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Learning from oligopoly rivalry: Implications for business financial statements

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Abstract

Research question: Utilizing the tenets of oligopoly competition that is a well-known type of imperfect rivalry, this study is interested in building a financial theory of inter-company price or pricing (ICP) economics and documenting its direct affinity with corporate financial reporting in general and corporate financial statements in particular. It is also interested in executing an analytical application unveiling the straight linkage of ICP with financial disclosure. ***Motivation:*** There is an extant body of literature that examines different ICP structures for different companies and industries or markets. However, the literature is silent in corroborating any explicit association that we argue and show does exist between ICP and accounting. To the best of our knowledge, this is the first study to break this silence. ***Idea:*** *Cost advantage* and *operating profit* are exploited to do the theorization and accounting implementation, by justifying the linkage between ICP and business financial statements. ***Findings:*** Investigations show that given that businesses transact or compete with each other at arm's length terms under oligopoly competition with a Stackelberg game; ceteris paribus, the operating profit figure of the business with cost advantage will be higher than the operating profit figure of the business without cost advantage. Investigations also show that given that businesses transact or compete with each other at arm's length terms under oligopoly competition with a Stackelberg game; ceteris paribus, asset size, earnings before interest and taxes (EBIT), earnings before taxes (EBT) and hence net income/profit after tax (NPAT) figures of the business with cost advantage will always be higher than asset size, EBIT, EBT and therefore NPAT figures of the business without cost advantage. Investigations further suggest that given that businesses transact or

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compete with each other at arm's length terms under oligopoly competition with a Cournot game where there is neither any cost advantage nor disadvantage one way or the other; ceteris paribus, the operating profit, asset size, EBIT, EBT and NPAT figures of the interacting business among the others will be identical.

Keywords: Oligopoly Competition, Cournot Model, Stackelberg Model, Corporate Financial Reporting, Corporate Financial Statements, Cost Advantage, Inter-Company Price, Inter-Company Pricing, Operating Profits, Perfect Information, Imperfect Information

JEL Codes: M40, M41, M48, M49

1. Introduction and related literature

In theory, ranging from perfect competition to imperfect competition, there are many different market forms around. Among those, oligopolies, like whole lot of other forms, fall into the category of imperfect competition where the major norms of perfect competition do not apply. In the daily life, it is hard to see some other types of imperfect markets such as monopolies (except for state-owned enterprises or such) or monopolistic competition (more common than monopolies though), but quite common to observe oligopolies due to their natures. Namely, oligopolies arguably depict the real-world situations better than any other types of imperfect rivalries.

First, in oligopolies, there are a few sellers or producers in the market with a plenty amount of buyers or consumers. Since the number of sellers of a certain good is few, they feature a notable amount or share of the market. Second, products or goods sellers are willing to offer are either homogeneous or somewhat differentiated over each other in oligopolies. Third, like monopolies, there are also tough entry barriers in oligopolies. Market entry is quite difficult owing to the similar reasons underlying monopolies such as industry structure, need for economies of scale, or hefty capital requirements (e.g. like those applicable to financial institutions). Fourth, despite the fact that it is not a prerequisite (to label a market as oligopoly), it might be likely that the information available to the buyers or consumers, such as prices or availability of substitutes, may also be missing or incomplete under oligopolies (Mathis & Koscianski, 2002).

Unlike monopoly or perfect competition market types, there is not one single oligopoly market model. There are rather various oligopoly theories or approaches, based on different underlying assumptions and therefore resulting in different outcomes. Among these approaches are the Cartel model, Cournot model, Stackelberg model, Bertrand model, Dominant Firm Model, Sweezy Kinked Demand Curve model and so on. In all these, market equilibria have to vary by

definition, meaning that the quantity (output) and price figures of the competing firms happen to be different in each of these approaches. Because of this difference, (optimal) market prices that could be obtained at equilibrium are subject to fundamental differentiation as well.

In this paper, Cournot and especially Stackelberg models are considered to theorize and perform analytical investigations for many reasons. For instance, approaches such as Cartel model or the like lean on explicit collusions (e.g. contractual agreements) among the market competitors (competing firms). In the real life, this is not allowed as it would be a breach of anti-trust or competition laws. A similar motive applies to the Dominant Firm Model. In Dominant Firm model, it is assumed that there is a firm which has the highest market share, called the Dominant firm. All the other firms are considered very small in that they are really not capable of competing with the dominant firm. Thanks to this strength, dominant firm may even influence the market price alone, while all the small firms have to take on only the price-take role. This type of oligopoly approach may be exercised through a price leadership model since the dominant firm can act as a price leader (Mathis & Koscianski, 2002).

As just mentioned, the Dominant Firm model may also be quite difficult to be applicable or even not permissible in the real life. It could be that competition laws, regulations or other legal arrangements governing some specific industries do not allow firms in the market to be dominant players. This is because firms with that un-proportionately huge market power might revert to monopolies in the long-run.

Let us consider the financial industry for a moment, especially banks. Banking statutes across the globe are so stringent that they usually mandate a diffused ownership structure of market share by the involving banks. Diffused ownership, unlike blockholder ownership, suggests that there should not be one single (ruling) bank in the market that has the largest portion of the market share (e.g. customer portfolio, total assets, total sales, total turnover, profit margin etc.). It could be that there may be some banks that can have significantly higher market share vis-à-vis the other banks in the market, but this should be to a lesser degree than holding a major dominant position in the market. Therefore, dominant firm model, albeit reasonable to be applicable in our analyses in this paper to a certain degree is not followed as a role model either.

On the other hand, in Bertrand type of competition for instance, market firms compete on price. Due to its main property, Bertrand oligopoly model may also appear to be one of the most reasonable approaches to conduct our analyses as one may see price competition more often than non-price competitions in practice. However, it is just the opposite. There are several reasons for that. First, in Bertrand competition, firms rival in one period on the price that is being chosen once and

established for good. Second, each competitor must expect that, setting the price lower will at once be covered with the same move by the other competitor. This suggests that, no firm should expect to get higher market share (if not sizeable) simply by cutting the price down, and hence, the preferred strategy there will be the one to establish prices exactly at monopoly price level. Third, in Bertrand model, it is assumed that, if a firm undercuts a rival to obtain all the market share, it will have to supply the entire market. This is not possible for lots of firms in the market since their capacities do not suffice to achieve that. As to be realized, assumptions underlying the Bertrand oligopoly approach are unrealistic. Therefore, as with the Cartel or Dominant Firm models, theorizations and analyses performed are not built on the Bertrand model, too.[i]

When units or divisions in a company or when companies in a group company (such as holdings) make transactions among themselves, unlike the transactions they would make with outsiders, the applicable price to be charged to those goods or services that become the subject matter of the exchange or transaction is known as "inter-company price" (hereinafter referred to as "ICP") in accounting and economics literature.[ii]

This paper is interested in treating the ICP issue with or without the state of cost advantage (which grows on its firm-specific prospect) and showing its connection with companies' financial statements in particular and corporate financial reporting in general when the market exhibits an oligopoly structure. There is no study like this, to the best of our knowledge, that explores the effect of cost advantages on ICPs and hence on operating profit figures of the businesses in oligopolies. Even though economies of scale advantage may be one of the technical reasons underlying firms' cost advantages, as firms' corporate governance structures might by definition include scale economies, this examination argues that it is the significant difference of governance structures or skills that creates cost advantages or leads to cost disadvantages. However, it does not mean at all that, governance is the exclusive foundation for generating corporate cost advantage.

As suggested already, we believe that the two oligopoly models that better fit to demonstrate such interdependence between ICPs and corporate financial reporting are Cournot and Stackelberg models. The main reason is that the strength of the market competitors in these oligopoly approaches is the key to competition. In Cournot and Stackelberg competitions, firms in the market compete on quantities rather than prices. Cournot and Stackelberg models (unlike Bertrand model for instance) allow more than two firms in the market to compete with each other. Since these models perceive the quantities as vehicles to combat the competition but not the price, solution algebra (i.e. equilibrium levels that simultaneously optimize the competing firms) yields more reasonable outcomes than those in Bertrand.

In particular, Cournot model is followed and further theorized for the ICP analysis without cost advantage for it is assumed that sizes of the competing firms are almost identical to each other in Cournot. In other words, there is neither room nor space for any significant cost advantages in Cournot type of oligopoly competition. Stackelberg model is rather followed and theorized thanks to its appropriateness to treat the ICP investigation cost advantage for Stackelberg, at least in its sequential version, is rather geared towards explaining the state of the market in terms of the size difference of the competing firms. This is reasonable. As a matter of practice, there are many firms with different marketing strategies (e.g. different quality products, services and so on), different capabilities and eventually with different natures. All these factors even alone might suffice to create some significant cost advantages.

The ICP literature vis-à-vis oligopolies is quite narrow although the ICP literature is well-established (e.g. (e.g. Abdel-khalik & Lusk, 1974; Amershi & Cheng, 1990; Anctil & Dutta, 1999; Arpan, 1972-73; Baldenius *et al*. 1999(a), 1999(b), 2000, 2004 and 2006; Bierman, 1959; Bond, 1980; Brem & Tucha, 2005; Buus, 2006; Cook, 1955; Cravens, 1997; Dawson & Miller, 2000; Dean, 1955; Dopuch & Drake, 1964; Edlin & Reichelstein, 1995; Eden, 1995; Greene, 1969; Göx, 2000; Göx & Schöndube, 2004; Hart, 1983; Hirshleifer, 1956; Horst, 1971; Hyde, 2002; Jie-a-Joen and Sleuwagen, 1997; Kassicieh, 1981; Korn & Lengsfeld, 2007; Machlup, 1967; Mathis & Koscianski, 2002; Mervillel & Petty, 1978; Narayanan & Smith, 2000; Nieckels, 1976; Pfeiffer & Wagner, 2007; Schjelderup & Sørgard, 1997; Schmidt, 1997; Thomas, 1980; Vaysman, 1996 and 1998; Zhao, 2000, etc.). Among these for instance, Schjelderup and Sorgard (1997) argue that the delegation of authority as well as the nature of the competition influences the role the ICPs are expected to play. The scholars believe that transfer prices may be employed to achieve strategic and tax saving goals of a given business. They suggest that, if affiliates or liasons of a multinational business compete in the market with the terms oligopoly competition stipulates, the central office (headquarter) of the multinational may not strive for accomplishing its profit maximization goal. This is up to the reactions of its market competitors.

Zhao (2000) demonstrates that it is possible to employ ICPs as a rent-shifting tool by a multinational which is in part decentralized and has one competitor in the market. He believes that ICPs can be used to well manage the subsidiaries of a multinational business. The ICP value may be affected through (a) whether the product of the rival firm is final or intermediate and (b) whether the rival firm is diffused or not. The scholar contends that the ICPs will get lower as the rival firm happens to get decentralized and integrated.

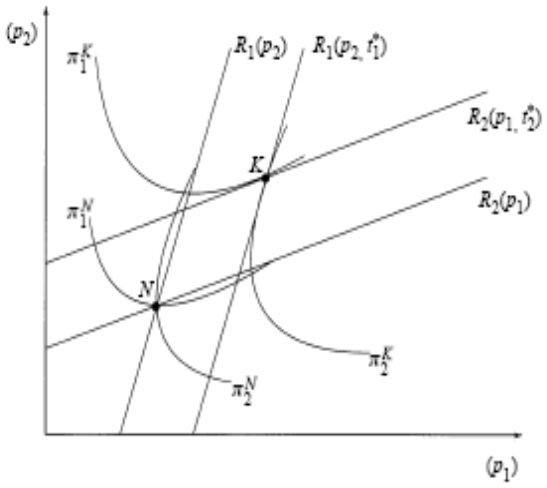
Göx (2000) examines ICP as a strategic instrument in segmented businesses with duopolistic price competition. He argues that as long as ICPs are observable, the

central offices of the competing duopoly firms will charge such a (strategic) ICP that is set above the marginal cost of the intermediate good. This will result in the managers' acting like not harsh but softer competitors in the market for the finalized goods. On the other hand, when one cannot observe the ICPs, strategic ICP will not be an equilibrium any more, implying that, the optimality will happen at a such point where ICP is equal to the marginal cost of the intermediate product.

Gök (2000) advocates that using an absorption costing system, it is possible to see the degree of ICPs as greater than or equal to marginal cost since the absorption costing system will reveal the ICP through a public commitment. As a result of this, arising profit volumes at the equilibrium would significantly outweigh the profit volumes that may be obtainable on the basis of marginal cost-induced ICP scheme.[iii] Among the propositions made by the scholar are that (a) optimal ICP exceeds the marginal cost of the intermediate product and (b) the final product market equilibrium induced by strategic ICP cannot be imitated by a mandated price scheme.

The figure below shows strategic ICP equilibrium that Gök (2000) obtained. Notice that the figure derives from the proposition suggesting that the final product market equilibrium led by strategic ICP cannot be duplicated by a mandated or an obligated price scheme. In other words, both the competing firms strictly prefer decentralization over centralization as it is not possible to accomplish a collusive market outcome by means of a centralized decision ruling.

