing methods with their UK affiliates. Hoi Ki Ho’s (2008) study has considered the reasons for choosing pricing strategies between the respectively related firms to identify what type of advantage was being sought by the firms engaging in the price setting activity. It found that compliance with regulations was considered to be the highest consideration for management (Hoi Ki Ho 2008). Thus, it can be seen that tax advantages are an important consideration in the setting of transfer pricing strategies by firms.

Nevertheless an issue that has not been explored in depth due to its relative unimportance in the past is transfer pricing in relation to financial capital, specifically the pricing of international loans within the corporate treasury context of multinational enterprises (MNEs). Whether to provide a loan, purchase a receivable, provide a guarantee, sweep cash (a cash sweep is an automated process whereby all, or a portion, of the available cash is moved from a non-interest bearing account into an interest bearing account or an interest bearing instrument), factor a
receivable, provide a hedge or insurance product, a transfer pricing consideration is present (Curtis 2008). Curtis’ (2008) examination of the use of transfer pricing within the corporate treasury context in the MNEs demonstrated that firms do use corporate treasuries to, in some ways, circumvent the usual transfer pricing regulations. It is possible that corporate treasuries could obscure the use of transfer pricing through advantageous trading of currency or lending, but countries have this capitalisation tax rules e.g. Australia, USA, Canada, and others.

Another issue that has arisen in relationship to this research problem in recent years is whether countries actually encourage this transfer pricing behaviour by using their corporate tax rates in a competitive manner (Devereaux, Lockwood, & Redoano, 2008). The study by Devereaux, Lockwood and Redoano (2008) determined that countries compete with each other over tax rates in two dimensions, including effective marginal tax rate and statutory tax rates, with their research indicating that statutory tax rates fell dramatically during the period in question, with a reduction in capital controls also taking place during this period.

The study by Peralta, Wauthy and van Ypersel (2006) shows how the leniency of governments in the control of transfer pricing behaviour can be used as a complement to the taxation of corporate profits. The authors revealed the role of taxes of multinational firms in influencing both a multinational firm’s location and the place where it declares its profits.

A review of the current literature has demonstrated that transfer pricing an ongoing concern for businesses in their relationship with the different national taxation regulatory bodies, as well as international monitoring organisations, such as the OECD, which specifically provides guidelines for firms in OECD member countries for determining transfer prices for products and services traded between associated entities (OECD 2001). This is because transfer pricing can be used to provide a potentially unfair advantage to multinational firms by preventing fair price competition within national markets where the ability of domestic firms to compete is reduced.

As noted by OECD clarifications regarding the use of transfer pricing: “When independent enterprises deal with each other, the conditions of their commercial and financial relations (e.g. the price of goods transferred or services provided and the
conditions of the transfer or provision) ordinarily are determined by market forces. When associated enterprises deal with each other, their commercial and financial relations may not be directly affected by external market forces in the same way” (OECD 1995, p. 1-1). These non-market driven relationships may take place through a number of mechanisms, such as the sale or purchase of goods and services, loans obtained through central entity treasury facilities, which leverages funds from different related entities in order to manage internal financing, or other means (OECD 1995).

Transfer pricing, as such, is not illegal, rather it is the manipulation of it to shift profit earned in one national jurisdiction that may have a higher tax rate to another national jurisdiction with a lower tax rate that may be illegal (Abdallah 2004). So it is this purposeful manipulation to avoid tax in one country, the country where the profits were earned, that is the target of legal prohibition in many developed countries. However, many firms do strive to uphold the so-called “arm’s length” principle that requires firms to determine the appropriate price as related to market conditions. This means that the manipulation of transfer prices is difficult to observe in a particular business environment. Evidence shows that some firms do not. An example is the study undertaken by Lall (1973) which focused on transfer price manipulation in Colombia, the details of which are discussed in subsection 2.4.1.1 of the thesis.

In particular, firms may use transfer pricing to gain a competitive advantage through the tactic of reducing the overall cost of production for a particular entity. Some of the costs of a subsidiary are shifted to another elsewhere, and although the total costs of the MNC are the same, they are shown in different amounts in the subsidiaries involved. The tax considerations for the firm only come about if these entities are located in different countries and the tax regimes of those countries are different. However, if they are the same, then there is no tax differential for the MNC and so the situation is tax neutral. However, one of the countries misses out on its tax revenue, while the other country gains more tax revenue. Such a scenario means that there are other considerations for the parent entity, though not for the countries involved as only their respective tax revenue flows will be affected. From the perspective of the country which loses tax revenue applicable to profits shifted,
the shifting of the profits to other tax jurisdictions could be seen as tax avoidance if such shifting is prohibited by law.

1.2: The various transfer pricing approaches

From a practitioner's standpoint, the setting of internal transfer prices remains a contentious issue in many divisionalised and multinational firms. The range of approaches is really a necessity resorted to where the external market is imperfect through to the situation where there are no external markets at all. Where there is no external market to use as a benchmark for internal transfer pricing, it is necessary to come up with alternatives approaches (methods). These are regarded as an attempt to reflect an external market price and in a sense a form of shadow pricing. The effort in the application of the principle of the arm's length transaction to set acceptable transfer prices is a pragmatic response to the dilemmas and challenges involved in practice. Consequently, they are an attempt to reflect an external market price only in the sense of economic value of the goods/services transferred, as is then would align with the pursuit of an efficient/economic allocation of resources by the firm's decision-makers that would be in the best overall economic interests of the firm.

Drury (2004, p. 886-893) outlines the conventionally recognised four fundamental bases relied on in practice for the setting of transfer prices:

- Market-based transfer prices;
- Marginal cost transfer prices;
- Full cost transfer prices; and
- Negotiated transfer prices.

The first approach relies on printed price lists or invoices available from market transactions of a similar product or service. Benke and Edwards (1980) showed that, when transfers are set at market prices, divisional performance is more likely to represent the real economic contribution of the division to total company profits. The author's argue that if the supplying division does not exist, the intermediate product would have to be purchased in the outside market at the current market price. Also, if the receiving division does not exist, the intermediate product would have to be sold
in the outside market at the current market price. The market-based transfer pricing method simply reflects that, where there is a competitive market for the intermediate product, the market price can be used to allow the decisions of the supplying and receiving divisions to be made independently of each other. The market price can be the most desirable source for setting a transfer price because a perfect market in particular has a dynamic that tends towards more efficient operations as each participant in the market competes to sell its product/service in order to make a profit and maximise it. However, the more markets deviate from perfect market features, then there is more scope for distortion and diversity of prices for the homogenous product. As markets become less reliable as an independent external source for a price, then the realm of oligopoly becomes more dominant, and finally that of monopoly, where an external market by definition cannot be referred to for a price as there is only one supplier and that supplier sets the (monopoly) price.

The second approach is that of using a marginal costing approach to setting a transfer price. When set on this basis, the transfer prices can motivate both the supplying and receiving division managers to operate at output levels that will maximise overall organisational profit (Gox and Schiller 2006). Furthermore, marginal cost is also considered to be constant per unit throughout the relevant output range and is treated as being equivalent or approximate to short term variable cost. In this situation, the accountant’s determination of marginal cost transfer pricing can be interpreted as being equivalent to the variable cost of the supplying division of providing an intermediate product or service. Such a basis is biased towards the short term as the fixed costs are not included in the variable costs that may be relied on for approximating the marginal cost. Consequently, a pricing policy on this basis would not allow the supplier division to show any profit from internal transfers, and thereby motivate divisional management to minimise its supply to related entities. Drury (2004) and much earlier Abdel-Khalik and Lusk (1974), suggest that marginal cost transfer pricing induces dysfunctional behaviour of divisional managers, and has led to low usage in most organisations, because managers tend to reject the short-term interpretations of approximating marginal costs with variable costs.

The full cost transfer pricing is a third approach. The cost base represents the sum of the cost of all those resources that are committed to a product or service in the long
run, interpreted in terms of accounting measurement to be the full costs of production incurred on an annual basis. A survey by Lengsfeld and Schiller (2004) shows, 40 to 50% of organisations are believed to be using the full cost method for the setting of transfer prices. In some cases, an arbitrary mark-up is added to variable costs in order to cover fixed costs to further approximate the full costs (Drury 2004). The mark-up represents an attempt to meet the performance evaluation purpose by enabling the supplying divisions to calculate a profit on the goods or services transferred to related entities. Lengsfeld and Schiller (2004) discuss the strengths and weakness of determining full costs on the basis of actual cost incurred or the set standard costs. Though, the full cost method has been shown to be the most accepted basis under certain conditions, variations in the specific accounting methodologies can result in a range of prices. However, the range can be narrowed if, as advocated by Kaplan and Atkinson (1989), full cost transfer prices are derived from an activity based costing system. Nevertheless, accounting calculations of full costs for an entity can only provide poor estimates of long run marginal costs of an entity from an economic theory standpoint.

The fourth basis is the approach of negotiating a transfer price between the related party entities. Intra-company prices are arrived at by across-the-table bargaining by the managements of the producing and purchasing divisions. Kachelmeier and Towry (2002) observe that negotiated transfer prices are most appropriate in situations where some market imperfections exist for the intermediate product or goods, especially when there are different selling costs for internal and external sales, or where there exist several different market prices. Hence, when there are such imperfections, the respective divisional managers must have the freedom to buy and sell outside the company to enable them to engage in a bargaining process. Anctil and Dutta (1999) advocate that negotiated transfer prices can help to resolve conflicts between the related entities involved. A much earlier empirical research study by Lawrence and Lorsch (1967) showed that successful firms facing uncertain environments are able to effectively resolve inter-divisional conflicts by negotiating transfer prices.
1.2.1: The implications of the existence of different degrees of imperfect markets

Theoretical models, such as the Bartelsman and Beetsma (2003) model, largely allow for different degrees of information access/knowledge of all parties that make up the market. This means that not all information is necessarily perfectly reliable, relevant, perfectly understood by the managers perfectly timed. In other words, there are many imperfections and inadequacies that exist in reality and it is these circumstances that give rise to setting a transfer price in different ways in order to best deal with prevailing imperfections. The greater the degree of perfect markets, the more reliable is the market information, the greater the understanding of all parties of the common objectives and considerations of parties involved, then the closer the transfer price result approaches the theoretical norms of behaviour outlined in the economic theory. It is because of the imperfections and the diversity of circumstances, including the diverse nature of the products themselves, which then make it not possible to treat all products as homogenous, and, therefore, having the same homogenous market, and, in turn, therefore, presuming that the same market price applies. The generally recognised bases are but a practical response in trying to achieve the recognised economic principles, which should lead in the direction of the desired result. These very same imperfections, and inadequacies that exist in reality, provide the opportunity for managers of some MNCs to take advantage of them to structure the operations of the group and their internal transfer relationship in a way that allows them to shift profits between tax jurisdictions with differential taxes.

The implications for the core interest of this thesis are several: in terms of the degree of diversity of the products of the oil sector, and the typical organisational structure of the sector. These features indicate the potential degree of difficulty for setting a transfer price, and thus, the degree of opportunity for manipulating it under certain conditions in the pursuit of tax minimisation for the overall entity. For example, oil drilling will only take place where the oil is located, so the degree of choice is virtually non-existent. Consequently, managements have to deal with the tax jurisdictions in which the oil reserves exist. On the other hand, there is a certain amount of flexibility for the actual refinement stages, that is, deciding where they can be located – in the same country or other countries, and thus there may be some choice. However,
once the location is chosen, it is a long term investment commitment simply because such operations are extremely capital intensive. In terms of diversity of product – in the case of the oil and gas sector of Saudi Arabia - it is largely homogenous, even though there are different degrees of quality of oil from different oil source locations. Thus, the market is international and factors these features of the product into the price offered. The market price, therefore, becomes quite a reliable indication of the value of the oil to the market and from there one can proceed to consider the values of the intermediate products through the stages from the source, to the variety of finished products that are refined at various stages. It is usually based on the listed price of a similar product or service, which is recognising the degree of similarity of the product. However, just how similar is the product, given that in the world of commerce each company is trying to differentiate its product from all other ‘similar’ products, because product differentiation allows a little more scope for setting prices marginally higher. Where a monopoly exists, then the price is set by the single supplier, and that is the market price. So, the transfer prices derived from this price would be driven not by competitive forces, but by the monopoly company management which perhaps may consider for itself other aspects such as performance evaluation, and tax considerations where tax differential exist. As noted earlier, tax considerations include not only income taxes, but also payroll taxes, customs duties, tariffs, sales taxes, value added taxes, environment-related taxes, and other government levies. However, tax regulations of different countries often attempt to prevent entities from setting transfer prices that result in tax being avoided in their national jurisdiction.

2.2.2: Discussion of the transfer pricing approaches

Generally, surveys by Drury et al. (1993) and Borkowski (1990) of various countries including the US, UK, Australia and Canada, show that, amongst these transfer pricing methods, less than 10% of organisations transfer goods or services using the marginal cost method. Their studies further show that a significant proportion of organisations use each of the other methods with the largest proportions using the market based prices, or either full cost or cost plus a mark-up transfer prices for pricing their goods or services.
In terms of an international perspective, where the transfers of goods or services are between divisions in different regions or countries, regulatory and fiscal authorities normally have an interest in the determination of transfer pricing methods. This is due to the fact that taxes, duties and quotas are involved when goods or services cross national boundaries.

The OECD (2011) in addressing the issue of transfer price setting behaviour from a national jurisdiction point of view of its nation members has recommend five methodological approaches for the determination of transfer prices guided by the arm’s length principle. These methodological approaches require the use of accounting information and principles at their core and are represented as follows:

- The Comparable Uncontrolled Price Method;
- The Resale Price Method;
- The Cost Plus Method;
- The Transactional Net Margin Method; and
- The Profit Split Method.

The range of approaches is necessary as none of the individual approaches is capable of being satisfactory for all situations and types of products and services exchanged between related parties. Thus they are necessary not only because of the diversity of internal exchanges, but also by the range of imperfections present in markets right through to the extreme situations where no independent external market exists for a particular good or service. Additionally, the challenge is made more complex because of the inadequacy of accounting measures and operational limitations of accounting systems themselves, especially that given that market are dynamic environments embodying changes at many levels the full consequences and implications of which are not capable of being captured by management nor by accounting systems. It is against this background that the range of transfer price setting approaches should be considered. The choice of approach should be determined by the circumstances and guided by the underlying principle of ensuring an objective result as much as possible that is consistent with the underlying principle of an arm’s length transaction. Of the range of approaches, the most preferred is the comparable uncontrolled price method as it endeavours to seek what
an acceptably competitive market between unrelated entities would generate as a market price at any given time.

The resale price method evaluates whether the amount charged in a controlled transaction is at arm’s length by reference to the gross margin realised in comparable uncontrolled transactions.

In relation to the Cost Plus method, the transfer price is arrived at by adding a suitable mark-up on the production costs of the selling division. The approach is employed where there is no reliable external market for comparable goods/service to refer to. However, there are a number of challenges associated with this approach. They are in the form of having to make internal decisions about the appropriate cost base to be used as well as determining what is a suitable profit mark-up for a product/service that does not have a comparable reliable independent external market.

The transactional net margin method is a variation of the cost plus approach. Essentially, it requires comparing the net margin resulting from a group of related party transactions with the net profit margins of independent companies that are engaged in broadly comparable transactions. Similar problems beset this approach and the cost plus method to an even greater degree of subjective interpretation.

An even more challenging approach and methodology is the profit split method which relies entirely on the internal data of the entity and requires a detailed review of how a multinational generates the whole of its profits on a particular product or set of similar product types. This method may be appropriate where transactions are highly dependent upon the relationship between the parties so that third party comparable uncontrollable prices do not exist or where a single type of related party transactions cannot easily be isolated. The main aim of this approach is to achieve the same quality of profit split as would be found between two independent parties co-operating in a joint venture. This approach is adopted where management places importance on ensuring that the motivations of the managements of subsidiaries are not impaired. It ensures that each subsidiary is allocated a share of the profit and, thereby, neither of the subsidiaries key accounting performance indicators suffer at the expense of the other's gains.
Tyrrall and Atkinson (1999) observe that transfer pricing surveys from the early 1970s to late 1990s show that a large number of multinationals used more than one approach of transfer pricing, with the cost based methods used slightly more than the market based methods. Both of these approaches were used considerably more than the negotiated transfer pricing method. A similar survey of the comparative usage of the different OECD approaches by Ernst and Young (Global Transfer Pricing Survey 2007/2008, p.1) reveals that for benchmarking intercompany services, for example, the cost-plus method is the most commonly used method. The comparable uncontrolled price method remains the most popular method both for financing and intangible property transactions. The popularity of the comparable uncontrolled price method for intercompany financing transactions is perhaps best explained by the availability of data regarding what are largely commoditised transactions. In the earlier study by Tyrrall and Atkinson (1999) they concluded that there might still be an element of complacency about transfer pricing at the time which multinationals cannot afford.

Although it transfer pricing plays a significant role in decision making in both multidivisional and multinational organisations, there has been little consensus within the academic literature of the practice being beneficial to the overall company for maximizing profits, minimizing taxes, maintaining goal congruence and evaluating managerial performance. It has also been shown that, amongst the various approaches, bases and methods of applying the practice to conform with regulatory and fiscal demands, no one particular transfer pricing policy is optimal in achieving overall organisational goals. This is due to the overlapping nature of regulations and constraints accompanying organisational objectives and within which transfer price policy and practices needs to be clearly and effectively shaped.

1.3: The concept of tax avoidance versus tax evasion
One of the key issues in the tax literature and legal structures is tax avoidance behavior versus tax evasion behaviour. Although these two approaches result in the same action (not paying a certain amount of tax), they are not defined in the same way legally and do not result in the same legal issues. This brief discussion examines tax avoidance and tax evasion and discusses the differences between them.
Tax evasion is most commonly regarded as the more serious of these two approaches (Morse, 2009). Tax evasion can be briefly defined in terms of a consensus definition as the avoidance of paying taxes that are mandated by legislation (Morse, 2009). This commonly involves a refusal to pay tax or failure to pay tax that is required (Morse, 2009). There are a number of different ways that this can occur. The most common way is concealment of legally earned income from tax officials, such as by misreporting income or failing to report income (Brasaveanu & Obreja, 2010). However, tax evasion can also involve the concealment of income from illicit sources, such as the proceeds from illegal activities gambling or drug dealing (Brasaveanu & Obreja, 2010). Because tax evasion is frequently identified as sources of funds gained from illegal activities, then the notion of tax evasion is often presumed to be a characteristic of the shadow (or illicit) economy, a notion that itself is not understood with as much clarity or consistency as the notion of tax evasion (Brasaveanu & Obreja, 2010; Morse, 2009).

Tax evasion is commonly defined as illegal in most jurisdictions, although the specific actions that are considered to be tax evasion and the penalties for tax evasion activities vary widely between jurisdictions (Webley, 2010). The extent of tax evasion behavior, is in most jurisdictions, not precisely known, because of the difficulties involved in measuring and understanding the economic impact of the shadow economy (Webley, 2010). However, a recent global estimate in relation to 145 countries suggests that government losses to tax evasion could total $3.1 trillion or more (Werdigier, 2011).

In contra-distinction, tax avoidance is considered to be the arrangement by the taxpayer of earnings and income to reduce the tax burden associated with the earnings (Hanlon & Heitzman, 2010), in essence commonly also known as tax minimisation. Some of the most common approaches to tax avoidance include the use of tax shelters (or legal entities designed to reduce the tax advantage through approaches such as international investments or international bank accounts), charitable gifts, and reinvestment of funds (Hanlon & Heitzman, 2010). Unlike tax evasion, tax avoidance is not generally illegal, although it may involve extensive use of legal technicalities and loopholes and as such does require extensive involvement.
by professional accountants and others. (Hanlon & Heitzman, 2010). However, tax avoidance is commonly considered to be unethical or amoral, and this is not considered to be a useful social act in many cases (Mumford, 2007). Thus, while tax avoidance is legalistically distinguishable from tax evasion, it is still considered to be socially problematic despite being extensively used. Furthermore, although tax evasion can be defined in terms of legality or illegality of various activities, the definition of categories of activities considered to be tax avoidance are not as clear (Hanlon & Heitzman, 2010). For example, a large charitable donation has tax avoidance effects, but in many cases may not be undertaken with the intent of avoiding tax; similarly, firm reinvestments have the effect of reducing tax liability, but are not necessarily undertaken with this goal (Hanlon & Heitzman, 2010). Because of this difference, what is considered to be tax avoidance may often be socially constructed rather than legally constructed (although there are attempts to legislate abusive tax avoidance) (Brown, 2012). As in the case of tax evasion, uncertainty in the definition of tax avoidance leads to some uncertainty about the extent of tax avoidance and revenues lost by a given national tax jurisdiction. However, estimates derived from the USA corporate sector indicate that tax avoidance behavior is quite extensive, with the top 280 corporations in the USA paying an average of 18.5% taxes in contrast to the headline corporate tax rate of 35%. (Riley, 2011). This average includes a large number of firms that had no tax liability or actually received tax refunds due to a negative tax liability result. (Riley, 2011).

Tax evasion and tax avoidance are similar concepts in that they both can result in the loss of tax revenues to governments because of non-payment by individuals or corporations. In all, there are also some significant differences between these two distinguishable behaviours. Fundamentally, tax evasion is generally illegal, while tax avoidance is regulated (and often changes to be reduced), but is not necessarily illegal. The income involved in tax avoidance is generally legal, while tax evasion income source may be legal, but more commonly may be illegal. A third distinction between these behaviours is that the process of tax evasion involves not declaring income that would otherwise be declared, while income involved in tax avoidance is likely to be fully declared.
Tax minimisation is the legal utilization of the tax regime to entity's advantage, by reducing the amount of tax liability by means that are within the law. The United States Supreme Court has stated that: "The legal right of an individual to decrease the amount of what would otherwise be his taxes or altogether avoid them, by means which the law permits, cannot be doubted" (Helvering v. Gregory (1935) 293 U.S. 465).

Borkowski (1997) completed a survey of 47 countries that provides evidence that transfer pricing issues are of genuine and increasing concern to the governments of both developed and developing countries. One recommendation to limit transfer pricing manipulations was to develop standardised transfer pricing policy and procedures to be implemented globally. A second recommendation was to mandate increased disclosures about the magnitude and effects of transfer pricing on subsidiary income and tax liabilities in the financial reports of transnational corporations (TNC) engaging in cross-border transactions. However, as some nations continue to operate as tax havens, income shifting by TNCs is tacitly encouraged and will continue unabated while such opportunities continue to exist.

The OECD identifies three key factors in considering whether a jurisdiction is a tax haven: lack of effective exchange of information between firms and governments; lack of transparency; and no or only nominal taxes. However, the OECD found that its definition caught certain aspects of its members' tax systems as some developed jurisdictions have low and some even zero tax rates for certain favored groups. Its later work then focused on the single aspect of information exchange. This is generally thought to be an insufficient definition of a tax haven, but is politically expedient because it includes the small tax havens (with little power in the international political arena).

An increasingly important issue in a more globalised world of commerce is that there may be penalties involved in using transfer pricing as a means of tax avoidance. The study by Choe and Hyde (2007) examined the issue of firms that use transfer pricing for tax avoidance, and the balance of risk between this use and potential penalties involved in violating the “arm’s length” principle, that is, the principle that prices in transfer pricing transactions should be the same in different national tax jurisdictions as those paid to unrelated parties. As Choe and Hyde (2007) point out, not
complying with this principle can result in fines for the offending firms depending on the national tax jurisdictions. The authors determined an optimal incentive transfer price in the multinational firm’s choice of transfer prices when the firm uses separate transfer prices for tax and managerial incentive purposes, and when there is a penalty for non-compliance with the “arm’s length” principle. This optimal incentive price was: “the weighted average of the marginal cost of production and the optimal tax transfer price, plus an adjustment by a fraction of the marginal penalty for non-arm’s length pricing” (Choe & Hyde 2007, p. 404). In other words, Choe and Hyde (2007) determined the specific pricing strategies that firms in the study used. This is relevant to this thesis because it will help to indicate what level of risk firms consider themselves to be at for incurring a fine or penalty if detected, to be engaged in improper transfer pricing behaviour.

