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INTANGIBLE ASSETS OF MNE FOREIGN SUBSIDIARIES: THE ROLE OF INTERNAL FINANCIAL RESOURCES AND HOST COUNTRY INSTITUTION

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ASTRACT

We examine key factors which affect intangible asset holdings of foreign subsidiaries of multinational enterprises (MNEs). We develop our hypotheses by drawing upon the pecking order theory in the finance literature and the institution theory. We theorise that MNE foreign subsidiaries combine and utilize their cash holdings (finance-based firm-specific advantages - FSAs) with host country economic freedom (host country-specific advantages - CSAs) in their holdings of intangible assets which are internally created and/or purchased. We empirically test our hypotheses using a new original dataset of European subsidiaries of U.S. MNEs. We find that cash holdings and host country economic freedom share a significant and positive relationship with intangible asset holdings. We discuss the implications of our findings for theory and practice.

Key words: subsidiary-level intangible assets; the pecking order theory; the institution theory; IAS38 – Intangible assets.

INTANGIBLE ASSETS OF MNE FOREIGN SUBSIDIARIES: THE ROLE OF INTERNAL FINANCIAL RESOURCES AND HOST COUNTRY INSTITUTION

INTRODUCTION

Our study focuses on intangible asset holdings of foreign subsidiaries of multinational enterprises (MNEs). The literature has used a wide variety of terminologies, definitions and measurements for intangible assets. For the purpose of consistency between conceptualization and measurement, we refer to the International Accounting Standard IAS38 on Intangible assets. IAS38 provides a clear definition and strict accounting criteria for recognition and measurement. Intangible asset is defined as "non-monetary identifiable asset without physical substance". Examples of intangible assets are (a) assets related to marketing, such as newspaper masthead, trademarks, non-compete agreement, and internet domain names; (b) assets related to customers, such as order backlog, lists of customers, and existing relationships with these clients; (c) artistic assets, such as literature, music performance, photographs, and movies; (d) assets based on contracts, including agreements for licensing, services, franchises, broadcast rights, employment and use; (e) technological assets, including computer software, trade secrets, and patents (IAS38, IFRS website, 2018). Intangible assets can be acquired by separate purchase, as part of a business combination, by a government grant, by exchange of assets, and/or by self-creation (internal generation) (IAS38).

Intangible assets are a source of international competitiveness and drivers of value creation for multinational enterprises (MNEs) and their subsidiaries (Buckley and Casson, 1976; Rugman, 1981; Rugman, 2014; Hall, 2001; Dischinger and Riedel, 2011). The literature reports the links between intangible assets and financial performance (Denicolai et al., 2014). Intangible assets are found to contribute significantly to market value (Hall et al., 2005; Greenhalgh and Rogers, 2006;

Sandner and Block, 2011; Clausen and Hirth, 2016). Prior research also finds a positive relationship between intangible assets and internationalization (Denekamp, 1995; Braunerhjelm, 1996; Delgado-Gomez and Ramirer-Aleson, 2004). However, intangible assets have been taken as a given and treated more as an explanatory variable rather than as a variable which needs to be explained (Arrighetti et al., 2014).

Foreign subsidiaries actively contribute to the generation and acquisition of knowledge-based intangible assets for MNEs (Papanastassiou and Pearce, 2009; Rugman and Verbeke, 2001). Because MNEs and their subsidiaries have shifted their investments more and more from tangible (physical) assets to intangible assets, it becomes important to understand this phenomenon (Jarboe and Ellis, 2010). Yet, there is a paucity of research on intangible asset holdings of MNE foreign subsidiaries. Previous studies in the extant literature tend to focus on international connectivity, technology, R&D, innovation and knowledge (Andersson et al., 2016; Cantwell, 2017; Mudambi et al., 2017) and use patents and patent citations as proxies for value measurements (Gambardella et al., 2008; Hall et al., 2009). In business reality, MNE subsidiaries use a bundle of intangible assets and leverage the synergy of technology, patents, software, customer lists, and branding/ trademarks, etc. not just patents alone.

