# INSIDE THE MNC: STRUCTURING OWNERSHIP OF FIRM-SPECIFIC ADVANTAGES

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## ABSTRACT

This study examines how multinational firms (MNCs) organize internal ownership of their firm-specific advantages (FSAs). In contrast to the assumption that FSAs are a public good within MNCs, we find that MNCs allocate economic ownership of their FSAs to affiliates and/or the parent within the firm. The MNC entities that own the FSAs contract or license them to other MNC entities. We draw on property rights theory to understand the decisions that MNCs make with regard to the internal ownership of FSAs, and we identify four different ways in which MNCs choose to structure internal FSA ownership. We argue that these structures are important in creating internal incentives and facilitating coordination. We find that MNCs with independent and easily codifiable FSAs, such as trademarks, are more likely to use ownership structures that provide market-like incentives. In contrast, MNCs with knowledge-intensive, tacit FSAs are more likely to use ownership structures that facilitate knowledge sharing and coordination within the firm.

## INTRODUCTION

At the heart of the theory of the multinational firm (MNC) is the idea that firms can exploit an internal knowledge asset more successfully by directly investing in a foreign market than by licensing the asset to other firms. The inefficiencies associated with licensing the asset stem from a common set of problems related to contracting for knowledge in conventional markets. Because markets for knowledge often fail, certain transactions are better accomplished when they are "internalized" by firms (Caves, 1971; Dunning, 1980; Rugman, 1981). Transaction cost economics and property rights theories of the firm reach similar conclusions.

Economic theories of the firm have generally considered how contracting difficulties affect whether transactions are conducted within or between firms. There is widespread agreement in the fields of strategy and economics regarding the benefits of "internalization" when contracts are difficult to write. However, once these transactions are brought inside of firms, very little is known about how they are structured. Property rights theory explicitly suggests that the same kinds of contracting difficulties that occur at the boundaries of the firm are also likely to occur inside of firms (Grossman and Hart, 1986; Hart and Moore, 1990; Holmstrom and Roberts, 1998). Thus, the difficulties inherent in contracting for knowledge in markets may not be resolved by internalization.

In this paper, we examine how MNCs internally organize ownership of their most important value-generating assets. These assets correspond to what strategy and international business researchers variously call knowledge assets, resources, competencies, and firm-specific advantages (FSAs). Although the theory of the MNC suggests that firms establish foreign operations when their FSAs are not suitable to contract or license in markets (Dunning, 1980), these same FSAs are extensively contracted and licensed *within* MNCs. MNCs use internal contracts between affiliates and/or the parent to assign economic ownership and control rights to FSAs inside the firm. Since many MNCs grow by acquiring firms with existing FSAs or by

internally developing FSAs in foreign affiliates, firms face the organizational problem of allocating FSA ownership and control rights across a diverse network of affiliates.

We argue that the need to create, maintain and share FSAs within firms generates *internal* motivation and coordination problems similar to those that exist at the boundaries of the firm. To the extent that the FSAs involve tacit, incomplete or shared knowledge and specific investments are required, the same kinds of hold-up problems that occur in market transactions are likely to occur within firms. This is particularly the case in MNCs, where a firm's network of foreign affiliates may be spread over many countries with different customs, culture, languages and institutions. MNCs face additional complications from the high costs of monitoring activities in a geographically dispersed global network.

At the boundaries of the firm, the critical choice variable when contracts are hard to write is whether to undertake a transaction within the firm, in markets, or through some hybrid arrangement. *Within* firms, the critical choice variable with regard to structuring internal transactions is whether to have all the FSAs owned by a single entity, to have multiple entities separately own the FSAs, or to have multiple entities share ownership of the FSAs.

Assigning economic ownership of FSAs to the parent and/or affiliate(s) reduces free-rider problems that would arise if no entity within the firm had ownership rights to the FSAs it created. If the FSAs were treated as pure public goods within the firm, there would be limited incentives to innovate, since affiliates that bore no costs of developing the FSAs would have access to knowledge assets developed elsewhere within the firm. When MNC entities own FSAs, they typically have the ability to make strategic decisions, determine the desired level of investment in the FSAs and keep the profits earned from contracting or licensing the FSA to other divisions of the firm. FSA owners are assigned responsibility and control over decisions regarding the FSA and bear the operational risks associated with development, maintenance, and exploitation of the FSA.

Drawing on property rights theory, we examine MNCs' choices with regard to FSA ownership structures. We predict that, in general, MNCs will select the ownership structure that

allocates FSA ownership to the division or divisions whose marginal effort is most important with regard to developing, maintaining, and reinvesting in the asset. For example, similar to Grossman and Hart's (1986) illustration of how client lists are owned in the insurance industry, FSAs like customer relations and procurement know-how are typically owned by the MNC unit that deals directly with a particular set of customers or suppliers. However, in some cases, the need for central coordination or the inability to monitor the actions of affiliates will require greater involvement by the parent in internal FSA transactions. We predict that MNCs with FSAs that are more "contractible" in the sense of being non-tacit, independent, and easy to describe, will use structures that engender more market-like incentives but have less capacity for central coordination. In contrast, MNCs with FSAs that are tacit or complementary, and are therefore less "contractible," will use structures that allow for greater coordination and control.

Using a confidential new panel data set on the internal ownership of FSAs and transactions within MNCs, we find that firms choose one of four different types of FSA ownership structures. First, approximately 35% of MNCs in the sample choose "Sole" ownership structures in which a single entity owns all of the FSAs of the MNC. Second, 18% of MNCs choose "Shared" ownership structures in which two or more entities co-own all of the FSAs. A third structure chosen by approximately 42% of MNCs is "Separate" ownership in which different affiliates of the firm own different FSAs. Finally, about 5% of MNCs choose "Mixed" structures in which ownership of some FSAs is shared and other FSAs is separate. The different FSA ownership structures not only trade off incentives and control, but they also necessitate very different patterns of knowledge and financial flows within the firm. Once a particular structure is chosen, it is costly and difficult to change, leading to a low incidence of switching observed in our data (less than 4% of observations).

The key contribution of our research is our ability to shed light on the structure of transactions for knowledge within firms. Due to data limitations, previous empirical research in economics and strategy has not been able to open up the black box of internalized transactions. We identify four ways in which MNCs structure ownership of their FSAs. The four modes have

different implications for control, coordination, incentives and knowledge sharing within the MNC. By examining how contracts for knowledge assets are written and structured *within* firms, we gain insight into the ability of "incomplete contracts" theories to explain internal firm behavior. Since contracts are so widely used to structure ownership of FSAs within firms, it seems likely that internalization is not sufficient to deal with the difficulties inherent in contracting for knowledge.

From a policy standpoint, our research contributes to our understanding of the kinds of benefits foreign affiliates can bring to a local market. Affiliates that own the MNC's FSAs can accrue significant income from FSAs and have considerable strategic determination over how the MNC's key assets are developed, maintained and deployed. In this sense, ownership and control rights to FSAs are similar to subsidiary mandates (e.g. Birkinshaw, 1996; Rugman, 1981). Additionally, some MNCs do choose ownership structures as a way to minimize taxes. Our results also shed light on the importance of this aspect of MNC organization.

**FSA Ownership Structures**

FSAs are the MNC's proprietary assets that provide the firm with a competitive advantage. These assets are unique company strengths and include a broad range technological, manufacturing, marketing, and organizational competencies and know how (Rugman, 1981; Rugman and Verbeke, 2001). FSAs may originate from the parent or the network of affiliates.

In order to gain and sustain a competitive advantage from the FSAs, firms need to continuously develop and maintain these assets (Peteraf, 1993). This requires a careful balance between the need to generate market-like incentives that encourage investment in FSAs with the need to coordinate knowledge-generating activities and allocate capital to the highest-return investments throughout the firm. To this end, MNCs use four different internal FSA ownership structures. The following provides an overview of each structure.

*Sole Ownership*

Sole ownership occurs when one entity within the MNC owns the rights to all of the MNC's FSAs, regardless of where R&D, manufacturing, distribution, or marketing activities occur within the firm. Figure 1 shows an example of a sole ownership structure.

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Insert Figure 1 Here

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In the above example, the parent is the only FSA owner of the MNC. The parent owns all FSAs and contracts all other entities within the MNC to perform activities such as R&D, manufacturing and distribution. Sole ownership structures generate limited incentives within the firm since all but one entity owns no FSAs (FSA users). In Sole structures, FSA users earn a guaranteed income from their activities but have no rights to residual profits earned from FSA creation. Sole ownership structures centralize operational risks such as development, market penetration, and warranty risks into one entity. They also allow for centralized coordination and control. Information flows from the FSA users to the one FSA owner and from the one FSA owner to the FSA users. However, since all FSA users report to the one FSA owner, bounded rationality can limit the FSA owner's ability to identify the best investment opportunities.

Sole ownership structures are administratively simple, easy to manage, and efficient in that only one FSA-owning entity – usually the parent – contracts with FSA users throughout the firm. Sole ownership structures limit disputes and bargaining problems between MNC entities regarding the allocation of returns since there is only one FSA owner within the firm.

*Shared Ownership*

Shared ownership of FSAs occurs when two or more entities co-own all of the MNC's FSAs. Under a shared ownership structure, the costs, risks, and benefits of the FSA are shared between owners based on relative contribution to the FSA, geographical region, or field of use. Figure 2 provides an example of a shared ownership structure based on geographical region.