Firms are expected to maintain records regarding their use of transfer pricing in order to ensure that this use is within the guidelines of the “arms’ length” principle and, thereby, avoid the penalties levied for unacceptable transfer pricing behaviour (Abdallah 2004). However, it can be difficult for both firms and regulators to determine when transfer pricing is occurring and what, if anything, can be done to prevent it. Because of this, it can often be difficult to determine when manipulation of transfer pricing is occurring based on a simple inspection of the firm’s accounting records (Abdallah 2004). The basic elements of transfer pricing, including its basic legality, imprecision of definition, and lack of a clear indication both in the entity’s records of management’s thinking, and motivations underlying their decisions, can often make it difficult to determine when improper transfer pricing behaviour is taking place.

1.4: The purpose of the study

The purpose of this study is to detect whether transfer pricing behaviour for the purpose of reducing the burden of taxation on profits is identifiable in the case of the oil and gas sector of Saudi Arabia. In pursuing this line of research, the widely recognised Bartelsman and Beetsma model (2003) has been chosen and applied to determine whether the results generated can reliably identify the presence of such behaviour in that sector.
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 the thesis for the following reasons, (which are further elaborated in Chapter Three):

- 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, as discussed in detail in Chapter Three; and
- 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.

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. The variables are elaborated and discussed in detail in Chapter Three.

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 2007. 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.

1.5: Research question, propositions and hypotheses

The research question at the center of this thesis 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:

- **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 thesis:
• **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.

1.6: Choice of Saudi Arabia

Transfer pricing is the process of setting and applying a price for the transfer of goods and services from one division of an entity to another division of an entity (Rathore, 2009). Transfer pricing can have an additional major impact on large companies that operate in different national tax jurisdictions because of the ability to essentially shift profits from one division in a particular tax jurisdiction to another in a different tax jurisdiction as a way of avoiding high taxation in one country by reporting lower profits in that country and increasing profits in a country with lower tax levels. One of the countries that is highly sought after by international companies as a location for using transfer prices in this manner is Saudi Arabia because of its very low taxes even on firms that have levels of ownership by foreign companies.

The basic corporate tax rate in Saudi Arabia is 20%, however, this can vary greatly depending on the specific industry in which a company operates. For example, companies in the natural gas industry are levied a tax of 30% on their profits, while companies in the oil industry are taxed at a rate of 85% (Oxford Business Group, 2010). On the surface, these figures might not make it seem that the effort required to engage in transfer pricing involving Saudi Arabia would provide a large financial incentive. However, it is the other aspects of the taxation system in Saudi Arabia that have caused many international companies to engage in business in that country for the purpose of taking advantage of transfer pricing opportunities.

International companies that have operations in Saudi Arabia in which at least 25% of the business is owned by Saudi firms are exempt from income taxes on profits for a period of 10 years (Chemingui & Lofgren, 2004). This means that even for
companies that operate in the oil industry in which the normal level of taxation is 85%, any profits from the first ten years of their operations would not attract any corporate tax. The opportunity to be exempt from corporate profit tax on profits for 10 years is a very high incentive for international companies to establish operations and joint ventures in Saudi Arabia.

Furthermore, tax laws in Saudi Arabia allow international companies that operate in the country to have an unlimited amount of time to write off losses (Naser & Nuseibeh, 2003). For companies that may be experiencing a lack of profitability, such as in the present economic climate in many countries around the world, showing larger losses in divisions that operate in Saudi Arabia could be beneficial over the long-term. The total amount of losses that are incurred in the country can be written off against future earnings until the full amount of losses are written off. This could mean that even once a company becomes profitable, its division in Saudi Arabia could avoid paying taxes for several years until losses from prior years are written off.

Finally, Saudi Arabia is an attractive location for transfer pricing considerations because it seems unlikely that the current corporate taxation structure will significantly change in the near future. While specific levels of taxes or specific rules may be adjusted over time because of changes in the financial conditions of the country, Saudi Arabia is largely committed to having a very liberal tax structure (Raphaeli, 2003). This means that international companies can engage in taking advantage of the transfer pricing opportunities in Saudi Arabia without a great deal of concern that the country’s tax policies may drastically change and result in large increases in tax costs.

1.7: Research methodology and design

The original study design called for the use of the Silva (1999) method and that of Bartelsman and Beetsma (2003) model for identifying transfer pricing behaviour. These models don’t determine transfer prices – they identify transfer pricing behaviour in entities studied, the entities themselves determine the transfer price, and as we know, not all transfer prices set involve shifting profits. However, it was
determined that the Silva (1999) methodology was not supported by the literature. Another secondary methodology was that of Grubert and Mutti (1991). This methodology was selected because there was a closer suitability to the research material as well as being considerably better supported within the literature. However, the required variables were not available in the Saudi market for this model in contrast to the study based on USA companies. The Bartelsman and Beetsma model will be used to detect transfer pricing behaviour, while the Grubert and Mutti model will be used to explain the effects of the transfer pricing in the corporate decision-making process. As can be seen in the literature review for each model, the various the studies reviewed have been successful in overcoming challenges to the lack of relevant and sensitive direct information from entities by resorting to the use of relevant public data to identify transfer pricing behavior.

This thesis 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.

Chapter Three provides a quantitative description of the process involved, including the sources of data employed in this study, and also presents the details of the samples used. The variables of the Bartelsman and Beetsma model and the data sources are also listed in Table 20 Appendix A. Chapter Four presents the key empirical findings of the research and an analysis of the results.
1.8: Contribution of the Thesis

The thesis 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.

The key features of the model are discussed in Chapters Three and Four. Specifically Chapter Three addresses and sets out the detail about the methodology research, the suitability of the Bartelsman and Beetsma model (2003) and the kind of public data sets available and suitable for the model to be applied. Moreover chapter Four sets out and explains the application of the model and the kind of results that the application generates.

The contribution of the results of this research is elaborated on and discussed in detail in Chapter Four. The summary of findings, contributions, and limitations of the study are set out in Chapter Five.

1.9: Outline of the Thesis

Overall, this thesis is structured as follows:

- Chapter Two provides an overview of the literature setting out:  

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The role of transfer pricing in making decisions concerning the reporting of profits from operations in an international context; The purposes of transfer pricing; and The behavioural implications of transfer pricing models.

Chapter Three presents the research methodology and study design, including an overview of the justification for the methods, a concise description of the methods used, including a discussion about the data sources, an overview of applicable literature for the Bartelsman and Beetsma (2003) model, and the theoretical framework of transfer pricing.

Chapter Four presents the empirical analysis and results.

The final chapter, Chapter 5, presents a summary of the results and findings, the contributions, and limitations of the study. A structured overview of this thesis is presented in figure 1.

Figure 1: Structured overview of the dissertation by chapter
CHAPTER TWO: A REVIEW OF THE LITERATURE

2.0: Introduction

This chapter seeks to:

- explore the literature on the role of transfer pricing in making decisions concerning the reporting of profits from operations in an international context;
- provide an explanatory overview of the purposes of transfer pricing,
- Outline the behavioural implications concerning the setting of transfer prices for managers and tax authorities of different competing national governments.

2.1: Literature review on the role of transfer pricing

Borges (2002, P. 6) defines a transfer price as the internal price charged by companies of a group when selling goods and services to another company or sub-entity within the same group. It is the price that is set for the transfer of goods/services within a defined legal entity, e.g., MNC with subsidiary companies, as well as cost centres within the same entity. The latter will not involve any tax implications, because the legal entity is the entity which is taxed, not the individual cost centres that are integral operational segments of the legal entity. Where are MNC has subsidiary companies in other countries, there may be tax differentials to consider when goods and services are transferred between the subsidiary (legal) companies located in different countries. Where a company does not have operations in other national jurisdictions, there are no tax considerations that would otherwise arise from different tax jurisdictions. Transfer prices may be set and used for operations within a company for a range of different and legitimate managerial reasons.

These views are reflected in the definitions put forward earlier by authors Borkowski (1997) and Merville and even earlier still Petty (1978) who observe that transfer prices are necessary as a strategy for pricing tangible goods as well as services transferred between the parent entity and its subsidiaries, or between subsidiaries to maximise profits, and minimise taxes only where differential tax jurisdictions exist between the subsidiaries, as well as maintain goal congruence and/or evaluate
managerial performance. More recently, Eden and Kudrle (2005) and Adams and Godshaw (2002) reiterate the same definition of transfer pricing, but identify its application to more contemporary situations when they point out that it not only applies to physical goods, but also to service departments or organisations that charge out their services, such as telecom and information technology service providers.

Gabrielsen and Schjelderup (1999) argue that the growth of the practice of transfer pricing by organisations and its significance became evident as the business environment began to witness a significant increase in terms of foreign direct investments and globalisation of commerce. These dynamics had the effect of expanding the size of organisations which meant that their organisational structures became more extensive and complex, especially when they had to distribute their operations geographically, the more so across national jurisdictions. The larger the physical and related managerial organisational structure became the greater the need to organise those activities into more manageable related centres, whatever the name that may be given to them: divisions, departments, cost centres, subsidiary companies and entities. As a result, the increased volume of transferred goods as well as various services transferred between them required the setting of a price for the transfers, be it within a single national tax jurisdiction or across one or more national tax jurisdictions. The implications of multiple tax jurisdictions can bring into consideration taxes to be paid on the reported profits of legal entities where those tax jurisdictions have different corporate tax rates and rules for recognising taxable profits. Where they do not, then the tax element is neutral, however, all the other reasons are still valid considerations: efficient resource allocation between entities, performance evaluation of entities (cost centres) and their managements.

Madura (2006) and Leitch and Barrett (1992) observe that the comparative advantage, which is provided by imperfections arising from global markets, is reflected by the foreign direct investments and international exchange theories, such as the Interest Rate Parity Theory (IRP), the International Fisher Effect (IFE) and the Purchasing Power Parity (PPP) theory. For example, MNEs strive to take advantage of market imperfections in national markets for products, factors of production and financial assets. Large international firms are better able to exploit such competitive
features as economies of scale, managerial and technological expertise, product differentiation, and financial strength than are their local competitors. In addition, once MNEs have established a physical presence abroad, they are in a better position than purely domestic firms to identify and implement market opportunities through their own internal information network. (Moffett 2009, p. 296).

Accordingly, foreign direct investment and globalisation has had a profound effect on the way multinational organisations conduct businesses and compete in the national and now global marketplace. Consequently, organisations are being pressured by competition arising from different national markets, that is global markets, to embrace fundamental changes to their business supply chain model that ‘criss-cross national boundaries’ with respect to the delivery of goods and services, communication with suppliers, business partners, and their interaction with different governments and regulatory bodies (International Tax Review 2005/2006).

Emmanuel and Mehafdi (1994) traced a trend in changing organisational structures that reached as far back as the late 1800s, when typical organisations of the time adopted a centralised structure, or the ‘U-form’ of organisational structure, which was designed around functional divisions. Such divisions typically comprised and highlighted a functional perspective of entity activities: manufacturing, sales, finance and personnel departments, which were all answerable to the equivalent of the chief executive officer. The centralised structure was suitable for small and medium-sized single product firms, because most of the organisational activities, especially the decision making processes, were concentrated within a defined central division and commonly within one national jurisdiction.

Foster (2000) points out that, by the second decade of the 20th century and, more so after the Second World War, larger multi-product organisations were experimenting with a decentralised multi-divisional structure, the ‘M-form’, organised around semi-autonomous operating divisions. Each of these operating divisions served as a profit centre with sufficient local authority to maximise divisional profit, much like an independent single-product organisation. Divisional managers were closer to the operations for which they were responsible and for which they were given the authority to manage the resources. In turn, the evaluation of the company’s performance was based on reported divisional profits. The corporate headquarters
tended to focus on long-range planning and investment, was responsible for providing common administrative and support services, and set the framework for how divisions should relate to one another.

As Desai and Mukherji (2001) point out, such organisational restructuring posed control problems for management as some organisations integrated vertically where one division or affiliate produced intermediate inputs that were used by the other related division to produce final products; while others integrated horizontally, where different but related divisions produced the same products in different markets.

Within such an organisational context a dilemma arises when one operating division supplies some or all of its outputs, as intermediate goods, as input to a related division. What should be the price or charge for this internal transfer of product between related divisions? If the decision is left to divisional managers to negotiate, and there is no external market for the product in question, the supplying division may insist on a high transfer price and the receiving division may be equally insist on a low transfer price. Alternatively, the transfer price could be set by corporate headquarters so as to avoid intransigent conflicts between the managements of two divisions. However, this could be contrary to the key intention of giving divisions autonomy for the purpose of maximising operational efficiency and the consequent evaluation and rewarding of divisional performance (Drury 2004).

A complicating issue arises when there is no external market for the intermediate product. In these circumstances, the challenge is to set a transfer price that will appropriately motivate the managements of both divisions to make decisions about the use of the resources of their respective divisions that are in the best interests of the company as a whole, while simultaneously maximising the goals of the divisional managements—in short achieving goal congruence for the company as a whole. As Horngren (1972) has argued, there is rarely a single transfer pricing method that meets the requirements of all three criteria of goal congruence, performance evaluation and divisional autonomy that will induce the desired decision. Emmanuel and Mehafdi (1994) and later Mehafdi (2000) observed that, due to the diversity of these methods and company policies, there was no universal or ‘cure-all’ transfer pricing method.
2.2: Competing interests of national states

In a broader context, where organisational dealings cross national boundaries, the interests of each nation state become another element that can directly affect the multinational organisation’s pursuit of maximising its financial gains as a global entity. The interests of the various nation states are competitive and consequently are reflected in their respective national taxation legislation with regard to recognising taxable entities, and the taxes to be applied to them and their operations. Consequently, there exists a variety of definitions, tax rates, allowable deductions, exemptions and requirements to be met by taxable entities. Multinational entities are, therefore, faced with differing requirements and rates depending on the national tax jurisdictions within which they operate. These can be complementary, but often competitive between the tax jurisdictions themselves, depending on the government’s national interests that are given priority at any given time, as well as the capacity of the administrative infrastructure to apply the taxation regulations and requirements. Consequently, where tax differentials exist between different tax jurisdictions, an opportunity may arise for multinational companies to give consideration to minimising the tax liabilities for the multinational entity as an overall entity.

Studies have shown that one of the avenues for minimising the overall tax of MNEs is to ensure that operations in low national tax jurisdictions and thus reported profits are maximised, while those in high national tax jurisdictions are minimised (Horst 1971; Eden 1998).

Other studies such as that by Nielsen, Raimondos-Moller & Schjelderup (2001) suggest that companies have used transfer pricing to shift profits from their operations in high tax jurisdictions to their operations in low tax jurisdictions. Nielsen et al.’s (2001) study demonstrates that under conditions of imperfect (oligopolistic) competition, a transition from separate accounting (SA) rules by affiliates of a multinational firm to formula apportionment (FA) rules does not eliminate the problem of profit shifting via transfer pricing. In particular, if affiliates of a multinational firm face oligopolistic competition, it is beneficial for the multinational to manipulate transfer prices for tax–saving as well as strategic reasons under both FA and SA.
The analysis shows that a switch from SA rules to FA rules may actually strengthen profit shifting activities by multinationals.

The study by Sikka and Willmott (2010) provides some ad hoc evidence about the use of transfer pricing related to both emerging and developed economies. Many studies have identified the creative use of transfer pricing, especially the adjustment of import and export prices that shifts profits from China to more tax jurisdictions. A study by Sun cited in a news article China Daily estimates that Chinese exports by multinational corporations are under-priced by an average of 17% whilst imports are overpriced by an average of 9% (Sun 1999). The Chinese tax authorities claim that tax evasion by multinational companies is costing them more than 30 billion Yuan (US$3.6 billion) in lost tax revenues annually and that, “.. almost 90 per cent of the foreign enterprises are making money under the table. . . . most commonly, they use transfer pricing to dodge tax payments . . .” (China Daily 25 November 2004 ). Despite strict currency controls, it was estimated in 2004 that China then was being deprived of around US $100 billion of capital each year, primarily through mispricing of imports and exports (Gunter 2004).

Some of the issues have been given visibility by the trade in oil and gas which are major contributors to the Russian economy (Ahrend, 2004). In early 2004, a World Bank report stated that the Russia’s oil and gas exports accounted for 25% of the country’s GDP rather than 9% reported in the official data (Financial Times, 19 February 2004). The major reason for the discrepancy was that corporations exploited a variety of “tax loopholes, engaged in transfer pricing including creating a series of onshore and offshore trading companies to purchase oil at low cost from production sites and then sell it back again through intermediaries” (The Globalist, 1 December 2004). World Bank officials state that “many large Russian firms benefit from transfer pricing by employing trading companies to avoid taxation. Companies sell their products to trading subsidiaries at below-market prices; these trading subsidiaries then sell the product to the end customer at market prices and pocket the difference . . . . typically shell companies are registered in remote regions . . . . [some] simply disappear soon after they have concluded as many transactions with end customer as possible” (Ruehl and Schaffer, 2004).
For example, Russian oil priced for sale internally at US $10 a metric ton (circa 2005) was sold to an exporter’s foreign subsidiary at US $10 a metric ton and then resold to foreign buyers at the market price of US $120 a metric ton, with the profits being booked and retained in external companies (Baker 2005). A report by Russia’s Audit Chamber noted that 80% of the coal exported from Russia was sold through offshore entities. The trading companies registered offshore accumulated significant coal revenues as Russian producers sold to them at a discount of 30–54% to global prices (Bloomberg 2009). As a result, MNE companies operating in Russia avoided taxes because profits were not booked in Russia.

Russian gas company Gazprom created Itera, an affiliated company based in Jacksonville, US. It has been claimed by Baker (2005) and Browder (2002) that gas with a Russian domestic price of $2 to $4 per thousand cubic meters was sold at the domestic price to Itera between related companies in the US at between US $30 to US $90 per thousand cubic meters, with the profits being retained in the US (Baker 2005; Browder 2002).

2.3: Transfer Pricing Practice – An Oil and Gas Industry Perspective

Mainstream textbooks on international business cover, as a standard component, how multinationals operate in imperfect of market conditions. They provide a common set of considerations of how these imperfections are taken advantage of by multinationals, who through foreign direct investment vertically integrate and internalise their transactions in order to improve efficiency and retain their competitive advantage. Research by Gresik and Osmundsen (2004), Desai and Mukherji (2001), Cravens (1997) and Rugman (1985) have developed explanatory arguments along these lines. The theory of internalising transactions can be traced back to the seminal work of Coase (1937), Kindleberger (1969), and later Hymer (1976), which was subsequently integrated into the theory of internalisation and elaborated in the studies of Rugman (1986), Dunning (1993) and Gattai (2005).

There are specific characteristics of the oil and gas industry that need to be taken into account when designing regulations and analysing transfer pricing within the industry. First, the oil and gas industry is based on a non-renewable resource, which needs to be analysed using uncertainty in production (and availability of remaining
reserves) as a key factor (Lund, 2009). However, as Lund (2009) noted, uncertainty is often not taken into account in analysis of rents, taxation, and transfer pricing in non-renewable industries, calling into question the reliability of the analysis.

In the case of the oil and gas industry, Aliber (1970) argues that the type of organisation-specific competitive advantage that may be controlled within a multinational in this industry is usually one determined by imperfections in the external market. The multinationals in the oil and gas industry co-ordinate the production, transportation, refining and distribution of crude oil at lower costs than individual firms at each stage might be able to do, by using the market. Thus, as Rugman (1985) suggests, oil and gas multinationals engage in vertical integration in response to both natural and government induced market imperfections. Brock et al. (1996) and later Gallun et al. (2001) show that the rate of development of an oil field requires co-ordination of the production and marketing function in a dynamic sense. The industries’ four stages of vertical integration, that is, exploration and extracting, transportation, refining, and distribution, require the control of the supplies and markets, so as to allow the crucial capital intensive stage of refining to operate at full capacity.

Rugman (1985) points out that the oil and gas industry’s high level of vertical integration and internal transacting can be argued as revolving around the strategic, functional necessity, and economic and organisational purposes of its existence. Oil and gas multinationals in the UK, for instance, which are characterised by operations in the North Sea, are seen to be exposed to technologically demanding and, thus, expensive environments. This is due to the extreme ocean depth, which requires additional necessary expertise and financing and, therefore, limits the potential number of companies capable of undertaking this activity to a small number of large multinationals. Due to the special nature of deep-sea drilling, the markets for property and liability insurance have been seen to be quite thin and the risk characteristics can vary from one drilling platform to another. This leads multinationals in the industry to self-insure their risk in insurance subsidiaries, and then reinsure a portion of their risk with independent insurers. For such reasons, Rugman (1985) showed that oil and gas multinationals’ internal markets ensure their:
- Security of oil supply, which reduces the risk of interruptions in capital intensive and thus expensive refining operations;
- Marketing brand name advantages, which reduces buyer uncertainty and helps ensure stable distribution; and
- Information and research transfers, which reduces the costs of knowledge acquisition.

The contention in the oil and gas industry as regards internalising transactions amongst affiliates or subsidiaries has been shown, according to conventional wisdom, to involve the multinationals, tax authorities and the host governments. A United Nations (2003) conference on trade and development reported that foreign direct investment (FDI) in natural resources in oil, gas, copper, nickel, bauxite, gold, diamonds, iron ore, and other minerals can have a dramatic impact on the balance of payments and the tax revenues of the host country where the natural resources are found. The multinationals have continually argued that internal markets are needed to strategically minimise logistics, inventory, transaction and transportation costs (Rugman 1985). Tax authorities argue to the contrary, that internal markets are used by multinationals in a strategic fashion, with the main aim of reducing overall tax payments of the MNE as such. Accordingly, the tax authorities have developed regulations to limit such abilities (Rugman 1985).

As Drury (2004) observes, when it comes to internal transacting and associated transfer pricing by multinationals, the taxation issues in an overriding position from amongst all other strategic objectives. Bernard and Geneste-Laplante (1995) claimed earlier that, despite the large body of literature analysing the circumstances under which transfer pricing could be used to lower taxes by oil and gas multinationals, the empirical evidence as to these allegations are meagre, because of the privacy involved in gaining intra-firm transaction information from multinationals.

Bertrand in his 1981 study noted that there was an excessive increase of suppliers to Canadian companies – an estimated $3.2 billion from the period 1959 to 1973 – as a result of increased transfer pricing. The Restrictive Trade Practice Commission (RTPC 1986). The Restrictive Trade Practice Commission (RTPC) supported the
previous evidence in the presence of little systematic evidence about transfer pricing in that case.

The first systematic empirical analysis of transfer pricing in the oil and gas industry in the US was carried out by Bernard, & Weiner, (1992). Through a longitudinal study using data collected from the Energy Information Administration. They analysed crude oil imports into the United States over the period 1973 to 1984 to test if internal prices set by the multinationals operating therein were different from the arm’s length requirement and, consequently, if average effective corporate tax rates explained the observed patterns of transfer pricing.

Using regression analysis, Bernard, & Weiner found that the revenue transferred by deviations from arm’s length prices represented two percent or less of the value of the crude oil imported by the multinational companies each year. They further observed that the differences between arm’s length based transfer prices and the transfer prices set are not easily explained by average effective tax rates in exporting countries. Their conclusions suggest that little support and evidence was found for the claim that oil and gas multinationals set their transfer prices to avoid taxes. A major hypothesis towards explaining this reasons that the nature and enforcement of regulations by the US tax authority, the Internal Revenue Service, may be so effective that multinationals are discouraged from reducing their tax obligations through transfer pricing.