Additionally, little is known about how MNE foreign subsidiaries finance intangible asset holdings and how host countries' broader institutional factors, such as economic freedom affects their decision of intangible asset holdings. Although institutional setting of a country may include various other formal and informal institutions as suggested by North (1990), the selected variable of economic freedom is more concrete than others. Economic freedom is defined as the strengths and the consistency of national policies and formal institutions of a given country (The Fraser Institute, 2015). From the point of view of both managers and policy makers, gaining a clear

understanding of what affects MNE foreign subsidiaries to hold intangible assets in the first place can be of importance (Arrighetti et al., 2014). Furthermore, such a perspective is also relevant for academic research because it offers an opportunity to develop a theory to explain the phenomenon. For these reasons, this study aims to fill the gaps. The central research questions are

1. How do MNE foreign subsidiaries finance their intangible asset holdings?
2. What do host countries' economic freedom affect MNE foreign subsidiaries' intangible asset holdings?

Our study adopts a subsidiary-centric perspective which emphasises that knowledge-based intangible assets can be generated anywhere in MNEs and that subsidiaries not only receive knowledge from their parent firms but also create new knowledge. We focus on the efficiency and value creation aspects of MNE foreign subsidiaries when they hold intangible assets. Our theoretical development is built upon the pecking order theory in the finance literature (Myers and Majluf, 1984) and the institution theory (North, 1990). According to the pecking order theory, firms hold cash as a financial slack to fund investments when debt and external equity finance are too expensive. Specifically, we propose that the availability of cash holdings/ liquid assets (a type of finance-based FSA) enables foreign subsidiaries to finance the self-creation and/or the purchases of intangible assets. The financing of intangible assets of the subsidiary may be subject to the headquarters' approval in the annual budgeting cycle. Furthermore, we build upon the institution theory (North, 1990) to argue that host country economic freedom (a type of host CSAs) is an important factor which MNE foreign subsidiaries take into consideration when they make a strategic decision in intangible asset holdings.

We empirically test our hypotheses using a new original dataset of European subsidiaries of U.S. MNEs. Our data is compiled from Amadeus database, which provides detailed accounting information at the subsidiary level and identification of a multinational group's ownership structure. We also use other public data sources for country-level variables. The empirical results confirm our prediction and points to a robust relationship between cash holdings and host country economic freedom and intangible assets holdings of MNE subsidiaries. The effects are statistically and economically significant and consistent across a range of specifications and our estimation models address endogeneity concerns and the nature of intangible assets.

We make three new contributions to the literature, which are elaborated in more detail in the discussion section. First, our core contribution is to develop a theory to explain intangible asset holdings of MNE foreign subsidiaries from a strategic perspective. We combine the pecking order theory in the finance literature and the institution theory to develop a conceptual model which examines both subsidiary-level financial resource and country-level institutional factor affecting intangible asset holdings. This is aligned with the framework of FSAs and CSAs (Rugman, 1981).

Second, our study responds to the increasing calls for more contextualization in research (Michailova, 2011). Specifically, we test our theoretical model in the context of European subsidiaries of US MNEs. Our findings show that these subsidiaries are driven by efficiency and value creation rather in their strategic decision of intangible asset holdings (Penrose, 1956). In this way, our work differs from prior research in the international taxation and public economics literature which examines the phenomenon using a parent-centric and tax-based perspective focusing value appropriation (tax avoidance, profit shifting and rent seeking).

Third, our approach of incorporating finance into our research is a new feature. Oxelheim et al. (2001) argue that international finance will enrich our understanding of international strategies of MNEs. Overall, our study is among few attempts to examine the phenomenon of intangible asset holdings of MNE foreign subsidiaries from a strategic perspective.

HYPOTHESES DEVELOPMENT

Subsidiary-level cash holdings (liquid assets)

The "pecking" order theory (Myers and Majluf, 1984) posits that firms hold cash for speculative uses and deploy them to take advantage of emerging opportunities. Cash holdings as a financial slack can be used to finance investments when equity or debt finance is too expensive (for a review, see Ramirez and Tadesse, 2009). Cash holdings are viewed as an outcome of different financing and investment decisions proposed by the hierarchical pattern of financing (Dittmar et al., 2003). The pecking order theory has been widely used in various applications. It is frequently used to examine the capital structure of the firm. It also explains the inverse relationship between profitability and debt ratios, dividend payout ratios (Brealey et al., 2008) and cash holdings (Dittmar et al., 2003; Al-Najjar, 2013; Ramirez and Tadesse, 2009). Shyam-Sunder and Myers (1999) find that the pecking order is an excellent first order descriptor of firms' financing behaviour than by the trade-off theory. Studies using datasets of different countries have found that firms follow the pecking order theory (Aggarwal and Zong, 2006; Seifert and Gonenc, 2008; Zeidan et al., 2018; for a survey, see Tsuji, 2011).