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Insert Figure 2 Here

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In the above example, the French entity owns the European rights to the FSAs and the parent firm owns the U.S. and Asian rights to the FSAs. The FSA owners are responsible for licensing the FSAs and contracting the FSA users for products or services distributed within their region. The FSA owners share the costs of developing the FSAs, and share the risks and returns based on geographical regions. Thus, if the U.S. and Asian revenues combined represent 65 percent of the total revenues of the MNC, the U.S. FSA owner pays for 65 percent of the development costs.

In shared ownership structures, the co-owners share incentives, control, and risks, which can increase the MNC's ability to expand geographically and engage in more risky investment projects in the hopes of furthering growth. For these firms, joint ownership incentivizes sharing knowledge and collaborating to increase total FSA value. Shared ownership structures offer the greatest potential to coordinate within the firm in that different FSA owners can manage regions, divisions or units and work with other FSA owners to decide the best strategic actions to take.

An important disadvantage of shared ownership is that FSA co-owners have veto power over decisions related to the FSA. Bargaining problems may arise between the co-owners and differences of opinion could lead to non-optimal decision making.

*Separate Ownership*

Separate ownership occurs when two or more entities within the MNC own different FSAs. For example, the Singapore affiliate of a consumer goods company may own the rights to a technology and a UK affiliate may own the rights to a brand. Alternatively, the FSA ownership may be separated based on technologies, products, localized relationships, brand names, or a mix of the above. Figure 3 provides an example of a separate ownership structure.

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Insert Figure 3 Here

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In the above example of separate FSA ownership, there are four FSA owners. Each FSA owner owns a distinct FSA. The U.S. entity owns the FSAs associated with its manufacturing processes and is able to keep the profits associated with its manufacturing activities. The South Korean entity owns the rights to the brand name and marketing intangibles for the South Korean market. The South Korean entity pays the parent and French FSA owners royalties for the products that it sells. Since the South Korean entity owns the rights to the brand intangibles, it bears the risks associated with market penetration and brand development in its region and is able to keep any profits from the brand intangibles. This incentivizes the South Korean entity to create brand value in its region. The parent and French entities are responsible for developing their own product groups and bear the risks as well as returns from their efforts. The U.K. manufacturer and German distributor do not own the rights to any FSAs. Instead they earn set returns on their manufacturing costs.

By dispersing risk and control rights to FSAs throughout the firm, separate ownership structures create market-like incentives. In comparison to sole ownership structures, separate ownership structures can improve MNC investment decisions since the entities that are best positioned to make decisions about FSAs own and control them. Separate ownership tends to create fewer bargaining problems than shared ownership since each FSA owner has full control over an FSA and does not need another party's approval to make a decision.

Despite their advantages, separate ownership structures can increase the difficulty of leveraging innovations and best practices across the firm. Separate ownership structures are more administratively complex than sole and shared ownership structures since the different FSA owners act as "mini firms" within the MNC. Information flows between the FSA users and the particular FSA owner(s) with which they contract. If an FSA owner were to use an innovation from another FSA owner, it would have to pay the other FSA owner a royalty for the innovation. Therefore, separate FSA owners have the incentive to develop innovations themselves and not to source knowledge from other FSA owners. When information is shared, cross licenses need to be negotiated within the firm. This can create bargaining problems and increase internal

contracting costs. Additionally, separate structures can make it difficult to inventory the kinds of knowledge that reside with different FSA owners throughout the firm.

*Mixed Ownership*

Mixed ownership occurs when two or more entities within the MNC share ownership of at least one FSA and at least one entity owns a separate and distinct FSA. For example, in a consumer product company, one entity may own the rights to old technology associated with the legacy product lines and two entities may share the rights to new technology, which is associated with the new product lines. Figure 4 provides an example of a mixed structure.

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Insert Figure 4 Here

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The mixed structure is basically a combination of both the shared and separate structures. In the above example, the French entity and parent share ownership of the MNC's product intangibles based on geographical region. The U.S. manufacturer also separately owns the manufacturing process intangibles and South Korea owns the brand intangibles.

Mixed ownership structures provide the ability customize ownership of the FSAs owned by the MNC. Mixed ownership structures are the most operationally complex. Having different FSA owners and co-owners means that the firm may experience problems with power struggles and bargaining. Mixed ownership structures can have operational overlap if multiple FSA owners contract with the same FSA users. This creates administrative complexity for managing the different FSAs, activities, transactions, and returns across the MNC. It is therefore not surprising that among the firms in our sample, very few choose this type of structure to organize internal ownership rights to FSAs.

*Tax Haven FSA Ownership*

Tax haven FSA ownership occurs when MNCs locate all or part of their FSAs in low tax jurisdictions. Examples of tax haven locations include Ireland, Luxembourg, Singapore, and Cayman Islands (OECD, 2000). Tax haven countries typically implement a combination of

policies designed to attract MNCs, including low tax rates, minimal currency and banking controls, confidentiality, low interest rates on loans, and high interest rates on deposits.

Tax haven FSA ownership can occur in any of the FSA ownership structures. Not all MNCs use tax havens to own FSAs. In our sample, 42 percent of MNCs have tax haven FSA owners and 17 percent of the sample (38% of the tax haven FSA owners) have what can be considered "pure tax haven" FSA owners – FSA owners that are located in tax havens and do not perform R&D, manufacturing or distribution activities in these locations. When a tax haven FSA owner has operational activities such as R&D, manufacturing or distribution, the employees within the tax haven entity typically make strategic and operational decisions regarding the FSAs. When tax haven FSA owners have no operational activities, the parent typically makes the strategic decisions regarding the FSAs.[1]

**THEORY**

To balance the need for motivation and coordination in FSA creation and maintenance, firms use a number of mechanisms including job design, employee stock ownership, and compensation (Holmstrom and Milgrom, 1991; Wang et al, 2009). However, since performance can be difficult to measure and monitoring is costly, Holmstrom and Milgrom (1994) argue that these mechanisms enable only a very limited set of activities to be effectively rewarded. In cases where these mechanisms fail to provide adequate incentives, Holmstrom and Milgrom (1994) maintain that asset ownership can be a "broader, more powerful incentive instrument" (p. 972) by enhancing the bargaining power of asset owners and rewarding their investments in the asset. Property rights theory draws the same conclusions, suggesting that asset ownership provides control over and income from the asset and thus will be the most efficient way to incentivize investment.

[1] Our regression models are at the MNC-level. Thus, it is beyond the scope of our investigation to combine an analysis of MNC FSA ownership structures with affiliate-level location choices. We therefore deal with the tax haven issue by simultaneously estimating a model of structure choice with a model of the decision to own FSAs in a tax haven.

FSA ownership structures vary in the degree of centralized coordination they enable by allocating all FSA ownership rights to a single unit versus the "market-like" incentives they create by assigning FSA ownership rights to dispersed units within the firm. Because sole ownership structures are particularly advantageous for small firms, we believe that the choice is primarily a function of firm size, rather than FSA type. Similarly, since firms with mixed structures choose to own their FSAs both separately and shared between units, we do not have strong theoretical predictions at the firm level as to why mixed structures would be chosen over shared or separate structures. We therefore focus our predictions on the choice between shared and separate ownership structures.

**Property Rights, FSA Contractibility and Ownership Structure**

Teece (1986) argues that firms exist to capture the returns from complementary activities. However, when different units of the firm work together, conflicts and bargaining problems can arise with regard to how to divide the returns – particularly when the complementary activities involve knowledge creation. Holmstrom and Roberts (1998) write, "Information and knowledge are at the heart of organizational design, because they result in contractual and incentive problems that challenge both markets and firms" (p. 90). Although integrated firms might be in better than independent organizations at capturing the returns from knowledge transfers, "the problem of knowledge transfers can be viewed as part of the more general problem of free-riding when independent parties share a common asset" (Holmstrom and Roberts, 1998: p.91). When free-rider problems arise, incentives to invest in knowledge creation are muted.

Investment distortions arise, in part, because the ownership of non-human assets affects the incentives to invest in human and other intangible assets such as marketing, relationships, and knowledge creation (Hart and Moore, 1990; Feenstra and Hanson, 2005; Holmstrom and Roberts, 1998). It is costly and difficult to measure and evaluate investments in intangibles, and frequently, it is not clear *ex ante* how much and what kinds of investments in these assets are the most appropriate. Thus, contracts for the provision of services related to human and intangible assets (FSAs) are nearly always incomplete – even within firms (e.g., Grossman and Hart, 1986;

Hart and Moore, 1990). When it is not possible to write complete contracts and bargaining is costly, property rights theory suggests that assigning FSA ownership to the relevant entities within the firm will mitigate investment distortions. According to property rights theory, the "relevant" entity to which FSA ownership and control rights should be assigned is the entity that is in the best position to make important investments in the FSA (Grossman and Hart, 1986).

Although assigning property rights to FSAs can help resolve hold-up problems stemming from incomplete contracts, firms face several trade-offs related to using this mechanism internally. First, assigning property rights can potentially impede knowledge sharing within the firm to the extent that they serve as a "pay wall" to important firm know-how. In this sense, assigning property rights within firms clearly diminishes some of the potential benefits of internalization. For example, if a firm's knowledge cannot flow freely within its own boundaries internal spillovers from knowledge creation will surely be attenuated. As previously discussed, some FSA ownership structures actually constrain the type and direction of knowledge flows within firms. Second, some kinds of knowledge assets are more "contractible" than others. When complete contracts cannot be written that outline all possible rights and responsibilities of FSA owners, the same kinds of contracting problems that occur at the boundaries of the firm are likely to occur within firms.