Figure 1. Strategic ICP equilibrium



Source: Gök (2000)

In the upper graph, N represents the common equilibrium under centralized decision making, $R_1(p_2)$ and $R_2(p_1)$ refer to the reaction functions of the firms, K to latter equilibrium with the latter reaction functions of $R_1(p_2,t^*_1)$ and $R_2(p_1,t^*_2)$. Notice that N, the common equilibrium, is achieved by the intersection of $R_1(p_2)$ and $R_2(p_1)$. Likewise, K, the new equilibrium being set after the decentralization, is arrived at the intersection of the new reaction functions, $R_1(p_2,t^*_1)$ and $R_2(p_1,t^*_2)$. Notice also that, as implied early on, the new profit levels of the competing firms, π_1^K and π_2^K, are apparently higher than the previous profit levels of the firms which are π_1^N and π_2^N.

Nielsen *et al.* (2001) argue that under the terms of oligopolistic competition, the profit shifting problem through ICPs does not fade away even if formula apportionment approach instead of the separate accounting approach is followed. As the main ICP ruler worldwide, the OECD adopts the exercise of arm's length principle[iv] to each and every transaction of the multinationals located in the European (EU) Member countries. Such exercise or applicability relies on the accurate enforcement of a separate accounting system.

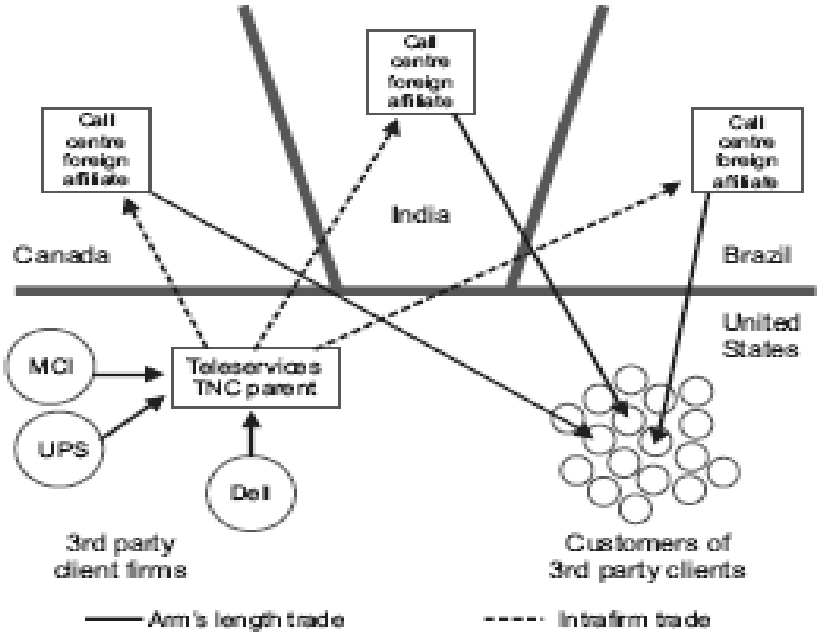
In their model, Nielsen *et al.* (2001) assume that there is a multinational with two affiliates, each located in one of the two countries, Country A and Country B. The affiliate in the country B has a local rival. S_B^* is the optimal quantity volume that the competitor is willing to pick up. Given the competitor's sales, the affiliate of the multinational in country B realizes a revenue of R_B (S_B, S_B^*), with $\partial^2 R_B / \partial S^2_B \leq 0$, and $\partial R_B / \partial S_B^* < 0$. Global profits of the multinational that are subject to tax levy are given there as $\pi^T = \pi^A + \pi^B$. The profit/objective function of the affiliate in country B is given as $\pi^B = R_B(S_B, S_B^*) - qS_B$. The scholars suggest that formula apportionment technique does even tend to further up profit shifting activities multinationals may be undertaking. In addition, they show that if the multinational's affiliates compete under oligopoly rivalry state, manipulating ICPs can make the multinational better off for the purposes of tax-saving and being strategic.

Kind *et al.* (2002) investigate the influence of economic integration on the level of equilibrium taxes. Building a symmetric two country model with two multinational enterprises competing on quantities, scholars show that trade liberalization rises up if multinational enterprises belong to home-country residents. Moreover, they conjecture that increased international ownership results in higher tax rates in equilibrium. In their model, Kind *et al.* posit that costs to incur to disguise ICP manipulation are assumed to be exogenous and tax-deductable.

Eden (1995) brings an economic approach to the ICP of offshored business services while examining the implications from the rapid growth in the offshored business services. Eden conducts a case study of transnational businesses in teleservices industry. The particular reason to go over teleservices industry concerns its nature.

Basically, Eden is aware that, the businesses in the teleservices industry have foreign liasons supplying inbound and outbound call services to their (third party) clients. She states that the firms functioning in this industry are of both vertically and horizontally transnational business types. She concludes that a went-for-cost or priced-at-cost approach is the proper way of finding out the correct ICPs in the telecommunication business. The scholar models the teleservices transnational corporation (TNC) as follows.

Figure 2. Modelling a teleservices TNC

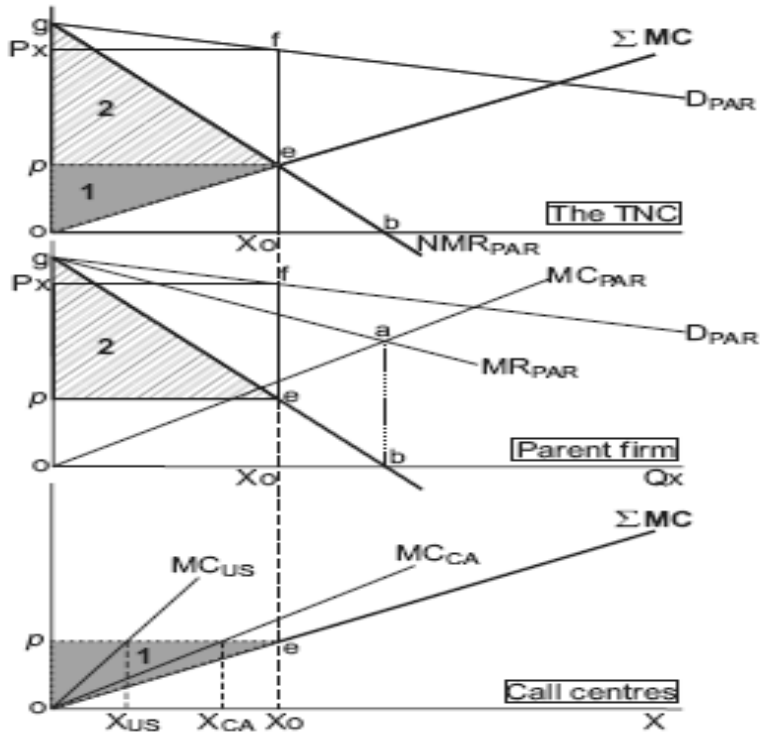


Source: Eden (1995)

Eden (1995) assumes that a teleservices TNC has a parental firm, PAR, located in the US and two call center affiliates (wholly-owned), the USCO and the CANCO. The USCO refers to the affiliate in the US and CANCO to the affiliate in Canada. She also assumes that both the affiliates provide the same type of services to the customers of the third party clients. Among the other assumptions of the model are that (a) the demand curve of the parental company, D_{PAR}, is downward sloping, (b) all third party clients are charged the identical price per unit of service, P_X and (c) the volume of the services, X, being equal to the sum of services provided by each of the call centers of the TNC, where $X = X_{US} + X_{CA}$. Total revenue realized by the TNC is the product of P_X and the aggregated value of the services delivered by

the call centers, meaning X. In other words, total proceeds may be obtained as P_X * (X_{US} + X_{CA}).

Figure 3. Profit maximization by a teleservices TNC



Source: Eden (1995)

As the upper figure depicts, from the above assumptions, profit maximization condition Eden (1995) arrives at is $MR_{PAR} – MC_{PAR} = NMR_{PAR} = MC_{US} = MC_{CA} =$ p (Statement #1), where NMR is the net marginal revenue, MR is the marginal revenue, MC is the marginal cost and p is the efficient ICP. The net marginal revenue of the parental firm of the TNC, NMR_{PAR}, is the vertical distance between the two curves, MC_{PAR} and MR_{PAR}. ∑MC sums the marginal costs of the two centers, MC_{US} and MC_{CA}. The point e where ∑MC crosses NMR_{PAR} satisfies the statement (1) and therefore maximizes the global profit of the TNC. Notice that any tariff, corporate tax or any other market barriers are ignored in this model. Notice also that p, the efficient ICP, is the Lagrangian value, given the constraint that all the quantity produced is sold (Eden, 1995).

Modifying the setting by Kind *et al.*, Amerighi (2006) builds a symmetric two country model in the context of a partial equilibrium where two multinational enterprises compete on quantities and try to manipulate their ICPs. As different from Kind *et al.* (2002) and as similar to Peralta *et al.* (2006), costs to incur to disguise ICP manipulation are embedded into the function of the enforcement level for it is assumed to be endogenous in the model Amerighi develops. Further, these costs are non tax-deductable. The scholar shows that stronger enforcement of the arm's length principle, through the pressure of the government or an increased economic integration, rises tax rates in equilibrium.

Komoriya (2007) studies ICPs of decentralized multinational firms under asymmetric oligopoly. Scholar argues that if the corporate tax rate of the host country is materially or significantly higher than that of the home country, firm efficiency will be reliant of the source of the cost differences. The efficient firm will have a higher mark-up (add-up) ratio relative to that of the inefficient firm. In this case, ICPs of the multinational firms will be strategic complements. Scholar contends that if the corporate tax rate diffentials among the home and host countries are not that significant, these findings will not be applicable any more. Indeed, as the findings will just be the opposite, ICPs of the multinational firms will not be strategic complements but rather be strategic substitutes.

Mu *et al.* (2009) examines ICP stragies (divisional) companies follow under oligopoly rivalry where there may be a market for (external) intermediate products. Assuming that companies operate in the existence of duopolistic price competition and that internal and external prices applicable to intermediate products are identical, the scholars find that optimal ICP value be higher than marginal cost of the intermediate product in exchange. They also find that optimal level of ICP will be also more than marginal cost of the traded intermediate product should company headquarters decide to pursue a policy that can differentitate internal from external markets, which will also result in an increase in the corporate profit.

Bagnoli and Watts (2010) that further extends the model given by Fischer and Verrecchia (2004), examines earnings management and disclosure under the tenets of oligopoly market structure in general and Cournot Duopoly model versus Bertrand model in particular. The scholars are motivated to investigate the manner in which (a) earnings management influences product market rivalry and (b) competition may drive corporate financial reporting (voluntary disclosure) and financial (production or manufacturing) decision. They consider an asymmetric environment where the competing companies are fully aware of their internal production costs while not being aware of their competitors', suggesting that costs are not public or common but private information. They show that missing contracts or agency issues happen to be not necessary for generating incentives on the companies to publish any biased financial statements (disclosure) and that should there be a chance, companies tend to distort their disclosures (financial reporting process) since it will allow them to

lower their costs to manufacture, to level up the prices applying to their products and thereby to augment their profit volumes.

Verge (2010) investigates the relationship among horizontal mergers, structural remedies, and consumer welfare in the setting of oligopoly (Cournot) rivalry with assets. The scholar documents that a merger is going to have higher chances of failing to benefit consumers, when there are no technological synergies, although it may still have faced through certain convenient structure remedies. Matsui (2011) examines the linkage of stragetic ICP with social welfare when products are differentiated. The scholar suggests that setting ICPs at a level that exceeds marginal cost can yet significantly harm social welfare should the products be significantly differentiated, even when markets prove to be competitive enough.

Yao (2013) studies the arm's length principle and ICP with (endogenous) location choices involved, considering tax revenues. The scholar finds that the level of ICP is conditional on both taxation policies and location preferences of companies. The scholar also shows that tax revenues will not increase should arm's length principle be strived to be enforced on multinationals, when endogenous location choices are present.

More recently, Hamamura (2018) studies the relationship of free information linkage systems with ICP, corporate organization structure and corporate profit. By developing an analytical model, the scholar shows that should a company follow an information affinity framework to lessen any information asymmetry that may exist between corporate headquarters and downstream units, corporate profit tends to level down. In another study for instance, Hamamura (2019) finds that when (a) competing corporate managers happen to be blind about ICP values, (b) these managers are assessed through a balanced scorecard, (c) companies are divisionalized, and (d) price competition drives final product market, these (optimal) ICP values beats marginal cost. This is given be a direct cause of the underlying assumption positing that corporate manager indeed takes into account the (reactional) profit of the competitor in her decision making, given that the ultimate objective may be to maximize not short-term but long-term profit.