We draw upon the insights of the pecking order theory and previous studies in the finance literature which shows that liquidity is instrumental in financing R&D and innovation activities (Brown and

Petersen, 2011; Himmelberg and Petersen, 1994; Hall, 2002). We theorize that MNE subsidiaries use subsidiary-level cash holdings to develop and/or to acquire intangible assets.

First, similar to investments in R&D, financing frictions are particularly relevant due to the lack of collateral value for most intangible assets and reduce the scope of tangible asset-backed financing strategies (Brown and Petersen, 2011; Himmelberg and Petersen, 1994; Hall, 2002). Second, subsidiaries face large adjustment costs for internally created intangible assets because of wage payments to highly skilled technology workers (Brown and Petersen, 2011). Third, there are potentially severe information asymmetries between subsidiaries and external investors. The nature of intangible assets precludes outsiders from making accurate appraisals of value, leading to a higher cost of capital (Himmelberg and Petersen, 1994; Hall, 2002). Additionally, barriers to the valuation and marketability of intangible assets can lead to important gaps in the external credit funding. Long and Malitz (1985) and Brown et al. (2013) and other provide empirical evidence that financial leverage is negatively correlated with R&D (for a survey, see Hall and Lerner, 2010). Furthermore, compared to tangible (physical) assets, intangible assets tend to be more difficult to identify, separate, utilize and value. Their value is sensible to who owns and employs them (Falato et al., 2012). Currently, banks tend to lend money based on the borrower's physical and financial assets as collaterals, which can be easily bought and sold, borrowed against, and used to back other financial instruments (Jarboe and Ellis, 2010).

Subsidiaries rely on internal finance. Subsidiaries which most likely face financing frictions rely extensively on cash holdings to smooth R&D. The findings in Brown and Petersen (2011) provide new insights into the strategic value of liquidity and the financing of intangible investments and suggest that cash reserve is important for R&D smoothing. Thus, cash holdings are expected to be

instrumental in intangible assets holdings. Taken the theoretical and empirical development altogether, we predict

Hypothesis 1: Cash holdings (liquid assets) of a subsidiary are positively related to its holdings and investments of intangible assets.

Host country economic freedom

We draw upon the institution theory to suggest that formal institutions of host countries are decisive factors when MNE subsidiaries consider allocating resources in productive and value-creating investments (North, 1990). Formal institutions influence the cost of knowledge-creating inputs and also protects the knowledge outputs and thereby influence the subsidiary-level decisions of intangible asset holdings (Alam et al., 2018; Kramer et al., 2011). Choi et al. (2014) find that effective institutions can encourage R&D investments by minimizing agency problems among decision makers. Better institutions promote financial market liberalization which in turn encourages R&D investments by reducing financial constraints of the firms (Laeven, 2003).

We focus on the host countries' broad institution of economic freedom (for a detail discussion on economic freedom of the world, see Gwartney and Lawson, 2003). Economic freedom measures the quality of formal institutions in five broad areas, such as government, legal structure and security of property rights, access to sound money, freedom to trade internationally, and regulation of credit, labour and business (Economic Freedom of the World Index (EFWI), The Fraser Institute, 2015). There is a large volume of studies which have extensively examined the role of economic freedom in the economic growth and financial development literatures. The consensus is that several elements of economic freedom enhance economic performance at the macro level (Easton and Walker, 1997; de Haan and Sturm, 2000; Greenaway et al., 2001; Baier et al., 2012; for a review, see Hall and Lawson, 2013).