The degree to which goods, services and assets are "contractible" is related to how easily they can be observed, separated, measured, evaluated, and whether they require relationship-specific investments and investments in intangibles. By definition, it is easier to write complete contracts for goods, services and assets that are more "contractible." Because markets provide stronger incentives for performance than firms, transaction cost theory predicts that when complete contracts *can* be written, transactions are more efficient when undertaken by independent parties in markets. In empirical research on transaction cost theory, there is considerable evidence that contractible goods or services are more likely to be exchanged in markets, rather than within firms (i.e., "bought" rather than "made") (see, e.g., Anderson and Schmittlein, 1984; Masten, 1984; LaFontaine and Slade, 2007). Property rights theory and

empirical research comes to analogous conclusions (see, e.g., Lerner and Malmendier, 2010; Elfenbein and Lerner, 2003; Kaplan and Stromberg, 2003). According to this literature, when complete contracts *cannot* be written, market-like incentives can be achieved by assigning "residual rights" ownership of important productive assets to the entity that is best positioned to decide how the assets should be used. The assumption that problems related to incomplete contracts can be resolved by exchange within firms is much stronger in transaction cost theory than in property rights theory (Grossman and Hart, 1986).

The difficulties in contracting for FSAs are similar to those that arise in transactions for knowledge. Because FSAs are often intangible and are costly to develop and maintain, firms have an interest in creating *internal* structures that provide high-powered incentives to invest in FSAs. Separate FSA ownership structures share many of the same features as markets. They provide strong incentives for FSA-owning units within the MNC to create and maintain FSAs. These structures grant the FSA-owning units decision and control rights to the FSAs and require these units to undertake the associated risks. In return, FSA-owning units have the right to keep the residual profits associated with their endeavors. Because ownership of FSAs is dispersed throughout the firm and control rights are disaggregated, separate structures trade off central control and coordination for high-powered incentives to innovate. We argue that MNCs will be willing to make this trade-off when FSAs are more contractible. When FSAs are easy to measure, observe and evaluate, structures that allocate FSA ownership and control rights to these entities will generate fewer investment distortions.

When FSAs are difficult to measure, observe or evaluate, or when FSAs require knowledge inputs from more than one unit within the firm, structures that enable units to collaborate and monitor each other's inputs are likely to generate fewer investment distortions. In contrast to separate structures, shared structures allow the MNC to reap the maximum benefit from complementary assets. In this sense, shared structures trade off market-like incentives for coordination and control. In shared structures, costs, risks and responsibilities for FSA creation and maintenance are shared by two or more units within the firm and these units share residual

profits generated by the FSAs. Knowledge flows freely between units that co-create FSAs, and "pay walls" do not exist between entities that share FSA ownership rights. Although property rights theory argues that joint ownership of assets is never optimal in that it grants veto rights over assets to more than one entity (Hart and Moore, 1990; Holmstrom and Roberts, 1998), it also it also states that "assets that are worthless unless used together should never be separately owned (Holmstrom and Roberts, 1998: p.78)."

Applying this insight to asset ownership within firms, we expect firms not to use separate ownership structures when FSAs require inseparable contributions by more than one entity within the firm. Contributions may be inseparable due to problems of measurement and observability, or they may be inseparable in the sense of having no stand-alone value. In cases of nonseparability, contracts detailing FSA ownership rights will be nearly impossible to design, and therefore, separate FSA ownership structures will distort incentives for investment.

Property rights theorists might argue that sole structures would be superior to shared structures in cases of extreme non-contractibility. In markets, shared owners such as alliance and joint venture partners can destroy a venture if conflicts arise with regard to value creation and profit sharing. These conflicts are important reasons why so many shared ownership arrangements like joint ventures ultimately fail. However, within firms, using sole FSA ownership structures when non-contractible contributions are required by more than one division can be very costly with regard to the lack of incentives these structures give to non-FSA-owning units. Hierarchies facilitate the use of shared asset ownership in important ways that markets do not. First, the parent entity can intervene to resolve intra-firm disputes. Second, MNC parents are often FSA co-owners in shared structures, which further reduces the potential for costly disputes (since one of the owners has the power of fiat). Indeed, recent literature on property rights theory questions the premise that joint ownership is never optimal and suggests that in some cases, the gains from sharing ownership outweigh the potential costs (e.g., Hart 1995; Matouschek, 2004). Since hierarchies resolve many of the potential hold-up costs related to sharing ownership, we expect that firms will be more likely to use shared structures if the firms'

FSAs are less contractible. Shared ownership of inseparable assets creates incentives for the FSA co-owners to invest to increase the total value of the asset. In this sense, Shared ownership structures are likely to be superior to Sole ownership structures.

**Hypotheses**

We predict that two dimensions of FSA contractibility— independence versus complementarity and codifiability versus tacitness— will be associated with MNC decisions with regard to FSA ownership structures.

*Independence versus Complementarity*

Independent assets are non-synergistic assets (Hart and Moore, 1990). They are often idiosyncratic to different parties. When FSAs can be clearly associated with only one unit within the firm and are therefore "independent" separate ownership structures will be superior to all other ownership structures. Separate ownership structures provide market-like incentives for developing and maintaining the FSAs to the entities within the firm that are best positioned to invest in the FSAs. Because no additional value is created from common ownership, the costs associated with shared control are expected to outweigh the benefits.

In MNCs, there are two potentially different reasons why some FSAs are more independent than others. First, some FSAs are clearly related to the local operations of individual foreign affiliates and are not related with FSAs developed by other units of the firm. This is often the case with FSAs like customer relationships and services. Second, some FSAs do not require the contributions of more than one entity within the firm. This is often the case with process-related FSAs that may be intentionally or accidentally discovered as a result of variation in routines within a particular unit of the firm (Nelson and Winter, 1982).

In contrast, complementary assets provide synergistic value by being owned together. As we discussed above, when FSAs are complementary, separate ownership structures are never optimal. Thus, we advance the following hypothesis:

*Hypothesis 1: MNCs with independent (complementary) FSAs will be more likely to have Separate (Shared) ownership structures and less likely to have Shared (Separate) ownership structures.*

*Tacitness versus Codifiability*

Tacitness refers to the extent to which knowledge or some knowledge-based asset is non-codifiable and requires application to be observed. Research on the knowledge-based view of the firm (KBV) has given significant emphasis to the problems inherent in transferring tacit knowledge (e.g., Grant, 1996; Kogut and Zander, 1992, 1993; Teece, 1977; Martin and Solomon, 2003). Tacitness is perhaps the most important feature of knowledge contractibility. When knowledge is embedded in complex routines and decision rules, the cost of transferring it can become prohibitively high, effectively making it non-contractible. Tacit knowledge has been found to significantly increase the costs of transferring knowledge abroad (Teece, 1977), to reduce the perceived ease of internally transferring specialized marketing know-how (Simonin, 1999), and to increase the time it takes to make new knowledge work well after it has been transferred (Galbraith, 1990).

When the knowledge underlying FSAs is more tacit, FSAs are less contractible. In such instances, MNCs will be less likely to use separate structures to allocate FSA ownership rights. Since separate structures create "mini firms within the MNC," these structures enhance the difficulty of measuring and monitoring affiliates' contributions and the difficulty of transferring knowledge across the firm. To the extent that some FSAs are more difficult to measure and evaluate in the first place, the problems inherent in separate structures will be exacerbated.

*Hypothesis 2: MNCs with tacit (codifiable) FSAs will be more likely to have Shared (Separate) ownership structures and less likely to have Separate (Shared) ownership structures.*

## METHODS

### Data

The analyses are at the MNC-level. To examine our predicted relationships we use a new

confidential panel data set on internal FSA ownership and transactions within MNCs. The dataset was compiled from several sources. First, information on the types of FSAs owned by the MNCs and the FSA ownership structures were taken from transfer pricing reports provided to us by a consulting firm. MNCs are required by tax authorities to document their intra-firm transactions each year in transfer pricing reports that determine whether or not the intra-firm transactions are at market price.[2] The transfer pricing reports discuss in detail the contractual relationships and transactions between MNC entities, the FSAs owned by the MNC entities, and the activities performed by each entity in the transactional relationship. Second, MNC financial data was gathered from Bureau Van Dijk's Orbis database. The Orbis database contains income statement, balance sheet, business segment, and industry information on public and private firms located worldwide. Third, public and private merger and acquisition data for each MNC was collected from Thomson Financial Worldwide Merger and Acquisitions database.

**Sample**

We note that there are obvious sample selection biases related to our data source. All MNCs in our sample sought the services of a consulting firm that specializes in advising MNCs with regard to transfer pricing strategies and other related activities. However, many MNCs seek the services of such firms, and all MNCs with material intra-firm transactions have to fill out transfer pricing reports. Thus, we do not believe our sample of firms is unusual.

Our raw sample contains data on 102 MNCs over the 2000-2012 time window. Altogether there are 672 organization-year observations on the 102 MNCs. The number of years

[2] According to U.S. Treasury Regulations Section 1.482, Organization for Cooperation and Development (OECD) Transfer Pricing Guidelines, and various other local country requirements, MNCs must document each year their intra-firm transactions in transfer pricing reports. Although documentation requirements are country-specific, many countries follow the OECD Guidelines for transfer pricing and most countries require that all material related-party activities are documented contemporaneous with the firm's tax filing (E&Y, 2013). The purpose of transfer pricing reports is to test whether or not their intra-firm transactions are at market price and then document the analysis and results in the reports. In order to test that the internal transfer price for each transaction is consistent with the external market price, the activities performed by the MNC entities, their risks, and the economic ownership of intangible assets must be taken into account. Therefore, the transfer pricing reports provide detailed descriptions of the products and services, intangible assets owned, and activities performed by the entities. Intra-firm agreements are typically included as appendices to the reports.

of data for each MNC ranges from 3 to 13 years. Orbis had financial information on 514 of the 672 MNC-year observations. In order to avoid unnecessary loss of observations in the sample, data were entered from the company consolidated financial statements used for the transfer pricing reports when Orbis data were missing. Consolidated financial data were missing for 80 observations leading to a total of 592 MNC-year observations after merging the financial and FSA ownership data. Lagging the independent variables reduced the sample by 105 observations. The final sample contains 487 MNC-year observations on 88 MNCs.