As to be followed from the upper discussions, the ICP literature is in fact silent in corroborating any explicit association that (we argue and show in this research) does exist between ICP and accounting. To the best of our knowledge, this is the first study to break this silence. This paper is solely motivated to develop a financial theory of ICP economics and thereby show its direct affinity with corporate financial reporting in general and corporate financial statements in particular. In so doing, this research contributes to the accounting literature through exploring the effect of cost advantages on (a) the establishment of firm-level ICPs as well as operating profit figures and on (b) the financial reporting process of the companies.

The resting paper is structured as the following. Section two (2), the next section, investigates oligopoly (Cournot) competition without cost advantage while presenting a business case. Section three (3) examines oligopoly (Stackelberg) competition with cost advantage while providing a business case. Section four (4) develops the equilibria obtained under oligopoly competition rivalry where the interacting banks may come to a mutual agreement. Section five (5) makes an exhaustive analytical application using the insights, the implications and the findings from the theoretical discussions done prior. It shows how theory applies to corporate financial reporting process by documenting the main impact of ICP analysis on the financial statements of the interacting businesses living in the world of oligopoly rivalry. And finally, section Six (6), concludes this examination with some propositions and remarks.[v]

2. Oligopoly competition without cost advantage: competition under Cournot

In this section, we will build a model and show how ICPs may be set under oligopolies, particularly in Cournot competition, when none of the group firms has any cost advantage over the other. Consider that there are two commercial banks, bank L and bank F. Both the banks lend fund to the market and to each other. There is no other bank in the market who supplies fund. These banks with legal entities belong to the same group firm (e.g. a financial holding corporation or a conglomerate for instance).

Let the unit revenue (price) function for the (duopoly) industry be $P(R)\ [q_l + q_f]$, wherein, the subscript l stands for the banking firm L, and f for the banking firm F and q for the quantity. As one may see, price [P(R)], average unit operating revenue, is given to be a function of total or industry output. Specifically,

$$P(R) = \alpha - \psi Q$$

conditional on P, α, $Q > 0$. Q, the global quantity, represents the sum of output volumes, therefore is equal to the $(q_l + q_f)$ of each competing firm.
That is, $Q = \sum q_l + q_f$.

The banking firm *L* in the market has a cost structure of $C_l(q_l)$, where $C_l = \beta + \gamma q_l$ while the banking firm F has a cost structure of $C_f(q_f)$, where $C_f = \beta + \gamma q_f$; both conditional on C_l , C_f , $\beta > 0$. C_l stands for the average unit operating cost of the bank L and C_f for the average unit operating cost of the bank F. Costs are everywhere differentiable such that $C_l' > 0$, $C_f' > 0$. This will make sure that none of the banks realizes any operational cost saving. Among the main assumptions underlying the above model are that:

- there are no taxes

- there are only two commercial banking firms (banks) in the market, L and F, providing fund to the market as well as to each other at arm's length (third-party) terms and belonging to the same group firm
- since both the banks entered the banking market at the same time, they make simultaneous moves each time as there is no first mover's advantage
- banks fight (compete) under the terms of Oligopoly in general and in particular Cournot (Duopoly) Game
- there is no capacity constraint
- information (unlike the competition) is perfect
- operating costs for the competing banks are cost of funding *per se*
- costs are symmetrical
- both the banks have fixed and variable cost components
- all the functions are linearly specified
- there is no another transaction
- banks earn one source of operating revenue or income which is the sales revenue and bear one source of operating expense which is the cost of sales
- there is neither any other type of revenues (other than operating revenue) nor any other type of costs (other than operating cost) for the banks
- both the banks have increasing cost structures, meaning that none of the banks has cost advantages over the other (or any operational cost saving)

The reason underlying the last assumption is that operating or sales costs are the same with cost of funding in this model; as fund or money transfer, being the main (ordinary) course of business of the banks, is the subject-matter of the market trade. As the governance structure or quality of neither the banking firms is assumed to be good nor any better than the other, both the banks have increasing cost structures. Before passing on to the model resolution, remember that in Cournot model, in spite of the fact that firms react to the changes in the level of the output offered by their competitors, they are not expected to revise their decisions, meaning to respond to the changes in their own output volumes. This is an assumption stipulating that the conjectural variations of the oligopolists be equal to zero (Mathis & Koscianski, 2002).[vi] Equivalently, revising the assumptions, it will be seen that the competing banks make simultaneous moves that may be intrinsic to the repeated games. Thereby, we provide the model resolution as the following.

Under Cournot competition, as opposed to Bertrand competition, firms compete on quantity volumes, as in Stackelberg competition. From the conventional properties of Cournot game, we know that (a) sales revenue is the product of price and quantity and that (b) we may take the firms' cost functions as specified already. In order to find the individual equilibria, we first should specify the objective functions of each competing banking firms. Namely, pay-off (profit) or objective functions of any competing banking firms (i) might be written up as such:

$$\Pi_i (q_l, q_f) = (\alpha - \psi(q_l + q_f)).q_i - C_i(q_i) \quad \text{(Statement or Equation \#1)}$$

For the purposes of maximization, we need to derive Π_l and Π_f as to q_l and q_f respectively through setting them out to zero. Accordingly;

$\partial\Pi_l / \partial q_l = 0$ or, $\partial((\alpha - \psi(q_l + q_f))q_l - (\beta + \gamma q_l)q_l)) / \partial q_l = 0$ (Statement #2)
$\partial\Pi_f / \partial q_f = 0$ or, $\partial((\alpha - \psi(q_l + q_f))q_f - (\beta + \gamma q_f)q_f))/\partial q_f = 0$ (Statement #3)

$$q_l = \frac{\alpha - \beta - \psi q_f}{2\left(\gamma + \psi\right)} \text{ and } q_f = \frac{\alpha - \beta - \psi q_l}{2\left(\gamma + \psi\right)} \quad \text{(Statement \#4)}$$

Incorporating both the optimized quantity parameters will yield the solution set, (q_l^*, q_f^*). The solution set is obtained as such:

$$q_f^* = \frac{(\alpha - \beta) + (\frac{2(\alpha - \beta)(\gamma + \psi)}{-\psi})}{(\frac{4(\gamma + \psi)(\gamma + \psi)}{-\psi}) + \psi} \text{ or } q_f^* = \frac{-(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2} \quad \text{(Statement \#5)}$$

From the statement (4), we also know that:

$$2q_l\left(\gamma + \psi\right) = \alpha - \beta - \psi q_f$$
$$2q_f\left(\gamma + \psi\right) = \alpha - \beta - \psi q_l \quad \text{(Statement \#6)}$$

We see that $q_l^* = q_f^*$. Therefore, $q_l^* = \frac{-(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2}$ (Statement #7)

These are the optimal transfer output or quantity levels for the banking firms.
From the Cournot approach, we know that there must be one general market price which is the ICP. The ICPs of each competing bank are the same as the market price since market price is available in this case and transaction happens at arm's length terms. Market price becomes available as the competing banking firms happen to be the market firms themselves. Accordingly, ICP will be the same as

$$\alpha - \psi(Q^*) \text{ or } \alpha - \psi(q_l^* + q_f^*) \quad \text{(Statement \#8)}$$

Placing both the optimized quantity parameters into the upper equation, we will obtain the ICP as the following:

$$\text{ICP} = \alpha - \psi[\frac{-2(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2})] \quad \text{(Statement \#9)}$$

2.1 A business case: financial services industry

Supposing that all the assumptions specified in this section hold, consider that there are two commercial banks, bank L and bank F, operating in a banking (financial services) industry in the country X. Bank L and Bank F who belong to the group firm A are the only commercial banks providing fund to the market and to each other at arm's length terms. Suppose also that these two banks compete with each other under the boundaries of Cournot game. The average unit operating revenue (price) (R) = 100 – 0,5Q, $C_l = 20 + 0{,}1q_l$ and $C_f = 20 + 0{,}1q_f$, where Q represents the aggregate output quantity and is therefore equal to the sum of the output of L (q_l) and the output of F (q_f), C_l stands for the average unit operating cost of L and C_f for the average unit operating cost of F. Calculate the ICP (in $) and the corresponding fund volumes (units) each bank will offer to the market at the equilibrium and will thereby consider when to transact with each other.[vii]

Following the suggested resolution, in this example, output and transfer price will read 47 units and $53 for each of the banks respectively.

Solution. In order to resolve the problem, in the light of backward induction, one needs first to identify the objective function of the bank F and to derive it as to its quantity. In so doing, best reaction may be obtained. Accordingly,

$$\Pi_l = (100 - 0{,}5\,(q_l + q_f))\,q_l - (20 + 0{,}1q_l)\,q_l \quad \text{(Statement or Equation \#1)}$$

$$\text{Max } \Pi_l \text{ wrt. } q_l \text{ or } \partial\Pi_l/\partial q_l$$

$$80 - 0{,}5q_f - 1{,}2q_l = 0 \quad \text{(Statement \#2)}$$

$$1{,}2q_l + 0{,}5q_f = 80 \text{ or } 2{,}4q_l + q_f = 160 \quad \text{(Statement \#3)}$$

$$\Pi_f = (100 - 0{,}5\,(q_l + q_f))\,q_f - (20 + 0{,}1q_f)\,q_f \quad \text{(Statement \#4)}$$

$$\text{Max } \Pi_f \text{ wrt. } q_f \text{ or } \partial\Pi_f/\partial q_f$$

$$80 - 0{,}5q_l - 1{,}2q_f = 0 \quad \text{(Statement \#5)}$$

$$q_l + 2{,}4q_f = 160 \quad \text{(Statement \#6)}$$

Solving the statements (2) and (6) together, we will have: $q_l^* = q_f^* \approx 47$ units. Therefore, the ICP value must be 100 – 0,5(47+47), which is $53.

The upper result is consistent with the economic intuition. As a result of the nature of the game; the quantities (transfer outputs) of the competing banks must be

identical owing to cost symmetry (non-existence of any cost advantage or disadvantage vis-à-vis each other), and there is a single market price which is the ICP itself since the transaction happens at arm's length, meaning third-party terms. The next section examines oligopoly competition where one of the competing banks enjoys cost advantage over the other.

3. Oligopoly competition with cost advantage: competition under Stackelberg

Cost advantage affects pricing patterns of businesses in oligopoly markets. Operating either cross border (i.e. a multinational group) or domestically, businesses do not have the same economic properties. Put differently, some businesses might enjoy cost advantage over the others who try to survive in the market without any cost advantage. This might occasion from a plenty of technical reasons.

For instance, those with cost edge might have lower cost of funding or sourcing (therefore higher leverage and profitability) opportunities as compared to the others. In addition to the usual governance covenants (e.g. higher managerial skills, better know-how, lower agency costs, lower transaction costs, scale economies, better disclosure policies etc.), this could reason from a well-recognized or long-established brand name or prestige in the market (e.g. more customer portfolio, higher customer retention ratio, better network, high reputation etc.), size or from decent or relatively better corporate governance skills in general. Firms with good governance structures do much better in the market than their competitors without as they will have cost advantage. This may also well apply to a banking industry where competitors are in principle banks.

Think about a financial services industry that is served by various commercial banks. Some banks might actually have strong advantages than the others. The forefront pro among them could be the cost advantage that is highlighted in this paper. Apparently, a commercial bank with lower degree of cost of funding (hence cost of capital) for instance might grant a loan (fund) to both individual (customer) and institutional clients (corporations) at more favorable terms (e.g. lower interest rate, longer due date, flexible pay-off options etc.) than the ones with higher funding or sourcing cost. That is, in order for a bank with higher cost of capital to grant a loan of any capacity (e.g. personal loan, commercial or business loan, real estate or mortgage loan, property loan, education loan or whatsoever), it would need to charge such interest rates that might be significantly higher relative to those in others in the market.

The reason, as stressed many times, is that they may suffer due to lack of any cost advantage. In other words, since those banking firms do not have any cost advantage, their costs of financing their operating expenses will be higher than those of the banks with cost advantage. Adding up some profit margin (a cost-plus figure) on to

this cost volume will eventually result in a higher price for the loans that they are willing to offer.

The upper passages imply that, cost advantage might lead to different cost schemes even in the businesses that may be both (a) competitors of each other and (b) legal properties of the same multinational or group as well. Businesses with different cost figures might also need to price their products and services differently. Probably, commercial banks with higher cost of funding would tend to offer higher interest (yield) rates on (time) deposits (e.g. CDs, savings, preferred deposit accounts, premiere money market accounts etc.) as well. The reason for this is naturally to attract money market investors being banking customers. This further increases the costs of funding for those banks. On the other hand, banks that enjoy cost advantage will not really need to set their interest rates that high since they simply will not need to do so. In other words, banks with cost advantage have little-to-no problems with accessing the capital. This is what we observe in the real-life commercial banking practices around the globe.