In 1995, Bernard and Genest-Laplante took (1995) the study by Bernard, & Weiner, (1992) a step further by looking at the transfer pricing behaviour of individual multinationals. Their study reflects a stronger test, since it deals with individual multinationals rather than oil and gas companies as a group. Specifically, they tried to examine and analyse whether particular Canadian subsidiaries of a known oil and gas multinational paid internal prices that were different from the third party or arm’s length transaction for a specific country in a given year when transactions and crude oil characteristics were taken into consideration. The analysis was made using data collected from the Canadian Oil Import Compensation Program for the period 1974–1984, which contained some 5,000 observations.
Applying regression analysis and the Bonferroni testing procedure, they observed that, while there was manipulative transfer pricing by Canadian affiliates of multinational oil and gas companies, it did not result in higher crude oil import prices against the Canadian interest during the sample. They concluded that the six largest Canadian affiliates of oil and gas multinational companies, responsible for 84% or more of all Canadian crude oil import transactions in the period under study, paid transfer prices equal to or lower than prices of the arm’s length transaction. They further noted that little evidence was found for the claim that oil and gas multinationals set their transfer prices to avoid taxes.

Recommendations by Scapens (2006), and earlier Emmanuel and Mehafdi (1994), and McAulay and Tomkins (1992) suggest the need for more field and case study approaches towards understanding the practical nature of the management accounting practice of transfer pricing. Chan (1997) and Scapens (2006) suggest that management accounting systems and practices constitute organisational rules and routines which can both shape and be shaped by the institutions which govern their organisational activities. They refer to it as the Institutionalist Framework for the interpretation of the management accounting activity. This notion explores the complex and ongoing relationship between actions and institutions and demonstrates the importance of organisational routines and institutions in shaping the processes of management accounting practices.

The Institutionalist Framework emphasises organisational habits and routines and does not deny the fact that individuals or organisations have reasons for their actions. In terms of intra-organisational processes, the framework is in a better position to aid managers in multinational organisations to anticipate the issues and difficulties involved in the management accounting practice of transfer pricing.

The subsequent parts of this chapter will, first, deal with the purposes of transfer pricing. The Second will outline the methods used in setting transfer prices. Finally, the behavioural implications of transfer pricing for managers, tax authorities and host national governments will be considered.
2.4: The purposes of transfer pricing

As stated above, the role of transfer prices derives from the objectives pursued by the management of the overall organisational entity where goods and services are transferred between related parties within the group entity, and the volume involved is significant. In turn, the challenge of determining the most appropriate transfer price to benefit the company as a whole is affected by whether or not an external market for those goods and services exists, and the degree of imperfections of that market, if one does exist. Within this context, managers of related entities and divisions are faced with the task of maximizing their own performance as measured by financial and other performance indicators while having, in theory, unconstrained authority to do so. Dilemmas arise when managers in pursuit of maximizing the objectives (measures of performance) of their related entities make decisions that do not maximise the financial objectives of the company as a whole and, thus, reflect a less than optimal use of resources of the company. The reasons why such situations arise, though diverse, can be related to the pursuit by different parties within the group entity of their own priorities in relation to profit, cash flow, marketing, operations (production), socio-political, and behavioural factors. Researchers by Bierman (1959), Abdel-Khalik and Lusk (1974) and Drury (2004) note several of these objectives.

From a multinational perspective, Emmanuel and Mehafdi (1994, p.71) cite Daniels et al. (1976) as identifying the main objectives in setting a transfer price as being:

- Central concentration of cash flow;
- Duties, quotas and global tax liability minimisation;
- Minimisation of inflation risks of exchange;
- Avoidance of restrictions on the repatriation of dividends;
- Provision of cheap finance to improve competitive advantage;
- Management of joint ventures involving foreign partners;
- Maintaining good relations with host countries and the public in general; and
- Designing relevant performance measures for segments of the enterprise.
Leitch and Barrett (1992), basing their argument on multinationals evolving according to the theory of foreign direct investment, list the range of dominant factors that motivate the setting of transfer prices more succinctly into the following categories:

- Profit objective;
- Cash flow objective;
- Marketing objective;
- Production objective;
- Tax minimisation objective;
- Behavioural objective; and
- Objective related to change in socio-political factors objective.

These various purposes are discussed below in terms of why transfer pricing has an increasingly significant role in organisational decision-making in both national and international domains.

Considering together Daniel et al.'s (1976) and Leitch and Barrett's (1992) views, it is possible to restate the range of purposes ascribed to transfer pricing into four sets of categories. McAulay and Tomkins (1992) propose the following more succinct, yet fundamentally meaningful categories:

- Functional necessity purpose;
- Economic purpose;
- Organisational purpose; and
- Strategic purpose.

This section will focus and elaborate on the organisational purpose, economic purposes and operational Purpose.

### 2.4.1: Organisational purpose

The functional necessity purpose reflects the view that transfer pricing is a functional necessity resulting from organisational divisionalisation into investment, profit and cost centres. Profit centres are divisions responsible for both costs and revenues resulting from their operations, while cost centres are organisational sub-units whose responsibility is primarily confined to the costs that they generate. As Camfferman
and Cooke (2004) point out, any organization with a divisionalised or sub-entity structure wishing to measure sub-entity profitability would need to develop and use transfer prices. The role of transfer prices here recognises a degree of autonomy of the sub-entity over the use of resources under a sub-entity’s control, and yet at the same time acknowledges that the decisions taken would need to be in the best interests of the company as a whole.

Furthermore, the functional necessity category could be looked at from both a national and an international perspective. From a national perspective, the transfer of goods and services between the sub-entities would not involve any profit tax considerations for the group, unless the sub-entity was recognised as a legal entity. In contrast, from an international context, related entities of multinational organisation which transfer goods and services between themselves across national boundaries would be subject to the tax requirements of the national jurisdictions in which they operate.

2.4.1.1: Country studies

Empirical work in the area of transfer price manipulation for profit shifting purposes has been done along several different dimensions, such as country or industry studies, which started as far back as the early 1970s in the works of Arpan (1972), Granick (1975), Wu and Sharp (1979), Milburn (1978), Tang (1981), Rugman (1985), Atkinson (1987), Bafcop et. al. (1991), Bernard and Genest-Laplante (1995), Cravens (1997), Boyns, Edwards and Emmanuel (1999), Bartelsman and Beetsma (2003), Chen (2005) and Baldenius (2006).

In terms of particular country studies, the US is the country that has been the subject of most studies, since it has the best available data on intra-firm trades and, also, according to Emmanuel and Mehafdi’s (1994) study, it has the ‘M-form’ of organisational structure there. A range of other studies that used US data were undertaken by Benvignati (1985), Bernard and Weiner (1992), Eden (1988, 1991), Grubert, Goodspeed & Sivenson (1993), Grubert and Mutti (1991), Harris et al. (1991), Hines and Hubbard (1990), Hines and Rice (1994), Bartelsman and Beetsma (2000, 2003) and Eden et al. (2005).
The US studies can be further sub-divided into those that focus on transfer pricing by foreign controlled companies in the US and those that focus on transfer pricing by US majority-owned foreign affiliates abroad. For example, Grubert et al. (1993) addressed an issue that foreign controlled companies in the US report on average a much lower rate of return than domestically controlled companies, thus paying lower taxes for a given level of assets. The data from these studies were used to construct two basic data sets, a cross-section and a panel. The cross-section was constructed using 1987 data with 600 foreign-controlled companies and 4,000 domestically controlled companies. This led to the possibility that foreign controlled companies engage in income shifting by means of abusive transfer pricing practices. The authors basic strategy is to separate the impacts of determinants of taxable incomes as a ratio of either assets or sales. Grubert et al. (1993) found that about half of the initial foreign-domestic taxable income differential of companies in the US is attributable to the specific characteristics of foreign controlled companies and not to transfer pricing practices. The remaining half of foreign-domestic taxable income differential can be deemed as the upper-bound of the impacts of determinants attributable to transfer price manipulation. From the opposite angle, US resident multinationals are faced with incentives and constraints regarding income shifting that are similar to those faced by foreign resident multinationals. Harris et al. (1991) attempted to assess quantitatively the importance of profit shifting of US resident multinationals. The authors’ basic strategy was to ascertain whether taxes paid to the US government, as a ratio of either US assets or US sales, are related to the location of foreign operations, holding constant other determinants of profitability. Their hypotheses are that the US ratio should be lower than otherwise, if the multinational operates in low-tax countries, and higher than otherwise, if it operates in high-tax countries. The authors used a five year panel of data covering the period 1984-88 for two hundred large US manufacturing firms. They found evidence that is consistent with tax-motivated profit shifting. Having a subsidiary in a tax haven, like Ireland, or in one of the Asian countries called “four dragons” is associated with lower US tax ratios. Also, having a subsidiary in a high tax region generally is associated with a higher US tax ratio. These results suggest
that the USA manufacturing companies shift income out of high-tax countries into the US and from the US to low-tax countries. Such behaviour certainly lowers worldwide tax liabilities for large US manufacturing companies and appears to significantly lower their US tax liabilities as well. The authors argued that this pattern of profit shifting reduces US tax amounts significantly only when firms have an extensive multinational structure. For US multinational companies as a whole, profit shifting leads to a moderate reduction in US tax payments of 3% - ranging up to 22% of total tax liabilities.

Eden et al. (2005) adopted an event study methodology to analyse the effects of the US penalty legislation on stock market valuation of 24 Japanese multinationals with US subsidiaries over the period 1990-1999. They found that the threat of the transfer pricing penalty negatively affected market valuation. They also found that the penalty caused a drop in their cumulative market value of $56.1 billion, representing 12.6% of their 1997 market value.

Most of the non-US research on transfer pricing has been carried out in relation to less developed countries. For example, Lall (1973) studied Colombia; Ellis (1981) studied Central America; ESCAP, Lecraw (1985) focused on the group of southeast Asian (ASEAN) countries; Natke (1985) studied Brazil; and Lin, Levebvre and Kantor (1993) studied the Asia-Pacific region.

Hines and Rice (1994) directed their research to the study of the issues involved in the use of tax havens by American companies, cited in the Grubert and Mutti (1991) study, as a basis for asserting that tax benefits are one of the most common reasons for the use of transfer pricing and tax havens by American firms, and they posed the question: ‘Do MNEs shift movable, taxable assets to low-tax locations?’ Their study used data from the 1982 benchmark survey of US FDI to examine the distribution of assets, equity, and employment by US MNEs among three locations: tax havens, developing countries, and industrialized countries outside the US. The data includes all industries worldwide with 2245 parent MNEs and with a total of 18,339 affiliates. Grubert and Mutti (1991) and Hines and Rice (1994) showed profit margins were higher in low-tax countries than in high-tax countries.
In the earlier study by Lall (1973 p.173-195) he found that, compared with world market prices (adjusted for transportation costs and 20% margin for error), the multinationals in Colombia over-priced their imports by 33%-300% in the pharmaceutical industry, and by 24%-81% in the rubber and electrical industries during the period 1967-1970. The authors concluded that the foreign multinational entities studied were manipulating the setting of their transfer prices to evade Colombia's foreign exchange controls.

The Lecraw (1985) study is based on interviews of managers of 153 foreign subsidiaries in six light manufacturing industries with 111 parents headquartered in the USA, Japan, Europe, and developing countries in 1978 in ASEAN countries concerning their pricing policies. They found that most multinationals operating in the ASEAN countries use a non-market price for intra-firm exports and imports, whereas external transactions were conducted at market prices or on a cost plus basis.

Lin et al. (1993), after analysing the economic environments in the Asia-Pacific region, concluded that transfer pricing manipulations are popular in this region. Lecraw (1985) concluded that tariffs, relative tax rates, price and foreign exchange controls, and country risk were significant variables explaining transfer pricing behaviour in the ASEAN countries.

Natke (1985) studied the import prices of 127 products by 141 foreign and domestic firms operating in Brazil during 1979 and found that multinationals pay higher prices on imports than local firms, and that the prices of multinationals’ imports also exhibit greater variability. The results of this study suggested some support for the hypothesis that transfer prices were manipulated in order to avoid government regulations imposed during that period. However, Natke cautioned that the price differences could have been due to factors other than transfer price manipulation, such as the quality of the imported goods. Nevertheless, Natke (1985) concluded that MNEs were over-invoicing imports into Brazil to avoid Brazil’s extensive regulations, which included price and credit controls, profit repatriation restrictions, and high corporate income tax (CIT) rates.
2.4.2: Economic purpose

From an economic standpoint, the purpose of transfer pricing is that a company will set the price to transfer goods or services to another unit of the organization at a price that will allow for the maximization of profits by both organizational units in question while at the same time ensuring that the company as a whole maximizes its profit (Zhao 1998). It is also generally presumed that as a general rule the optimal price that will be set will be based on the differential costs of the materials in question plus the opportunity cost (Shih 1996).

Gox and Schiller (2006) identify that the overall objective of transfer pricing is the efficient allocation of resources within the organisation. Under both national and international perspectives, when deciding to allocate resources to divisions, or affiliates where profitability is an important measure of performance in use of resources and where the transfer commodity’s value has a significant impact on a division’s result, transfer pricing can be influential.

In a much earlier study, Abdel-Khalik and Lusk (1974) showed that, in an organisational setting where a low transfer price is set, the buying division may appear to be more profitable and this will result in too high an allocation of scarce resources to it. The secondary tax considerations are a function of the profit shown in subsidiaries, where they are located in different tax jurisdictions and a profit tax differential exists. In situations where the tax differential is quite minor and/or the divisional profit may also be quite minor, then the incentive to minimise tax would be quite insignificant, because, from a practical point of view, there is often a cost involved in making the arrangements to manipulate the transfer price in a systemic fashion, in contrast to a ‘one-off’ transaction.

Similarly, the shifting of costs between related entities through manipulating the allocations of fixed costs with the intent of affecting the level of transfer prices will not have any tax effects where tax differentials do not exist. Although the reported costs in each of the subsidiaries is altered (lower in one, but higher in another), nevertheless, the total costs for the group remains unchanged by this action. Consequently, the overall group’s profit also remains unchanged. Only the reported profit in each of the subsidiaries involved is changed, and this will only have tax
implications where the subsidiaries are located in different tax jurisdictions with differential tax regimes (Tomohara 2004). In this regard, for many MNC companies, the pre-eminent economic purpose of transfer pricing is trying to minimise their overall tax liability.

Hirschleifer (1956), an original elaborator of the economic purpose of organisational intra-firm trade, argues that transfer prices were not introduced into business operations as desirable innovations in their own right, but were rather a necessary by-product of decentralisation of the organisational structure of large organisations. He further suggests that the main objective behind transfer price setting by organisations is the presumed behavioural advantage of operating autonomous units in the absence of externally determined market prices for the internally exchanged goods. This further means that transfer prices should be set to enable and motivate managers to make sound and unbiased decisions that are in the best economic interests of the MNC as a whole while, at the same time, ensuring that divisional autonomy is not undermined, thereby enabling a reasonable measure of managerial performance and motivation to work at the divisional level. In relation to this, Borkowski (1990) and Mehafdi (1990) argue that setting a transfer price to meet the economic purpose is not a mere technical problem that can easily be solved through a clever cost formula.

Proponents of the economic reasoning behind transfer price setting, such as Blois (1978), Kanodia (1979) and Koutsoyiannis (1982), claim that the efficient allocation of resources and the most profitable price/output, or price-output combination in the setting of transfer prices between divisions, is one where, in principle, marginal revenue equals marginal costs which equality identifies the optimum output level. Emmanuel and Mehafdi (1994) argue that such a rationale only focuses on profit maximisation through marginal cost analysis, and, thereby, presumes homogenous economic rational behaviour by all managers. In such circumstances, the resulting divisional profits for the evaluation of divisional performance may, in reality, contain material inadequacies and this might lead to dysfunctional behaviour at the sub-entity level, such as the manipulation of cost information by divisional managers, as recognised by Drury (2004).
2.4.3: Operational Purpose

Aside from the economic and organizational purposes, which often seem to be given the most attention with regards to the reasons why companies engage in transfer pricing, another important purpose of transfer pricing is to allow for divisional autonomy within organizations. From a technical theoretical perspective, it would be less challenging for the executives and leaders of a company with multiple divisions to establish the prices at which goods and services are to be transferred between divisions. In fact, establishing specific transfer prices would allow company leaders to ensure that the greatest benefits are achieved from the use of transfer pricing with any potential risks being kept to a minimum. As the operating conditions of the entire organization change, the transfer prices and even the quantity of goods and services to be transferred between specific divisions could be revised (Drury 2005).

The problem, however, with a centralized form of intervention, with regard to the prices and quantities involved in internal exchanges, is that each division in a large company would not operate as if they were an autonomous unit. A centralized managerial structure has a tendency to give rise to disputes between divisional leaders with consequential reduction in productivity and performance, stifled creativity, loss of responsiveness to market opportunities – all these factors individually and/or combined can significantly reduce profitability of a company (Maher, Stickney & Weil, 2007). By allowing divisions themselves to set transfer prices, companies are able to reduce some of the conflict that would otherwise occur because divisional leaders are able to make decisions related to the internal movement of goods and services based on their own needs and their desires to achieve profitability. However, at the same time, there would need to be an over-riding recognition by the divisions that each division is indeed a part of a larger organization for which performance and profitability goals have been established and would have priority (Hansen, Mowen& Guan 2007). If divisional leaders behave unfairly, or only think about the profitability of their own divisions, then they are likely to make sub-optimal economic decisions for the company as a whole.

From a financial standpoint, transfer pricing in relation to the purpose of achieving divisional autonomy generally results in more profits for divisions over the long-term
The reason underlying such a desirable outcome is that there are several fundamental rules and guidelines that give rise to divisional autonomy. For example, the process setting of transfer prices often starts with considering the full cost of production as well as the marginal costs of the goods or services that are being exchanged.

Divisional autonomy related to transfer pricing allows divisions to purchase only the goods or services that are required for their operations (Jain & Khanna 2007). Any divisions’ manager would be trying to purchase at the lowest price and only the quantity needed, whether they buy internally or externally. Divisions do not intend to purchase large quantities of goods and services from outside sources at market prices that may not be entirely used.

The end result is that long-term profitability and profit maximization does indeed generally occur because of the divisional autonomy that is achieved with the economically sound setting of transfer prices from the perspective of the company as a whole. Divisional leaders are not simply receiving goods and services with little consideration for their costs or how they are to be used. Instead, there is a more conscious concern about the costs that are being incurred by the company as a whole and how the goods and services are used for the operations that are performed. Open communication is an additional necessary imperative for the setting of transfer prices at the divisional level. Divisional leaders need to engage with each other in terms of the goods and services that are needed from each other, as well as the prices that are fair based on an understanding of costs incurred under efficient operating conditions and the desire of achieving a fair profit at the divisional level. If corporate leaders simply establish transfer prices, there is no need for divisional leaders to openly share information with each other. This could result in problems related to the availability of goods and services within an organization and the willingness for divisional leaders to make necessary goods and services available to each other (Chatterjee 2001). In contrast, transfer pricing that is undertaken to support divisional autonomy increases communication between divisional leaders.
2.5: Implications of the various transfer pricing models

This section considers the behavioural implications of transfer pricing in relation to the key parties involved:

- managers of related sub-entities who are involved in the internal transfer of goods and services (because those who are not so involved do not need to make use of transfer prices as they sell only directly into the market place);
- the management of the overall organisation (parent company) because they have the ultimate responsibility for the overall resources of the company as well as for evaluating the performance of their subsidiary entities;
- the tax authorities; and the various government bodies/agencies that are created and empowered to implement the laws created by government.

2.5.1: Behavioural implications for managers

Contemporary and non-contemporary organizations face global competition on an unprecedented scale and are under considerable pressure to rethink and restructure their roles and strategies to potentially more dynamic marketplace. In order to be successful, organizations restructure to reduce waste, improve productivity, better allocate scarce resources, minimize taxes, maximize profits and maintain goal congruence across their range of operations. The management process is ongoing and not costless. Thus, managers are expected to make efficient and profitable decisions for the entity as a whole within the constraints of the limited resources available. The setting of transfer prices, intended to operate as a rational economic mechanism to serve these purposes, has embedded the expectation that it will be used in a manner that motivates managers in subsidiaries involved in the internal provision of goods and services to maximise the performance of the entity sub-units involved, whilst giving pre-eminence to the economic interests of the company as a whole. However, because the practical application of the principle is imperfect due to the capacity to include subjective judgement that may arise from motivations based on different objectives and priorities of some of the parties involved, the setting of transfer prices does have a motivational dimension that needs to be recognised.
Part of the motivational effect arises from the fact that the price that is set has a prominent role in the process of evaluating the performance of the sub-entities involved and, at the same time, their respective management personnel. This, in turn, is important as the performance evaluation may lead to performance rewards that are sought by personnel. Though Vancil (1979) and Coates et al. (1993) argue that differences between the performance of the manager and that of the affiliate entity are rarely found in practice, internal reports of the multinational entity normally include transfer pricing information as the revenues and costs for the respective parties to internal transactions are affected (Drury 2004). Thus, if managers of those sub-entities perceive that their well-being is affected due to the role of the transfer price on profit performance, their motivation and consequent behaviour is likely to be influenced. Emmanuel et al. (1990) observe that the interaction between transfer pricing and managerial performance evaluation is complex, especially when the internal transaction is material, and when transfer pricing decisions are centrally administered.

Another motivational issue that transfer pricing is related to is the issue of equity valuation, or valuation on the stock market (Eden, Juarez Valdez, & Li, 2005). This is important because many firms rely on stock market valuations for funding as well as firm profile. Eden et al’s (2005) research on the US penalty on excessive misuse of transfer pricing (not adhering to the arm’s length standard) found that Japanese firms subjected to these penalties had a drop in their cumulative market value of $56.1 billion, representing 12.6% of their 1997 market value.

A study of the Russian oil and gas firms further confirmed that corporate governance behaviour, including transfer pricing, had an effect on the share price value of these firms (Black, 2001). Black (2001) included transfer pricing in one of the characteristics that enabled ranking of corporate governance effectiveness within Russian firms, noting that transfer pricing enabled the hiding of wealth and tax avoidance and so classifying it as negative behaviour. In his study of 1999 returns, the effects of corporate governance were found to increase the value of the stock over 500 times from the worst-managed to the best-managed firms (though it should be noted that Russia, particularly at the time, was known for poor corporate governance) (Black, 2001) .
These studies indicate that in order to protect shareholder value (a key component of corporate governance), firms need to avoid mis-using transfer pricing in order to avoid the loss of equity value identified by the studies cited. However, the determination of the extent of this effect is uncertain. A study of Russian firms in the oil and gas industry showed that cross-sectional analysis of effects of transfer pricing and other corporate governance issues may be inaccurate because of endogeneity and other variables (Black, Love, & Rachinsky, 2006). Issues found by Black et. al.’s study included magnitude errors as well as sign reversals. This means that while transfer pricing is likely to have an effect on stock price, it is not certain that the effect is as extensive as that identified by Eden et al (2005), Black (2001), or in other studies. Thus it remains an issue of debate that requires more research to establish a definitive relationship.

Studies by Borkowski (1990) and Mehafdi (1990) report on the relationship between the managerial performance evaluation objective of transfer pricing and the conflicting motivations of the subsidiary entities in the companies they surveyed. Their results show that the setting of transfer prices is not really a mere technical problem which can easily be solved by a clever cost formula, but, rather, requires strategies that address motivation and human behaviour. Borkowski (1999) finds some evidence that specific performance evaluation criteria for subsidiary managers in transnational corporations do vary in importance by country. Emmanuel and Mehafdi (1994) state that the existence of transfer pricing in organisations blurs divisional boundaries, and gives rise to all kinds of disagreements between the parties to the internal transaction, with each sub-entity trying to maximise its own performance indicators. Thus, in these kinds of situations, organisations frequently resort to negotiations between the parties involved, or arbitrations by the upper levels of management to resolve conflicts, which, at times, lead to the aggravation of hostilities when the interaction between transfer pricing and managerial divisional performance is not handled properly.

As Kachelmeier and Towry (2002) observe, managers do consider equity issues in dealing with transfer pricing decisions and, in the absence of acceptable equity outcomes, interdivisional conflicts tend to arise. Transfer pricing conflict has long been shown to involve disagreements about both means and objectives, due to the
cause-effect relationship between transfer pricing and managerial divisional performance (Eccles 1985). The conflict comes from disagreements on the method of setting the transfer price. Conflicts can also arise because of the simultaneous roles assigned to transfer pricing itself, that is, maximisation of profit, minimisation of corporate tax, maintenance of goal congruence and managerial performance evaluation. More specifically, Emmanuel and Mehafdi (1994) point out that, since the transfer price is revenue for the transferor and at the same time a cost for the transferee, the conflict over objectives resides in the impact of the transfer prices on divisional results, as measured and rewarded by the organisational performance measurement, evaluation and reward system.