The data was coded and compiled under strict confidentiality. For this reason, no company names or company-specific information can be identified. Therefore, only means, standard deviations, percentages and other statistical measures are reported and all qualitative examples are redacted to disguise identity.

The sample comprises a diverse group of MNCs. The firms in the sample operate in a broad range of industries including consumer goods, pharmaceutical, semiconductor, retail, and financial service firms. Approximately 76 percent of the MNCs in the sample were headquartered in the United States, 15 percent in Europe, 2 percent in Asia, and the remaining seven percent were headquartered in other regions. A total of 20 percent of the firms in the sample are private. There is large variation in the size of MNCs in the sample, with a heavily right-tailed distribution. The sample average MNC revenue is USD 11.0 billion, with a standard deviation of USD 37.9 billion.

**Variables**

Dependent Variable – *FSA Ownership Structure* is operationalized as a binary indicator set equal to 1 for Shared FSA ownership structure and 0 for Separate FSA ownership structure. A categorical variable was also created, coded 1 for Sole, 2 for Shared, 3 for Separate, and 4 for Mixed ownership structure. These mutually-exclusive categories were coded based on the

detailed descriptions of FSA ownership provided in the transfer pricing reports.[3] Appendix – Table 1 contains examples of the qualitative descriptions used in coding the variable.

*Independent Variables*

*MNC FSAs and FSA Contractibility Dimensions*. The transfer pricing reports contain lengthy qualitative descriptions of the FSAs owned by the MNC. Underpinning these FSAs are flows of licensing revenues between MNC entities. Thus, transfer pricing reports describe the bundle of skills, knowledge, routines, processes, technologies, patents and other firm value-drivers that are owned or co-owned by one or more entities and contracted or licensed to other entities within the firm.

We had several choices with regard to how to use this data to create the key explanatory variables used in this research. First, we could identify the firms' FSA or FSAs, using the detailed descriptions. The problem with this approach – although we report robustness results that use this approach here – is that firms' descriptions of their value drivers rarely identify unique, stand-alone FSAs.[4] A second approach that we use here is to remain agnostic as to what the FSAs actually are, but instead use the FSA descriptions to code the features of the MNC's bundle of FSAs. We used word counts to construct the two hypothesized contractibility dimensions (tacit vs. codifiable and independent vs. complementary). We created a list of potential words for each end of the two dimensions (tacit and codifiable for Tacit Scale and

[3] Economic ownership of MNC FSAs is supported by legal contracts between entities, risk bearing, and transactional payments and flows within the MNC.

[4] For example, a firm might indicate that its primary source of value is its ability to create new products as well as the brands and trademarks it currently owns. In this simple case, it is not clear whether the firm's FSA is product innovation or the brands and trademarks it owns or both. We created four FSA categories (1) Manufacturing Processes, (2) Expertise and Relationships, (3) Product Innovation, and (4) Trademarks and Brands. We assigned as many FSA categories to each firm as we thought the descriptions conveyed. Thus, we would have categorized the firm above as having "Product Innovation" and "Brands" FSAs. This labeling scheme is problematic for two reasons. First, in some cases there may be only one identifiable revenue flow (from licensing) associated with the bundle of FSAs, so naming more than one FSA category causes identification problems. Second, from a theoretical standpoint, we considered Product Innovation to be more tacit and Brands to be more codifiable, so it is not clear what kind of a structure we would predict from theory. Despite the problems with this approach, we use it here primarily for the sake of illustrating interesting properties of our data. An alternative approach is assigning each firm to a unique FSA category based upon the description in the transfer price reports. At this point, we are hesitant to do this because it is often not straightforward which skill, asset, process, technology, etc. is the "primary" value-driver of the firm.

independent and complementary for Independent Scale). The words and phrases were selected to be consistent with prior research (e.g., Grant, 1996; Ambrosini, 2001; etc.). The lists were narrowed by eliminating duplicate words, words that were only used once or twice, or words that were often used to mean many different things. Appendix — Table 2 contains the final list of words. Once the word list was created, the relevant sections of the transfer pricing reports were searched for each of the listed words in the descriptions to form preliminary counts of "Tacit," "Codifiable," "Complementary," and "Independent" words. For example, in the phrase, "…these new innovations are fundamentally distinct from, and do not rely upon, the technologies used in the past…." the word "innovations" would be counted as tacit and the word "distinct" would be counted as independent. The count of words was then cleaned by reviewing the text again to ensure that, for example, words like "suite" referred to a suite of products or applications rather than an address. In cases, where the words were out of context, the count was changed to exclude the irrelevant observations.

After finalizing the word counts, we created scales from the word counts for the two contractibility dimensions (Jap, Robertson, and Hamilton, 2011). *Independence Scale*, is operationalized as the total count of independent words minus the total count of complementary words divided by the natural log of total words searched. A positive value of Independence Scale indicates that the MNC's bundle of FSAs is independent, whereas a negative value indicates that the MNC's FSAs are complementary. Similarly, *Tacit Scale* is measured as the total count of tacit words minus the total count of codifiable words divided by the natural log of total words searched. A positive value of Tacit Scale indicates that the MNC's FSAs are tacit, whereas a negative value indicates that the MNC's FSAs are codifiable.

*Control Variables*

*Firm Size.* We controlled for Firm Size using the natural log of the total number of MNC subsidiaries, lagged by one year. The average firm in the sample had 72 subsidiaries, with a standard deviation of 118. We expect small MNCs to be more likely to have a Sole ownership structure and larger MNCs to be more likely to have Shared, Separate, or Mixed structures. We

use the number of subsidiaries as a measure of size rather than assets or sales because we expect that the complexity of the MNC will rise significantly with affiliate network size. To show this, we also include the squared number of MNC subsidiaries. As network size increases, the administrative costs of the more complex structures rise dramatically. We therefore expect to see the largest MNCs using sole ownership structures to reduce organizational costs. Firm Size and Firm Size Squared are mean-centered in our regression estimates.

*R&D Intensity.* We control for MNC R&D Intensity in order to take into account the relationship between innovation activities and structure choice. R&D Intensity is measured as R&D expenditures in the prior year divided by total revenue in the prior year. We expect this measure to be positively associated with Shared and Mixed ownership structures.

*Diversification.* We use a one-year lagged total entropy diversification measure to capture the diversity of a firm's activities (e.g. Palepu 1985). The measure was calculated using the business segment information from Orbis and, in the case where Orbis data was unavailable, from the consolidated financial data in the transfer pricing reports. This variable equals zero for single business firms and increases with greater levels of diversification. We expect Diversification to be positively associated with Separate ownership structures since diversified firms should be more likely to have independent FSAs.

*Number of M&As.* We define an acquisition event as an MNC acquiring or merging 100 percent with a target firm. The variable is calculated as the sum of the total number of acquisitions and/or mergers that an MNC made in the prior year. On average, the MNCs in the sample engaged in one M&A in a given year. Since post-merger integration is costly and complex, we expect MNCs that undertake a greater number of acquisitions will be more likely to use Separate or Mixed structures.

*Tax Haven Ownership.* Tax Haven ownership is a binary indicator variable, set equal to one if the MNC has at least one FSA owner incorporated in a tax haven. Tax Haven countries were identified based on the OECD's list of tax haven countries (OECD, 2000).

In all regressions, we controlled for industry using dummy variables for Service,

Manufacturing and Other industries. We controlled for time using a time trend. All independent variables are lagged by one year.

**Estimation**

We proceed with our analysis in three parts. First, we estimate a probit model of the choice between Shared and Separate structures, excluding firms that use Mixed or Sole structures. Second, using the same sub-sample, we estimate a bivariate probit that combines the choice between Shared versus Separate structures and the choice to have an FSA owner located in a Tax Haven. We believe these are endogenous and interrelated decisions. The bivariate probit, which is a variation of the standard Heckman model, allows us to estimate the two decisions together. Third, as an exploratory analysis, we use a multinomial logit model to examine the choice set of FSA ownership structures.[8] All errors are clustered to account for repeat observations on MNCs.

**Results**

*Descriptive Statistics*

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Insert Tables 1 and 2 Here

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Table 1 contains descriptive statistics on MNC characteristics, FSAs and FSA dimensions by ownership structure. We use superscripts to denote significant differences between structures. We number each structure 1-4 (Sole, Shared, Separate and Mixed). Thus, the statistics for revenue can be interpreted as follows. The average of the natural log of revenue for MNCs using a sole structure is 12.62. The superscripts 2,3,4 indicate that 12.62 is significantly different from

[8] The multinomial logit (MNL) estimates are problematic due to the fact that (1) the choice processes for the different structures are not the same (e.g., firms do not go directly from Sole to Mixed) (2) some FSA ownership structures can be viewed as substitutes for each other (e.g., Mixed ownership structures might be used as a substitute firms choosing to change from Shared (Separate) to Separate (Shared) ownership structures). Thus, the inclusion of Mixed structures clearly violates IIA. We therefore report MNL results on a truncated sub-sample of MNCs that excludes 37 firm-year observations with Mixed ownership structures.

the corresponding values for all of the other structures. Looking down the table, we can see large differences in some of the variables for each structure.