Banks do have different volumes of credit margin or yield which may cause different operating profit figures reported. Banks with cost advantage, the ones who lead the market in the real life, probably realize higher profit (credit) margins than the banks without any cost advantage, meaning those who follow the market leaders. One of the major reasons underlying this affinity is the lower cost of capital edge that the leading banks with cost advantage do have relative to the following banks with cost disadvantage in relative terms at least. For the followers, it is not easy to change (reduce) their cost of capital figure in the short run as the leaders are still out there in the market. Therefore, the following banks (followers) without cost advantage, in order to cover resulting gap in operating profit and indeed to survive in the banking market, will need to concentrate more on the income sources that are expected to generate all the financial and/or even extraordinary profit but operating profit they would generate. On the contrary, the leading banks (leaders) might even overlook their financial profit components since they may already feel satisfied with their operating income denominators (i.e. operating profit).[viii] These combine to imply that, at the end of the day, the leading banks may tend to price their financial products and services differently from their followers.

In the following discussion of this study, we run two banking firms (commercial banks) competing in the market with perfect information. We assume that bank with cost advantage acts in a leader fashion while the other one therefore has to act in a follower fashion. Notice that one may extend this analysis to the further firm numbers (even infinite) with imperfect information, but that would be unnecessarily restrictive on the generalizability of our analysis. More importantly, that would not be relevant for the scope of this paper. We feel that, restricting the numbers of the competing firms to two and considering that we are living in a perfect information

world, will facilitate a more comprehensible and effective understanding of ICP that is by definition a complex issue.

Tippett and Wright (2006) have argued that washing out the assumptions underlying friction-less markets might influence optimal ICP rules. In particular, some accounting procedures may be utilized to satisfy the missing goal congruence that the agency frameworks might give a rise to. Scholars make two assumptions here, one being general (market) and one being specific (technical/information). Concerning the general one, they consider that demands and costs of the competing business divisions are isolated of each other in an imperfectly competitive (intermediate and final) market. Concerning the specific one, scholars surmise that the agency costs are non-zero where the utility functions of the managers and shareholders vary significantly. Scholars conjecture that, when this is the case, ICPs should be set equal to marginal cost in manufacturing division with a standard overhead absorption costing system in use. Notice that absorption costing, as stated early on, unlike variable costing, is known as full costing in the literature where all the cost figures that a business incurs in a given period are recorded as the cost (expense) items in their financial statements. This means that there is going to be 100% effect (i.e. negative impact on the profit layers) on corporate income statements for the companies applying absorption costing.

Unlike Tippett and Wright (2006), we consider though that there is a dependence among the activities or decisions of the involving banks (e.g. Atkinson *et al.* (2001) etc.). This dependence, as cited before, is given as conjectural variation in Mathis and Koscianski (2002). Having a conjectural variation will enable us to see how pricing and output/quantity/unit decisions of the competing banking firms may be influenced from each other.

First, it will make sure that the pricing and quantity decisions of one of the competing banks will affect the prices at which the other bank may sell its quantity (e.g. fund). Therefore, a change in the pricing or supplying policy pursued by one bank will stimulate a reciprocal change in the pricing or supplying policy pursued by the other bank. Second, this will make it possible that change in costing policies followed by one bank will result in a change in the costing policy followed by the other bank.[ix]

Below we build a model and show how ICPs may be arranged under oligopolies, particularly under Stackelberg, when one of the banks has cost advantage over the other. Suppose that there are only two commercial banks operating in the market, bank L being the leader bank and bank F being the follower. Competing under Stackelberg game, both the banks lend fund to the market and also to each other. There is no other bank in the market who is capable of providing fund. The given banks with legal personalities (entities) belong to the same group firm and therefore share the identical corporate control and thereby are literally affiliates or related.

Consider that the average unit revenue (price) function for the (duopoly) industry be $P(R)\ [q_l + q_f]$, at which, the subscript l stands for the leader firm (bank), and f for the follower firm (bank) or competitor, q for the quantity. As one may see, price is given to be a function of total or industry output. Specifically,

$$P\ (R) = \alpha - \psi Q$$

conditional on P, α, $Q > 0$. Q, the global quantity, represents the sum of output volumes, therefore is equal to the $(q_l + q_f)$ of each competing firm. That is, $Q = \sum q_l + q_f$, where $q_l \neq q_f$.

The leading banking firm *L* in the market has a cost structure of $C_l(q_l)$, where $C_l = \beta + \gamma q_l$, and the following banking firm F has a cost structure of $C_f(q_f)$, where $C_f = \beta + \gamma q_f$; conditional on C_l ,C_f, $\beta > 0$. C_l stands for the average unit operating cost of the leading bank and C_f for the average unit operating cost of the following bank. Costs are everywhere differentiable such that $C_l' < 0, C_2' > 0$. This will make sure that the leader realizes an (significant) operational cost saving due to its cost advantage while the follower does not.

Among the main assumptions underlying the above model are that:

- there are no taxes
- there are only two commercial banks in the market, the leader who is the bank L and the follower who is the bank F, both providing fund to the market as well as to each other at arm's length (third-party) terms and belonging to the same group firm
- banks fight under the terms of Oligopoly in general and Stackelberg Competition in particular; i.e. exhibiting a Stackelberg duopoly structure with sequential game
- the leader is the one who moves first. In particular, the leader (bank L) has entered the banking market before the follower (bank F) did, therefore has a first mover's advantage. In other words, the leader has decreasing cost structure (cost advantage) while the follower has increasing cost structure (cost disadvantage)
- there is no capacity constraint
- information (unlike the competition) is perfect
- operating costs for the competing banks are cost of funding *per se*
- costs are asymmetrical
- both the banks have fixed and variable cost components
- all the functions are linearly specified
- there is not any other transaction
- banks earn one source of operating revenue or income which is the sales revenue and bear one source of operating expense which is the cost of sales

- there is neither any other type of revenues (other than operating revenue) nor any other type of costs (other than operating cost) for the banks

The reason underlying the last assumption is that operating or sales costs are the same with cost of funding in this model; as fund or money transfer, being the main (ordinary) course of business of the banks, is the subject-matter of the market trade. As the governance quality of the bank L being the leader is assumed to be sufficiently good and significantly better vis-à-vis the bank F being the follower, the bank L with cost advantage has a downward cost function while the bank F without any cost advantage (a cost disadvantage in fact) has an upward cost function, both of which are everywhere differentiable for the purposes of optimization.

Before passing on to the model resolution, remember that unlike firms competing in Cournot oligopoly model, under Stackelberg model with sequential duopoly game, firms react to the changes in the level of the output offered by their competitors, as well as foreseeing the competitors to revise their decisions or to respond to the changes in their own output volumes. This suggests that, Stackelberg model relaxes the tenet of absence of the conjectural variation underlying the Cournot model. This is because competing banks make sequential moves that are intrinsic to the sequential games. As before, we provide the model resolution as the following.

As mentioned before, under Stackelberg competition, unlike Bertrand competition, firms compete on quantity volumes, as in Cournot competition. A way in solving Stackelberg problem would be to run a regular backward induction method; meaning that, to obtain an equilibrium, best response or reaction function of the follower (bank F) must be identified first and operationalized afterwards. Thus, strategy profile that serves best the problems of each player will be constructed, given the strategies of the other player.[x]

Owing to the nature of the backward induction technique, the leader has to consider first what the best response of the follower might be; namely, leader has to figure out how the follower would respond, given the quantity arrangement it will make. Leader then will opt for a (special) quantity (point) that would probably constitute the best response to the expected response of the follower. The follower, as a reaction, in equilibrium, would prefer to stick to a certain quantity that would read an optimal amount as it would render the best, given the best of the leader. The profit of the follower is revenue, netted of cost.

Since sales revenue is the product of price and quantity and since we take the firm's cost function as granted, profit of the follower (follower's objective function) or the follower's problem might be stated as:

$$\Pi_f = P(q_l + q_f).q_f - C_f(q_f) \quad \text{(Statement or Equation \#1)}$$

where the letters have obvious meanings. Hence the best response is to find the value of q_f that maximizes Π_f given q_l, or namely; the output of the leader. Thus, Π_f is optimized, wrt. q_f. In other words, the output that maximizes the follower's profit is obtained this way. For the purposes of maximization, deriving Π_f as to q_f and setting that to zero will look:

$$\partial \Pi_f / \partial q_f = [[\partial P (q_l + q_f) / \partial q_f] * q_f] + (P(q_l + q_f)) — [\partial C_f (q_f) / \partial q_f] = 0 \quad \text{(Statement \#2)}$$

The value(s) of q_f that satisfies the upper equation is (are) the best reaction(s). Now that we have obtained the best response state of the follower, we can also get the best response function of the leader as well. The profit of the leader (leader's objective function) or the leader's problem may be given as:

$$\Pi_l = P(q_l + q_f(q_l)).q_l - C_l(q_l) \quad \text{(Statement \#3)}$$

where $q_f(q_l)$ goes to the follower's quantity as a function of quantity which has been calculated before. Analogically, the best response of the leader is to find the value of q_l that maximizes Π_l given $q_f(q_l)$, i.e. given the best response function of the follower. In so doing, the quantity volume that maximizes the leader's profit could be also found. Thus, the maximal value of Π_l wrt. q_l is to be obtained as well. Deriving Π_l as to q_l and setting it to zero would look as follows:

$$\partial \Pi_l / \partial q_l = [[\partial P (q_l + q_f) / \partial q_f] * (\partial q_f (q_l) / \partial q_l) * q_l] + (P(q_l + q_f (q_l))) — [\partial C_l (q_l) / \partial q_l] = 0 \quad \text{(Statement \#4)}$$

In order to resolve the problem, in the light of backward induction again, one needs to identify the objective function of the follower first and then to derive it as to its quantity. Best reaction may thereby be obtained. Accordingly,

$$\Pi_f = (\alpha — \psi (q_l + q_f)) q_f - (\beta + \gamma q_f) q_f \quad \text{(Statement \#5)}$$

$$\text{Max } \Pi_f \text{ wrt. } q_f \text{ or } \partial \Pi_f / \partial q_f$$

$$\alpha — \psi q_l — 2\psi q_f - \beta - 2\gamma q_f = 0 \quad \text{(Statement \#6)}$$

$$q_f{}^* = \frac{\alpha - \beta - \psi q_l}{2(\gamma + \psi)} \quad \text{(Statement \#7)}$$

Since $q_f{}^* \geq 0$, from the Statement (7), we see that:

$$(q_f{}^*) * (2(\gamma + \psi)) = \alpha - \psi q_l - \beta \quad \text{(Statement \#7a)}$$

Therefore;

$$q_l{}^* = \frac{\alpha - \beta - 2q_f{}^*(\gamma + \psi)}{\psi} \quad \text{(Statement \#7b)}$$

Incorporating both the optimized quantity parameters generates the solution set, (q_l^*, q_f^*), which is built as follows. Since we exactly know where the follower can optimize its quantity, we can simultaneously treat the problem of the leader firm. Likewise, we should first write out the objective/profit function of the leader. That is;

$$\Pi_l = P(q_l + q_f)\, q_l - (\beta - \gamma q_l)\, q_l \quad \text{(Statement \#8)}$$

In the above equation, objective function could be rearranged by plugging q_f^* into q_f. Then, it turns out that:

$$\Pi = (\alpha - \psi(q_l + ((\frac{\alpha - \beta - \psi q_l}{2(\gamma + \psi)}))q_l - (\beta - \gamma q_l)q_l \quad \text{(Statement \#9)}$$

Max Π wrt. q_l will reveal the optimized unit value of q, which is q_l*. Accordingly,

$$q_l^* = \frac{\alpha - \beta - \psi \frac{(\alpha - \beta)}{2(\gamma + \psi)}}{[2(\psi - \gamma)] - [2(\frac{(\psi)(\psi)}{2(\gamma + \psi)})]} \text{ or } q_l^* = \frac{(\alpha - \beta)(2\gamma + \psi)}{[4(\psi - \gamma)(\gamma + \psi)] - [2(\psi^2)]} \text{ (Statement \#10)}$$

From the statement (7) above, we know that:

$$q_f^* = \frac{\alpha - \beta}{2(\gamma + \psi)} + (\frac{-\psi}{2(\gamma + \psi)})(\frac{(\alpha - \beta)(2\gamma + \psi)}{[4(\psi - \gamma)(\gamma + \psi)] - [2(\psi^2)]}) \quad \text{(Statement \#11)}$$

These are the optimal transfer output or quantity levels for the banking firms. From the previous discussions, we know that there must be one single market price which is the ICP in this case. As in the preceding state, the ICPs of each competing bank are the same as the market price since market price is available in this case and transaction happens at arm's length meaning third-party terms. Market price becomes available as the competing banking firms happen to be the market firms themselves. Accordingly, the inter-company price being ICP will look like the following:

$$\text{ICP} = \alpha - \psi(Q^*) \text{ or } \alpha - \psi(q_l^* + q_f^*) \quad \text{(Statement \#12)}$$

Placing both the optimized quantity parameters into the upper ICP equation, we obtain the optimal ICP which will be equal to:

$$(\alpha - \psi[(\frac{(\alpha - \beta)(2\gamma + \psi)}{[4(\psi - \gamma)(\gamma + \psi)] - [2(\psi^2)]}) + \frac{\alpha - \beta}{2(\gamma + \psi)} + (\frac{-\psi}{2(\gamma + \psi)})\frac{(\alpha - \beta)(2\gamma + \psi)}{[4(\psi - \gamma)(\gamma + \psi)] - [2(\psi^2)]}] \quad \text{(Statement \#13)}$$

3.1 A business case: financial services industry

Considering that all the assumptions specified in this section hold, suppose that there are two commercial banks, the bank L being the leader and the bank F being the follower, operating in the country X. Bank L and Bank F belonging to the group firm A are the only commercial banks providing fund to the market as well as to each other at arm's length terms.