When viewed from an agency theory perspective, the transfer pricing conflict among multidivisional and/or multinational managers is highly influenced by information asymmetry on human behaviour. The agency relationship that exists within an organisation generates two major problems when it comes to intra-firm trading between the principal (top level managers) and agent (low level managers), that is, adverse selection and moral hazard problems (Yeom & Balachandran 2000). The former is characterised by a manager’s selfish interest towards taking actions at the expense of corporate objectives, while the latter is due to the principal’s incapacity to observe perfectly and, thereby, reliably measure the agent’s efforts. This is because the agent is believed to have the advantage of possessing private information, which could sometimes be of a superior nature, about the tasks performed. In turn, this situation may further lead to non-disclosure problems, especially when managers perceive such private information will not serve their self-interests (Dharwadkar et al. 2000).

As empirical observations by Borkowski and Mehafdi (1990) in their survey of UK companies show, the main contributing factor to inter-divisional conflict was the financial impact of the transfer price upon divisional performance results. In addition Emmanuel and Mehafdi (1994) in their study exploring relevant transfer pricing conflict management strategies, came to a major conclusion that transfer pricing is undoubtedly conflict-rich. Similarly, the misrepresentation of asymmetrical information further aggravates the conflict and, since there is a relationship between
transfer pricing and managerial performance evaluation, it is crucial to gain a better understanding of its role in the effective management of such conflict.

In addition to interdivisional conflict and other associated issues, transfer pricing within the firm poses ethical considerations (Mehafdi, 2000). Transfer pricing can be used for legitimate purposes, but it can also be used for (or create the appearance of) tax avoidance and extraction of capital from non-renewable resources. This provokes an ethical dilemma for the firm, as it requires the firm to reflect on its responsibilities in each of the respective areas in which it does business (Mehafdi, 2000). Furthermore, the perceived mis-use of transfer pricing can exacerbate public relations sensitivities, since a firm perceived to be avoiding taxation will attract both regulator and public scrutiny. Under these conditions, transfer pricing becomes an even more complex issue to manage.

2.5.2: Behavioural implications for the national tax (host governments)

The key consideration for host governments arises from the view that profits earned from operations in the country should be taxed by that country. This view is motivated by the belief/conviction that the revenue from the taxes collected are intended to contribute to the funding of the nation’s needs in all areas – broadly encapsulated by the notion of national development. It is therefore understandable that when tax revenues are reduced as a result of profits being shifted by multinational entities to other countries and taxed in those jurisdictions, then the original host country misses out on the tax revenue it would otherwise have collected. In contrast, the country to which the profit has been shifted gains from the exercise – the amount of tax it collects from the higher levels of reported profits. Obviously, the multinational has benefited economically overall from a reduced tax liability for the multinational overall. Thus there is the implication that with increasing global commerce and competition in the private sector, there is also increasing competition by national governments to attract multinational operations and ensure that profit taxes are at levels which do not encourage multinationals to shift profits to lower national tax jurisdictions. National governments have responded to these implications in part by making agreements (tax treaties) between countries whereby reciprocal treatments of taxable entities is agreed as to the kind and amount of tax that will be levied (and exempted) where they operate in both countries. However,
governments do have control over the extent to which they seek out rents from the oil and gas industry and other resource industries, and may choose higher or lower levels of taxation in order to achieve specific policy goals (Dunning, 2010). This means that appropriate rents are not necessarily simply based on production levels, but also on political concerns and issues related to areas outside the usual level of economic analysis. In particular, rent capture from various industries may be susceptible to electoral cycle concerns and the waxing and waning in political popularity of a given industry, meaning that a level of political analysis is needed to understand the economic results (Dunning, 2010).

Governments need to overcome substantial incentives on the part of firms to engage in tax avoidance using transfer pricing (Sikka&Wilmott, 2010). Transfer pricing clearly has a legitimate role in pursuing economies of scale and internal efficiency within the firm, but as Sikka and Wilmott (2010) note, it also provides a means of avoiding tax. In particular, it enables firms to transfer earnings from higher-tax countries to lower-tax countries without detection (or with minimal detection), preventing appropriate taxation in one of the countries. Thus, the tax receipts in higher-tax countries are reduced by the amount of tax foregone on profits shifted to lower-tax countries. The amount involved can be substantial, the more-so in economically underdeveloped countries, thereby adding to the burden of social impoverishment of and economic harm to those countries (Sikka&Wilmott, 2010). An analysis of the abuse of internal capital markets has shown that some companies are more prone to take advantage of transfer pricing in this manner (Ozbas&Scharfstein, 2010). In particular, the Ozbas study showed that a low ownership stake by firm managers increased Q-sensitivity, suggesting that there is an agency problem at work within internal capital markets. This finding suggests that the use of transfer pricing can actually change the nature of the magnitude and the profile of investment involved in a given industry. Equally importantly, however, it suggests that governments’ policies of incentives are not designed to apply equally in all industries. The incentives policies do not necessarily need to be applied equally, as government regulation also needs to take into consideration industry structure and the alignment of firms within these industries to be most effective.
Host governments may provide financial and other incentives for multinationals to locate and operate within their own countries. Incentives tend to create market imperfections because they affect comparative advantages of firms. Some multinationals may take additional advantage of transfer pricing strategies to shift profits to lower tax national jurisdictions. Benvignati (1985) observed that multinationals do have distinct profit advantages over purely domestic firms operating in the same market place, but these profit advantages can be difficult to achieve when the same governments introduce legislation and other constraints to restrict multinational discretion over exploiting market imperfections through the setting of transfer prices that negatively impact on the national interests of the country.

Leitch and Barrett (1992) had suggested in 1992 that one possible way for multinationals to exploit market imperfections is through foreign direct investments. Host government policies have been shown to influence the determinants of foreign direct investment through liberal tax write-offs and tax moratoriums (Emmanuel & Mehafdi 1994). Such incentives are evident most especially in developing nations where the intention is to favourably influence foreign direct investment decisions. In fact, Borkowski (1997) shows that some nations operate a tax free or tax haven economy to benefit multinationals and as well as the country at the expense of other countries.

Several studies of managerial perception of important market imperfections have been carried out, and have indicated that national government policies are highly influential, particularly those that attempt to limit multinational’s discretion. One such survey was carried out by Borkowski (1997) of 187 United Nations member countries where 47 countries provided evidence that transfer pricing issues are genuine and of increasing concern to the governments of both developing and developed countries. Particular respondents in the survey, such as the government of Nigeria and Grenada, viewed the core difficulty as being ascertaining the true profit and loss of multinationals resident in the respective countries and, consequently, the difficulty in ascertaining their tax liabilities in these countries.
2.6: Conclusion

This chapter provides an overview of the nature of transfer pricing and its features from several perspectives. It is important to note that this section broadly discusses the literature that provides the context for the main focus of this study. A more specific discussion of the literature that is especially focused on the modelling undertaken to examine the hypotheses developed for this study is discussed in detail in chapters Three and Four respectively.

This Chapter has discussed the literature on transfer pricing of relevance to this study by outlining the literature on the role of transfer pricing in making decisions concerning the reporting of profits from operations in an international context; then addressing the purposes of transfer pricing, as well as the methods that are used in setting transfer prices. The discussion of the various implications of transfer pricing for national taxation jurisdictions was also covered in this chapter.

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.

Chapter Three presents the research methodology of this thesis, including the justification for the methods, a concise description of the methods used, as well as a discussion about the data sources, an overview of applicable literature for the Bartelsman and Beetsma (2003) model, and the theoretical framework of transfer pricing.
CHAPTER THREE: RESEARCH METHODOLOGY

3.0: Introduction

This chapter presents theoretical frameworks of transfer pricing, economic modelling, applicable literature, the research design, the sources of data employed in the thesis, and also sets out the details of the samples used. Some basic descriptions and explanations are also presented in this chapter to better understand the nature of the data and non-linear regression analysis. This is followed by the conclusion.

3.1: Transfer pricing – theoretical frameworks

In the past two decades, researchers in the field of transfer pricing have proposed a number of theoretical frameworks in order to help understand the nature of transfer pricing systems adopted by organisations. These frameworks are by Eccles (1985), Spicer (1988), Colbert and Spicer (1992) and Emmanuel and Mehafdi (1994), which emanated from the works of Coase (1937), Cyert and March (1963), and Williamson (1975, 1979).

Eccles’s (1985) framework provides a sketchy link between the practice and transaction cost economics literature. He used inductive reasoning and empirical evidence to develop a prescriptive theory of transfer pricing based on a two-dimensional Manager’s Analytical Plane (MAP). The two dimensions on which he believes transfer pricing depends are the strategy of vertical integration and the strategy of diversification.

Eccles’s (1983) also explains that the two dimensions of vertical integration and strategy of diversification requires management oversight of the transfer process. Without the oversight of a higher level manager who is aware of all of the costs involved in the transfer, the division or unit managers within the firm are likely to only be concerned with the profits and costs of their own divisions. However, with the use of vertical integration, monitoring from higher level managers can ensure that the link between strategy and integration is put to good use in the transfer pricing process. The vertically integrated firm seeks to maximize its overall or total profit (as opposed
to the profitability of one or another division). Therefore, it will typically seek to design transfer prices that do not provide a subsidy to one division by another.

Spicer’s (1988) transfer pricing model comprises a set of organisational, behavioural, strategic and transactional variables. His model places more emphasis on the situation-specificity of the internal transaction by categorizing the transferred commodity as idiosyncratic and unique. He therefore highlights the sophistication of capital investment and the sensitivity of the technology involved in the interdependent divisions or affiliates. The decision to ‘make or buy’ the transferred good or service is said to hinge on the sum of production and transaction costs involved, thus reflecting the degree of exchange hazards associated with production and external procurement. In his framework, he also shows that the stability of the internal trade over time is an important dimension in the transfer pricing exercise. In addition, he sets the transfer pricing process within the context of strategy, structure and management control system design.

Collier and Agyei-Ampormah (2007) take this one step further and explain that transfer within organisations involves more than just the costs of the goods in question. Instead, transfer involves the costs associated with the negotiation process, the administration of the transfer, and any insurance or risk protection that may be involved. Even the monitoring of the transfer process is a cost that is incurred in the transfer process. All of these costs must be understood in order to truly understand the way in which transfer prices are established by the parties that are involved in the process of transferring goods or services. Without understanding all of these costs, it is not possible to fully understand the transfer pricing process, because there are costs that are present that are not being accounted for.

Emmanuel and Mehafdi (1994), recognizing the limitation of the Eccles and Spicer framework, which is their inability to provide definitive statements as to the transfer pricing system to be utilised under all possible circumstances. They suggest the development of an encompassing explanatory framework, which treats the transfer pricing system as one of a set of both quantitative and qualitative variables. These variables include: value chain, organisation structure, divisional autonomy considerations, dimension of internal trade and the nature of the performance measurement, evaluation and reward system. One key feature of this framework is
its dynamic interactions and stresses the need for modifications in the light of the particular case under consideration.

With regard to the above mentioned models, each seems to provide a different perspective with regard to management accounting practice. In order to fully understand the practice within organizations, Scapens (2006) argues that a study of the interplay of broad systematic trends and unique idiosyncratic factors has to be taken into account, that is, a combination of all of these frameworks; hence the proposition with regard to the institutional framework, which has been shown to aid researchers in developing their understanding of management accounting practices.

In recent years, various types of institutional frameworks have been used to gain insights into organisational and management accounting practices. These include: the new institutional economics (NIE), which is concerned with the structures used to govern economic transactions (Tsukamoto 2003); the new institutional sociology (NIS), which is concerned with the institutions in the organisational environment that shape organisational structures and systems (Furubotn & Richter 2005); and the old institutional economics (OIE), which is concerned with the institutions that shape the actions and thoughts of individual human agents (Dolfsma 2004).

Selznik (1949), in his study of the natural system model, used the Institutional framework to argue that formal structures can never succeed in conquering the non-rational dimensions of organisational behaviour. Specifically, he took the view that one such non-rational dimension is the organisational structure that includes the formal aspects and, also, the complex informal systems that link participants with one another and with others external to the official boundaries.

Parsons (1960) applied the same framework to his cultural-institutional theory of organisations, by examining the relationship of an organisation and its environment. He further explored the ways in which the value system of an organisation is legitimated by its connections with the main institutional patterns in different functional contexts. He came to a conclusion that every organisation is a subsystem of a wider social system.
Plasschaert and Dunning (1994) also argue that transfer pricing must incorporate the concepts of horizontal and vertical integration within an organization. They state that, without this incorporation of vertical and horizontal integration, models of transfer pricing are not taking into account the realities of multinational firms. The idea is that multinational firms are not one dimensional, nor established with either a predominant horizontal or vertical integration organisational structure. Instead, these firms have features of both types of integration, which means that this should be brought into the framework of transfer pricing.

Manes and Verrecchia (1982) go one step further and state that upper management within firms must be willing to get involved in the transfer pricing process, but also know when not to interfere in the actual transfer that is taking place. The idea is that upper managers must have a method for measuring the variable costs associated with the transfer that affect the overall costs and profits associated with the transaction. Upper managers have to be willing to take on this responsibility if they want the desired outcome of moving profit to specific divisions of the company to maximize profits.

Spekle (2002) applied the institutionalism framework to argue that the discipline of management control is likely to benefit from those theories that provide a cogent and comprehensive perspective in their attempts to address the issue of control structure variety. Spekle’s (2002) study drew from the NIE approach, in that his research was based on the reasoning associated with transaction cost economics. He was of the opinion that in situations where there is uncertainty, high levels of asset specificity and frequent transactions, business relationships are likely to be conducted on a hierarchical basis, but, if otherwise, they are likely to be conducted through the market or at arm’s length.

Siti-Nabiha and Scapens (2005) also applied the framework to explore the relationship between ‘stability and change’ within the processes of management accounting change in a gas processing company located in an East Asian country. Their study drew from the OIE and NIS approaches in interpreting the management accounting practices within the gas company.
Abdullah (2002) points out that one of the problems that is present at the current time is a lack of understanding of taxation based on electronic commerce and electronic transactions. The problem is made worse by the fact that multinational firms are increasing the number of electronic transfers that they make between divisions of their companies. This is an area where taxing authorities and economists have much work to do in order to fully understand how electronic commerce and the electronic movement of goods and services affect the overall scheme that is used for transfer pricing.

Chan and Chow (2001) also explain that, in the new economic conditions that many multinational firms are facing, the level of ownership between nations and the origination of financing are affecting transfer pricing. Again, the problem is that this is an issue that has not been often dealt with, because it is one that has been created with the opening of large new markets, such as in China. This is an issue that will have to be dealt with further to fully understand transfer pricing for many multinational firms.

A number of different methods of transfer pricing identification have been proposed in the literature Table 1. Many of these methods vary only in the type of information used, as most are based on an assumption regarding the causes of transfer pricing behavior, specifically the gradient of taxes between two different countries. Table 1 below has a brief discussion of identified transfer pricing identification models and their strengths and weaknesses. Table 1 has been used to identify the best model for the purpose of this thesis. Five models have been identified that meet minimum criteria regarding availability of information and an explicit description is given of the model that will be used in undertaking research.

**Table 1: Comparison between the selected models**

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<tr>
<th>MODEL</th>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
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| 1- Bartelsman and Beetsma (2003) use the headline tax rate and reported profit levels within an industry to detect transfer pricing | • Relies entirely on public information.  
• The model is acknowledged by researchers in the field to reliably identify transfer | • Could require some level of adjustment for use in a single industry rather than across multiple industries.  
• Relies on headline tax |
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<td>between OECD countries.</td>
<td>pricing simply and efficiently</td>
<td>rate (not reflective of full taxes paid).</td>
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<td></td>
<td>• Complete description of model is available for use and modification.</td>
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<td>• Tested outside OECD countries.</td>
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<td>2-</td>
<td>Silva (1999) presents an operational model for determining the appropriate transfer pricing of intra-firm transferred goods in accordance with the “arm's length” principle.</td>
<td>Uses public information that can be obtained solely from firm financial records (including annual report and consolidated financial statements)</td>
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<td>• Provides a description of allowable transfer pricing at the firm level under arm’s length rules.</td>
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<td>Not well supported in the literature and has not been used in other analyses of transfer pricing.</td>
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<td>• Does not address identification of transfer pricing abuse but instead focuses on the description of appropriate transfer pricing models.</td>
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<td>• Maybe be sufficient for first-order analysis, but should not be used for higher analysis of the issues involved in transfer pricing.</td>
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<td>3-</td>
<td>Grubert and Mutti (1991) an empirical economic model based on observation of firm behavior in the US multinational market, which assumes that firms use transfer pricing to avoid taxation and that this affects capital accumulation within countries.</td>
<td>Built on publicly available information regarding firms and economic status, such as reported by governments and economic monitoring agencies.</td>
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<td>• Has been highly cited within the literature and is acknowledged as a valid finding and model.</td>
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<td>• Contains simple and easily constructed models built on well-identified economic concepts, making it simple to verify the validity and reliability of the model.</td>
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<td>• Has been shown to be effective in a number of geographic use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of headline tax rate reduces the strength of findings and may change it by as much as an order of magnitude, as observed by Hines and Rice (1994). This can be corrected using Hines and Rice’s model (1991) that creates a more accurate composite model of taxation levels, but this information is more difficult to find.</td>
</tr>
<tr>
<td>4-</td>
<td>Hines and Rice (1994) extended the work of Grubert and Mutti (1991) in order to create a model that more accurately reflected the taxation levels that firms were subject to, which changed the magnitude of the results of the model. However, the basic construction of the model was the same.</td>
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<td>---</td>
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<td></td>
</tr>
<tr>
<td>•</td>
<td>Built on Grubert and Mutti’s model</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Uses a more accurate determination of the taxation model that takes into account relative tax rates as well as headline tax rates.</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Information for enhanced tax rate model is difficult to find and may not be available for all countries.</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Otherwise disadvantages are the same as those for Grubert and Mutti (1991) identified above.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5-</th>
<th>Nielsen, Raimondos-Møller, and Schelderup (2001). This model examines transfer pricing under market conditions of oligopolistic competition, which makes it appropriate for current industrial focus.</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>Uses public information that can be obtained solely from firm financial records (including annual report and consolidated financial statements).</td>
</tr>
<tr>
<td>•</td>
<td>Well supported in the literature.</td>
</tr>
<tr>
<td>•</td>
<td>The requirement to use firms that only use separate accounting limits the number of firms that are available for analysis to those that use this process.</td>
</tr>
</tbody>
</table>

### 3.2: Economic modelling

The Bartelsman and Beetsma (2003) model was used in the thesis for the following reasons. The Bartelsman and Beetsma (2003) model has been identified as the most appropriate model for use in this study, because the voluntary disclosure of information by companies in their financial statements in the Saudi market is very limited. However, data comprising a range of relevant economic indicators were available in relation to the Saudi market.
As can be seen in the literature review for Bartelsman and Beetsma (2003), these studies have been successful in overcoming challenges to the lack of direct information involved in the use of public data to identify transfer pricing.

This model was specifically designed to detect transfer pricing behaviour across industries in OECD countries. The Bartelsman and Beetsma (2003) model developed a model directly to examine tax avoidance through transfer pricing. 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. The model may require some modification in order to operate on a per-firm basis in a fixed sector, which will be examined during the optimization process. The Bartelsman and Beetsma (2003) model equation requires non-linear regression.

In essence, it 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 ratio 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.

The theoretical economic model, set out in Figure 2, derived from the classical Cobb-Douglas production function, simulates the effects that tax rates may have on the scale of business operations, measured by constants and variable inputs into the production process. The variable on the right hand side of the squared brackets of the first term captures the effect of substitution between capital and labour. The second variable in squared brackets on the right hand side captures the transfer
pricing effect due to tax differences between the home country and foreign countries. Both effects can be separately identified as functions of the value-labour ratio, because they are assumed to be different functions of the corporate tax rate.

**Figure 2: The Bartelsman and Beetsma model**

\[
V_{ijt} = \left[ 1 + \left( c^{csy} \right)^{1/(\rho-1)} \left( \frac{\ddot{r}_{it}}{W_{ijt}} \right)^{\rho/(\rho-1)} \right] \left[ 1 + \gamma^{cs} \left( \tau_{it} - \bar{\tau}_{jt} \right) \right] + \varepsilon_{ijt}
\]

Where:

\( V_{ijt} \) = recorded value-labour ratio in home country \( i \), industrial sector \( j \), and time period \( t \);

\( c^{csy} \) = constant elasticity of substitution (CES);

\( \rho \) = constant;

\( \ddot{r}_{it} \) = Jorgensen-Hall tax dependent user cost of capital in home country \( i \), at time \( t \) defined by \( \left[ \frac{P_{it} \left( \tau_{it} q - 1 \right)}{(1-\tau_{it})} \right] \left[ 1 - \tau_{zt} \right] \);

\( P_{it} \) = investment deflator;

\( r \) = long term interest rate;

\( \theta \) = depreciation rate;

\( q \) = expected appreciation rate;

\( \tau_{zt} \) = discount rate (discounted tax value of depreciation deductions);

\( w \) = wage rate in home country \( i \), industrial sector \( j \), at time \( t \);

\( \ddot{r}_{it} / w \) = capital-labour substitution;

\( \gamma^{cs} \) = country specific response coefficient;

\( \tau_{it} \) = headline corporate tax rate in country \( i \), at time \( t \);

\( \bar{\tau}_{jt} \) = mean headline corporate tax rate in industrial sector \( j \) at time \( t \), excluding the home country \( i \);

\( \tau_{it} - \bar{\tau}_{jt} \) = tax difference (between the home country and foreign countries); and
\( \varepsilon_{i,j,t} \) = error (between the predicted value-labour and the reported value-labour) for home country \( i \), in industrial sector \( j \), at time \( t \).

The model assumes theoretically that, for home countries where transfer pricing enforcement policies may be lax, the value of both the response coefficient \( \gamma^{cs} \) and the error \( \varepsilon \) should be larger than for countries where transfer pricing enforcement is strict. Bartelsman and Beetsma (2003) calibrated the model with respect to \( \gamma^{cs} \) and \( \varepsilon \) using a substantive set of constants and variables extracted from the STAN database for \( i = 16 \) OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Portugal, Spain, Sweden, the United Kingdom and the United States) for \( j = 15 \) manufacturing sectors including:

- Food, beverages, tobacco;
- Textiles, wearing apparel, leather and leather products, footwear;
- Wood products, furniture and fixtures;
- Paper products, printing and publishing;
- Industrial chemicals;
- Other chemicals;
- Pottery and china, glass products, non-metallic products;
- Iron and steel;
- Non-ferrous metals;
- Metal products;
- Machinery;
- Electrical machinery;
- Transport equipment;
- Professional goods; and
- Other manufacturing.