Table 2 contains descriptive statistics and correlations for the full sample of MNCs. The highest correlation in Table 2 is between Firm Size and the Number of M&As (r=0.44). We enter M&As and Diversification into the regressions separately from Firm Size.

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Insert Figure 5 Here

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Figure 5 presents the distribution of FSA ownership structures in our sample and the proportion of firms using each structure that have a "Pure" tax haven FSA owner. Not surprisingly, MNCs with sole structures almost never allocate FSA ownership rights to pure tax haven affiliates. Pure tax haven use is much more prevalent in Shared structures (55% of observations) as compared to Separate ownership structures (11% of observations). MNCs using Mixed structures are the most prolific users of pure tax haven subsidiaries (59% of observations).

Figure 6 shows the FSA categories and the degree to which they are owned in Shared versus Separate structures. The bars on the chart represent the percentage of total observations that have Shared versus Separate structures. Some fascinating results emerge. First, *100% of MNCs with Manufacturing Process or Expertise and Relationship FSAs use Separate structures!* This is consistent with Hypothesis 1 in that these FSAs are typically independent. Thus, we would expect them to be separately owned. Consistent with Hypothesis 2, MNCs with tacit FSAs like product innovation are much more likely to use Shared than Separate structures.

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Insert Figure 6 Here

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**Regression Results**

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Insert Table 3 Here

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In Table 3, we report probit results with the dependent variable set equal to 1 for Shared ownership structure. We remove MNCs with Sole and Mixed ownership structures from these estimates. Column 1 contains the control variables Firm Size, Size Squared, R&D Intensity, the time trend and dummies for Manufacturing and Other industries (Service industries is the referent category). Column 2 contains simple probit estimates of the base model with the Tacit and Independent scales added. The pseudo-$R^2$ more than doubles when we add the two FSA dimension scales. Column 3 shows the estimates of our base model with Firm Size and Firm Size Squared removed and Number of M&As and Diversification added. Columns 4 and 5 contain the bivariate probit estimates with the same independent variables as Columns 2 and 3, respectively. Finally, Columns 6 and 7 show the bivariate probit estimates using FSA categories as explanatory variables rather than FSA dimensions. We could only estimate these last two regression models using two of the four categories since 100% of MNCs with "Manufacturing Process" FSAs and "Expertise and Service" FSAs use Separate structures.

We find strong support for Hypotheses 1 and 2 in the estimates in Table 3. In the probit estimates and bivariate probit estimates in Columns 2-5, we find that MNCs with Independent FSAs are more likely to use Separate, rather than Shared ownership structures ($p<.01$) and MNCs with Tacit FSAs are more likely to use Shared rather than Separate ownership structures ($p<.05$). The estimated coefficients and standard errors for the two hypothesized scales show remarkable stability across the different probit and biprobit regression estimates.

In general, we find that smaller firms tend to use Shared rather than Separate ownership structures, and R&D Intensity is not related to the choice of Shared and Separate FSA ownership structures. MNCs that make a larger number of M&As are more likely to use Separate structures ($p<.10$, Columns 3 and 5), but Diversification is unrelated to FSA ownership choice.

Turning to the estimates in Columns 6 and 7, we see that MNCs with Product Innovation FSAs are more likely to use Shared, rather than Separate ownership structures ($p<.001$ and MNCs with Brand FSAs are somewhat less likely to use Shared ownership structures($p<.05$, Column 6; $p>.10$, Column 7). These results are consistent with the estimates in Columns 2-5 in the sense that Product Innovation FSAs tend to be more tacit and less independent, and Brand FSAs tend to be more codifiable and independent.

The bivariate probit results in columns 4 and 5 include a second set of regression estimates for which the choice to have a tax haven subsidiary is the dependent variable.[9] We do not report the results of these estimates, but in all cases, we found only one significant association—a negative and significant relationship between the choice to have a tax haven subsidiary and the Independent Scale ($p<.05$). Perhaps complementary FSAs provide greater opportunities for taking advantage of tax havens since they can be leveraged across the MNC's assets. The results suggest that the choice to use Shared versus Separate structures and the choice to have a tax haven affiliate are interrelated. However, the results also show that ***real*** considerations, such as the features of an MNC's FSAs as well as Firm Size and M&A activity are important correlates of structure choice.

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Insert Table 4 Here

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Table 4 reports the multinomial logit estimates. As discussed in footnote 6, these estimates are exploratory and we truncated the sample by removing MNCs that use Mixed FSA ownership structures. The results in Column 1 of Table 4 are similar to the results in Table 4. Compared to MNCs that use Separate structures, MNCs that choose Shared ownership structures have FSAs that are more Tacit ($p<.05$, Column 1) and less Independent ($p<.10$, Column 1). In

[9] The estimates in Columns 7 and 8 use the same bivariate probit regressors in the tax haven model. A Likelihood Ratio Test for Independence of the two regressions was significant ($p<.05$), however the bivariate probit specifications need further refinement.

Column 2, the only significant difference between MNCs that choose Shared versus Sole ownership structures is that the latter tend to be used by the largest MNCs in the sample. This is consistent with the idea that as firms grow to be extremely large, FSA ownership structures that allow for multiple FSA owners with joint control rights and their respective contracting arrangements simply become too administratively complex to manage.

Interestingly, MNCs that choose Separate structures are larger, on average than MNCs that choose Sole structures ($p<.01$, Column 3). However, the very largest MNCs are equally likely to choose both structure types. Finally, consistent with property rights theory, MNCs with Independent FSAs are more likely to choose Separate, rather than Sole FSA ownership structures ($p<.10$, Column 3). This suggests that when FSAs have no synergistic value, firms choose disaggregated ownership structures that provide market-like incentives for FSA development and maintenance to individual affiliates throughout the MNC.

We performed several robustness tests to check the sensitivity of our results. First, we included additional controls in our regressions such as a binary indicator for whether the firm is a public or a private firm and binary controls for whether the MNC is incorporated in the US, Europe, or elsewhere. Second, we used alternative measures for some of the controls in our regressions. For example, we replaced MNC number of subsidiaries with MNC revenues as well as MNC total assets, Diversification with the total number of four-digit SIC codes in which the MNC operates, and the Number of M&As with M&As activity defined as acquiring greater than 5% of the company. Third, we entered highly correlated variables into the regressions one at a time and also ran the regressions without Firm Size Squared. The results of these additional analyses on our theoretical variables of interest were consistent with the results reported herein.

**DISCUSSION**

This study investigates how MNCs internally organize ownership of their FSAs. Our findings suggest that the problems associated with incomplete contracts are not fully resolved by bringing an activity inside the firm. *From the standpoint of property rights and transaction cost theory, a key result of this research is that the same features of FSAs that render them more or*

*less contractible in markets also explain internal ownership structures chosen by firms*.

In contrast to the assumption that knowledge assets are public goods within MNCs (e.g., Ethier, 1986), we find these firms establish internal economic ownership structures in which FSA owners contract or license the FSAs to other affiliates and/or the parent. We identify four different types of FSA ownership structures: sole, shared, separate, and mixed. We argue that the reason that these FSA ownership structures exist is to balance motivation and coordination problems associated with contracting for knowledge. This creates internal market-like transactions and structures within the firm and, to some extent, limits the benefits of internalization such as the ability to freely access spillovers from internally created knowledge. Even within firms, free rider problems disincentivize FSA creation and maintenance. Thus, some degree of excludability is necessary for successful FSA development within firms. To this end, *MNCs choose different structures to delegate internal residual rights ownership of their most important knowledge assets—including assets for which contracts are extremely difficult to write.* Although these assets are considered to be non-contractible in markets (e.g., Dunning, 1980), they are extensively contracted and licensed within MNCs.

Our research draws on property rights theory to understand the decisions that MNCs make with regard to the internal ownership of FSAs. *Consistent with our predictions, we find that when FSAs are highly contractible, MNCs use separate structures, or "mini firms within the firm," to organize internal FSA ownership*. In separate structures, individual units within the firm own and control the FSAs in which they are best positioned to invest. Separate structures are the most common structure in our sample and have several interesting features. First, they are chosen by the vast majority of MNCs in service sector industries. Second, compared to Shared ownership structures, Separate structures are much less likely to be used by firms that use of "pure" tax haven FSA owners. Since Separate structures involve the delegation of ownership along with decision and control rights to MNC affiliates, it is perhaps not surprising that these rights are not often granted to pure tax haven units that perform no other functions for the MNC.

Third, Separate structures are chosen by 100% of MNCs with Manufacturing Process,

Expertise, Services and Relationship FSAs. We believe that in addition to being independent, these FSAs are organized in Separate structures because they tend to be localized.

*A key finding in our research is that within firms, shared ownership structures are much more likely to be used when FSAs are tacit and complementary*. These structures are not very widely used by firms in our sample – most likely due to the potential bargaining problems they create. The theoretical link between internal shared structures and the predictions of property rights theory is complex. In general, property rights theory maintains that two independent entities should not share ownership of complementary assets (Hart and Moore, 1990).[10] Rather, one entity or the other should own the assets and divide the returns. Hart and Moore (1990) refer to this as "integration," meaning only one entity owns the asset. "Integration" is analogous to ownership in hierarchies rather than markets. Within the firm, however, potential hold-up problems that arise due to the shared veto issue are mitigated by the fact that the parent entity can always resolve internal conflicts by fiat. Indeed, MNC parents are often FSA co-owners in our sample of firms, giving them even more power to settle disputes. In this sense, the ability to manage joint ownership arrangements when FSAs are tacit or complementary or in cases where contributions of individual units within the firm are difficult to measure, is one of the most important advantages of organization in firms rather than markets.