Suppose also that these two banks compete with each other under the boundaries of the Stackelberg model (sequential game with perfect information) as follows. The average unit operating revenue (price) (R) = 100 – 0,5Q, $C_l = 20 – 0,1q_l$ and $C_f = 20 + 0,1q_f$, where Q represents the aggregate output quantity and is therefore equal to the sum of the output of the leader bank (q_l) and the output of the follower bank (q_f), C_l stands for the average unit operating cost of the leading bank and C_f for the average unit operating cost of the following bank. Calculate the ICP (in $) and the corresponding fund volumes (units) that each bank will offer to the market at the equilibrium and will also consider when to transact with each other.[xi]

Following the suggested resolution, in this example, for the bank L being leader and the bank F being follower, the output volumes will be 122 units and 16 units respectively. The ICP which applies to both the banks in common will be approximately $31 per each bank.

Solution. In order to resolve the problem and as followed before, in the light of backward induction, one needs to identify the objective function of the follower first and to derive it as to its quantity. Best reaction could be obtained that way. Accordingly,

$$\Pi_f = (100 – 0,5\,(q_l + q_f))q_f – (20 + 0,1q_f)q_f \quad \text{(Statement or Equation \#1)}$$

$$\text{Max } \Pi_f \text{ wrt. } q_f$$

$$80 – 0,5q_l – 1,2q_f = 0 \quad \text{(Statement \#2)}$$

$$q_f^* \approx 67 – 0,42q_l \quad \text{(Statement \#3)}$$

Now that we know at which level the follower may optimize its quantity, we can deal with the problem of the leader firm. Likewise, we should first write out the objective/profit function of the leader which is:

$$\Pi_l = P(q_l + q_f)\, q_l – (20 – 0,1\, q_l)\, q_l \quad \text{(Statement \#4)}$$

In the above expression, objective function can be rearranged by embedding q_f^* into q_f. Then,

$$\Pi = (100 - 0{,}5\,(q_l + ((67 - 0{,}42q_l))\,q_l - (20 - 0{,}1q_l)\,q_l \quad \text{(Statement \#5)}$$

$$\text{Max } \Pi \text{ wrt. } q_l \quad \text{(Statement \#6)}$$

$$q_l^* \approx 122,\ q_f^* \approx 16 \quad \text{(Statement \#7)}$$

The ICP value thereby will be 100 – 0,5(122+16), which is ca. $31.

The upper result is also consistent with the economic intuition. Since it is specifically assumed in the model that (a) banks fight under the terms of Stackelberg with sequential game, (b) information is perfect and (c) the leader bank has a first mover's advantage over the follower; as a result of the nature of the game, the quantity (transfer output) of the leader will rank much higher than that of the following bank –so do the outcomes corroborate already. The next section provides a further technical examination on the main findings & results obtained under the theoretical analyses.

4. Equilibria: mutual agreement

In this section, we provide an in-depth and at-length discussion of the theoretical analyses performed in the previous sections.

4.1 What the theoretical examination says for the businesses competing in oligopoly

Two oligopoly cost states have been theoretically examined in the preceding sections; i.e. (a) oligopoly competition without cost advantage and (b) oligopoly competition with cost advantage. The former state pertains to Cournot competition model and the latter to Stackelberg competition model, in both of which two commercial banks, bank L and bank F operate and compete. In addition, these banks are under the control of the same group company and make transaction to the market as well as with each other.

We have seen that changing the scenario from 'without cost advantage' to 'with cost advantage' profoundly affects the degree of the values; meaning the level of ICPs and the level of transfer outputs. The reason is that cost advantages differentiate banks' ICP establishments even though both the banks compete under the world of oligopoly competition. The table below compiles the model results gathered in Cournot and Stackelberg oligopoly approaches.

Table 1- Model results under oligopoly: Cournot and Stackelberg equilibria

Imperfect Competition: Oligopoly	Model results: optimal functions in equilibrium	
Intra-Group Banking Firms	***The Bank L***	***The Bank F***
ICP_n^*	$\alpha - \psi[\frac{-2(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2})]$	
ICP_c^*	$(\alpha - \psi[(\frac{(\alpha-\beta)(2\gamma+\psi)}{[4(\psi-\gamma)(\gamma+\psi)]-[2(\psi^2)]}) + \frac{\alpha-\beta}{2(\gamma+\psi)} + (\frac{-\psi}{2(\gamma+\psi)})\frac{(\alpha-\beta)(2\gamma}{[4(\psi-\gamma)(\gamma+\psi)}$	
q_n^*	$\frac{-(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2}$	$\frac{-(\alpha - \beta)(2\gamma + \psi)}{\psi^2 - 4(\gamma + \psi)^2}$
q_c^*	$\frac{(\alpha-\beta)(2\gamma+\psi)}{[4(\psi-\gamma)(\gamma+\psi)]-[2(}$	$(\alpha - \psi[(\frac{(\alpha-\beta)(2\gamma+\psi)}{[4(\psi-\gamma)(\gamma+\psi)]-[2(\psi^2)]}) + (\frac{-}{2}$ $+(\frac{-\psi}{2(\gamma+\psi)})(\frac{(\alpha-\beta)(2\gamma+\psi)}{[4(\psi-\gamma)(\gamma+\psi)]-[2(\psi^2)]}$

In the upper table, ICP_n^* and q_n^* respectively refer to the optimal ICPs and transfer quantities of each bank operating under Cournot competition in oligopoly where neither the bank L nor bank F has any cost advantage. ICP_c^* and q_c^* respectively refer to the optimal ICPs and transfer quantities of each bank operating under Stackelberg competition in oligopoly where the bank L with cost advantage acts the leader and the bank F without cost advantage (with cost disadvantage) acts the follower.

Considering the numerical commercial banking case results, in the section where none of the banks were considered to have any cost advantage, attributable to the cost symmetries they have, quantities (funds as transfer outputs) that bank L and F are willing to supply are the same and 47 units each. The optimal ICP is $53. In this case, ICP is identical to the market price as market price is available and intra-group transaction happens at arm's length terms. This suggests that it is the price that banks will consider to apply to the other market players who are particularly the individual customers or corporate (institutional) clients demanding for such funds. This is also the price banks will consider to charge when transacting with each other. Recall that banking firms belonging to the same group firm and hence affiliated or related are the only ones competing in the market. Therefore they are market firms as well. To conduct this theoretical investigation, Cournot oligopoly approach has been pursued, due to its nature (appropriateness) for the absence of cost advantage or disadvantage state. Notice that things (prices and output levels) might change if bank L and the bank F were making the fund transfer to each other at non-arm's length terms. The reason is that any optimal ICP would then significantly deviate from the market price.

In the subsequent case, bank L that has cost advantage thanks to its decent governance structure acts the leader and bank F that has cost disadvantage acts or remains the follower. This is the oligopoly state with cost advantage. Bank L will set the volume of its quantity such that it could be significantly higher than that of bank F. Considering the numerical commercial banking case results, the optimal ICP value will read $31. The quantity (fund as transfer output) that the leader bank is willing to supply is 122 units and the quantity (fund as transfer output) that the follower bank is to supply is 16 units only. ICP will again be the same as the market price, for the market price is available now and the intra-group transaction happens at arm's length terms.

The below table summarizes the results, where the letters have obvious meanings. The numerical findings over there should not be surprising to us since we know that this is the expected course of being in Stackelberg competition with a sequential game.

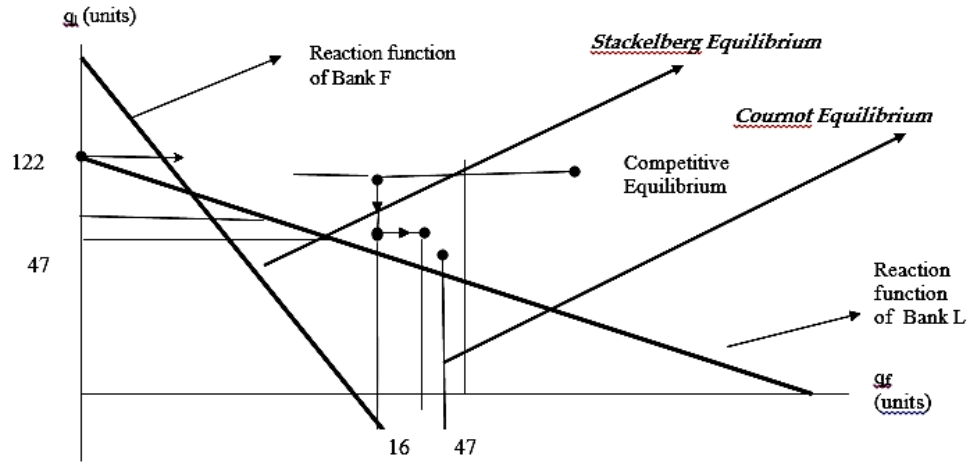
Table 2- Findings from numerical examples under oligopoly

Imperfect Competition: Oligopoly		
	Findings: Optimal Values in Equilibrium	
Intra-Group Banking Firms	***The Bank L***	***The Bank F***
$\mathbf{ICP_n^*}$	$53	
$\mathbf{ICP_c^*}$	$31	
$\mathbf{q_n^*}$	47 units	47 units
$\mathbf{q_c^*}$	122 units	16 units

The inverse relationship between ICP and aggregate output (summing the individual quantities of the banks) suggests that as the aggregate output rises, the ICP value will be lower. This is the case here. The aggregate output level in Stackelberg competition which is 138 units (= 122+16) is much higher than the one we got back in Cournot competition which is 94 units (= 47+47). Since the ICP is specified as a function of '$\alpha - \psi(Q^*)$', where Q* refers to the optimized volume of the aggregate quantity, the optimal ICP value in Stackelberg that is \$31, is quite less than the optimal ICP value in Cournot that is \$53.

The figure given below depicts the transfer quantity outcomes in equilibria that have been obtained in oligopoly markets. q_l refers to the optimized quantity or output of the bank L in Cournot Competition and the bank L (leader) operating in Stackelberg competition, while q_f refers to the optimized quantity of the bank F in Cournot Competition and the bank F (follower) in Stackelberg competition.

Figure 4- Equilibria under Cournot and Stackelberg competitions



Source: Adapted from Ünsal (2001)

The next section makes an exhaustive analytical application using the insights, the implications and the findings from the theoretical discussions prior to that. It shows how theory applies to corporate financial reporting process.

5. Application to corporate financial reporting: the effects of ICP analysis on the financial statements of the businesses operating under oligopoly competition

In the presented oligopoly states, the given banks are the market competitors trying to sell their products (services) both to each other and to the outside (market) at the

arm's length meaning third-party terms. Therefore, the (optimal) ICP value at the equilibrium has been advocated to be equal to the market price that has to be a unique number out there.

From the theoretical analyses, remember that two banks have been assumed to exist, bank L and bank F. Oligopoly market has been examined through two well-known approaches: the Cournot model and the Stackelberg model. Competing at the terms that Cournot model stipulates, it has been assumed that there is no significant difference between the governance skills of the banks L and F. On the other hand, in Stackelberg model, it has been assumed that, governance structure of bank L is sufficiently good and significantly better than that of bank F. In other words, bank L has cost advantage while bank F does not. Because of the first mover edge, bank L with cost advantage has been dubbed *the leader* (the leading bank), and bank F without cost advantage (or with cost disadvantage) has been dubbed *the follower* (the following bank) in Stackelberg case.

Before showing the effects of transfer pricing analysis on banks, there is a need to comprehensively discuss the natures of the bank's financial statements as they are quite different from the financial statements applying to the firms in non-financial services industries which have been examined in the preceding chapters. The financial statement formats that have been used in the discussions so far are relevant for the non-financial businesses such as manufacturing companies, commercial or merchandising companies etc.

5.1 Financial statements of banks: how it works

As different from those of non-financial institutions (regular public companies), financial statements (financials) of financial institutions such as banks, brokerage/investment houses, leasing companies, factoring companies or insurance companies are quite different. They have special formats. The main reason underlying this significant variance is the difference originating from the definition of the ordinary course of business resting with financial institutions. From accounting theory, remember that it is the ordinary course of business that gets the business enterprises to earn operating revenue, to incur operating expense and hence realize an operating margin (profit or loss) that is the operating income, netted of any operating expense.