The Bartelsman and Beetsma (2003) model was developed over a protracted time period of \( t = 19 \) years (1979 to 1997), and the total number of observations in their empirical analysis was 4,100 in total. The theoretical model in Figure 2, had to be modified for the purposes of the present study, which is based on a much smaller set of data derived from only one sector, the specific manufacturing industry (oil & gas), over a time period of 10 years (1999 to 2008) for 13 countries, including non-members of the OECD.
The original idea had been discussed in academic and logical way to show that if the assumptions of OLS regression analysis have been seriously violated if the use multiple linear regression analysis as follow:

The first stage of this study, therefore, was to transform the essentially non-linear theoretical model defined in Figure 2 into a linear statistical model that could be calibrated by regression analysis. A statistical model was 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:

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

Where:

- \( V \) = value-labor in the home country
- \( \frac{1}{p-1} C^{csy} \) = constant elasticity of substitution (CES) in the home country
- \( \frac{\tilde{r}}{w} \) = capital labor-substitution in the home country
- \( \gamma^{cs} \) = response coefficient in the home country
- \( \tau - \tilde{\tau} \) = tax difference between the home country and foreign countries

To facilitate regression analysis, the model is expressed in the form of a generalized multiple linear regression equation (Tabachnik & Fidell, 2007) as follows:

\[
\log Y = \beta_0 + \beta_1 \log (1 + X_1) + \beta_2 \log X_2 + \beta_3 \log (1 + X_3)
\]

Where:

- \( Y \) = predicted mean value-labor in home country
- \( \beta_0 = \frac{1}{p-1} \log C^{csy} \), the constant elasticity of substitution (CES)
- \( \beta_1 = \frac{p}{p-1} \)
- \( X_1 = \frac{\tilde{r}}{w} \), the capital-labor substitution in the home country
- \( \beta_2 = \gamma^{cs} \), the response coefficient specific to the home country
- \( X_2 = \) a dummy variable to represent the country (1 = home country, 0 = foreign countries)
- \( \beta_3 = \) partial regression coefficient
- \( X_3 = \) tax difference between the home country and foreign countries

Since logarithms of zero or negative values are impossible, the transformation of \( X_1 \) and \( X_2 \) was \( \log (1 + X_1) \) and \( \log (1 + X_3) \).
Multiple linear regression analysis

First, the following model was calibrated by multiple linear regression analysis using SPSS (Tabachnik & Fidell, 2007; Field, 2009):

\[
\log Y = \beta_0 + \beta_1 \log (1 + X_1) + \beta_2 \log X_2 + \beta_3 \log (1 + X_3) \pm \varepsilon
\]

Where \( Y \) = the predicted value-labor in the home country (the dependent variable); \( X_1 \), \( X_2 \) and \( X_3 \) = the independent variables. \( X_1 = \frac{r}{w} \), the capital-labor substitution, where \( \frac{r}{w} \) = the user cost of capital and \( w \) = the wage rate/hour in US dollars in each home country; \( \frac{r}{w} \) was defined by \( \left[ \frac{P_I}{(r+\theta)} \right] \left[ 1 - \tau_Z \right] \) where \( P_I \) = the investment deflator in the home country, \( r \) = the long term interest rate in the home country; \( \theta \) = the depreciation rate (assumed to be a constant for all countries = 0.08), \( \tau_Z \) = the discount rate (assumed to be a constant for all countries = .06); \( X_2 \) = a country specific dummy variable (1 = home country; 0 = other countries); \( X_3 \) = tax difference measured as \( \tau - \bar{\tau} \), the difference between \( \tau \), the median headline corporate tax rate in the home country, taking into account that \( \tau \) in some countries is a variable and not a constant, and \( \bar{\tau} \) = the mean headline corporate tax rate in other countries, excluding the home country. In this multi-variate statistical model, a combination of four regression coefficients is used to explain the variance in value-labor. \( \beta_0 \) is a constant that represents the constant elasticity of substitution (CES) in the home country. \( \beta_1 \), \( \beta_2 \), and \( \beta_3 \) are the partial regression coefficients. The predicted estimate of \( Y \), the value-labor, changes by the value of \( \beta_1 \) with respect to the capital-labor substitution specified in \( X_1 \). The predicted value-labor changes by the value of \( \beta_3 \) with respect to the tax difference specified in \( X_3 \). \( \beta_2 \) is the most important statistic. It is the response coefficient assumed to control the variance in value-labor with respect to transfer pricing or income shifting in the home country specified by the dummy variable 1 (representing the home country) in \( X_2 \) as opposed to the dummy variable 0 (representing the other foreign countries). If the 95% confidence intervals of \( \beta_2 \) includes zero, then it is assumed that \( \beta_2 \) is not significantly different from zero at the .05 level. The residual error \( \varepsilon \), which may be positive or negative, represents the difference between the value-labor predicted by the model and the observed value-labor used to construct the model. A negative value of \( \varepsilon \) is used to estimate the value-labor lost or deflated by income shifting or transfer pricing in the home country.
95% confidence intervals are used to determine if the values of \( \epsilon \) are significantly different from the observed value-labor at the .05 level.

For the regression coefficients to be precise predictors of the variance in value-labor, the residual errors should be randomly distributed around their mean (zero) value. This assumption is tested by plotting the standardized residuals (the deviations from the mean divided by the standard deviation) against the predicted values of value-labor (Tabachnik & Fidell, 2007).

Multiple linear regression analysis by definition assumes that the relationships between the dependent variable and independent variables are linear, but the independent variables must not be collinear (i.e. not strongly correlated with each other). Pearson’s \( r \) coefficients with \( p \) values < .05 are used to reject the null hypothesis that two variables are not linearly related. Collinearity was checked following the general rule that Pearson’s correlation coefficient between two independent variables should not be > about 0.8 (Tabachnik & Fidell, 2007).

ANOVA F statistics with \( p \) values < .05 are used to reject the null hypothesis that the proportions of the variance explained by the regression models are not significant. Adjusted \( r^2 \) values expressed as percentages are computed to determine the proportion of the variance in the dependent variable that was explained by the independent variables.

Second, examine Bartlesman and Beestma (2003) model and log functions to see if they are correct. The results 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 thesis. The results of multiple linear regression analysis is elaborated and discussed in detail in Chapter four.

**Non-linear regression analysis**

The original idea to use linear regression will not be possible because the Bartelsman and Beetsma equation requires non-linear regression which is more
complicated than linear regression. The research procedure for non-linear regression analysis was as follows:

As a result, the parameter estimates (Table 1 in Chapter Four) were calibrated by non-linear regression analysis using SPSS Syntax by creating constant $p=0.025$, $\gamma=-0.0035$, and $C=2.7$ Bartelsman and Beetsma (2003, p.2237) Table 2 Baseline estimates—CES production function for selected countries. These are restricted to be fixed across countries from the following model. The model has been modified several times as follows. The research steps for non-linear regression analysis were as follows:

**Figure 3: The Bartelsman and Beetsma modified model**

1. The theoretical model (Figure 2) had to be modified for the purposes of the this study, which is based on a much smaller set of data derived from only one sector, the oil/energy sector, over a very short time period of two years (2004 and 2005) for 24 countries, including non-members of the OECD (Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Korea, Japan, Kuwait, Luxembourg, Netherlands, Norway, Poland, Portugal, Saudi Arabia, Sweden, UK, and USA). Table 20 Appendix A shows the variables of the Bartelsman and Beetsma (2003) model and their sources/formulas.

2. Preparation of data simulated using the same parameter indicator variables $p=0.025$, $\gamma=-0.0035$, and using a single value for parameter $C=2.7$ Bartelsman and Beetsma (2003, p.2237) Table 2 Baseline estimates-CES production function for selected 24 countries to make sure the process of doing the analysis correctly. Then being estimation process using SPSS non-linear regression module for selected countries as follow:
MODEL PROGRAM c=2.7 p=0.025 gamma = -0.0035.
COMPUTE PRED_ = (1+c** (1/(p-1)))*r_w** (p/(p-1))*(1+gamma*T_Tbar).
CNLR Value_Labour
/PRED PRED_
/BOUNDS c >= 0; p >= .0000001
/CRITERIA STEPLIMIT 2 ISTEP 1E+20.

USE ALL.
MODEL PROGRAM p=.025 gamma= -.0035
Australia_c=2.7
Austria_c= 2.7
Belgium_c=2.7
Canada_c=2.7
Czech_c=2.7
Denmark_c=2.7
Finland_c=2.7
France_c=2.7
Germany_c=2.7
Greece_c=2.7
Hungary_c=2.7
Italy_c=2.7
Korea_c=2.7
Japan_c=2.7
Kuwait_c=2.7
Luxembourg_c=2.7
Netherlands_c=2.7
Norway_c=2.7
Poland_c=2.7
Portugal_c=2.7
SaudiArabia_c=2.7
Sweden_c=2.7
UK_c=2.7
USA_c=2.7.
COMPUTE PRED_ = (1+
(Australia*Australia_c +
Austria*Austria_c +
Belgium*Belgium_c +
Canada*Canada_c +
Czech*Czech_c +
Denmark* Denmark_c +
Finland* Finland_c +
France* France_c +
Germany* Germany_c +
Greece* Greece_c +
Hungary*Hungary_c +
Italy* Italy_c +
Korea*Korea_c +
Japan*Japan_c +
Kuwait* Kuwait_c +
Luxembourg* Luxembourg_c +
Netherlands*Netherlands_c +
Norway* Norway_c +
Poland* Poland_c +
Portugal*Portugal_c +
SaudiArabia* SaudiArabia_c +
Sweden* Sweden_c +
UK *UK_c +
USA*USA_c)**(1/(p-1))*r_w**(p/(p-1))*(1+gamma*T_Tbar).
CNLR Value_Labour
/PRED PRED_
/BOUNDS p >= .0000001
/CRITERIA ITER 500 STEPLIMIT 2 ISTEP 1E+20.
The results of baseline estimates of individual countries- CES production function is elaborated in detail in Chapter four.

3. The analysis showed the presence of large standard errors in Belgium. Probably due to not enough data. Therefore, Belgium has been removed from selected countries as follows:

\[
\text{COMPUTE PRED}_\text{=} (1+ (\text{Australia} \cdot \text{Australia}_c + \text{Austria} \cdot \text{Austria}_c + \text{Canada} \cdot \text{Canada}_c + \text{Czech} \cdot \text{Czech}_c + \text{Denmark} \cdot \text{Denmark}_c + \text{Finland} \cdot \text{Finland}_c + \text{France} \cdot \text{France}_c + \text{Germany} \cdot \text{Germany}_c + \text{Greece} \cdot \text{Greece}_c + \text{Hungary} \cdot \text{Hungary}_c + \text{Italy} \cdot \text{Italy}_c + \text{Korea} \cdot \text{Korea}_c + \text{Japan} \cdot \text{Japan}_c + \text{Kuwait} \cdot \text{Kuwait}_c + \text{Luxembourg} \cdot \text{Luxembourg}_c + \text{Netherlands} \cdot \text{Netherlands}_c + \text{Norway} \cdot \text{Norway}_c + \text{Poland} \cdot \text{Poland}_c + \text{Saudi Arabia} \cdot \text{Saudi Arabia}_c + \text{Sweden} \cdot \text{Sweden}_c + \text{UK} \cdot \text{UK}_c + \text{USA} \cdot \text{USA}_c)^{1/(p-1)} \cdot r_w^{p/(p-1)} \cdot (1+\gamma \cdot T_{Tbar}).
\]

\[
\text{CNLR Value Labour}
\]

/\text{PRED PRED}_\text{ bound} p \geq 0.0000001
/\text{CRITERIA ITER 500 STEPLIMIT 2 ISTEP 1E+20.}
4. After running the model again the results showed the presence of large standard errors in 9 countries. Probably due to not enough data (Austria, Finland, Germany, Greece, Hungary, Italy, Luxembourg, Netherlands, and Portugal). Therefore, these countries have been removed from selected countries that achieved convergence.

MODEL PROGRAM  
 p=0.025 gamma= -0.0035
 Australia_c=2.7
 Canada_c=2.7
 Czech_c=2.7
 Denmark_c=2.7
 France_c=2.7
 Korea_c=2.7
 Japan_c=2.7
 Kuwait_c=2.7
 Norway_c=2.7
 poland_c=2.7
 SaudiArabia_c=2.7
 Sweden_c=2.7
 UK_c=2.7
 USA_c=2.7.
 COMPUTE PRED_=(1+(Australia*Australia_c +
 Canada*Canada_c +
 Czech*Czech_c +
 Denmark* Denmark_c+ 
 France*France_c +
 Korea*Korea_c +
 Japan*Japan_c +
 Kuwait* Kuwait_c+
 Norway* Norway_c+
 poland *poland_c+
 SaudiArabia*SaudiArabia_c +
 Sweden*Sweden_c +
 UK*UK_c+
 USA*USA_c)**(1/(p-1))*r_w**(p/(p-1))*(1+gamma*T_Tbar).
 CNLR Value_Labour
 /PRED PRED_
 /BOUNDS p >= .0000001
 /CRITERIA ITER 500 STEPLIMIT 2 ISTEP 1E+20.

5. After running the model again the results showed the presence of large standard errors in Denmark. Therefore, Denmark has been removed from selected countries to achieve convergence. Extra data have been collected since the study focused on the oil and gas sector in the Saudi Arabia over the period from 1999 to 2008. In addition, 3 years for Kuwait and 6 years for the other selected countries. Reason for choosing these years there are no data during the period from 1999 to 2008, as is the case in Saudi Arabia and non-suitability of the model. The model appears to be more stable with the extra data. The values for the c coefficients seem to be reducing and the value for gamma does not seem
as extreme was previously large compared to the countries Bartelsman and Beetsma (2003) paper.

```
MODEL PROGRAM   p= 0.025 gamma= - 0.0035
Australia_c=2.7  
Canada_c=2.7    
Czech_c=2.7    
France_c=2.7    
Korea_c=2.7    
Japan_c=2.7    
Kuwait_c=2.7    
Norway_c=2.7    
poland_c=2.7       
SaudiArabia_c=2.7  
Sweden_c=2.7    
UK_c=2.7    
USA_c=2.7     

COMPUTE PRED_=(1+(Australia*Australia_c + 
Canada*Canada_c + 
Czech*Czech_c + 
France*France_c + 
Korea*Korea_c + 
Japan*Japan_c + 
Kuwait*Kuwait_c+ 
Norway* Norway_c+ 
poland*poland_c+ 
SaudiArabia*SaudiArabia_c + 
Sweden*Sweden_c + 
UK*UK_c+ 
USA*USA_c)**(1/(p-1))*r_w**(p/(p-1)))*(1+gamma*T_Tbar).

CNLR  Value_Labour 
/PRED PRED_ 
/BOUNDS p >= .0000001 
/CRITERIA ITER 500  STEPLIMIT 2 ISTEP 1E+20 
/SAVE=RESID PRED.
```

Where:

V=the predicted value-labour in the home country (the dependent variable);

c =a constant that represents the constant elasticity of substitution (CES) in the home country;

P =constant;

r_w=the capital_labour substitution where \( \hat{r} \) = the user cost of capital and \( w \) = the minimum wage rate /Gross annual wage in US dollars in each home country;

\( r \) = is defined by \[
\frac{P_1}{(1-\tau_2)} \left[ \frac{1-\tau_2}{1-\bar{\tau}} \right] \[
\]

P_1 = the investment deflator in the home country;

r = the long term interest rate in the home country;
\[ \theta = \text{the depreciation rate (assumed to be a constant for all countries } = 0.08); \]

\[ \tau_z = \text{the discount rate (assumed to be a constant for all countries } = .06); \]

\[ \gamma^{cs} = \text{country specific response coefficient; } \]

\[ \tau - \bar{\tau}, = \text{the difference between } t, \text{ the difference between } \tau, \text{ the median headline corporate tax rate in the home country, taking into account that } \tau \text{ in some countries is a variable and not a constant, and } \bar{\tau} = \text{the mean headline corporate tax rate in other countries, excluding the home country; and the dummy variable where } 1 = \text{home country and } 0 = \text{other countries.} \]

3.3: Applicable literature

Much of the literature that is available dwells on various statistical and mathematical models that can be used to examine the role of transfer pricing. For example, various studies (Gox & Schondube 2006; Alles & Datar 1998; Ronen & Balachandran 1998) have developed models to take into account the issue of risk and risk aversion in understanding transfer pricing decisions. In addition, other studies (Radner (1986), Slof (1999) and Jordan (1990)) have tested models that have taken into account the size and divisional studies of multinational firms. There have also been other studies (Gangopadhyay (2007), Radner(1996) and Wagenhofer (1994)) that have attempted to create models to take into account how information, or the lack thereof, as well as how competition within firms can affect transfer pricing within multinational firms and the effect that this can have on the overall ability to maximise profits.

Other research on transfer pricing and profit maximisation has focused on issues related to the structure of firms and how this may impact transfer pricing. These studies have also focused on the issue of competition within firms and how organisations can actually encourage competition and a lack of information sharing that can lead to higher transfer prices and lower profits as a result (Ghosh 2000; Ghosh & Goldt 2004; Jacobides & Billinger 2006; Schroeder 1993).

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 relation to the Saudi market for the use of such mathematical models as was possible in the studies reliant on USA companies. The variables are discussed in detail in Chapter Three.

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.A companies engaged in pharmaceutical 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 2007. However, the required variables were not available in the Saudi market for the use of such mathematical models.

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 transfer pricing issue 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 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 the 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 in contrast to the study reliant on USA companies.

Hines and Rice’s (1994) exhaustive study of the issues involved the use of tax havens by American companies and was cited in the Grubert and Mutti study as a basis for asserting that tax benefits are one of the most common reasons for the use of transfer pricing and use of 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 larger 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 in contrast to the study reliant on USA 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 contrast to the study reliant on USA companies.

The model of transfer pricing proposed by Silva (1999) presents a method for identifying the appropriate transfer pricing based on an arm’s length method, similar to the three methods specified by U.S. regulations regarding transfer pricing at the time (Silva 1999). The three methods in use (the resale price, cost-plus, and comparable profits method) all predicted the appropriate arm’s length price based on a single scaling variable (Silva1999). Silva’s (1999) method allows an adjustment based on operating expenses in order to more correctly represent the appropriate transfer pricing cost. This also allows for an examination of transfer pricing as a percentage of operating expenses, which is useful for outside analysis. This is important due to the efforts undertaken by companies to hide evidence of transfer pricing behavior and obscure evidence of legitimate transfer pricing (Amram 2008). Despite increased disclosure requirements in some jurisdictions, there is still limited public information available for this practice, which precludes the direct examination of transfer pricing through data intentionally reported by the firms themselves (Amram 2008).

There have been a number of instances of mathematical method reported in use in the literature, although it is not a commonly used method in accounting practice. For example, one review identified at least four examples of analysis using either gross profit or net profit as the main scaling variable in analysis of transfer pricing, although each of these analyses used a different regression model (Rosenthal 2008). Use of gross profit methods of transfer pricing have been employed to identify cases of transfer pricing behavior, such as in the Glaxo Canada case, where it was determined that the company should have had a higher gross profit margin (Bernier
& Lewis 2008). Gross profit methods have also been used to detect profit shifting via behavior of transfer pricing in a study that examined European companies and their international business practices (Dischinger 2007). The use of a gross profit based method of evaluation of transfer pricing also captures the main motivation for transfer pricing behavior by firms, specifically the use of gross profit based tax regimes (Hazak 2009).

However, Silva’s (1999) method may be inadequate for fully accounting for appropriate transfer price. One group of researchers indicated that the gross profit basis was not necessarily the most accurate for transfer pricing, because the gross profit of uncontrolled suppliers or distributors is unlikely to be aligned with the company’s own gross profit (Abdallah & Maghrabi 2009). This approach, although suggested in previous work by the same authors, only yields an estimate of the appropriate level of pricing under an arm’s length transfer pricing regime (Abdallah & Murtuza 2006). One reason this may not be as effective as some other methods of transfer pricing is due to the relative efficiencies of various companies, which may realize different levels of gross profit, changing the relationship between gross profit and transfer pricing within the firm (Sharma 2008). This is the case in Sharma’s (2008) research, which indicated that the firm gained approximately 4% higher gross profit than its competitors and suppliers due to operational efficiencies. There is also the problem of varying rules on transfer pricing and gross profit margins between two (or more) different countries; due to these differing regimes, the use of a gross profit based method may be appropriate under the rules of one country while not being appropriate in another (Corcos & Dellos 2006). Thus, the use of the model by Silva (1999) should allow for a comparison between the various companies as long as the gross profits are known as well as the corporate tax rates in the various countries of operation. This will allow for each company to be compared determining the degree to which transfer pricing is used by these companies to reduce costs and increase profits. Also, this is a better model to compare the use of transfer pricing between companies and determine which ones are saving more money in relation to others. This model is designed to work with key financial indicators of individual firms in order to calculate the arm’s length pricing appropriate for the firm’s transfers of goods between one arm and another; this meets requirements for identifying potential transfer pricing within firms, because it provides a baseline price that would
be considered appropriate for these transfers. However, it is suggested that the two models should be used in conjunction in order to identify where transfer pricing may be appropriate.

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 on international trade patterns. Thus, while the Bartelsman and Beetsma's (2003) model can be used to detect transfer pricing, 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 maximisation, demand for capital, and analysis of capital distribution. These features make the Grubert and Mutti's (1991) model of analysis simple to use and well suited to the overall structure of this thesis.

Data requirements for Grubert and Mutti's (1991) model are largely accounted for in the Bartelsman and Beetsma (2003) data set already, as it includes such factors as tax rates and net revenues. The Grubert and Mutti's (1991) model also relies on the overall GDP and other readily available information. There are no difficulties anticipated in identifying the information required for this study. The model was tested by the authors using USA based multinational firms across 33 different countries, (Grubert & Mutti 1991). The authors’ clarity and specificity regarding the data and sources that were used, as well as the equations used in the analysis, make it much easier to apply and, if necessary, modify their model in order to use it in this thesis.

The Grubert and Mutti's (1991) model will be used to broaden the analysis of the Bartelsman and Beetsma (2003) model, which focuses strictly on the causative factor of the headline tax rate as an explanation, while the Grubert and Mutti (1991) model takes into account more complex issues and may result in a more complete analysis of the issue. The Grubert and Mutti (1991) model was also cited as
evidence for transfer pricing in Bartelsman and Beetsma (2003) indicating that it is a good fit with the other model selected for comparison.

The Grubert and Mutti (1991) model also has significant support in the literature both as a basis for analysis and in validating findings. 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 (1991) study as a basis for asserting that tax benefits are one of the most common reasons for the use of transfer pricing along with tax havens by American firms. This study provided much insight into the significance of the Grubert and Mutti (1991) model’s assertions, as well as describing how they fit into a larger structure. The results of the same 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).

Clausing (2003) employed a model similar to Grubert and Mutti’s (1991) model, using their model as specific justification of several aspects of Grubert and Mutti’s (1991) model. However, Clausing’s effective tax rate was constructed differently from the tax rate used by Grubert and Mutti (1991), and their construction of a tax rate from a more accurate source may prove to be an effective means of making Grubert and Mutti’s (1991) model more accurate. Grubert and Mutti’s (1991) model was further extended to the European context and confirmed to be appropriate within that context by Overesch (2006), who examined the use of transfer pricing in German firms in the same manner as the use of transfer pricing in American firms. This study demonstrated that it was possible to use Grubert and Mutti’s (1991) model outside the context of the American business model.

Grubert and Mutti’s (1991) model was also used in the context of examination of the concerns regarding foreign direct investment by developed and developing countries (Borkowski 1997), which could prove to be a significant issue in this thesis. Borkowski’s research could prove useful in framing the concerns regarding investment and transfer pricing in the examination of transfer pricing within Saudi firms.

A similar approach to Grubert and Mutti (1991) was used by Oyelere and Emmanuel (1998) in order to examine the issue of income shifting within UK firms, which had
significant findings to the Grubert and Mutti (1991) study in the United States. These studies indicate that the Grubert and Mutti (1991) model is both effective and has been used in other research contexts in order to expand the known information to other regions of the world, and that the Grubert and Mutti (1991 model is effective in detecting transfer pricing.

One discrepancy in the use of the model proposed by Grubert and Mutti (1991), and as applied by Hines and Rice (1994), is explained by De Mooij and Ederveen (2003), who point out that the Grubert and Mutti (1991) model and Hines and Rice (1994) model are identical in terms of analytical construction, but rely on different data for the underlying features; while Grubert and Mutti used one way of constructing the tax rate, the Hines and Rice (1994) study used another method that may be more accurate. However, the required variables were not available in the Saudi market for this model in contrast to the study that used USA companies.

Finally, another study used the results of Grubert and Mutti (1991) model as support for the use of taxes as a main determining factor in management decision-making processes within the multinational organisation (Cools, Emmanuel& Jorissen 2008), while a second managerial study used its evidence as well (Henisch, 2003).