Finally, in exploratory results we examine the correlates of Sole ownership structures. Consistent with our expectation that managers of very large firms view sole ownership structures as a way to reduce administrative complexity, our results indicate that Sole ownership structures are chosen by the very largest MNCs in the sample. Additionally, firms choose Separate structures rather than Sole structures when FSAs are independent. In such instances, Separate structures provide better disaggregated incentives to develop and maintain the MNC's FSAs.

[10] More recent work in property rights theory has taken issue with Hart and Moore's position that joint asset ownership is never optimal. Holmstrom and Roberts (1998) note that joint ownership may be more efficient when investments by more than one entity improve non-human assets (p79). Within firms, this is likely to be the case when investments are costly and capital intensive, requiring the participation of more than one unit within the firm.

It is important to note, that all structures are the result of a two-step process. First, ownership is "integrated" in the sense of being internalized within firms. Second, the choice is made within the firm to integrate FSA ownership (Sole ownership), share ownership between various units (Shared ownership), distribute FSA ownership to "mini firms within the firm" (Separate ownership) or use some hybrid of the latter two structures (Mixed ownership)

We also find that the choice of Shared versus Separate structures is interrelated with the choice to have tax haven subsidiaries. MNCs with Shared ownership structures have a larger proportion of pure tax haven FSA owners than MNCs with any of the other three structures. It therefore is no surprise the Internal Revenue Service classifies shared ownership with between US and foreign MNC entities as a tier 1 tax issue. The finding that MNCs with complementary FSAs are more likely to have tax haven FSA owners suggests that FSA characteristics may be associated with a firm's ability to take advantage of tax havens.

FSA owners can be seen as "entrepreneurs" of the firm in that they bear the operational risk and rewards associated with the firm's FSAs. In contrast to the centralized view of parent decision making and control, a number of researchers view the multinational firm as an interorganizational network (e.g. Ghoshal and Bartlett, 1990; Hedlund, 1986). The network perspective assumes that subsidiaries hold strategic roles in the development and maintenance of FSAs. Along these lines researchers studying subsidiary world mandates suggest that subsidiaries can be granted global responsibility for a product line (e.g. Birkinshaw, 1996; Rugman, 1981). Our research shares the view that subsidiaries can hold important roles in the development and maintenance of FSAs and in bearing global responsibilities. The activities of the FSA owner are not limited to domestic operations and exporting. Instead, they encompass contracting and licensing with other MNC entities. Our research suggests some subsidiaries may have power over others. That is, the FSA owner can influence the mandates that are gained and lost by the FSA users within the firm.

FSA ownership has implications for policymakers and managers alike. For policymakers, internal FSA ownership have been the subject of much scrutiny lately by

legislatures and governments around the globe (e.g. Levin and McCain, 2013; Thompson, 2012). FSA ownership has a significant effect on government revenues. Understanding the purpose and the factors that drive the selection of FSA ownership structures can provide insight into the sorts of policies that can attract MNCs to locate FSA ownership within the country. While firms vary in the extent to which they locate FSA ownership in tax havens, it is important to understand the operational antecedents of this choice.

From a managerial standpoint, our results indicate a clear association between characteristics of intangible assets owned by the firm and the internal ownership structures used to manage them. The different types of FSA ownership structures create different linkages across the units of the firm in terms of knowledge flows and financial flows.

There are many future research questions we plan to investigate. First, we want to examine firms' decisions to switch from one ownership structure to another. Although this is a relatively rare event, interesting patterns appear in the switching data such as the fact that MNCs with Shared ownership structures never switch to Separate ownership structures, but the reverse does not apply. Second, we plan to investigate MNC FSA ownership location choices at the affiliate level. We believe that such an analysis would contribute to both the product mandate literature and to the location choice literature. Third, we plan to examine at the affiliate level the relationships between ownership structures and flows of goods and services within the firm. Previous research suggests that intra-firm trade is knowledge-intensive and complex to organize within firms (Feinberg and Keane, 2006); however detailed data on transactions within MNCs have not been previously been available to researchers. With our unique data on ownership and related transactions within MNCs, we hope to shed light on basic questions related to the theory and management of multinational firms.

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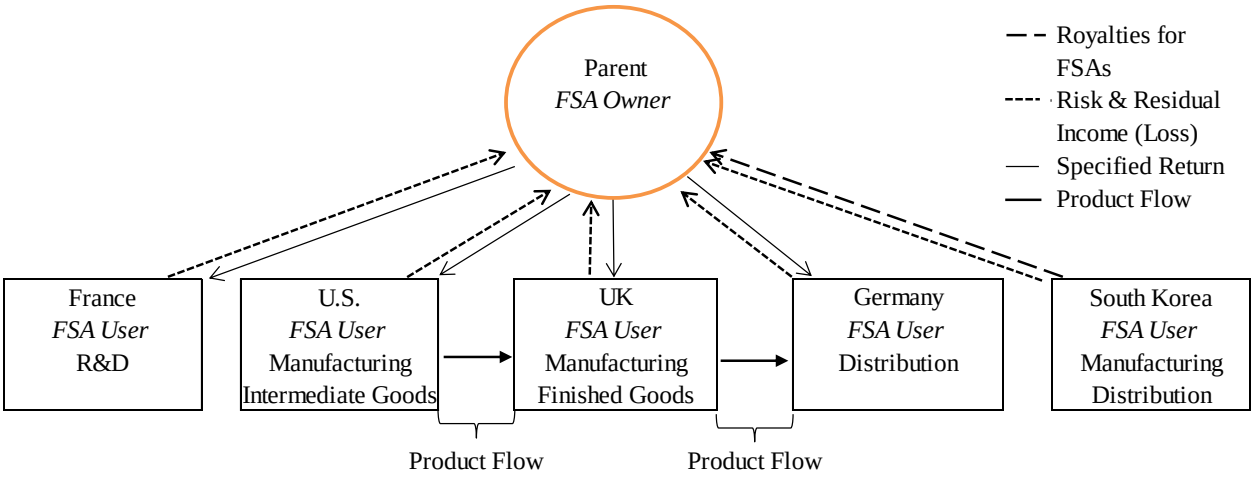
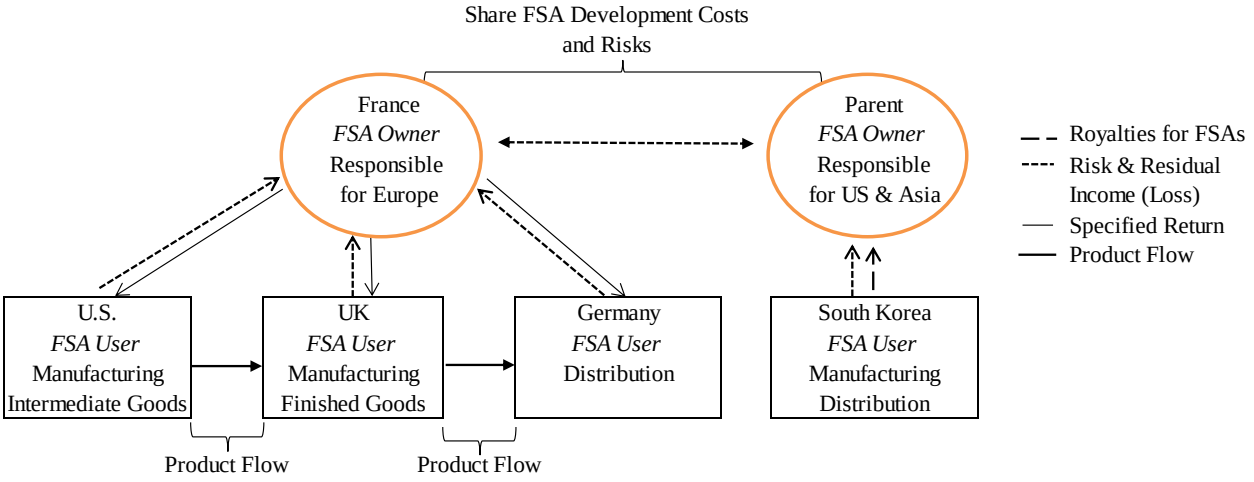
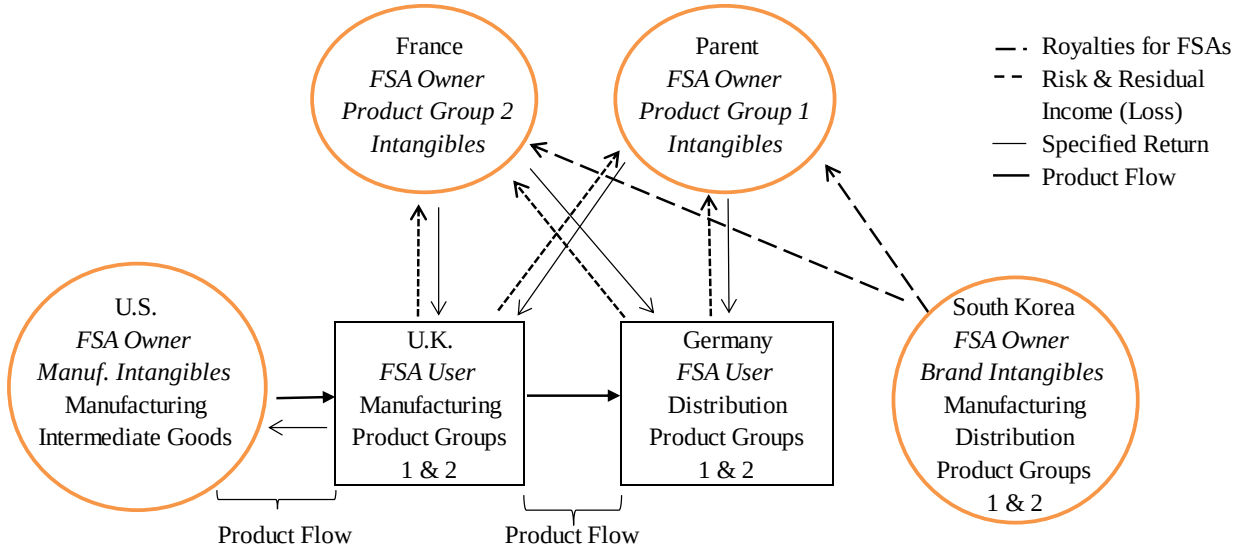
## Figure 1: Sole Ownership Structure