The usual criterion to coin the accounts as operating or not is whether those accounts reveal the prospects of regular transactions of a business. 'Regular transaction' phrase refers to the main or ordinary course of business action companies perform on their operations. For instance, for commercial (merchandising) businesses, we expect that they do realize profits out of the *buy*/*sell* trade on the transactions they make. Commercial businesses make profit (arbitrage) in the buy-sell price differences which are yields. They sell the goods they do not manufacture but purchase. Therefore, for such businesses, the account 'cost of goods sold (COGS)' is used to refer to 'cost of sales' incurred to.

Unlike commercial businesses that do not manufacture or produce anything physical, manufacturing businesses realize profits out of the *produce*/*sell* transactions they make. In other words, they sell the goods that they produce on their own. Therefore, the account 'cost of finished goods sold' is used to refer to 'cost of sales' incurred to for such businesses. On the other side, the ordinary course of business for a service company such as a resort, hotel or a fitness place for instance is to sell (deliver) the service. For this reason, the account 'cost of services sold or delivered' points to 'cost of sales' incurred to for such businesses.

Being different from all the mentioned three business types, financial institutions (firms operating in financial services industry) have different accounting systems. As introduced right above, the major reason that hinges on this material difference is the ordinary course of business of financial institutions. Banks are the foremost ones among those since they are the largest players in the league of financial services industry in terms of asset size, profit, turnover, branch, market share etc. In other words, they are the largest service providing financial businesses across the globe.

As the previous discussions suggested, concerning the financial statements of banks, there is a couple of things that may be given in first place. These features will help us to immediately differentiate the accounts of the banks' financials from the accounts of the financials of the non-financial institutions. For instance, deposits the commercial banks collect from their customers, individuals or corporations, appear as a passive item in their balance sheets. This is because deposits are liabilities for banks. In addition, banks have to pay interests to their customers out of the time deposits they hold. On the contrary, in a typical non-financial business, deposits fall into asset (not liability) category and therefore require an asset reporting as non-financial companies earn interest revenues from the principal amounts of money they deposit to the banks.[xii]

Similarly, loans that banks grant are usually categorized as assets in their balance sheets, while loans granted to non-financial institutions such as those to manufacturing companies appear as liabilities in their balance sheets. This is due to the similar reason given above. Banks earn interest revenue out of the loans they grant to their qualifying customers. However, typical non-financial businesses have to pay interests for the loans they obtain from the banks on the other hand.

Upper passages suggest that the main/ordinary course of business of banks, at least of commercial or depository ones, is to make profit, through collecting deposits and thus granting loans. Once the interest amounts banks earn outweigh the interest expenses they are borne with, they realize profit. They do realize losses if the opposite holds. Profit banks get this way is roughly known and reported on their income statements as interest income (profit), and the loss they realize this way is roughly known and reported as interest loss on their income statements. This interest variation (profit/loss) is also known as '*credit spread or credit (interest rate) margin*' in the banking literature as well, which has already been mentioned in the previous discussions.

Banks usually make reservations on the potential loan losses they might confront in the pursuit of their potential operations. This is for risk management purposes. For banks, there is quite a reasonable risk that they may face when to grant a loan. The risk pertains particularly to the collectability of the loans and therefore is known as *default risk*. When loans are not repaid to the banks on time or not repaid in whole or in part, they are reported as loss on their income statements. In that case, banks should also write them off from their assets.[xiii] In view of reserving (get-ready) for the risks that have not yet taken place, in accounting, the account 'provision for doubtful receivables or accounts' is used to capture and manage the risk. Since it is about the receivable (asset) side of the banks, banks' balance sheets are expected to be (negatively) affected by recording such (journal and ledger) entries into their books. Since it also concerns the revenue side of the banks, banks' income statements are also expected to be directly influenced by such entries.

Having said this, to be more precise, the account banks work with after making the aforementioned reservations, is known as "net interest income after provision for credit losses". This is apparently a regular bank's income statement item that corresponds to the 'operating profit' item for the regular non-financial companies.

The next section shows the effects of the theorizations that were built in the previous sections on the financial statements of the bank L and the bank F, embodying the numerical results obtained under Cournot. In other words, banks' financial statements in the state of the oligopoly competition where there is no cost advantage are scrutinized in there.

5.2 Oligopoly competition without cost advantage: Cournot model

5.2.1 The interplay between operating profits and ICPs

In the preceding discussions; we have seen that in order to show the effects of ICP analysis on the corporate financial statements, banks in this case, we need to characterize their operating profit volumes in the first place, so that all the other related components (items) can be figured out as well. We know that, an operating profit might be specified as follows:

$$\textit{Operating Profit (Loss)} = \textit{Total Revenue (Operating Income)} - \textit{Total Cost (Operating Expense)}$$

More specifically, we may obtain the operating profit figure for bank L as:

$$\textit{Operating Profit} = [TR^{l}] - [TC_{l}] \text{ which may equivalently be stated as:}$$

$$\textit{Operating Profit} = [ICP^{l} * q_{l}] - [C_{l} * q_{l}]$$

where TR^{l} stands for the total operating revenue of bank L, TC_{l} for the total operating cost volume of bank L, ICP^{l} for the inter-company price of bank L, q_{l} for the

corresponding (transfer) output of bank L, and C_l for the average unit operating cost volume of bank L. From the respective business case, remember that the ICP value of bank L that is equal to the ICP value of bank F is $53 and the transfer output of bank L that is again equal to the transfer output of bank F is 47 units. Thus, the operating profit for *bank L* will be the following:

Operating Profit = [53*47] – [(20 + (0.1*47))*47] which is $1,330.

Similarly, for *bank F*:

$$Operating\ Profit = [TR^f] - [TC_f] \text{ which boils down to:}$$

$$Operating\ Profit = [ICP^f * q_f] - [C_f * q_f]$$

where TR^f stands for the total operating revenue of bank F, TC_f for the total operating cost volume of bank F, ICP^f for the inter-company price of bank F, q_f for the corresponding (transfer) output of bank F, and C_f for the average unit operating cost volume of bank F. As just mentioned, the ICP value of bank F that is equal to the ICP value of bank L is $53 and the transfer output volume applying to bank F that is equal to the transfer output of bank L is 47 units. Hence, the operating profit for *bank F* will be calculated as the following:

Operating Profit = [53*47] – [(20 + (0,1*47))*47]

which is again $1,330.

As one may see, total revenue is equal to total operating revenue and total cost is equal to total operating cost over here. This is because of the assumption that there is neither any other type of revenues (other than operating revenue) nor any other type of costs (other than operating cost) for the banks. As it is also assumed that banks earn only one source of operating revenue or income which is the sales revenue and bear only one source of operating expense which is the cost of sales; total operating expense volume above, TC, is found to be the same as *cost of sales* and total operating income volume above, TR, is obtained to be the same as *sales revenue*. All the other incomes or expenses will be non-operating incomes or expenses that are assumed to be zero (0).

Particularly, the operating profit figures obtained as above will appear as ‘net interest income’, total revenues as ‘interest and similar income’ and total costs as ‘interest expense’ in the income statements of the ordinary deposit banks. Acknowledging this, next section presents the income statements of the banks competing under the umbrella of Cournot, bank L and bank F.

5.2.2 The income statements of the competing banks

In the preceding section, we have obtained the values that prove to be pivotal to the income statements of bank L and bank F. Below can a condensed form of income statement for bank L be found. The figures (accounts with corresponding numbers) there *except for* 'interest and similar income', 'interest expense', 'net interest income [Operating Profit], 'income before income tax expense [EBT]', '(corporate) income tax expense' and eventually 'net income [NPAT]', are assumed to be all zero.[xiv] A brief income statement for bank L may be given as follows.

Table 3. Annual income statement of bank L: oligopoly competition without cost advantage: Cournot rivalry

Income statement of bank L for the period ending 2019 (in $)	
	Dec' 2019
(1) Interest and similar income [Operating Revenue or Income]	2,491
(2) Interest expense (-) [Operating Cost or Expense]	1,161
(3= (2)-(1)) Net interest income [Operating Profit**]**	1,330
(4) Total Non-Interest income [Non-Operating Revenue or Income]	0
(5) Total Non-Interest expenses (-) [Non-Operating Cost or Expense]	0
(6= (3)+(4)-(5)) Income before income tax expense [Earnings Before Taxes**]**	1,330
(7) (Corporate) Income tax expense (-)	266
[8= (6)-(7)] Net income [Net Profit After Tax**]**	1,064

Similarly, a brief income statement for bank F could be depicted as the following.

Table 4. Annual income statement of bank F: oligopoly competition without cost advantage: Cournot rivalry

Income statement of bank F for the period ending 2019 (in $)	
	Dec' 2019
(1) Interest and similar income [Operating Revenue or Income]	2,491
(2) Interest expense (-) [Operating Cost or Expense]	1,161
(3= (2)-(1)) Net interest income [Operating Profit**]**	1,330
(4) Total Non-Interest income [Non-Operating Revenue or Income]	0

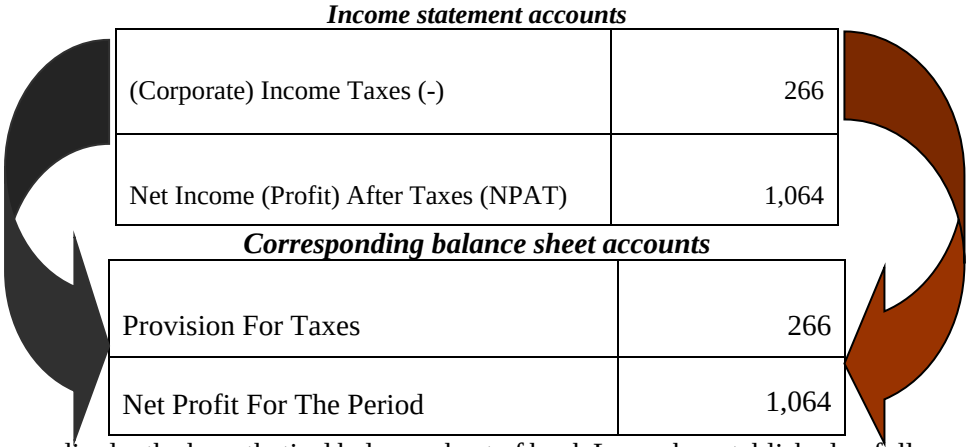
Income statement of bank F for the period ending 2019 (in $)	
	Dec' 2019
(5) Total Non-Interest expenses (-) [Non-Operating Cost or Expense]	0
(6= (3)+(4)-(5)) Income before income tax expense [Earnings Before Taxes**]**	1,330
(7) (Corporate) Income tax expense (-)	266
[8= (6)-(7)] Net income [Net Profit After Tax**]**	1,064

It is assumed that being annual and in US dollars, the upper income statements that are hypothetical are prepared for the year ending 2019.[xv] The level of the income tax rate applicable to the banks is given as 20%. Now that we have established the income statements of the banks that are corporate income taxpayers due to their resulting (positive) EBT volumes, we can build their balance sheets as given in the following section.

5.2.3 The balance sheets of the competing banks

From the income statement accounts, we have obtained 'provision for taxes' (corporate income taxes), 'earnings before taxes' (tax base/taxable income) and 'net profit after tax balances' (net profit for the period). We have seen that, provision for taxes or tax provisions and net profit for the period are the figures we will need to embed into the balance sheets of banks, which can be performed as follows.

Figure 5. Transforming the relevant income statement accounts to the balance sheet accounts of bank L: oligopoly competition without cost advantage: Cournot rivalry (in $)



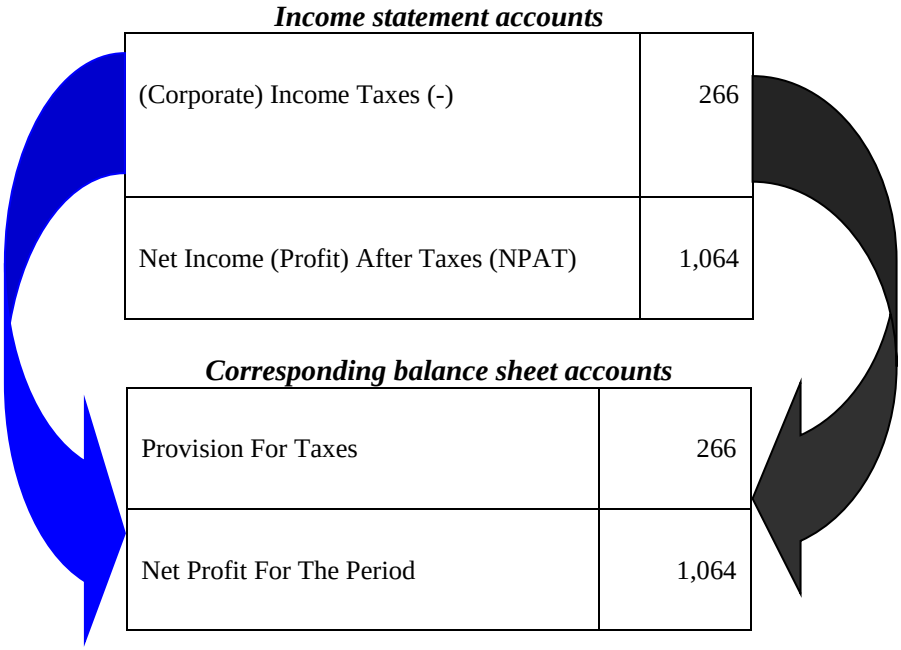
Accordingly, the hypothetical balance sheet of bank L may be established as follows.