One potential model of transfer pricing that could be used to detect transfer pricing from 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 focus on firms in the Gulf region is somewhat hampered by the fact that many firms within the region do not publish detailed financial reports, either due to a lack of requirement to do so, or because they are a primarily or entirely state-owned enterprises (SOES). Because of this, a continued focus on the Gulf region does limit the number of firms that could potentially be included in the study, unless earnings information can be obtained from these firms. While this is not impossible, it may take longer than the current research project has been allotted in order to accomplish this, which is one reason it may not be appropriate. The number of years this sample can include is very dependent on the firms chosen: Because of the high rate of organisational structure change (merger and acquisition) within the oil and
gas sector, it is often difficult to gain access to required information earlier than 1995, and, in many cases, 2000. The widest possible time period can be chosen by identifying firms and then creating a time series; alternatively, a cross-sectional approach that treats each year as a separate occurrence rather than a longtime series structure can be used to maximise the number of data points, even in the case of overlapping year ranges (Wooldridge2002). However, firm participants would need to be chosen first.

Zhao (2000) has developed complex models that have been based on the economics of a domestic firm where its subsidiary operates in another country and they transfer goods between each other. The author has used the basic model in additional research (Zhao1998) to help understand how market structures can affect transfer pricing within multinational firms.

Bartelsman and Beetsma’s (2003) model shares characteristics with other models or has been used in a number of other studies in order to identify transfer pricing among firms. A substantial number of other studies have used their evidence, or the model from which it was derived, in order to substantiate corporate profit shifting and transfer pricing practices. These can be used to identify the strengths and weaknesses of the model and identify why it would be a positive model for use in this thesis (or for use in basing a revised model of transfer pricing that could be used to more clearly identify transfer pricing in the current data set). These studies overcome the difficulties involved in the use of public data to identify transfer pricing.

Hoonsawat’s (2007) study drew directly from the Bartelsman and Beetsma’s (2003) study to disentangle the income-shifting effects from the effects of tax rates on real production activity. The author identified that the country sensitivity of transfer pricing is higher for countries with high wages rates and that are close to their major markets. The author identified that a difference in corporate tax rates leads firms to decrease their transfer prices. Hoonsawat (2007) used public information, including wage rate, lending rates and the consumer price index for the scale of production variable and corporate tax, each of which are publicly available. The following variables were required to calculate the user cost of capital: the investment deflator, the interest rate for lending, the depreciation rate, the expected appreciation of capital and the discounted tax value.
Peralta, Wauthy, and van Ypersele’s (2006) study drew directly from the Bartelsman and Beetsma (2003) study in identifying profit shifting and corporate taxation as part of a model of fiscal competition. The authors identified that multinational firms may not be fully monitored by countries that hope to gain from this fiscal competition, thus identifying one reason why transfer pricing by entities within the same taxation jurisdiction would not be illegal, but may be illegal where entities operate in different tax jurisdictions that have different taxation requirements which prohibit the use of transfer pricing to avoid taxation in a particular jurisdiction (Peralta, Wauthy & van Ypersele 2006). This study found that taxation influences the location and profit identification of multinational firms, using Bartelsman and Beetsma’s model as both evidence for this positioning and as a base for the identification of profit shifting. Peralta, Wauthy and van Ypersele (2006) described the potential advantages to transfer pricing on the national level rather than on the firm level and, as such, did not use firm-specific public information to build their model and examine the situation described. Instead they used the publicly available information regarding tax levels and relative advantage passed by the firm.

A study by Creedy and Gemmell (2008) identified a number of corporate responses to profit taxation that used Bartelsman and Beetsma’s (2003) model as guidance for evidence of OECD taxation levels and levels of transfer pricing within these countries. This study examined the transfer of profits between countries and identified specific behavioural responses regarding the shifting of these profits depending on elasticity of tax rates between nations or operational areas (Creedy & Gemmell 2008). This study also tied this transfer of corporate profits to the business cycle, identifying specific trends that occurred within periods of low and high growth. They used a process of mathematical manipulation of factors that were observable in public information in order to build their model. For example, they identified changes in the detection rate by differentiating a profit function built from public information.

A study by Hulzinga and Laeven (2008) confirmed the linkage between the company’s top tax rate and the rate of corporate profit shifting that was identified by Bartelsman and Beetsma (2003). This study identified a specific relationship in which a higher corporate tax rate led to lower declaration of profits within a given country, while not reducing the overall level of corporate profits found within the firm as a
whole, as well as identifying shifts between affiliate firms in related countries (Hulzinga & Laeven 2008). This further reinforces the link that was found by Bartelsman and Beetsma (2003). Huizinga and Laeven (2008) used non-consolidated financial statements derived from a database that detailed the accounting information of the firms in question. These details were not consistent across data sets, but were instead broken into two different sets depending on whether the firms had only basic sales data available or had more in-depth information available within the database. This study cannot be said to be completely derived from public information but, because the database is publicly accessible, it could be used in this thesis.

Graham & Tucker 2006 uses Bartelsman and Beetsma’s (2003) results in identifying the use of tax shelters by international firms. This study identified firms that made heavy use of tax shelters and compared their post-shelter tax liability in order to identify the overall burden of tax debt that is shifted due to use of tax shelters, such as the transfer pricing and profit transfers identified by Bartelsman and Beetsma (2003). This study found an approximate 8% reduction in overall tax liability within the firms that use these methods of profit shifting. They used public information including court records of firms that have been alleged to use illegal tax shelters. They then used a matched sample of firms that had not been found to be using tax shelters to identify discrepancies in the tax shelter.

A study combined the implications of transfer pricing in terms of tax competition and in terms of reduction of the tax base through the use of profit shifting to examine the overall implications on the tax base as modelled by Bartelsman and Beetsma (2003) (Stöwhase 2005). This study found that profit shifting does not ordinarily reduce the level of tax rates as such, but may increase the sensitivity of high tax and low tax jurisdictions to the shift in the tax base. It therefore uses Bartelsman and Beetsma’s (2003) model to identify effects directly on the tax rate. The Stöwhase (2005) model uses publicly available information, such as production costs (which can be estimated from financial and accounting statements), as well as tax rates and interest rates, each of which are publicly available, in order to determine whether there would be a comparative advantage to the firm to engaging in transfer pricing,
taking into account the potential for fines if the firm was caught. (This information is also publicly available.)

Bucovetsky and Haufler (2008) explored the issue of tax competition from an economic standpoint. They used a model based on publicly available information regarding the size of different countries and firms to construct an ideal equilibrium of firm control and taxes (Bucovetsky & Haufler 2008). The authors used Bartelsman and Beetsma’s (2003) work in the discussion of their own model as a means of modeling the potential tax savings from transfer pricing.

Olibe and Rezaee (2008) studied transfer pricing in US firms by constructing cross-sectional relationships between the value of cross-border intra-firm transfers, return on investment, the U.S. effective tax rate, and the global effective tax rate using linear regression in order to determine the degree to which income shifting occurred. The researchers used a linear regression method similar to the method proposed for the current research, and their work was based on the work of Bartelsman and Beetsma (2003); they used only public information in order to construct their data set.

Again, another study, Devereaux, Lockwood & Reoano 2008, used Bartelsman and Beetsma’s approach to determine whether countries compete over corporate tax rates (rather than directly examining whether firms transfer resources to take advantage of tax rates). This study used much of the same data that Bartelsman and Beetsma (2003) used and focused on the same OECD countries that were used in these studies, verifying their results from that side.

Clausing (2003) used Bartelsman and Beetsma’s (2003) work as support for her research into the change in effective tax rates in OECD countries over the period from 1979 to 2002 (Clausing 2007). This study examined the changes in maximum effective tax rate as compared to the size of the economy. In addition to providing support for the use of the Bartelsman and Beetsma (2003) model, this study also provides information for this thesis. These studies overcome the difficulties involved in the use of public data to identify transfer pricing.
3.4: Data sources

Given the nature of transfer pricing, the fundamental recognition is that publicly available data is the primary source data used by authorities and researchers to initially detect transfer pricing behaviour. The public accounting data are data generated from within entities and form the reports compiled for internal as well as for all external parties. The data obtained for this study were from various sources as follows:

- The Organisation for Economic Cooperation and Development (OECD) STAN Database for Industrial Analysis.²
- The Annual Economic Indicators database of the OECD.³
- The World Bank - World Development Indicators.⁴
- The National Accounts official Country Data, United Nations Statistics Division.⁵
- KPMG’s Corporate and Indirect Tax Rate Survey 2009.⁶
- Taxation of Corporate and Capital income, OECD.
- The World Bank - World Development Indicators, ERS Estimates and ERS Baseline Regional Aggregations.

3.5: Sample selection

The original dataset for use in this thesis consisted 24 countries (Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece,

²This dataset is widely used in the analysis of international trade or productivity, e.g.Harrigan (1999).Details about the STAN can be found in OECD (2010) or via the OECD web-site at http://stats.oecd.org/Index.aspx?DatasetCode=STAN08BIS&lang=en.
³Details about the annual economic indicators database of the OECD are found via the OCED web-site at http://stats.oecd.org/mei/.
⁴Details about the World Bank- World Development Indicators can be found via the website http://data.worldbank.org/indicator.
⁵Details about the United Nations Statistics Division can be found via the website United Nations Statistics Division.
It was necessary to exclude some countries from further analysis because they give very large standard errors in the regression model (Belgium, Austria, Finland, Germany, Greece, Hungary, Italy, Luxembourg, Netherlands, Portugal, and Denmark).

The standard errors in the regression model can be corrected if the values of standard errors between 3 and -3. The Results showed that the values of the standard errors were between 0.097 in UK and 2.119 in Kuwait.

Therefore, the fitted dataset consisted of 79 cases in 13 countries between 1999 and 2008. The study focuses on the specific manufacturing industry (oil and gas) in the members of the OECD and non-members of OECD countries. The selection of the sample was as follows (fitted data) based on availability of the dates.

- 11 members of the OECD countries and 2 non-members of the OECD countries.
- 10 years for Saudi Arabia over the period from 1999 to 2008.
- The fitted data for Kuwait between 2001 and 2003.
- The fitted data for Australia, Canada, and Japan over the period from 2000 to 2005 based on availability of the dates.
- The fitted data for France, Norway, Sweden, UK, and US over the period from 2002 to 2007 based on availability of the dates
- The fitted data for Czech Republic, and Korea over the period from 2003 to 2008 based on availability of the dates

3.6: Research procedure

The original idea to use linear regression will not be possible because the Bartelsman and Beetsma (2003) model requires non-linear regression. The research procedure for non-linear regression analysis was as follows:
1. Table 20, Appendix A displays all variables and their sources of the Bartelsman and Beetsma (2003) model.

2. Preparation of simulated data using non-linear regression analysis using SPSS Syntax by creating constant using indicator variables for p=0.025, gamma = -0.0035, and using a single value for parameter C=2.7. The p-values = c >= 0; p >= .0000001 for 24 countries, including non-members of the OECD (Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Korea, Japan, Kuwait, Luxembourg, Netherlands, Norway, Poland, Portugal, Saudi Arabia, Sweden, UK, and USA).

3. Examine fitted data to see how well it fits the Bartlesman and Beetsma (2003) model and does it make sense. The results of the variable C in the modified model of the current study were comparable with the variable C in the Bartelsman and Beetsma (2003) model. For example: the variable C in the following countries (Italy, Japan, Kuwait, Luxembourg, Netherlands, Norway, Saudi Arabia, and UK) was 2.7 Which gives an excellent indicator about match the modified model with the Bartelsman and Beetsma (2003) model. The results of non-linear regression analysis is elaborated and discussed in detail in Chapter four.

4. Carry out the non-linear regression analysis again of the real data. Experiment with the the Bartelsman and Beetsma (2003) model by changing the model parameters in order to understand the function better with a view to creating bounds in the non-linear fit to prevent parameters form achieving wild values. As a result, some countries were excluded from the countries selected for analysis because they were exhibiting very large standard errors as discussed in the Bartelsman and Beetsma modified model section.

5. Removing some countries which are (Austria, Finland, Germany, Greece, Hungary, Italy, Luxembourg, Netherlands, and Portugal) from the dataset that achieved convergence. The standard error for the
constant elasticity of substitution for each country ranged from a lowest value (= 0.398) in the United Kingdom to a highest value (= 4.877) in Kuwait. p=0.0327, and gamma= 2.088 and all estimated parameters were significantly positive statistically as shown in Table 2.

6. After running the model again the regression diagnostics (residual analysis) indicated that some of the value-labour values for Saudi Arabia and Poland had to be checked. As a result, data were collected 10 years for Saudi Arabia over the period from 1999 to 2008. Results here showed the model appears to be more stable with the extra data. All this is now the phase of seeing how well the Bartelsman and Beetsma (2003) model fits the data which is where we have been heading for a long time now.

7. There was another phase to verify the validity the model and that the work of a statistical analysis using another program called JMP (statistical software). Results showed that the fitted data consisted of 79 cases corresponding to 13 countries which are (Australia, Canada, Czech Republic, France, Korea, Japan, Kuwait, Norway, Poland, Saudi Arabia, Sweden, UK, and USA).

### 3.7: Conclusion

This Chapter provides a detailed literature review of theoretical frameworks of transfer pricing. This was followed by a general discussion of the statistical analysis employed, which is largely defined by the model that has been selected as the most appropriate for the thesis. Justification was provided for the main variables employed in the selected model employed to examine the thesis and a number of studies that have adopted the Bartelsman and Beetsma (2003) model. The major literature section is followed by the introduction and discussion of the features and constraints associated with the data search sample construction and the availability and use of various data sources, including a description of key strengths and weaknesses and nature of the various databases that have been used in prior studies for data collection and nonlinear regression statistical analysis to be used in this thesis.
The following chapter reports and discusses the research findings and provides various insights that can be compared with previous studies in the area of transfer pricing.
CHAPTER FOUR: EMPIRICAL ANALYSIS AND RESULTS

4.0: Introduction

This chapter presents the main results of this thesis. The chapter will show all illustrative examples of the main results of this thesis and other studies. It also presents a listing of the major findings of the investigation and discussion of the model and countries in their different contexts.

4.1: Write-up process

Writing up the empirical results: the report is divided into 4 sections as follows:

1. Testing the assumptions of linear regression;
2. Examination of the fit of the model;
3. The cross-section regression diagnostics; and
4. Discussion of model.

4.1.1: Testing the assumptions of linear regression Country by Country

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

<table>
<thead>
<tr>
<th>Case</th>
<th>$\hat{c}$</th>
<th>$\hat{\gamma}$</th>
<th>$\hat{\rho}$</th>
<th>$R^2$</th>
<th>SSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: $\gamma^{cs}$ fixed</td>
<td>2.70</td>
<td>-0.0035</td>
<td>0.025</td>
<td>0.57</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.0007)</td>
<td>(0.0092)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: $\gamma^{cs}$ varies over countries</td>
<td>3.57</td>
<td>-0.0042</td>
<td>0.041</td>
<td>0.59</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.0010)</td>
<td>(0.0093)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C: $\gamma^{cs}$ varies over sectors</td>
<td>2.57</td>
<td>-0.0033</td>
<td>0.021</td>
<td>0.58</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.0007)</td>
<td>(0.0093)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: (1) standard errors are in parentheses, $\hat{c}$ = estimate of $c$ from (5.2) (‘average’ constant),
$\hat{\gamma}$ = estimate of $\gamma$ from (5.3) (‘average’ response coefficient), with variation in stated dimension,
$\hat{\rho}$ = estimate of $\rho$. SSE = standard error of regression; (2) Numbers of observations is 4100; (3) Sample period is 1979–1997.


$$V_{yt} = \left[ 1 + \left( \frac{c^{CS}}{1/(\rho-1)} \right)^{\rho/(\rho-1)} \right] \left[ 1 + \gamma^{CS} \left( \tau_{Rt} - \tau_{yt} \right) \right] + \epsilon_{yt}$$

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:

$$\log V = -\frac{1}{p-1} \log C^{CS} + \frac{p}{p-1} \log \left( 1 + \bar{r}/w \right) + \log \gamma^{CS} + \log \left[ 1 + (\tau - \bar{\tau}) \right]$$
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.

The regression coefficients are:
$\beta_0 =$ Constant; 
$\beta_1 =$ Capital-Labor substitution coefficient; 
$\beta_2 =$ The response coefficient for the home country; and 
$\beta_3 =$ 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.

<table>
<thead>
<tr>
<th>Variables Entered/Removed$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>1</td>
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</tbody>
</table>

a. All requested variables entered.

b. Dependent Variable: Value-Labor

<table>
<thead>
<tr>
<th>Model Summary</th>
</tr>
</thead>
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<td>Model</td>
</tr>
<tr>
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95
### ANOVA

<table>
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<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<td>16.320</td>
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</tr>
<tr>
<td>Total</td>
<td>1415.793</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Australia, Tax Difference, Capital-Labor substitution
b. Dependent Variable: Value-Labor

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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a. All requested variables entered.

b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Canada, Capital-Labor substitution, Tax Difference
### ANOVA\(^b\)

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

b. Dependent Variable: Value-Labor

### Coefficients\(^a\)

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a. Dependent Variable: Value-Labor

### Variables Entered/Removed\(^b\)

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a. All requested variables entered.

b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Czech, Tax Difference, Capital-Labor substitution
### ANOVA

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a. Predictors: (Constant), Czech, Tax Difference, Capital-Labor substitution
b. Dependent Variable: Value-Labor

### Coefficients

<table>
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<th>Unstandardized Coefficients</th>
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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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a. All requested variables entered.
  b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), France, Capital-Labor substitution, Tax Difference
## ANOVA

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a. Predictors: (Constant), France, Capital-Labor substitution, Tax Difference
b. Dependent Variable: Value-Labor

## Coefficients

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a. Dependent Variable: Value-Labor

## Variables Entered/Removed

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a. All requested variables entered.
b. Dependent Variable: Value-Labor

## Model Summary

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

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99
### ANOVA

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a. Predictors: (Constant), Japan, Capital-Labor substitution, Tax Difference  
b. Dependent Variable: Value-Labor

### Coefficients

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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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a. All requested variables entered.  
b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Korea, Tax Difference, Capital-Labor substitution
### ANOVA

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a. Predictors: (Constant), Korea, Tax Difference, Capital-Labor substitution  
b. Dependent Variable: Value-Labor

### Coefficients

<table>
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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Kuwait, Capital-Labor substitution, Tax Difference
### ANOVA

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a. Predictors: (Constant), Kuwait, Capital-Labor substitution, Tax Difference  
b. Dependent Variable: Value-Labor

### Coefficients

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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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a. All requested variables entered.  
b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Norway, Tax Difference, Capital-Labor substitution
### ANOVA

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

b. Dependent Variable: Value-Labor

### Coefficients

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a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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a. All requested variables entered.

b. Dependent Variable: Value-Labor

### Model Summary

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a. Predictors: (Constant), Poland, Capital-Labor substitution, Tax Difference
### ANOVA

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<td>75</td>
<td>16.831</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1415.793</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Poland, Capital-Labor substitution, Tax Difference
b. Dependent Variable: Value-Labor

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>5.772</td>
<td>.708</td>
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<tr>
<td></td>
<td>Capital-Labor substitution</td>
<td>-13.856</td>
<td>10.658</td>
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<tr>
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<td>Poland</td>
<td>-2.267</td>
<td>2.001</td>
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### Variables Entered/Removed

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<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saudi Arabia, Tax Difference, Capital-Labor substitution</td>
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</table>

a. All requested variables entered.
b. Dependent Variable: Value-Labor

### Model Summary

<table>
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<th>Adjusted R Square</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>.181</td>
<td>.148</td>
<td>3.932369</td>
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a. Relevant field
### Model Summary

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<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.425(^a)</td>
<td>.181</td>
<td>.148</td>
<td>3.932369</td>
</tr>
</tbody>
</table>

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

### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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<tbody>
<tr>
<td>1</td>
<td>Regression</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Regression</td>
<td>256.028</td>
<td>3</td>
<td>85.343</td>
<td>5.519</td>
</tr>
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<td></td>
<td>Residual</td>
<td>1159.765</td>
<td>75</td>
<td>15.464</td>
<td></td>
</tr>
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<td>1</td>
<td>Total</td>
<td>1415.793</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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

b. Dependent Variable: Value-Labor

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
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<td></td>
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<tr>
<td>Capital-Labor substitution</td>
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<td>-.103</td>
</tr>
<tr>
<td>Saudi Arabia</td>
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<td>1.402</td>
<td>-.312</td>
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</table>

a. Dependent Variable: Value-Labor

### Variables Entered/Removed

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<thead>
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<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
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<td>sweden, Tax Difference, Capital-Labor substitution(^a)</td>
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<td>Enter</td>
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a. All requested variables entered.

b. Dependent Variable: Value-Labor
### Model Summary

<table>
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<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>.402a</td>
<td>.161</td>
<td>.128</td>
<td>3.978648</td>
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a. Predictors: (Constant), sweden, Tax Difference, Capital-Labor substitution

### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>3</td>
<td>76.190</td>
<td>4.813</td>
<td>.004a</td>
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<tr>
<td></td>
<td>Residual</td>
<td>75</td>
<td>15.830</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1415.793</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

b. Dependent Variable: Value-Labor

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B Std. Error Beta t Sig.</td>
<td>Lower Bound Upper Bound</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant) 6.556 .744 8.806 .000 5.073 8.039</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capital-Labor substitution -25.492- 10.282 -.276- -2.479- .015 -45.975- -5.008-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tax Difference -14.556- 6.014 -.259- -2.420- .018 -26.536- -2.575-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sweden -4.442- 1.797 -.278- -2.472- .016 -8.022- -.862-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Value-Labor

### Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UK, Tax Difference, Capital-Labor substitutiona</td>
<td>.</td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.

b. Dependent Variable: Value-Labor
### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.695&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.482</td>
<td>.462</td>
<td>3.125675</td>
</tr>
</tbody>
</table>

<br>a. Predictors: (Constant), UK, Tax Difference, Capital-Labor substitution

### ANOVA<sup>b</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Regression</td>
<td>683.055</td>
<td>3</td>
<td>227.685</td>
<td>23.305</td>
<td>.000&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Residual</td>
<td>732.738</td>
<td>75</td>
<td>9.770</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1415.793</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<br>a. Predictors: (Constant), UK, Tax Difference, Capital-Labor substitution

b. Dependent Variable: Value-Labor

### Coefficients<sup>a</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>5.594</td>
<td>.539</td>
<td></td>
</tr>
<tr>
<td>Capital-Labor substitution</td>
<td>-27.356</td>
<td>7.798</td>
<td>-.296</td>
</tr>
<tr>
<td>UK</td>
<td>10.137</td>
<td>1.350</td>
<td>.634</td>
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</table>

### Variables Entered/Removed<sup>b</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA, Capital-Labor substitution, Tax Difference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.</td>
<td>Enter</td>
</tr>
</tbody>
</table>

<br>a. All requested variables entered.

b. Dependent Variable: Value-Labor
Regression analysis

The regression statistics are presented in Table 2. $\beta_0$ is the intercept or constant corresponding to the constant elasticity of substitution. $\beta_1$ is the partial regression coefficient that controls value-labor with respect to capital-labor substitution. $\beta_2$ is the response coefficient that controls value-labor with respect to transfer pricing or income shifting in the home country; $\beta_3$ 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>
<thead>
<tr>
<th>Country</th>
<th>$\beta_0$ Constant elasticity of substitution</th>
<th>$\beta_1$ Capital-labor substitution coefficient</th>
<th>$\beta_2$ Transfer pricing response coefficient</th>
<th>$\beta_3$ Tax Difference coefficient</th>
<th>F statistic</th>
<th>p value</th>
<th>Adjusted $r^2$ %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>6.008</td>
<td>-17.997</td>
<td>-1.967</td>
<td>-11.117</td>
<td>3.018</td>
<td>.035</td>
<td>7.2</td>
</tr>
<tr>
<td>France</td>
<td>6.049</td>
<td>-18.532</td>
<td>-2.176</td>
<td>11.430</td>
<td>3.131</td>
<td>.031</td>
<td>7.6</td>
</tr>
<tr>
<td>Korea</td>
<td>5.814</td>
<td>-16.269</td>
<td>-.797</td>
<td>-12.269</td>
<td>2.635</td>
<td>.056</td>
<td>5.9</td>
</tr>
<tr>
<td>Norway</td>
<td>4.284</td>
<td>-1.092</td>
<td>9.495</td>
<td>-8.009</td>
<td>17.02</td>
<td>.000</td>
<td>38.1</td>
</tr>
<tr>
<td>Poland</td>
<td>5.772</td>
<td>-13.856</td>
<td>-2.267</td>
<td>-15.796</td>
<td>3.039</td>
<td>.034</td>
<td>7.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>6.556</td>
<td>-25.492</td>
<td>-4.442</td>
<td>-14.556</td>
<td>4.813</td>
<td>.004</td>
<td>12.8</td>
</tr>
<tr>
<td>UK</td>
<td>5.594</td>
<td>-27.356</td>
<td>10.137</td>
<td>-9.291</td>
<td>23.30</td>
<td>.000</td>
<td>46.2</td>
</tr>
<tr>
<td>USA</td>
<td>5.831</td>
<td>-17.732</td>
<td>.020</td>
<td>-12.489</td>
<td>2.568</td>
<td>.061</td>
<td>5.7</td>
</tr>
</tbody>
</table>