We discuss the impacts of some of the components of the economic freedom index on intangible asset holdings of subsidiaries by building upon previous studies which examine the relationship between institutions, innovation and R&D investments (Alam et al., 2017; Zhu and Zhu, 2018). Prior research shows that government policies can have significant impacts on R&D and innovation activities leading to the creation and/or acquisition of knowledge-based intangible assets. These include national innovation systems, financial incentives for R&D (e.g. R&D tax credit and tax schemes of patent box and innovation box offered by a number of European countries, etc.), non-financial incentives through the promotion of cross-country knowledge exchanges, increase direct and effective involvement in initiatives by local institutions, and increase use of intellectual assets (Kramer et al., 2011; Hall and van Reenen, 2000).

According to Levine (2005), the security of property rights has two dimensions. First, government effectiveness assures fair application of legal regulations, law enforcement and protects property rights. Second, government effectiveness constrains coercion and prevents bribery and corruption. Laws provide not only necessary protection of the outputs of R&D, innovation activities and knowledge creation, but also protection of investments in complementary assets (Lin et al., 2010). Furthermore, government effectiveness affects firm performance through its effects on managerial assumptions and actions and therefore, it reduces agency costs (Pearce et al., 2011). Lower agency costs increase the likelihood of efficient investments. Investors have confidence in regulatory and legal systems, especially property rights to protect returns on their investments of intangible assets. Prior research shows that keeping government spending at an appropriate level and implementing effective fiscal policies through taxation lead to increase in investments (DiLorenzo, 2004; Johansson et al., 2008).

Freedom to trade internationally increases the potential value of returns on intangible assets by selling innovative products and services in foreign markets. Alcala and Ciccone (2004) find a relationship between trade and productivity, suggesting that freedom to trade internationally favours innovative products and ideas. Moreover, business freedom indicates the efficiency of a country's rules and regulations and the associated costs of doing business, which in turn influence investments in intangible asset holdings and investments. In the related manner, labour freedom lowers transaction costs, which in turn increases entrepreneurial activities (McMullen et al., 2008). Host country economic freedom increases intra- and inter-firm resource flows, which in turn support both the exploration and exploitation of corporate innovation (Zhu and Zhu, 2017). It is highly likely that in the presence of economic freedom, intangible asset holdings become more rewarding. Therefore, MNE subsidiaries operating in countries with higher degree of economic freedom would find it encouraging to hold intangible assets. We propose the following hypothesis:

Hypothesis 2a: Economic freedom of a host country is positively related to intangible asset holdings and investments of a foreign subsidiary.

METHODOLOGY

Research setting

We empirically test our hypothesis using a new original dataset of European subsidiaries of U.S. MNEs for two reasons. First, this is an opportunity for us to examine the phenomenon of intangible asset holdings from a strategic perspective. This approach contrasts to much of prior research in the international taxation and public economics literatures which explain the phenomenon using a tax-based explanation (Grubert, 2003; Lindsey and Wilson, 2015; Mutti and Grubert, 2009). The tax research stream adopts a parent-centric approach emphasizing the headquarters as the main source of knowledge creation. The main arguments are that for tax saving purposes, MNEs relocate

and migrate their valuable intangible assets from the United States to low-tax jurisdictions, for example, Ireland (Irish corporate tax rate is 12.5%). They establish intellectual property holding companies which charge royalties to operating subsidiaries and exploit profit shifting strategies through the distortion of transfer prices for intangible assets traded within the firm. This arrangement helps MNEs to minimize their corporate tax bills worldwide (Grubert, 2003; Mutti and Grubert, 2009).

Second, there are quite a number of countries in Europe on the list of offshore financial centres (a type of tax havens) by IMF (2000) and OECD (2014). These locations offer relatively low corporate income tax and do not require substantive productive and economic operations in the country, suggesting that policies are geared towards attracting income only on a preferential tax basis. Thus, it will be interesting to study this phenomenon at the subsidiary level in the European context from a value creation perspective and compare our findings with earlier studies with arguments of value appropriation through tax avoidance and profit shifting.

Data sources and sample: Subsidiary-level and parent-level data

We construct our dataset from Amadeus database by Bureau van Djik, which is one of the world's leading financial intelligence service providers. This database has ownership and financial data of public and private parent firms and foreign subsidiaries in Europe. It has been widely used in academic research (Dischinger and Riedel, 2010).