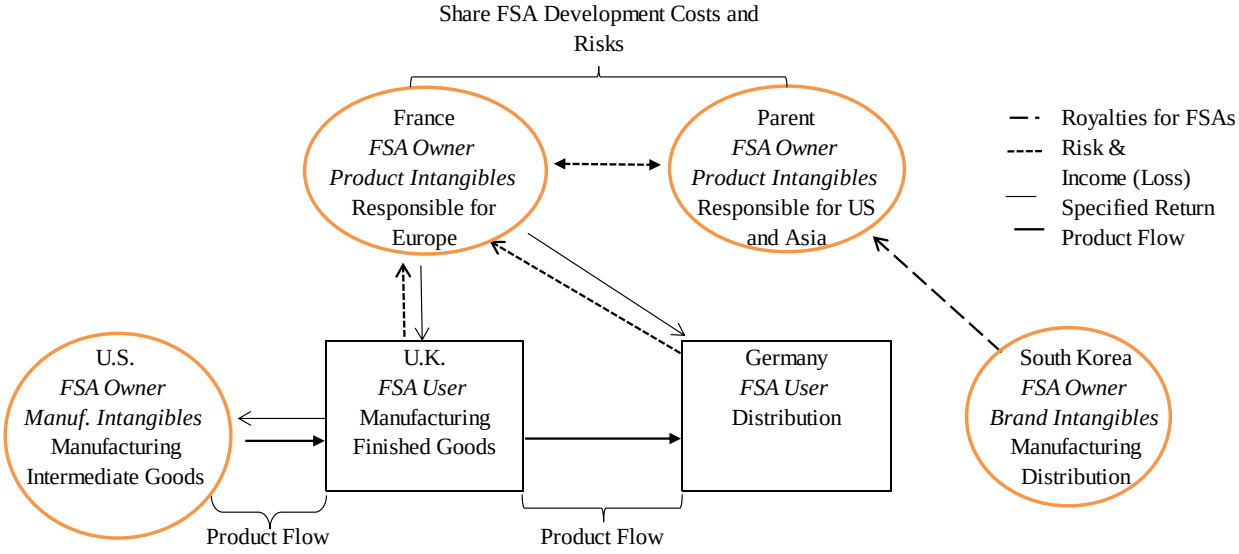

## Figure 2: Shared Ownership Structure




## Figure 3: Separate Ownership Structure



## Figure 4: Mixed Ownership Structure




## Table 1: Mean MNC Characteristics and FSAs by FSA Ownership Structure

| | All | Sole | Shared | Separate | Mixed |
|---|---|---|---|---|---|
| **MNC Characteristics** | | (1) | (2) | (3) | (4) |
| Revenue | 13.92 | 12.62 [2,3,4] | 13.41 [3,4] | 14.70 [4] | 15.83 |
| Assets | 14.43 | 13.08 [2,3,4] | 13.81 [3,4] | 15.31 [4] | 16.31 |
| Number of Subsidiaries | 3.63 | 2.91 [2,3,4] | 3.34 [3,4] | 4.02 [4] | 4.94 |
| R&D Intensity | 0.13 | 0.16 [2,3,4] | 0.19 [3,4] | 0.08 | 0.10 |
| Profitability | -0.05 | -0.13 [3,4] | -0.23 [4] | 0.06 | 0.12 |
| Effective Tax Rate | 0.26 | 0.25 | 0.24 | 0.28 | 0.19 |
| Tax Haven FSA Owner | 0.51 | 0.07 [2,3,4] | 0.84 [3,4] | 0.58 [4] | 1.00 |
| Pure Tax Haven FSA Owner | 0.19 | 0.00 [2,3,4] | 0.54 [3] | 0.11 [4] | 0.53 |
| Age | 41.66 | 32.46 [2,3,4] | 24.92 [3,4] | 57.56 [4] | 19.34 |
| Diversification | 0.32 | 0.21 [3,4] | 0.20 [3,4] | 0.36 [4] | 0.90 |
| Number of M&As | 1.14 | 0.47 [3,4] | 0.63 [3,4] | 1.68 | 2.06 |
| **Contractibility** | | | | | |
| Tacit Scale | 1.15 | 1.74 [2,3] | 3.12 [3,4] | -0.14 [4] | 1.43 |
| Tacit | 31.59 | 33.14 [2,3,4] | 46.96 [3,4] | 24.75 | 23.75 |
| Codifiable | 19.43 | 14.21 [3,4] | 14.13 [3,4] | 26.50 [4] | 8.72 |
| Independent Scale | -0.68 | -0.84 [2,3,4] | -1.53 [3,4] | -0.23 [4] | -0.48 |
| Independent | 6.02 | 4.73 [3] | 6.74 [4] | 6.80 [4] | 3.78 |
| Complementary | 13.41 | 13.71 [2,3,4] | 22.97 [3,4] | 9.53 | 8.78 |
| **FSAs** | | | | | |
| Product Innovation | 0.68 | 0.71 [2,3,4] | 0.93 [3] | 0.52 [4] | 0.91 |
| Manufacturing Processes | 0.19 | 0.23 [2] | 0.00 [3,4] | 0.23 | 0.38 |
| Trademark and Marketing | 0.51 | 0.55 [2,4] | 0.30 [3,4] | 0.54 [4] | 0.78 |
| Expertise and Services | 0.09 | 0.03 [2,3,4] | 0.00 [3,4] | 0.17 [4] | 0.00 |

**Table 2: Descriptive Statistics and Correlations[11]**

| | | Mean | s.d. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Shared | 0.21 | 0.41 | | | | | | | | | |
| 2 | Tacit Scale | 1.19 | 3.48 | 0.25* | | | | | | | | |
| 3 | Independent Scale | -0.70 | 1.24 | -0.33* | -0.35* | | | | | | | |
| 4 | Firm Size | 0.18 | 1.32 | -0.15 | -0.17 | 0.19 | | | | | | |
| 5 | R&D Intensity | 0.12 | 0.19 | 0.10 | 0.14 | -0.21 | -0.35* | | | | | |
| 6 | Number of M&As | 1.00 | 2.38 | -0.08 | 0.02 | 0.10 | 0.44* | -0.10 | | | | |
| 7 | Diversification | 0.29 | 0.45 | -0.09 | -0.01 | 0.08 | 0.28* | -0.10 | 0.08 | | | |
| 8 | Manufacturing Dummy | 0.66 | 0.48 | -0.17 | -0.05 | 0.00 | 0.09 | 0.09 | -0.09 | 0.14 | | |
| 9 | Other Industry Dummy | 0.09 | 0.29 | 0.10 | -0.14 | 0.08 | -0.07 | -0.20 | -0.11 | -0.10 | -0.43* | |
| 10 | Tax Haven Dummy | 0.49 | 0.50 | 0.37* | -0.07 | -0.07 | 0.34* | -0.22 | 0.18 | -0.03 | -0.11 | 0.00 |

* p<.05. Year=2007. Number of Observations 67.

**Figure 5: Ownership Structure by Type**

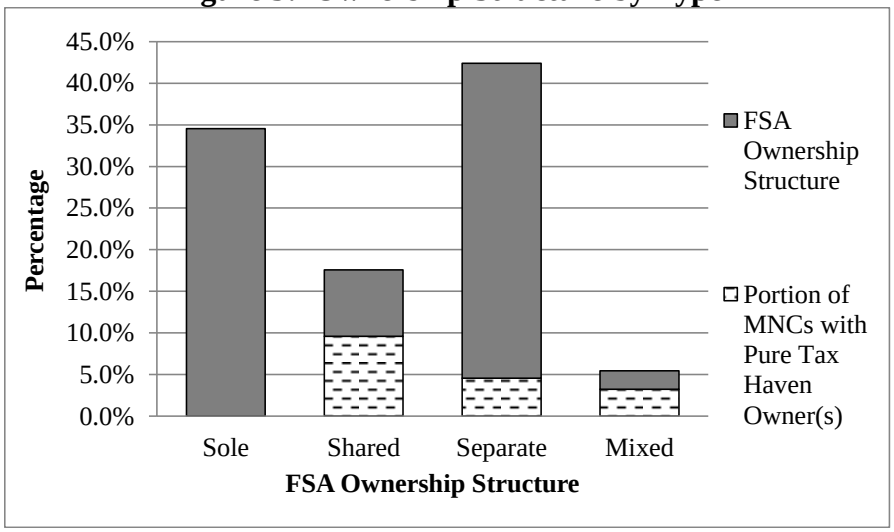
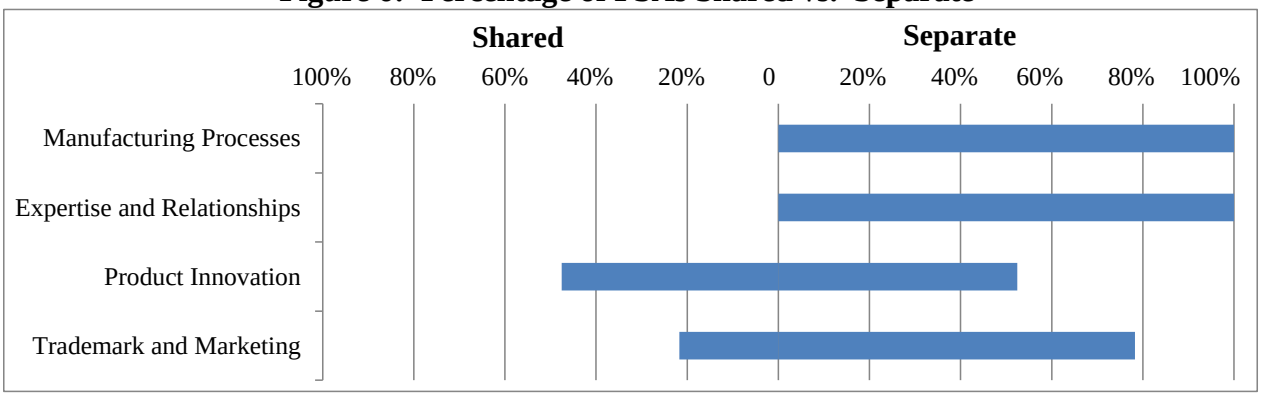