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 $\beta_2$ 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**

<table>
<thead>
<tr>
<th>Country</th>
<th>$\beta_2$</th>
<th>95 % confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transfer pricing response coefficient</td>
<td>Lower Bound</td>
</tr>
<tr>
<td>Australia</td>
<td>-3.324- *</td>
<td>-6.780-</td>
</tr>
<tr>
<td>Canada</td>
<td>-1.967- *</td>
<td>-5.508-</td>
</tr>
<tr>
<td>Czech</td>
<td>2.117 *</td>
<td>-1.579-</td>
</tr>
<tr>
<td>France</td>
<td>-2.176- *</td>
<td>-5.679-</td>
</tr>
<tr>
<td>Korea</td>
<td>-0.797- *</td>
<td>-4.505-</td>
</tr>
<tr>
<td>Japan</td>
<td>-1.724- *</td>
<td>-5.464-</td>
</tr>
<tr>
<td>Kuwait</td>
<td>2.154 *</td>
<td>-4.071-</td>
</tr>
<tr>
<td>Norway</td>
<td>9.495</td>
<td>6.478</td>
</tr>
<tr>
<td>Poland</td>
<td>-2.267- *</td>
<td>-6.254-</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>-3.972-</td>
<td>-6.764-</td>
</tr>
<tr>
<td>Sweden</td>
<td>-4.442-</td>
<td>-8.022-</td>
</tr>
<tr>
<td>UK</td>
<td>10.137</td>
<td>7.449</td>
</tr>
<tr>
<td>USA</td>
<td>.020 *</td>
<td>-3.663-</td>
</tr>
</tbody>
</table>

* Not significantly different from zero at the .05 level

### 4.1.2: 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 thesis.
### Table 4: Baseline estimates of individual countries – CES production function

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>p-value</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>p</td>
<td>.328</td>
<td>.046</td>
<td>0.0000001</td>
<td>.236</td>
</tr>
<tr>
<td>gamma</td>
<td>2.067</td>
<td>.785</td>
<td>0.0000001</td>
<td>.499</td>
</tr>
<tr>
<td>Australia_c</td>
<td>2.010</td>
<td>.479</td>
<td>0.0000001</td>
<td>1.053</td>
</tr>
<tr>
<td>Canada_c</td>
<td>2.084</td>
<td>.450</td>
<td>0.0000001</td>
<td>1.185</td>
</tr>
<tr>
<td>Czech_c</td>
<td>1.246</td>
<td>.431</td>
<td>0.0000001</td>
<td>.385</td>
</tr>
<tr>
<td>France_c</td>
<td>2.000</td>
<td>.431</td>
<td>0.0000001</td>
<td>1.138</td>
</tr>
<tr>
<td>Korea_c</td>
<td>.979</td>
<td>.182</td>
<td>0.0000001</td>
<td>.616</td>
</tr>
<tr>
<td>Japan_c</td>
<td>2.373</td>
<td>.556</td>
<td>0.0000001</td>
<td>1.261</td>
</tr>
<tr>
<td>Kuwait_c</td>
<td>4.872</td>
<td>2.096</td>
<td>0.0000001</td>
<td>.685</td>
</tr>
<tr>
<td>Norway_c</td>
<td>1.296</td>
<td>.552</td>
<td>0.0000001</td>
<td>.194</td>
</tr>
<tr>
<td>Poland_c</td>
<td>.842</td>
<td>.193</td>
<td>0.0000001</td>
<td>.457</td>
</tr>
<tr>
<td>Saudi Arabia_c</td>
<td>3.296</td>
<td>1.094</td>
<td>0.0000001</td>
<td>1.110</td>
</tr>
<tr>
<td>Sweden_c</td>
<td>4.672</td>
<td>1.675</td>
<td>0.0000001</td>
<td>1.325</td>
</tr>
<tr>
<td>UK_c</td>
<td>.398</td>
<td>.097</td>
<td>0.0000001</td>
<td>.204</td>
</tr>
<tr>
<td>USA_c</td>
<td>1.397</td>
<td>.261</td>
<td>0.0000001</td>
<td>.876</td>
</tr>
</tbody>
</table>

**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 interpretation is 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.

4.1.3: 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 ($\varepsilon$). 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*

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error $\varepsilon$</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>1999</td>
<td>1.2</td>
<td>0.078036</td>
<td>0.1</td>
<td>1.77</td>
<td>-0.57</td>
<td>32.2 % less</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>1.83</td>
<td>0.093858</td>
<td>0.151</td>
<td>1.7</td>
<td>-0.52</td>
<td>30.4 % less</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>1.221</td>
<td>-0.04832</td>
<td>0.047</td>
<td>1.58</td>
<td>-0.36</td>
<td>22.7 % less</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>1.227</td>
<td>-0.044</td>
<td>0.035</td>
<td>1.7</td>
<td>-0.47</td>
<td>27.8 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>1.556</td>
<td>-0.042</td>
<td>0.032</td>
<td>1.74</td>
<td>-0.18</td>
<td>10.6 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>1.885</td>
<td>-0.030</td>
<td>0.036</td>
<td>1.75</td>
<td>0.14</td>
<td>7.7 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>2.063</td>
<td>-0.02636</td>
<td>0.085</td>
<td>1.48</td>
<td>0.58</td>
<td>39.4 % higher</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>2.073</td>
<td>-0.12403</td>
<td>0.109</td>
<td>1.12</td>
<td>0.96</td>
<td>85.1 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>2.165</td>
<td>-0.12402</td>
<td>0.123</td>
<td>1.09</td>
<td>1.07</td>
<td>98.6% higher</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>1.785</td>
<td>-0.08453</td>
<td>0.134</td>
<td>1.2</td>
<td>0.59</td>
<td>48.8 % higher</td>
</tr>
</tbody>
</table>
The residual error ($\varepsilon$), 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 ($\varepsilon$) 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 ($\varepsilon$) 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 ($\varepsilon$) 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 ($\varepsilon$) (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 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Australia over the period 2000 to 2005.

**Table 6: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Australia over the period 2000 to 2005**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>( r_w )</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ( \varepsilon )</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>2000</td>
<td>2.333</td>
<td>-0.01114</td>
<td>0.037812</td>
<td>2.69</td>
<td>-0.35</td>
<td>13.3 % less</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>1.351</td>
<td>-0.04825</td>
<td>0.03235</td>
<td>2.6</td>
<td>-1.25</td>
<td>48.038 % less</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>2.933</td>
<td>-0.04193</td>
<td>0.033278</td>
<td>2.61</td>
<td>0.32</td>
<td>12.375 % higher</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2.009</td>
<td>-0.04193</td>
<td>0.030264</td>
<td>2.69</td>
<td>-0.69</td>
<td>25.316 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>3.393</td>
<td>-0.03033</td>
<td>0.030932</td>
<td>2.75</td>
<td>0.65</td>
<td>23.382 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>4.011</td>
<td>-0.02636</td>
<td>0.029324</td>
<td>2.82</td>
<td>1.19</td>
<td>42.234 % higher</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error (\( \varepsilon \)) changes from negative (years 2000, 2001, and 2003) to positive (years 2002, 2004, and 2005). The negative residual error (\( \varepsilon \)) means that the observed value-labour less than the value-labour predicted by the model (years 2000, 2001, 2003). In contrast, the positive residual error (\( \varepsilon \)) means that the observed value-labour greater than the value-labour predicted by the model (years 2002, 2004, and 2005). 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 (\( \varepsilon \)) (years 2000, 2001, and 2002). 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 2003, 2004, and 2005 it was not reflected in the predicted values possibly due to the value the capital-labour substitution or tax difference in Australia.

Table 7 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Canada over the period 2000 to 2005.

**Table 7: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Canada over the period 2000 to 2005**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>2000</td>
<td>2.199</td>
<td>0.0817</td>
<td>0.063245</td>
<td>2.68</td>
<td>-0.48</td>
<td>17.948 % less</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>3.625</td>
<td>0.065608</td>
<td>0.057107</td>
<td>2.67</td>
<td>0.95</td>
<td>35.768 % higher</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>2.849</td>
<td>0.042725</td>
<td>0.05365</td>
<td>2.61</td>
<td>0.24</td>
<td>9.157 % higher</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2.529</td>
<td>0.022533</td>
<td>0.047749</td>
<td>2.59</td>
<td>-0.07</td>
<td>2.355 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2.384</td>
<td>0.01755</td>
<td>0.044421</td>
<td>2.62</td>
<td>-0.24</td>
<td>9.008 % less</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>2.374</td>
<td>0.020875</td>
<td>0.03914</td>
<td>2.74</td>
<td>-0.37</td>
<td>13.358 % less</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error (ε) changes from negative (years 2000, 2003, 2004, and 2005) to positive (years 2001, and 2002). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years (years 2000, 2003, 2004, and 2005). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2001, and 2002). 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 (2000, 2001, and 2002). 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 (years 2002, 2003, and 2004), but in 2000, 2001, and 2005 it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Canada.

Table 8 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Czech Republic over the period 2003 to 2008.

Table 8: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Czech Republic over the period 2003 to 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>2003</td>
<td>9.413</td>
<td>-0.03109</td>
<td>0.007344</td>
<td>8.35</td>
<td>1.06</td>
<td>12.731 % higher</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>10.346</td>
<td>-0.052</td>
<td>0.007814</td>
<td>7.75</td>
<td>2.59</td>
<td>33.497 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>9.333</td>
<td>-0.06969</td>
<td>0.005333</td>
<td>8.78</td>
<td>0.55</td>
<td>6.298 % higher</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>8.622</td>
<td>-0.0832</td>
<td>0.005286</td>
<td>8.53</td>
<td>0.09</td>
<td>1.079 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>6.129</td>
<td>-0.08068</td>
<td>0.005959</td>
<td>8.14</td>
<td>-2.01</td>
<td>24.705 % less</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>5.691</td>
<td>-0.0737</td>
<td>0.006556</td>
<td>7.95</td>
<td>-2.26</td>
<td>28.415 % less</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error (ε) changes from positive (years 2003, 2004, 2005, and 2006) to negative (years 2007, and 2008). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 2007, and 2008). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2003, 2004, 2005, and 2006). 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 \((\varepsilon)\) (years 2003, 2004, and 2007). 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 (years 2003, 2004, and 2007), but (years 2005, 2006, and 2008) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Czech Republic.

Table 9 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for France over the period 2002 to 2007.

**Table 9: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for France over the period 2002 to 2007**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>(r_w)</th>
<th>The value-labour predicted by the model</th>
<th>The residual error (\varepsilon)</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>2002</td>
<td>2.082</td>
<td>0.014342</td>
<td>0.055203</td>
<td>2.54</td>
<td>-0.46</td>
<td>18.031 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2.351</td>
<td>0.0169</td>
<td>0.046214</td>
<td>2.69</td>
<td>-0.34</td>
<td>12.602 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2.984</td>
<td>0.028492</td>
<td>0.044414</td>
<td>2.78</td>
<td>0.2</td>
<td>7.338 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>3.512</td>
<td>0.027267</td>
<td>0.035436</td>
<td>2.98</td>
<td>0.53</td>
<td>17.852 % higher</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>2.742</td>
<td>0.032292</td>
<td>0.038137</td>
<td>2.94</td>
<td>-0.2</td>
<td>6.735 % less</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>2.98</td>
<td>0.032308</td>
<td>0.042615</td>
<td>2.84</td>
<td>0.14</td>
<td>4.93 % higher</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error \((\varepsilon)\) changes from negative (years 2002, 2003, and 2006) to positive (years 2004, 2005, and 2007). The negative residual error \((\varepsilon)\) means that the observed value-labour less
than the value-labour predicted by the model (years 2002, 2003, and 2006). In contrast, the positive residual error ($\epsilon$) means that the observed value-labour greater than the value-labour predicted by the model (years 2004, 2005, and 2007). 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 ($\epsilon$) (years 2002, 2005, 2004, and 2006). 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 (years 2002, 2005, 2004, and 2006), but (years 2003, and 2007) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in France.

Table 10 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Japan over the period 2000 to 2005.

**Table 10: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Japan over the period 2000 to 2005**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>$r_w$</th>
<th>The value-labour predicted by the model</th>
<th>The residual error $\epsilon$</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>2000</td>
<td>2.682</td>
<td>0.049442</td>
<td>0.026829</td>
<td>2.88</td>
<td>-0.2</td>
<td>6.875 % less</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>2.873</td>
<td>0.057267</td>
<td>0.020476</td>
<td>3.18</td>
<td>-0.31</td>
<td>9.654 % less</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>3.261</td>
<td>0.0736</td>
<td>0.019425</td>
<td>3.33</td>
<td>-0.07</td>
<td>2.072 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>3.657</td>
<td>0.076158</td>
<td>0.015625</td>
<td>3.59</td>
<td>0.07</td>
<td>1.866 % higher</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>3.363</td>
<td>0.073017</td>
<td>0.022203</td>
<td>3.19</td>
<td>0.17</td>
<td>5.423 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>3.604</td>
<td>0.076992</td>
<td>0.020162</td>
<td>3.31</td>
<td>0.29</td>
<td>8.882 % higher</td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error ($\varepsilon$) changes from negative (years 2000, 2001, and 2002) to positive (years 2003, 2004, and 2005). The negative residual error ($\varepsilon$) means that the observed value-labour less than the value-labour predicted by the model (years 2000, 2001, and 2002). In contrast, the positive residual error ($\varepsilon$) means that the observed value-labour greater than the value-labour predicted by the model (years 2003, 2004, and 2005). 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 ($\varepsilon$) (years 2002, 2005, 2004, and 2006). 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 (years 2002, 2005, 2004, and 2006), but (years 2003, and 2007) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Japan.

Table 11 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Korea over the period 2003 to 2008.

Table 11: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Korea over the period 2003 to 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>The residual error $\varepsilon$</th>
<th>The value-labour predicted by the model</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>2003</td>
<td>3.48</td>
<td>-0.04518</td>
<td>0.119975</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>4.047</td>
<td>-0.03358</td>
<td>0.1047</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>3.623</td>
<td>-0.05344</td>
<td>0.09768</td>
<td>-0.13</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>3.421</td>
<td>-0.04278</td>
<td>0.097994</td>
<td>-0.42</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>3.85</td>
<td>-0.04277</td>
<td>0.092938</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>4.643</td>
<td>-0.00328</td>
<td>0.093438</td>
<td>0.39</td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error (ε) changes from negative (years 2003, 2005, 2006, and 2002) to positive (years 2004, and 2008). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 2003, 2005, 2006, and 2002). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2004, and 2008). 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) for all years. 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 12 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Kuwait over the period 2001 to 2003.

Table 12: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Kuwait over the period 2001 to 2003

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwait</td>
<td>2001</td>
<td>2.57</td>
<td>0.210017</td>
<td>0.272292</td>
<td>1.69</td>
<td>0.88</td>
<td>52.071 % higher</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>2.297</td>
<td>0.22635</td>
<td>0.021444</td>
<td>2.37</td>
<td>-0.08</td>
<td>3.08 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2.712</td>
<td>0.228908</td>
<td>0.009509</td>
<td>2.83</td>
<td>-0.11</td>
<td>4.17 % less</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error (ε) changes from positive (year 2001) to negative (years 2002, and 2003). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (year 2001). In contrast, the positive residual error (ε) means that the
observed value-labour greater than the value-labour predicted by the model (years 2002, and 2003). 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 2001, and 2003). 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 (years 2001, and 2003), but (year 2002) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Kuwait.

Table 13 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Norway over the period 2002 to 2007.

### Table 13: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Norway over the period 2002 to 2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>2002</td>
<td>11.859</td>
<td>-0.06615</td>
<td>0.002705</td>
<td>11.37</td>
<td>0.49</td>
<td>4.301 % higher</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>11.933</td>
<td>-0.06359</td>
<td>0.0022</td>
<td>12.56</td>
<td>-0.63</td>
<td>4.992 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>13.969</td>
<td>-0.052</td>
<td>0.001918</td>
<td>13.74</td>
<td>0.23</td>
<td>1.667 % higher</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>16.14</td>
<td>-0.04803</td>
<td>0.00132</td>
<td>16.46</td>
<td>-0.32</td>
<td>1.944 % less</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>17.132</td>
<td>-0.03737</td>
<td>0.001467</td>
<td>16.06</td>
<td>1.07</td>
<td>6.675 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>14.067</td>
<td>-0.03735</td>
<td>0.001723</td>
<td>14.92</td>
<td>-0.85</td>
<td>5.717 % less</td>
</tr>
</tbody>
</table>

The cross-section regression diagnostics show that the residual error (ε) changes from positive (years 2002, 2004, and 2006) to negative (years 2003, 2005, and 2007). The negative residual error (ε) means that the observed value-labour less
than the value-labour predicted by the model (years 2003, 2005, and 2007). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2002, 2004, and 2006). 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 2002, 2003, 2004, 2005, and 2007). 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 (years 2002, 2003, 2004, 2005, and 2007), but (year 2006) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Norway.

Table 14 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Poland over the period 2001 to 2007 Excluding year (2004).

Table 14: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Poland over the period 2001 to 2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>2001</td>
<td>2.72</td>
<td>-0.1495</td>
<td>0.13871</td>
<td>3.03</td>
<td>-0.31</td>
<td>10.231 % less</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td>2.727</td>
<td>-0.03748</td>
<td>0.109887</td>
<td>4.42</td>
<td>-1.69</td>
<td>38.303 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>3.672</td>
<td>-0.07443</td>
<td>0.086001</td>
<td>4.46</td>
<td>-0.79</td>
<td>17.668 % less</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>5.458</td>
<td>-0.14553</td>
<td>0.074024</td>
<td>3.91</td>
<td>1.54</td>
<td>39.591 % higher</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>4.499</td>
<td>-0.13487</td>
<td>0.075127</td>
<td>4.01</td>
<td>0.49</td>
<td>12.195 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>4.827</td>
<td>-0.13485</td>
<td>0.080606</td>
<td>3.9</td>
<td>0.92</td>
<td>23.769 % higher</td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error (ε) changes from negative (years 2001, 2002, and 2003) to positive (years 2005, 2006, and 2007). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 2001, 2002, and 2003). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2005, 2006, and 2007). 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 2001, 2002, 2005, and 2007). 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 (years 2001, 2002, 2005, and 2007), but (years 2003, and 2006) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Poland.

Table 15 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for Sweden over the period 2002 to 2007.

**Table 15: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for Sweden over the period 2002 to 2007**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>2002</td>
<td>1.955</td>
<td>-0.06615</td>
<td>0.002593</td>
<td>2.46</td>
<td>-0.5</td>
<td>20.528 % less</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2.829</td>
<td>-0.06359</td>
<td>0.002319</td>
<td>2.56</td>
<td>0.27</td>
<td>10.508 % higher</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>2.512</td>
<td>-0.052</td>
<td>0.002223</td>
<td>2.67</td>
<td>-0.16</td>
<td>5.918 % less</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>2.563</td>
<td>-0.04803</td>
<td>0.001427</td>
<td>3.12</td>
<td>-0.56</td>
<td>17.853 % less</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>3.155</td>
<td>-0.03737</td>
<td>0.001581</td>
<td>3.09</td>
<td>0.07</td>
<td>2.104 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>3.797</td>
<td>-0.03735</td>
<td>0.001816</td>
<td>2.95</td>
<td>0.85</td>
<td>28.712 % higher</td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error (ε) changes from negative (years 2002, 2004, and 2005) to positive (years 2003, 2006, and 2007). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 2002, 2004, and 2005). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model (years 2003, 2006, and 2007). 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 2002, 2004, and 2007). 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 (years 2002, 2004, and 2007), but (years 2003, 2005, and 2006) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in Sweden.

Table 16 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for UK over the period 2002 to 2007.

**Table 16: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for UK over the period 2002 to 2007**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>r_w</th>
<th>The value-labour predicted by the model</th>
<th>The residual error ε</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>2002</td>
<td>13.178</td>
<td>-0.04448</td>
<td>0.087013</td>
<td>12.7</td>
<td>0.48</td>
<td>3.764 % higher</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>12.554</td>
<td>-0.04193</td>
<td>0.07885</td>
<td>13.36</td>
<td>-0.8</td>
<td>6.033 % less</td>
</tr>
<tr>
<td></td>
<td>2004</td>
<td>13.099</td>
<td>-0.03033</td>
<td>0.080985</td>
<td>13.54</td>
<td>-0.44</td>
<td>3.257 % less</td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td>14.834</td>
<td>-0.02636</td>
<td>0.070061</td>
<td>14.59</td>
<td>0.24</td>
<td>1.672 % higher</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>16.526</td>
<td>-0.0157</td>
<td>0.070346</td>
<td>14.9</td>
<td>1.62</td>
<td>10.913 % higher</td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td>13.126</td>
<td>-0.01568</td>
<td>0.07667</td>
<td>14.33</td>
<td>-1.2</td>
<td>8.402 % less</td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error ($\varepsilon$) changes from positive (years 2002, 2005, and 2006) to negative (years 2003, 2004, and 2007). The negative residual error ($\varepsilon$) means that the observed value-labour less than the value-labour predicted by the model (years 2003, 2004, and 2007). In contrast, the positive residual error ($\varepsilon$) means that the observed value-labour greater than the value-labour predicted by the model (years 2002, 2005, and 2006). 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 ($\varepsilon$) (years 2002, 2003, 2004, and 2007). 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 (years 2002, 2003, 2004, and 2007) but, (years 2005, and 2006) it was not reflected in the predicted values possibly due to the value of the capital-labour substitution or tax difference in UK.

Table 17 shows the observed value-labour versus the value-labour predicted by the model, the residual error, and percentage difference for US over the period 2002 to 2007.

**Table 17: Predicted value-labour by model vs. actual value-labour ratio, residual error, tax difference, capital-labor substitution and percentage change for US over the period 2002 to 2007**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>The observed value-labour</th>
<th>T-Tbar</th>
<th>$r_w$</th>
<th>The value-labour predicted by the model</th>
<th>The residual error $\varepsilon$</th>
<th>Error as % difference from predicted value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>2.253</td>
<td>0.056267</td>
<td>0.062445</td>
<td>3.74</td>
<td>-1.49</td>
<td>39.759 % less</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>3.604</td>
<td>0.05915</td>
<td>0.055862</td>
<td>3.91</td>
<td>-0.31</td>
<td>7.826 % less</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>4.022</td>
<td>0.070525</td>
<td>0.060821</td>
<td>3.88</td>
<td>0.14</td>
<td>3.66 % higher</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>5.058</td>
<td>0.074175</td>
<td>0.063155</td>
<td>3.85</td>
<td>1.2</td>
<td>31.377 % higher</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>4.08</td>
<td>0.08505</td>
<td>0.072657</td>
<td>3.75</td>
<td>0.33</td>
<td>8.8 % higher</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>3.925</td>
<td>0.084633</td>
<td>0.068203</td>
<td>3.82</td>
<td>0.1</td>
<td>2.749 % higher</td>
<td></td>
</tr>
</tbody>
</table>
The cross-section regression diagnostics show that the residual error (ε) changes from negative (years 2002, and 2003) to positive (years 2004, 2005, 2006, and 2007). The negative residual error (ε) means that the observed value-labour less than the value-labour predicted by the model (years 2002, and 2003). In contrast, the positive residual error (ε) means that the observed value-labour greater than the value-labour predicted by the model positive (years 2004, 2005, 2006, and 2007). 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) all years. 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 inconsistent with the findings of the Bartelsman and Beetsma (2003) model and with the figure of the predicted value-labour by model of this study for all years possibly due to the value of the capital-labour substitution or tax difference in US.