Table 5. Annual balance sheet of bank L: oligopoly competition without cost advantage: Cournot rivalry

	Dec' 2019
Total Assets	
Cash and due from banks	609
Interest-earning deposits with banks	856
Central bank funds sold and securities purchased under resale agreements	345
Securities borrowed	670
Equity method investments	200
Loans	1,990
Goodwill and other intangible assets	340
Other assets	101
Total assets	***5,111***
Total Liabilities & Owner's Equity	
Deposits	431
Central bank funds purchased and securities sold under repurchase agreements	150
Securities loaned	130
Financial liabilities at fair value through profit or loss	40
Other short term borrowings	20
Other liabilities	10
Provision For Taxes	266
Long-term debt	1,000
Total liabilities	**2,047**
Paid-up Capital	1,500
Retained earnings	500
Net Profit For The Period	1,064
Total equity	**3,064**
Total liabilities and equity	***5,111***

In the balance sheet above, the figures (accounts with corresponding numbers) except for 'net profit for the period' and 'provision for taxes' are hypothetical. As with bank L, bank F will need to post the relevant income statement accounts (figures) into its balance sheet as the following.

Figure 6. Posting the relevant income statement accounts to the balance sheet accounts of bank F: oligopoly competition without cost advantage: Cournot rivalry (in $)



Accordingly, hypothetical balance sheet of bank F may be displayed as follows.

Table 6. Annual balance sheet of bank F: oligopoly competition without cost advantage: Cournot rivalry

Annual balance sheet of bank F as of the year ending 2019 (in $)	
	Dec' 2019
Total Assets	
Cash and due from banks	609
Interest-earning deposits with banks	856

Annual balance sheet of bank F as of the year ending 2019 (in $)

	Dec' 2019
Central bank funds sold and securities purchased under resale agreements	345
Securities borrowed	670
Equity method investments	200
Loans	1,990
Goodwill and other intangible assets	340
Other assets	101
Total assets	***5,111***
Total Liabilities & Owner's Equity	
Deposits	431
Central bank funds purchased and securities sold under repurchase agreements	150
Securities loaned	130
Financial liabilities at fair value through profit or loss	40
Other short term borrowings	20
Other liabilities	10
Provision For Taxes	266
Long-term debt	1,000
Total liabilities	**2,047**
Paid-up Capital	1,500
Retained earnings	500
Net Profit For The Period	1,064
Total equity	**3,064**
Total liabilities and equity	***5,111***

In the balance sheet above, the figures (accounts with corresponding numbers) except for 'net profit for the period' and 'provision for taxes' are hypothetical. The next section shows the effects of the theorizations that were built in the previous sections on the financial statements of the bank L and the bank F, embodying the numerical results obtained under Stackelberg. In other words, banks' financial

statements in the state of the oligopoly competition where there may be a cost advantage are examined there.

5.3 Oligopoly competition with cost advantage: Stackelberg model

Following the previous discussions, in order to accurately show the effects of ICP analysis on the financial statements of the banks competing under oligopoly, we will first use operating profit (net interest income) volumes of banks for all the other related components (items) to be obtained. Remember that in this case, bank L turns out to be the Leader Bank while bank F is to be the Follower Bank. An operating profit, as before, might be written as the following:

Operating Profit (Loss) = Total Revenue (Operating Income) – Total Cost (Operating Expense)

Or else, the operating profit figure the *leader bank:*

$$Operating\ Profit = [TR^{l}] - [TC_{l}]$$ which may be restated as:

$$Operating\ Profit = [ICP^{l} * q_{l}] - [C_{l} * q_{l}]$$

where TR^{l} stands for the total operating revenue of the leader, TC_{l} for the total operating cost volume of the leader, ICP^{l} for the inter-company price associated with the leader, q_{l} for the corresponding (transfer) output of the leader, and C_{l} for the average unit operating cost volume of the leader. As to be remembered from the concerning business case, the ICP value of the leader is \$31 and the transfer output is 122 units. Hence, the operating profit for the leader will read the following:

Operating Profit = [31*122] – [(20 – (0.1*122)) * 122] which is \$2,978.

Similarly, for the follower bank:

$$Operating\ Profit = [TR^{f}] - [TC_{f}]$$ which may be restated as:

$$Operating\ Profit = [ICP^{f} * q_{f}] - [C_{f} * q_{f}]$$

where TR^{f} stands for the total operating revenue of the follower, TC_{f} for the total operating cost volume of the follower, ICP^{f} for the inter-company price of the follower, q_{f} for the corresponding (transfer) output of the follower, and C_{f} for the average unit operating cost volume of the follower. Being the same with that of the leader, the ICP value of the follower is \$31 and transfer output is 16 units. Hence, the operating profit for the follower will read the following:

Operating Profit = [31*16] – [(20 + (0,1*16))*16]

which is \$150.

From the prior section, remember that operating profit figures as obtained right here will appear as 'net interest income', total revenues as 'interest and similar income' and total costs as 'interest expense' in the income statements of the typical deposit banks, as does the following section for the competing banks.

5.3.1 The income statements of the competing banks

From the previous chapter, we have obtained the values that prove to be pivotal to the income statements of the leader (bank L) and the follower (bank F). Below is a compact income statement for the leader. The figures (accounts with corresponding numbers) *except for* 'interest and similar income', 'interest expense', 'net interest income [Operating Profit], 'income before income tax expense [EBT]', '(corporate) income tax expense' and eventually 'net income [NPAT]', are assumed to be zero. The same applies to the follower as well.[xvi]

Table 7. Annual income statement of the leader bank: oligopoly competition with cost advantage: Stackelberg rivalry

Income statement of bank L (leader) for the period ending 2019 (in $)	
	Dec' 2019
(1) Interest and similar income [Operating Revenue or Income]	3,782
(2) Interest expense (-) [Operating Cost or Expense]	952
(3= (2)-(1)) Net interest income [Operating Profit**]**	2,830
(4) Total Non-Interest income [Non-Operating Revenue or Income]	0
(5) Total Non-Interest expenses (-) [Non-Operating Cost or Expense]	0
(6= (3)+(4)-(5)) Income before income tax expense [Earnings Before Taxes**]**	2,830
(7) (Corporate) Income tax expense (-)	566
[8= (6)-(7)] Net income [Net Profit After Tax**]**	2,264

Comparing with the income statement items of bank L in the 'oligopoly competition without cost advantage' section, we see that 'interest and similar income' has increased from $2,491 up to $3,782 and 'interest expense' has decreased from $1,161 down to $952. Therefore, 'net interest income (operating profits)' (from $1,330 up to $2,830), 'income before income tax expense (earnings before taxes)' (from $1,330 up to $2,830), '(corporate) income tax expense' (from $266 up to $566), 'net income (net profit after taxes)' (from $1,064 up to $2,264), have all changed in a positive direction. Similarly, a compact income statement of the follower bank may be presented as the following.

Table 8. Annual income statement of the follower bank: oligopoly competition with cost advantage: Stackelberg rivalry

Income statement of bank F (follower) for the period ending 2019 (in $)

	Dec' 2019
(1) Interest and similar income [Operating Revenue or Income]	496
(2) Interest expense (-) [Operating Cost or Expense]	346
(3= (2)-(1)) Net interest income [Operating Profit**]**	150
(4) Total Non-Interest income [Non-Operating Revenue or Income]	0
(5) Total Non-Interest expenses (-) [Non-Operating Cost or Expense]	0
(6= (3)+(4)-(5)) Income before income tax expense [Earnings Before Taxes**]**	150
(7) (Corporate) Income tax expense (-)	30
[8= (6)-(7)] Net income [Net Profit After Tax**]**	120

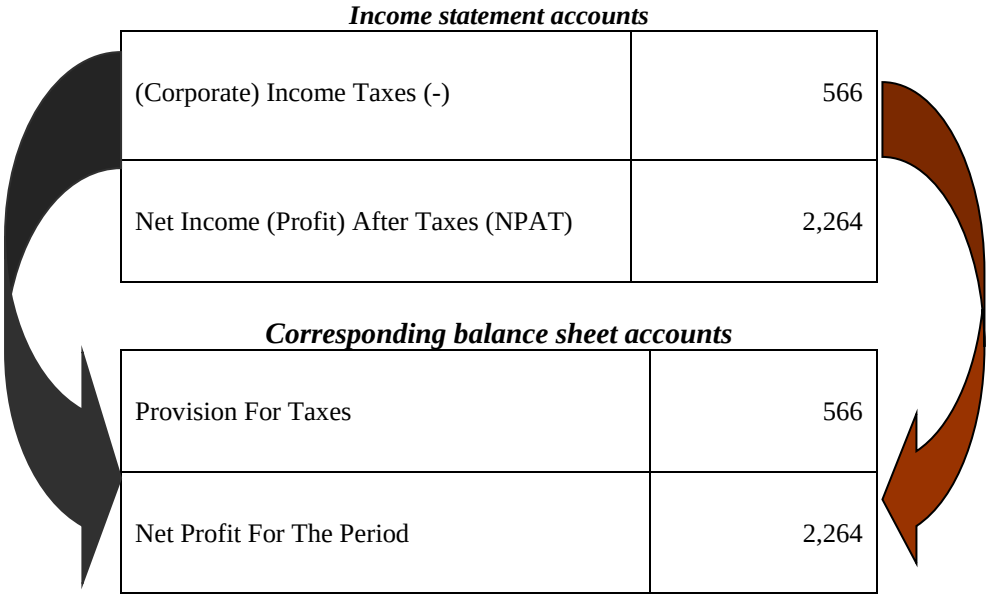
Comparing with the income statement items of bank F in the 'oligopoly competition without cost advantage' section, we see that 'interest and similar income' has decreased from $2,491 down to $496 and 'interest expense' has decreased from $1,161 down to $346. Therefore, 'net interest income (operating profits)' (from $1,330 down to $150), 'income before income tax expense (earnings before taxes)' (from $1,330 down to $150), '(corporate) income tax expense' (from $266 down to $30), 'net income (net profit after taxes)' (from $1,064 down to $120), have all significantly changed in a negative direction, meaning lessened.

As one may immediately see, there is a huge difference among the operating profits and therefore NPAT volumes of the competing banks. The reason is, as unveiled several times, the cost advantage arising. The leader bank has a cost advantage over the follower bank. This also explains the sharp reduction in the profit figures of the follower. The next section construes the banks' balance sheets.

5.3.2 The balance sheets of the competing banks

From the previous discussion, we have obtained 'provision for taxes' (corporate income taxes), 'earnings before taxes' (tax base/taxable income) and 'net profit after tax balances' (net profit for the period). We have seen that provision for taxes or tax provisions and net profit for the period are the figures we need to merge into the balance sheets of the banks.

Figure 7. Posting the relevant income statement accounts to the balance sheet accounts of bank L (leader): oligopoly competition with cost advantage: Stackelberg rivalry (in $)



The hypothetical balance sheet of the leader may then be constructed as the following.