We first retrieve all listed, non-financial US ultimate owners with at least one European subsidiary in their group structure. We discard all parents and subsidiaries from financial institutions, utilities, and quasi regulated industries, because their balance sheets are specific in these cases and potentially incomparable to industrial firms. This approach has been adopted in prior research (Foley et al., 2007). From these MNEs, we retrieve subsidiaries which are directly held by the

parent firm with an equity stake of at least 51 percent. They have non-zero total assets, and all necessary information for the year 2014 for the empirical analysis is available.

The sample consists of 150 largest subsidiaries in terms of revenue (29 percent are located in the United Kingdom, 15 percent in Germany, 14 percent in the Netherlands, 10 percent in France, seven percent in Ireland, and the rest in other European countries -Austria, Belgium, Cyprus, Denmark, Finland, Hungary, Italy, Luxembourg, Norway, Poland, Russian Federation, Slovakia, Spain, Sweden and Switzerland). The median subsidiary in our sample is large with average assets of EUR 5,462 million, average sales of EUR 6,762 million and average employees of 6,753 people. Our sample size of 150 subsidiaries is sufficient for empirical tests. First, it is enough for continuous data (Barlett et al. 2001). Second, the ratio of observations to independent variables is satisfactory because it does not fall below the threshold of five (Hair et al., 2010). Our regressions have 12 variables (three independent variables and nine control variables). Third, this reasonable sample size allows us to be able to consult and perform manually the content analysis of the full accounts of UK subsidiaries filed with the UK Companies House to further corroborate regression results (the UK Companies House is a government body which registers/ dissolves company and makes documents and information available to the public). The content analysis is defined as a qualitative method to interpret meaning from the content of text and data. Analyzing the content of the full accounts is quite demanding and time-consuming. For example, IBM United Kingdom's full accounts of 2014 have 85 pages. Given that there are 44 UK subsidiaries in our sample, it means that a substantial number of pages of the full accounts, especially strategic reports, management discussion and disclosure notes, etc. need to be studied manually. In the next section, we will present one example using the content analysis method which aims to complement our findings from the multiple regression analytical approach.

Country-level data

We use the economic freedom of the world index (EFWI) from the published reports by the Fraser Institute, Vancouver, Canada with data sourced from more than 70 think-tanks around the world (The Fraser Institute, 2015). The summary index comprises of five sub-indexes, which are size of government (which captures size of government, expenditures, taxes, and enterprises); legal system and property rights (which capture legal system and security of property rights); sound money (which captures access to sound money); freedom to trade internationally (which captures freedom to trade internationally); and regulation (which captures the regulation of credit, labour and business). These sub-indexes are rated on a scale of 0-10 with higher value meaning of better quality. We use the summary chained index.

Variable definitions

Dependent variable: Intangible assets

We follow Deschinger and Riedel (2010) to measure intangible assets by the natural logarithm of the ratio of intangible assets over total assets. The use of a natural logarithm is appropriate because it has a highly skewed distribution and logarithm transformation makes a positively skewed distribution more normal (Hair et al., 2010).

Independent variables

Subsidiary-level cash holdings: We follow Foley et al. (2007) to measure subsidiary-level cash holdings by the ratio of cash and cash equivalents to net assets. Net assets are defined as total assets minus cash and equivalents. It is the natural logarithm of subsidiary-level cash holdings to address the highly skewed distribution (Hair et al., 2010).

Host country economic freedom: We use economic freedom of the world index to measure the quality of the host country institutions where the subsidiary is located. This index has been used in previous studies (Nguyen and Almodovar, 2018).

Control variables

Based on the literature, we include a set of control variables, which have been identified to explain intangible asset holdings and investments. These are subsidiary characteristics, parent firm characteristics, host country characteristics, and sectors.

Subsidiary size: Subsidiary size is measured by the natural logarithm of the subsidiary's total assets.

Subsidiary age: Subsidiary age is measured by the natural logarithm of the number of years in operation since its inception.

Subsidiary financial leverage: Debt might be an alternative financing source to fund intangible asset holdings and investments (Brown and Petersen, 2011; Brown et al., 2013). Subsidiary financial leverage is measured by long-term debts to total assets. Because intangible assets are a type of long-term assets in nature, it is more appropriate to use long-term debts rather than short-term debts.