Figure 4 shows changes in, and an overview of, the actual value-labour ratio for selected countries over the period from 1999 to 2008.

**Figure 4: Actual value-labour ratio for selected countries**

![Graph showing changes in actual value-labour ratio for selected countries over the period from 1999 to 2008.](image-url)
The significance of these results show that the value added/labour ratio (value-labour) officially reported by tax authorities and national statistics authorities for all selected countries.

Figure 5 shows changes in, and an overview of, the predicted value-labour by the Bartelsman and Beetsma (2003) model for selected countries over the period from 1999 to 2008.

**Figure 5: Mean predicted value-labour by model for selected countries between the years 1999 and 2008**

The significance of these results shows that the results of the predicted value-labour by model have been changed due to the change in tax difference, capital-labor substitution for all selected countries.

The predicted values-labour ratio by the modified Bartelsman and Beetsma (2003) model of these selected countries (the Czech Republic, Norway, and the United Kingdom) are different from the selected grouping countries. In the case of the Czech Republic and the United Kingdom, the fitted data obtained was from C11 Extraction of crude petroleum and natural gas and related services. The data of value-labour ratio from industry C23 coke, refined petroleum products and nuclear fuel does not fit the model. In the case of Norway, data collection was available and
appropriate for the model of C11 extraction of crude petroleum and natural gas and related services.

Figure 6 shows the residual error for all selected grouping countries over the period from 1999 to 2008. The residual error ($\epsilon$), 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 ($\epsilon$) means that the observed value-labour is less than the value-labour predicted by the model. In contrast, the positive residual error ($\epsilon$) means that the observed value-labour is greater than the value-labour predicted by the model.

Figure 6: Mean Residuals for selected countries

The plot of regression diagnostics, or computed residuals, shows the differences between the observed and the predicted values expressed as a Percentage of deviations from zero and visualizes the error in the reported value-labour figures compared with the values computed by the model. There is a relatively random scatter of points around the mean, or zero, which indicates that the variances are relatively homogeneous and do not vary systematically with the predicted value. The negative values of the residual error are situated at the bottom of the plot, well below
the zero line, possibly representing deflation in the recorded value-labour figures. Positive values of the residual error are situated well above the zero line, possibly representing inflation in the recorded value-labour figures. The points that are closer to the zero line represent smaller errors in the recorded value-labour figures.

Figure 7: Plot of residual errors for selected countries

The figure 8 shows that frequency distributions of residual errors for all selected countries were also normally distributed. So both of the key statistical assumptions for the regression model are met, namely normality of residuals and constant variance of the residuals.
4.1.4: The discussion of model and results

This next section will discuss the value-labour results which are calculated and shown in Table 18 for each country and then assess the suitability of the Bartelsman and Beetsma (2003) model on the basis of overall results in relation to yearly results based on error as percentage difference from predicted value-labour: the actual value-labour ratio for this study (c).

Table 18 shows the comparison percentage change between the actual value-labour versus predicted value-labour for all countries, but not separately for the different years. The percentage was calculated between the highest value and smallest value multiplied by 100 among all years for each country separately.
Table 18: Comparison percentage change between the actual value-labour vs. predicted for all models

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

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 study for 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 in column (c) (error as percentage difference from predicted value-labour: the actual value-labour ratio) are considered good indicator whenever the percentage change of predicted value-labour for this study is compared to the actual value-labour ratio closest to 100% in the same direction, with the exception of Saudi Arabia and Kuwait (opposite direction).

Table 19 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.

In the case of Australia, the results of this thesis indicate that the Australian oil and gas sector does not follow the Bartelsman and Beetsma (2003) model because the
results in the following years (2003, 2004, and 2005) did not reflect in the predicted values possibly due to the value the capital-labour substitution or tax difference.

In the case of Canada, the results of this thesis indicate that the Canadian oil and gas sector does not follow the Bartelsman and Beetsma (2003) model because the results in the following years (2000, 2001, and 2005) did not reflect in the predicted values.

The results of this thesis indicate that the oil and gas sector in Czech Republic does not follow the Bartelsman and Beetsma (2003) model because the results in the following years (2005, 2006, and 2008) did not reflect in the predicted values.

The results of this thesis indicate that the French oil and gas sector does not follow the Bartelsman and Beetsma (2003) model because the results in the following years (2003, and 2007) did not reflect in the predicted values.

The results of this thesis indicate that the Japanese oil and gas sector does follow the Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model in the following years (2002, 2005, 2004, and 2006) were consistent consistent with the findings of the Bartelsman and Beetsma (2003) model.

The results of this thesis indicate that the Korean oil and gas sector does follow the Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model for all years were consistent consistent with the findings of the Bartelsman and Beetsma (2003) model.

The results of this thesis indicate that the Kuwait oil and gas sector does not follow the Bartelsman and Beetsma (2003) model because the predicted value-labour ratio of this study was in the opposite direction with the actual value-labour ratio, as is the case in Saudi Arabia.

The results of this thesis indicate that the Norway oil and gas sector does follow the Bartelsman and Beetsma (2003) model because the results of in the predicted value-
labour by model for all years were consistent consistent with the findings of the Bartelsman and Beetsma (2003) model.

In relation to Poland, the results of this thesis indicate that the oil and gas sector does follow Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model years (2001, 2002, 2005, and 2007) were consistent consistent with the findings of the Bartelsman and Beetsma (2003) model, but years (2003, and 2006) it was not reflected in the predicted values.

The results of this thesis indicate that the management of multinational companies in the Saudi Arabia oil and gas sector does not align with Bartelsman and Beetsma (2003) model because the predicted value-labour ratio of this study was in the opposite direction with the actual value-labour ratio, as is the case in Kuwait.

In Sweden, the results of this thesis indicate that the oil and gas sector does not follow Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model years (2002, 2004, and 2007), but years (2003, 2005, and 2006) it was not reflected in the predicted values.

In the United Kingdom, the results of this thesis indicate that the oil and gas sector does follow Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model years (2002, 2003, 2004, and 2007) were consistent consistent with the findings of the Bartelsman and Beetsma (2003) model, but years (2005, and 2006) it was not reflected in the predicted values.

In the United States, the results of this thesis indicate that the oil and gas sector does not follow the Bartelsman and Beetsma (2003) model because the results of in the predicted value-labour by model for all years were inconsistent with the findings of the Bartelsman and Beetsma (2003) model.
Table 19: identifies the countries that are either consistent and or inconsistent with the Bartlesman and Beetsma (2003) methodology

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

4.2: Conclusion

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 thesis.

The results of this thesis 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 thesis 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 Tables (5-17) Chapter 4. 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 thesis 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. Chapters 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 thesis 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.
CHAPTER FIVE: SUMMARY OF FINDINGS, CONTRIBUTIONS AND LIMITATIONS

5.0: Introduction

The first section of this chapter (5.1) outlines the major results and the main contributions of this thesis. The second section (5.2) presents the limitations of this thesis.

5.1: Summary of findings and contributions

The purpose of this thesis was to examine whether this hypothesis holds in relation to the oil and gas sector of Saudi Arabia and is formulated as hypothesis (b), given that Saudi Arabia is regarded as being a low tax jurisdiction and the significant volume of oil and gas that it supplies to the world market.

In pursuing this line of research, the widely recognised Bartelsman and Beetsma model (2003) was chosen and applied to determine whether the results generated can reliably identify the presence of such behaviour in that sector.

The review of the literature in Chapter 2 indicated that there was considerable evidence to support this research project’s hypothesis (a) which was derived from the two propositions (a) and (b) as set out in section 1.5 of Chapter 1.

Hypothesis (a) contends that managements of multinational companies use transfer pricing to shift profits from their operations in high tax jurisdictions to their operations in low tax jurisdictions. A consequence of such behavior is that the multinational company as a group minimizes the amount of overall they tax paid by the MNE, and thereby maximizes its wealth.

The Bartelsman and Beetsma (2003) model of investigation was chosen to examine whether it produced reliable results that would support the main hypothesis (b) for the following reasons:

- The model is widely recognised as having the capability of reliably identifying the presence of transfer pricing behaviour for the purpose of shifting profits from high to low tax national jurisdictions;
The model examines the available public data at industry level, which is available for most developed, developing, and also 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 also tax-haven countries;
- The model is acknowledged by researchers in the field to reliably identify transfer pricing simply and efficiently, as discussed in detail in Chapter Three; and
- A complete description of the model is available for use and adaptation by 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. Thus, 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.

The key features in the application of the model are as follow:

- c – a country specific factor (each country will have its own value);
- p – the value of money coefficient; and
- Gamma (γ) - the coefficient for the transfer pricing response to taxation.

The results of this thesis 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.

In relation to this thesis the specific results of the regression diagnostics indicated the existence of differences between the actual value-labour ratio versus the predicted value-labour by Bartelsman and Beetsma (2003) model, as shown in Tables (5-17) Chapter 4. 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. The 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 thesis 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. Chapters 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. 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 thesis 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.

5.2: Research limitations and conclusions

This section discusses a number of general limitations of the thesis as follows: given the nature of transfer pricing, the fundamental recognition is that publicly available data are the primary source data used by authorities and researchers to initially detect transfer pricing behavior. The public accounting data are data that are generated from within entities and forms the reports compiled for internal as well as all external parties.

The Bartelsman and Beetsma, (2003) model was constructed as a time series analysis of a longer time frame (18 years), which consists of data ranging from 1979 to 1997. The model focused on the analysis of data from OECD countries, and, as such, this was a period of time for which reliable 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 so that the model took into account any number of industries for which there was information for that period of time. This yielded a robust and effective model that provided definitive evidence of transfer pricing.

The limitations of this study include the reliance on public data and the short time period that was examined. In the case of reliance on public data, there is the potential that a firm will use non-GAAP or non-IFRS accounting measures in order to reduce the appearance of transfer pricing manipulation, which could reduce the ability of these models to detect transfer pricing abuse (since they are all based on public information.) There is also the potential that firms will not relate the data at the granularity required for more reliable study, a further problem with relying on public information.

The short time period means that the result will potentially reflect a period of high stress within the industry. The 1999-2008 periods was a time of rapid change and economic stress within the industry, which could have increased the potential that a firm would use transfer pricing abuse to prop up flagging profits.
However, the current research does not allow for this scope of information regarding the analysis in terms of a time series analysis. In many cases, the individual firms that are included within this study (even at its broadest point) do not have 18 years worth of individual firm data that can be used to construct an equivalent data set. Additionally, due to the reconstruction of the Saudi economy during the 1980s and the resulting establishment of firms such as SABIC and Saudi Aramco, many of the firms that would be involved in a study did not exist during this time period at all, while others existed only as national or even regional enterprises for which no public information would be available.

Additionally, the use of a transfer pricing model within a firm that operates only within national boundaries is not required due to the inability to gain revenues through income tax level arbitrage in this situation. Thus, the data set available for this single-industry analysis is more limited and is confined to the period 1999 to 2008. Information will be transferred between firms as firms are acquired within the structure of the industry, which happens frequently. In essence, it is not possible to gain the depth of information constructed in the more broad data set used in the study by Bartelsman and Beetsma (2003). The information is simply not available for the time period, geography and industry desired. Even with a shorter time period, the Bartelsman and Beetsma (2003) model can generate reliable results as discussed in more detail in the sensitivity analysis Baseline estimates of individual country – CES production function Table 4 Chapter 4.

Thus, the results of this thesis can be used as a basis for extension into the future for the same sector because the adapted Bartelsman and Beetsma (2003) model as such retains its robustness and rigour, but would have more data to deal with if the future theoretical environment remains the same as it was during the period of the study (1999-2008). This is consistent with the principle behind using statistical models to make predictions, namely – the key factors of the future environment should be same as the past in which the model was developed.

Economic theory is a conceptualisation of reality, and economic models are no more than simplified theoretical frameworks providing an approximation of economic processes. Simplifying assumptions are made to eliminate the predictable noise or variance that confounds the immense complexity of the real economy (Chiang and
Wainright 2005). Such a theoretical model was defined by Bartelsman and Beetsma (2003) to explain the errors in the reported value-added statistics associated with income shifting by way of transfer pricing. The Bartelsman and Beetsma (2003) model is very important for a theoretical environment in which tax considerations do not exist to explain the errors in the reported value-added statistics associated with income shifting through the use of the transfer pricing process.

This thesis has addressed the question that was posed: to detect whether transfer pricing behaviour for the purpose of shifting profit tax is identifiable in the case of the oil and gas sector of Saudi Arabia. The findings derived from the application of the Bartelsman and Beetsma (2003) model suggest that the setting of transfer prices in the oil and gas sector of Saudi Arabia for the purpose of shifting profits to the Saudi Arabia’s lower tax jurisdiction was not detected.
APPENDICES

Appendix A: The variables of the Bartelsman and Beetsma (2003) model and the data sources

\[
V_{jt} = \left[ 1 + (c^{(e^z)})^{1/(\rho-1)} \left( \frac{\gamma_{jt}}{W_{jt}} \right)^{\rho/(\rho-1)} \right] \left[ 1 + \gamma^{e^z} (\gamma_{jt} - \gamma_{jt-1}) \right] + \epsilon_{jt}
\]

Table 20: The variables of the Bartelsman and Beetsma model and their sources/formulas

<table>
<thead>
<tr>
<th>MATHEMATICAL SAMPLE</th>
<th>NAME</th>
<th>DESCRIPTION</th>
<th>SOURCES/FORMULA</th>
</tr>
</thead>
</table>
| VALU                | Value added, current prices | Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. | • The OECD’s ‘Structural Analysis Database’ (STAN). The OECD website at http://stats.oecd.org/Index.aspx?DatasetCode=STAN08BIS&lang=en  
  • World Bank, World Development Indicators. The World Bank web-site at http://data.worldbank.org/indicator  
  • The database contains detailed official national accounts statistics in national currencies as provided by the National Statistical Offices. The UNSD web-site at http://data.un.org/Data.aspx?d=SNA&f=group_code%3A201%3Bitem_code%3A22#SN |
| LABR                | Labour costs (compensation of employees) | Compensation of employees (CE) is a statistical term used in national accounts, balance of payments statistics and sometimes in corporate accounts as well. It refers to the total gross (pre-tax) wages paid by employers to | • The OECD’s ‘Structural Analysis Database’ (STAN). The OECD website at http://stats.oecd.org/Index.aspx?DatasetCode=STAN08BIS&lang=en  
  • World Bank, World Development Indicators. The World Bank web-site at |
<table>
<thead>
<tr>
<th>V_{i,j,t}</th>
<th>Value_Labour</th>
<th>Recorded value-labour ratio in home country i, industrial sector j, and time period t</th>
<th>VALUE_LABR</th>
</tr>
</thead>
<tbody>
<tr>
<td>\frac{1}{p-1} C^{c_{sy}}</td>
<td>constant elasticity of substitution (CES) in the home country</td>
<td>It is the intercept or constant corresponding to the constant elasticity of substitution (CES) in the home country</td>
<td>Computed by the equation figure (2)</td>
</tr>
<tr>
<td>\text{The values of } \bar{P}_{i,t} \text{ are stored under the variable name rbar in the SPSS}</td>
<td>the user cost of capital in home country i, at time t, defined by \left[ \frac{\bar{P}<em>{i,t} \left( r + \theta - \Omega \right)}{(1-t)} \right] \left[ 1 - t</em>{z} \right], the expected capital (q) is =0</td>
<td>Computed by the equation</td>
<td>P_{1}^\ast (r+ \theta)/(1-t_{n}) \ast (1-t_{z})</td>
</tr>
</tbody>
</table>
| P_{1} | The price deflation for investment or we can use the consumer price index (CPI) | The values of P_{1} are stored under the variable name price_deflator_PI | • The annual economic indicators database of the OECD.http://stats.oecd.org/mei/  
  World bank, world development indicators, ERS Estimates, and ERS Baseline regional Aggregations |
| r | Long term interest rate | The values of r are stored under the variable name Interest_Rate_r | • The annual economic indicators database of the OECD.http://stats.oecd.org/mei/  
  World bank, world development indicators, ERS Estimates, and ERS Baseline regional Aggregations  
  TradingEconomics.com |
<p>| \theta | Depreciation rate | The values of \theta are stored under the variable name Depreciation_O | \theta =0.08 as assumed by Bertelsman and Beetsma (2003). |
| T_{z} | Discount rate | Discounted tax value of depreciation | T_{z} = .06 as assumed by Bertelsman and Beetsma |</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>The values of W are stored under the variable name Wage.</td>
</tr>
<tr>
<td>Minimum wages at current price</td>
<td></td>
</tr>
<tr>
<td>• Minimum wages at current price in NCU of the OECD</td>
<td></td>
</tr>
<tr>
<td>• The International Monetary Fund (IMF)</td>
<td></td>
</tr>
<tr>
<td>• World Economic Outlook Database</td>
<td></td>
</tr>
<tr>
<td>( \hat{r}_{lt} / w )</td>
<td>The values of ( \hat{r}_{lt} / w ) are stored under the variable name rbar_w</td>
</tr>
<tr>
<td>The capital-labour substitution in the home country. Computed by the equation ( P1^<em>(r+ \theta)/(1- \tau_{it})</em>(1- Tz)/W )</td>
<td></td>
</tr>
<tr>
<td>( \tau_{it} )</td>
<td>MeanTax_Tbar(Mean Tax)</td>
</tr>
<tr>
<td>Headline corporate tax rate in country i, at time t</td>
<td></td>
</tr>
<tr>
<td>• Taxation of Corporate and Capital Income of OECD.PART II. Taxation of Corporate and Capital Income (2009)</td>
<td></td>
</tr>
<tr>
<td>• KPMG's Corporate and indirect Tax Rate survey 2009.</td>
<td></td>
</tr>
<tr>
<td>( \bar{\tau}_{j,t} )</td>
<td>MeanTax_Tbar(Mean Tax)</td>
</tr>
<tr>
<td>Mean headline corporate tax rate in industrial sector j at time t, excluding the home country i. a country specific dummy variable (1 = home country; 0 = foreign countries)</td>
<td></td>
</tr>
<tr>
<td>The weighted average of the period-t headline corporate tax rates of foreign countries (excluding the home country i)</td>
<td></td>
</tr>
<tr>
<td>( \tau_{it} - \bar{\tau}_{j,t} )</td>
<td>TaxDifference_T_Tbar</td>
</tr>
<tr>
<td>tax difference (between the home country and foreign countries excluding the home country )</td>
<td></td>
</tr>
<tr>
<td>MeanTax_T - MeanTax_Tbar</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>predicted value-labour</td>
</tr>
<tr>
<td>Estimate how much the value added/labour ratio officially reported by tax authorities and</td>
<td></td>
</tr>
<tr>
<td>Computed by the equation figure (2)</td>
<td></td>
</tr>
</tbody>
</table>
statistics offices was lost or deflated by income shifting or transfer pricing.
Appendix B: value-labour ratio, capital-labour substitution, and corporate tax rates difference for all selected grouping countries (These Figures linked to dataset).

Figure 9: Frequency distribution of value-labour ratio for all selected countries

Figure 10: Frequency distribution of capital-labour substitution for all selected countries
Figure 11: Frequency distribution of corporate tax rates difference for all selected countries (mark-up)

![Frequency distribution of corporate tax rates difference](image1.png)

- Mean = -0.06919629
- Std. Dev. = 0.796505765
- N = 79

Figure 12: Mean value capital–labour substitution for Australia over the period between 2000 to 2005

![Mean value capital–labour substitution](image2.png)

Country: Australia

Year: 2000 to 2005
Figure 13: Mean Residuals for Australia over the period between 2000 to 2005

Figure 14: Mean corporate tax rates difference for Australia and other selected countries (mark-up) over the period between 2000 to 2005
Figure 15: Mean value capital-labour substitution for Canada over the period between 2000 to 2005

Figure 16: Mean Residuals for Canada over the period between 2000 to 2005
Figure 17: Mean corporate tax rates difference for Canada and other selected countries (mark-up) over the period between 2000 to 2005

Figure 18: Mean value capital –labour substitution for Czech Republic over the period between 2003 to 2008
Figure 19: Mean Residuals for Czech Republic over the period between 2003 to 2008

Figure 20: Mean corporate tax rates difference for Czech Republic and other selected countries (mark-up) over the period between 2003 to 2008
Figure 21: Mean value capital–labour substitution for France over the period between 2002 to 2007

Figure 22: Mean Residuals for France over the period between 2002 to 2007
Figure 23: Mean corporate tax rates difference for France and other selected countries (mark-up) over the period between 2002 to 2007

![Graph showing mean tax difference for France over the period 2002-2007.](image)

Figure 24: Mean value capital–labour substitution for Japan over the period between 2000 to 2005

![Graph showing capital–labour substitution for Japan over 2000-2005.](image)
Figure 25: Mean corporate tax rates difference for Japan and other selected countries (mark-up) over the period between 2000 to 2005

Figure 26: Mean Residuals for Japan
Figure 27: Mean value capital-labour substitution for Korea over the period between 2003 to 2008

Figure 28: Mean Residuals for Korea over the period between 2003 to 2008
Figure 29: Mean corporate tax rates difference for Korea and other selected countries (mark-up) over the period between 2003 to 2008

![Graph showing mean corporate tax rates difference for Korea over the period between 2003 to 2008.](image1)

Figure 30: Mean value capital–labour substitution for Kuwait over the period between 2001 to 2003

![Graph showing mean value capital–labour substitution for Kuwait over the period between 2001 to 2003.](image2)
Figure 31: Mean Residuals for Kuwait over the period between 2001 to 2003

Figure 32: Mean corporate tax rates difference for Kuwait and other selected countries (mark-up) over the period between 2001 to 2003
Figure 33: Mean value capital-labour substitution for Norway over the period between 2002 to 2007

Figure 34: Mean Residuals for Norway over the period between 2002 to 2007
Figure 35: Mean corporate tax rates difference for Norway and other selected countries (mark-up) over the period between 2002 to 2007

![Graph showing mean corporate tax rates difference for Norway over the period 2002-2007.](image)

Figure 36: Mean value capital-labour substitution for Poland over the period between 2001 to 2007

![Graph showing mean value capital-labour substitution for Poland over the period 2001-2007.](image)
Figure 37: Mean Residuals for Poland over the period between 2001 to 2007

Figure 38: Mean corporate tax rates difference for Poland and other selected countries (mark-up) over the period between 2001 to 2007
Figure 39: Mean value capital-labour substitution for Sweden over the period between 2002 to 2007

![Graph showing capital-labour substitution for Sweden between 2002 and 2007.](image)

Figure 40: Mean Residuals for Sweden over the period between 2002 to 2007

![Graph showing mean residuals for Sweden between 2002 and 2007.](image)
Figure 41: Mean corporate tax rates difference for Sweden and other selected countries (mark-up) over the period between 2002 to 2007

![Graph showing mean corporate tax rates difference for Sweden over the period between 2002 to 2007. (SW)}

Figure 42: Mean value capital-labour substitution for UK over the period between 2002 to 2007

![Graph showing mean value capital-labour substitution for UK over the period between 2002 to 2007. (UK)]
Figure 43: Mean Residuals for UK over the period between 2002 to 2007

![Mean Residuals for UK over the period between 2002 to 2007](image)

Figure 44: Mean corporate tax rates difference for UK and other selected countries (mark-up) over the period between 2002 to 2007

![Mean corporate tax rates difference for UK and other selected countries (mark-up) over the period between 2002 to 2007](image)
Figure 45: Mean value capital-labour substitution for the US over the period between 2002 to 2007

Figure 46: Mean Residuals for the US over the period between 2002 to 2007
Figure 47: Mean corporate tax rates difference for US and other selected countries (mark-up) over the period between 2002 to 2007
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