Table 9. Annual balance sheet of bank L (leader): oligopoly competition with cost advantage: Stackelberg rivalry

Annual balance sheet of bank L (leader) as of the year ending 2019 (in $)

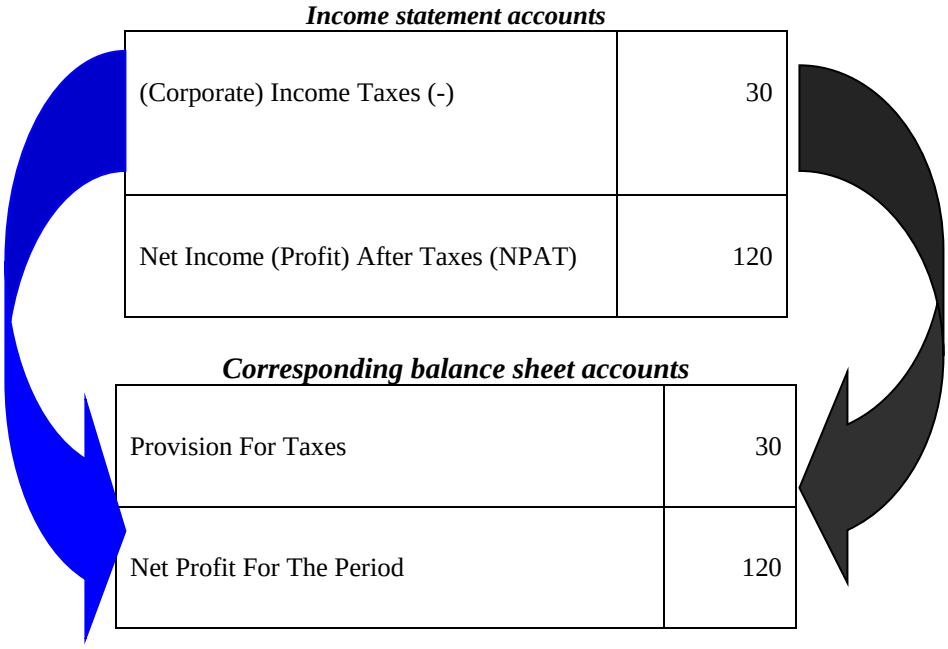
	Dec' 2019
Total Assets	
Cash and due from banks	609
Interest-earning deposits with banks	856
Central bank funds sold and securities purchased under resale agreements	345
Securities borrowed	670
Equity method investments	200
Loans	3,490
Goodwill and other intangible assets	340

Annual balance sheet of bank L (leader) as of the year ending 2019 (in $)

	Dec' 2019
Other assets	101
Total assets	***6,611***
Total Liabilities & Owner's Equity	
Deposits	431
Central bank funds purchased and securities sold under repurchase agreements	150
Securities loaned	130
Financial liabilities at fair value through profit or loss	40
Other short term borrowings	20
Other liabilities	10
Provision For Taxes	566
Long-term debt	1,000
Total liabilities	**2,347**
Paid-up Capital	1,500
Retained earnings	500
Net Profit For The Period	2,264
Total equity	**4,264**
Total liabilities and equity	***6,611***

In the balance sheet above, as with the discussions in the prior sections, the figures (accounts with corresponding numbers) *except for* net profit for the period and provision for taxes are hypothetical. Comparing with the balance sheet items of bank L in the 'oligopoly competition without cost advantage' section, we see that 'net profit for the period' has increased from $1,064 to $2,264 and 'provision for taxes' has increased from $266 to $566. Therefore, 'loans' (from $1,990 to $3,490), 'total assets' (from $5,111 to $6,611), 'total liabilities' (from $2,047 $ to $2,347), 'total equity' (from $3,064 to $4,264) and 'total liabilities & owner's equity' (from $5,111 to $6,611) have all risen up. The change (increase) in 'loans' which is $1,500 can for instance be explained by the change (increase) in earnings before taxes account (from $1,330 to $2,830) among the others. As in the case of the leader bank, the follower bank will need to merge the income statement accounts (figures) concerned into its balance sheet as the following.

Figure 8. Posting the relevant income statement accounts to the balance sheet accounts of bank F (follower): oligopoly competition with cost advantage: Stackelberg rivalry (in $)



The hypothetical balance sheet of bank F being the follower may be presented as the following.

Table 10. Annual balance sheet of bank F (follower): oligopoly competition with cost advantage: Stackelberg rivalry

Annual balance sheet of bank F (follower) as of the year ending 2019 (in $)	
	Dec' 2019
Total Assets	
Cash and due from banks	609
Interest-earning deposits with banks	856
Central bank funds sold and securities purchased under resale agreements	345
Securities borrowed	670

Annual balance sheet of bank F (follower) as of the year ending 2019 (in $)

	Dec' 2019
Equity method investments	200
Loans	810
Goodwill and other intangible assets	340
Other assets	101
Total assets	***3,931***
Total Liabilities & Owner's Equity	
Deposits	431
Central bank funds purchased and securities sold under repurchase agreements	150
Securities loaned	130
Financial liabilities at fair value through profit or loss	40
Other short term borrowings	20
Other liabilities	10
Provision For Taxes	30
Long-term debt	1,000
Total liabilities	**1,811**
Paid-up Capital	1,500
Retained earnings	500
Net Profit For The Period	120
Total equity	**2,120**
Total liabilities and equity	***3,931***

In the balance sheet above, as with the discussions in the preceding sections, the figures (accounts with corresponding numbers) *except for* net profit for the period and provision for taxes are hypothetical. Comparing with the balance sheet items of bank F in the 'oligopoly competition without cost advantage' section, we see that 'net profit for the period' has decreased from $1,064 to $120 and 'provision for taxes' has reduced from $266 to $30. Therefore, 'loans' (from $1,990 to $810), 'total assets' (from $5,111 to $3,931), 'total liabilities' (from $2,047 to $1,811), 'total equity' (from $3,064 to $3,931) and 'total liabilities & owner's equity' (from $5,111 to $3,931) have all reduced. The change (decrease) in 'loans' which is $1,180 can be

explained by the change (decrease) in earnings before taxes account (from $1,330 to $150).

Notice also that even though some of the upper accounts are hypothetical, they surely help to show how ICP analysis can impact the financials of the competing banks. Given that we have a real banking case scenario, the financials will yet look more or less the same way as done until here.

6. Conclusion

When group (affiliated or related) companies make transactions with each other, the price that is charged is known as inter-company price (ICP) in the literature. If this price is established in the manner it would be normally established in the market how independent (non-affiliated or un-related) companies would settle, then deals which this price applies to are considered at arm's length. The principle governing this is coined as "arm's length principle". Should it be established the other way around, then we will have a violation of arm's length principle where any ICP value would be deemed as biased or distorted and therefore would not be reliable.

Employing the prospects of oligopoly competition that is a common form of imperfect rivalry, this study builds a theory of ICP and performs an analytical application unveiling its straight linkage with corporate financial reporting in general and corporate financial statements in particular. *Cost advantage* and *operating profit* are exploited to do the theorization and accounting implementation, by justifying the affinity between ICP and business financial statements. Two major situations were imagined, "oligopoly competition without cost advantage" versus "oligopoly competition with cost advantage". To control for the former state Cournot competition, and to capture the latter state Stackelberg competition were embodied. In each competition framework two banks were considered as the sole players. In Cournot competition there was neither any cost advantage nor disadvantage whereas in Stackelberg competition one of the banks was playing the leader and the other playing the follower. The leader was the one with the cost advantage while the follower was the one with cost disadvantage for several reasons.

Investigations have clearly shown that given that businesses transact or compete with each other at arm's length terms under oligopoly competition with a Stackelberg game; ceteris paribus, the operating profit figure of the business with cost advantage will be higher than the operating profit figure of the business without cost advantage. Investigations have also shown that given that businesses transact or compete with each other at arm's length terms under oligopoly competition with a Stackelberg game; ceteris paribus, asset size, earnings before interest and taxes (EBIT), earnings before taxes (EBT) and hence net income/profit after tax (NPAT) figures of the business with cost advantage will always be higher than asset size, EBIT, EBT and

therefore NPAT figures of the business without cost advantage. Investigations have further suggested that given that businesses transact or compete with each other at arm's length terms under oligopoly competition with a Cournot game where there is neither any cost advantage nor disadvantage one way or the other; ceteris paribus, the operating profit, asset size, EBIT, EBT and NPAT figures of the interacting business will be identical.

Besides the monopolistic competition, oligopoly markets, may be observed among the common forms of industries in the world today and Stackelberg competition type rather than Cournot better explains the realities that are more consistent with the stylized facts for there are always leading firms (if not solo one only) and their followers in every single industry. As for instance given in Komoriya (2007), Bagnoli and Watts (2010), Mathis and Koscianski (2002), Fischer and Verrecchia (2004), or in Hamamura (2018), inception of an asymmetry in internal corporate production cost structures like this study does accounts for why some firms are doing much better than the others. There could be a wide-ranging mix that can ignite some far-reaching cost-to-make or cost-to-source strength or weakness for companies such as lower agency cost, lower transaction cost, scale economies, better disclosure policies, better managerial skills, better governance structure, highly valuable intangible (e.g. well-recognized reputation or brand etc.) and so on. This would in turn generate higher profitability or return.

It is also important to note that both the Cournot and Stackelberg games were constructed in an environment with full compliance with (dealing at) arm's length competition terms, so the results hold then. In particular, since the ICP values of the banks, under oligopoly competition either without or with cost advantage states, are assumed to be obtained at "dealing-at-arm's length", there has been no need to make any ICP value adjustments or modifications up or down. That is, banks make their transactions among each other at the nature of the third-party (bias-free) selling terms. Since there has been not any ICP value adjustment, there has been also no need for any modification in the amount of the EBT figure either. Namely, banks' earnings have not been treated such that additional earnings (taxable profits) may be accrued by the tax administrations in the way to be marked up to the declared earnings figures of the businesses. In such cases, declared earning volumes of the banks have been considered as being in line with what the tax administrations would acquire in the pursuit of an ordinary tax audit they would perform on them.

Points above further advocate that if arm's length terms are relaxed meaning violated owing to cost asymmetries for instance, the results will fundamentally change and differ a lot. Competing firms would then have economic incentives to internally manage their earnings by distorting (biasing) their disclosures in particular so that they can financially profit the most out of it. On the other hand, this will create an urge for the Standard-Setters (e.g. FASB, IASB etc) to be more cautious, rigid and

conservative especially on financial statement presentation specifications for public companies and their oversight. Standard-Setters will be more adamant in tolerating any disclosure malpractice, even voluntary one, let alone the mandatory one.

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[i] See Bertrand Competition, @http://en.wikipedia.org/wiki/Bertrand_competition.

[ii] In the literature, such terms as "intra-company price", "inter-company price", "intra-group price", "inter-group price", "intra-firm price", "inter-firm price", "internal price", "internal company price", or more popularly "transfer price", etc. are all used interchangeably. In this paper, inter-company price or inter-company pricing (meaning ICP) will be used as the relevant term because of the nature of its subject, being monopoly competition and its behavior that affect accounting stakeholders and their financial decision processes. Likewise, ICPs is meant to refer to inter-company prices..

[iii] Remember that absorption costing, unlike variable costing, is a full costing technique in accounting where all the cost figures that a business incurs in any given period are recorded as the cost (expense) items in its financials, especially income statement.

[iv] Arm's length principle is a principle that proposes that ICPs affiliated companies agree to apply to each other should be completely based on objective price formation rules (when available) as if they were exactly happening with a third-party which remains outsider to the affiliated or related businesses. If this price formation or establishment does not occur objectively then arm's length principle is considered as violated or breached. Group companies or firms are by definition affiliated or related for this affiliation or relatedness is meant to share the common corporate control within the same organization structure.

[v] This paper is based on and an extended and updated version of Kaymaz (2009)'s unpublished doctoral dissertation. One can also refer to such empirical examinations as Kaymaz and Kaymaz (2012), Kaymaz *et al.* (2010) for drivers or profitability of commercial banks.

[vi] Remember that conjectural variation refers to how one firm thinks that others (competitors) will respond to its self-adjustments in some strategic variables being pivotal to its/their objective functions. See Mathis and Koscianski (2002) for this as well.

[vii] Suppose that this transaction happens in the year 2019. Suppose also that group banks, banks L and F, do not have any other transaction in 2019.

[viii] This does not mean that, the leading commercial banks with cost advantage are not wise enough to think of benefiting from their sources that are supposed to yield financial income. That will not be rational. What is rather implied in here is that, leaders will not be aggressive on those sources, as would not be the case in their followers that do not possess any cost advantage. Bottom line is that, in order to survive in the market, banks that do lack cost advantage will do their best to satisfy an economic degree of earnings before interest rate and taxes, with (EBITDA) or without (EBIT) depreciation and amortization, and hence realize a reasonable net profit after tax volume (NPAT). This

relies on the presumption that in rational markets, operating profits compose the largest portion of EBIT or NPAT volumes of commercial banks.

[ix] See for instance Tippett and Wright (2006).

[x] For the fundamental properties of Stackelberg model that is discussed in this section, for instance refer to Aliprantis and Chakrabarti (2000), Mathis and Koscianski (2002), or to Stackelberg Competition, @ http://en.wikipedia.org/wiki/Stackelberg_competition (03.04.2007). Since these properties are invariant, they can be identically found in any economics textbooks around. See the given URL for the notations used and for some explanations on undertaking Stackelberg operation in this section.

[xi] Suppose that this transaction happens in the year 2019. Suppose also that group banks, bank L and F, do not have any other transaction in 2019.

[xii] Unless otherwise stated, the term 'bank' refers to the 'commercial or deposit bank' only. Investment banks are not entitled to collect deposits neither from natural persons (i.e. individuals) nor from legal persons (e.g. corporations).

[xiii] Therefore, the default risk requires both income statement and balance sheet reporting.

[xiv] Remember the model assumptions specified before.

[xv] Remember the model assumptions specified before.

[xvi] Remember the model assumptions specified before.