**Figure 6: Percentage of FSAs Shared vs. Separate**




[11] The correlation matrix is calculated using 2007 single-year data since standard cross-sectional correlations assume independence across observations. The correlation matrices for the pooled sample and for the other single years were consistent with those shown in Table 2.

## Table 3: Probit and Bivariate Probit Results Predicting Shared FSA Ownership

| | | Probit | | | Bivariate Probit | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| H1 (-) | Independent Scale | | -0.66** | -0.73** | -0.71** | -0.80** | | |
| | | | (0.25) | (0.25) | (0.26) | (0.26) | | |
| H2 (+) | Tacit Scale | | 0.20* | 0.22* | 0.19* | 0.21* | | |
| | | | (0.09) | (0.09) | (0.09) | (0.09) | | |
| H1 (-) | Brand | | | | | | -0.80* | -0.60 |
| | | | | | | | (0.39) | (0.39) |
| H2 (+) | Product | | | | | | 3.04*** | 2.76*** |
| | | | | | | | (0.71) | (0.61) |
| | Firm Size | -0.31* | -0.17 | | -0.19 | | -0.28† | |
| | | (0.14) | (0.14) | | (0.14) | | (0.15) | |
| | Firm Size Squared | -0.16** | -0.12† | | -0.12* | | -0.16* | |
| | | (0.06) | (0.06) | | (0.06) | | (0.07) | |
| | R&D Intensity | 0.27 | -0.41 | -0.38 | -0.48 | -0.44 | -1.04† | -0.68 |
| | | (0.61) | (0.50) | (0.51) | (0.50) | (0.50) | (0.60) | (0.59) |
| | M&As | | | -0.16† | | -0.17† | | -0.14† |
| | | | | (0.09) | | (0.09) | | (0.08) |
| | Diversification | | | -0.36 | | -0.47 | | -0.52 |
| | | | | (0.40) | | (0.47) | | (0.39) |
| | Trend | 0.07† | 0.03 | 0.04 | 0.05 | 0.05 | 0.04 | 0.05 |
| | | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) | (0.04) |
| | Manufacturing Industry Dummy | -0.69 | -0.81 | -0.81 | -0.90 | -0.82 | -0.49 | -0.16 |
| | | (0.43) | (0.56) | (0.53) | (0.56) | (0.55) | (0.48) | (0.51) |
| | Other Industry Dummy | -0.61 | 0.13 | 0.12 | 0.11 | 0.14 | 1.68* | 1.49* |
| | | (0.64) | (0.70) | (0.68) | (0.66) | (0.63) | (0.67) | (0.65) |
| | Constant | -0.43 | -0.79 | -0.85 | -0.84 | -0.93 | -2.58** | -2.72** |
| | | (0.57) | (0.63) | (0.57) | (0.64) | (0.59) | (0.93) | (0.86) |
| | Number of Observations | 348 | 348 | 349 | 348 | 349 | 348 | 349 |
| | Pseudo R-Squared | 0.15 | 0.37 | 0.37 | | | | |
| | Wald Chi-Squared | 24*** | 30*** | 31*** | 44*** | 43*** | 46*** | 39*** |
| | Log Pseudolikelihood | -184 | -136 | -136 | -319 | -324 | -309 | -327 |
| | Wald Test of rho=0 (Chi-Squared) | | | | 5.30* | 5.81* | 9.04** | 6.59* |

Robust, clustered standard errors are in parentheses. Two-tailed tests for variable coefficients.
†p<.10; * p<0.05; ** p<0.01; *** p<0.001

**Table 4: Multinomial Logit Results**

| | | Shared versus Separate 1 | Shared versus Sole 2 | Separate versus Sole 3 |
|---|---|---|---|---|
| H1 (-) | Independent Scale | -0.93† | -0.12 | 0.80† |
| | | (0.50) | (0.21) | (0.47) |
| H2 (+) | Tacit Scale | 0.21* | 0.11 | -0.10 |
| | | (0.10) | (0.09) | (0.08) |
| | Firm Size | -0.30 | 0.33 | 0.62** |
| | | (0.25) | (0.26) | (0.19) |
| | Firm Size Squared | -0.18 | -0.36** | -0.18 |
| | | (0.12) | (0.12) | (0.12) |
| | R&D Intensity | -0.49 | -0.55 | -0.06 |
| | | (0.68) | (0.43) | (0.42) |
| | Trend | 0.05 | 0.03 | -0.02 |
| | | (0.08) | (0.09) | (0.07) |
| | Manufacturing Industry Dummy | -0.71 | -0.41 | 0.31 |
| | | (0.85) | (0.77) | (0.53) |
| | Other Industry Dummy | 0.14 | 1.01 | 0.87 |
| | | (1.10) | (1.10) | (0.88) |
| | Constant | -1.31 | -0.12 | 1.19 |
| | | (1.13) | (1.08) | (0.84) |
| | Number of Observations | | | 498 |
| | Wald Chi-Squared | | | 56*** |
| | Pseudo R-Squared | | | 0.21 |
| | Log Pseudolikelihood | | | -412 |

Robust, clustered standard errors are in parentheses. Two-tailed tests for variable coefficients.

†p<.10; * p<0.05; ** p<0.01; *** p<0.001

**Appendix: Table 1 – Coding of FSA Ownership Structures**

| Structure | Definition | Examples of Phrases Used in Reports |
|---|---|---|
| Sole* | • All FSAs owned by the MNC are owned by one entity. | • [Entity] is the owner of all intangible assets owned by [the MNC].<br>• [Entity] owns, manages, and maintains [MNC's] portfolio of intangible assets. These assets include, but are not limited to, trademarks, process and information technology, know-how, patents, industrial models, and all other intellectual capital. |
| Shared | • Two or more entities within the firm share ownership of the MNC's FSAs. | • [Entity] and [Entity] share ownership of the rights to all of the techologies and trademarks associated with the products owned by [MNC].<br>• Pursuant to the Cost Share Agreement, [Entity] and [Entity] share all costs, risks, and rights to all of the Company's intellectual property. |
| Separate | • Two or more entities within the MNC own the rights to separate and distinct MNC FSAs. | • [Entity A] owns the rights to [FSA 1]… [Entity B] owns the rights to [FSA 2],…. and [Entity C] owns the rights to [FSA 3].<br>• Each [distribution entities] own the rights to their local market intangibles. |
| Mixed | • Two or more entities share ownership of at least one FSA and at least one other entity owns a separate and distinct FSA. | • [Entity A] and [Entity B] share ownership of [X FSAs]…[Entity C] owns the rights to [Y FSAs].<br>• [Entity A] is the economic owner and bears all costs and risks of [MNC's] activities associated with [X FSAs]. Under the terms of a Cost Share Agreement, [Entity A] and [Entity B] share the rights, risks and costs associated with [FSAs]. [Entity D] owns the rights to [X FSAs]. |

**Appendix: Table 2 –Contractibility Dimension Word Counts**

| **Tacit Scale** | | | | **Complementary Scale** | | | |
|---|---|---|---|---|---|---|---|
| **Tacit** | **Total Count** | **Codifiable** | **Total Count** | **Complementary** | **Total Count** | **Independent** | **Total Count** |
| expertise | 475 | trademark | 3021 | collaborat | 431 | standalone | 161 |
| experience | 1039 | trade name | 704 | combin | 2043 | separate | 905 |
| know-how | 340 | logo | 219 | integrat | 2859 | used only, used primarily in | 35 |
| knowledge | 441 | blend | 360 | common | 497 | distinct | 220 |
| trade secret | 115 | formula | 1778 | cross-functional | 78 | specialized | 473 |
| explore | 38 | recipe | 75 | bundle | 64 | custom | 907 |
| innovat | 1089 | compound | 1379 | companion | 29 | differentiated | 83 |
| technology | 8717 | manual | 383 | complement | 349 | diversified | 85 |
| solutions | 2906 | patent | 2257 | unified | 373 | -specific | 69 |
| complex | 1584 | schematic | 120 | suite | 383 | business segment | 320 |