Subsidiary working capital: We follow previous studies to control for the potential effects of working capital (Opler et al., 1999; Ozkan and Ozkan, 2004). Working capital is calculated by inventories and accounts receivable minus accounts payable, accrued expenses and short-term debts to total net assets. It measures the existence of other liquid assets, which may be used to fund intangible asset holdings and investments.

Subsidiary effective tax rate: A concern, which arises from interpreting intangible asset holdings of foreign subsidiaries, is corporate taxes. Tax is an important factor, because it influences the

location decision of intangible properties (Lindsey and Wilson, 2015; Deschinger and Riedel, 2011). We include the effective tax rate of the subsidiary, which is calculated by the amount of taxes payable in a particular year divided by earnings before taxes. This is an indicator of tax shields, in which low effective tax rates may encourage subsidiaries to invest in intangible asset holdings.

Parent firm's degree of multinationality: The degree of multinationality of the parent firm likely influences subsidiaries to access to the local innovation systems and to exploit host CSAs for intangible asset holdings. This variable is measured by the natural logarithm of number of foreign subsidiaries and it has been widely used in the literature (Morck and Yeung, 1991; Yang et al., 2013).

Parent firm's size: The core resources and knowledge of foreign subsidiaries are often transferred from their parent firms. This variable is measured by the number of employees of the parent firms (Nguyen and Rugman, 2015, Nguyen and Almodóvar, 2018).

Host country rule of law: We use the scores developed by the World Bank Institute in Governance and Anti-Corruption (Kaufmann et al., 2010). The rule of law measures the extent to which agents have confidence in and abides by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence (Kaufmann et al. 2010). We use the percentile rank among all countries (ranges from 0 (lowest) to 100 (highest) rank). This index has been used in previous studies by Beuselinck et al. (2011).

Host country as a location for offshore financial centre and/or special purpose entity (a type of tax haven): There are arguments that U.S. MNEs have an incentive to relocate and migrate intangible assets from the U.S. headquarters to subsidiaries in countries, territories, and jurisdictions with offshore financial centres (OFCs), where the corporate tax rate is zero or

relatively low by establishing special purpose entities (SPEs), and/or set up holding companies (HCs). The International Monetary Fund (IMF) produces a list of countries, territories, jurisdictions with offshore financial centres (IMF, 2000). The OECD also generates a similar list in its project on Base Erosion and Profit Shifting in 2014 (OECD 2014). UNCTAD (2013) identifies a number of countries in Europe, e.g. Luxembourg, the Netherlands, Hungary, Cyprus, Switzerland, Ireland, Portugal, Denmark, among others as popular locations for OFCs and SPEs. We create a dummy variable, which is assigned the value of 1 if the host country of the subsidiary is on the lists of offshore financial centres either by IMF or by OECD, otherwise 0.

Sectors: We control for the potential effects of sectors, which tend to have different dynamics in intangible assets holdings. Makino et al. (2004), Hansen and Gwozdz (2015) and Venaik et al. (2005) show that it is difficult to untangle industry effects and country effects, and that sector features may vary between countries. We use a dummy variable where we assign the value of 1 for manufacturing and 0 for service.

RESULTS

Descriptive statistics

Table 1

Table 1 reports descriptive statistics (means and standard deviations) and Pearson correlation coefficients between variables. The median European subsidiary of US MNEs had intangible asset holdings at approximately 14 percent of total assets before it was transformed into a natural logarithm. This ratio was lower than the median subsidiary of European MNEs which hold intangible assets at approximately 26 percent of total assets in the study by Dischinger and Riedel (2011). The average ratio of cash holdings (cash-to-net-assets) was nine percent before it was

transformed into a natural logarithm. The cash holdings mainly came from the profits of the existing operations of these subsidiaries. The majority operated at profits. Only six subsidiaries incurred loss. They had an average gross profit margin of 9.31 percent (standard deviation of 17.11 due to a variation with the maximum gross margin of 89 percent and the minimum of loss making at minus six percent). They had very low financial leverage as shown in the mean ratio of long-term debt over total assets of 0.08. During the period of the study, there was no new share issuance. All of them are private subsidiaries, meaning that they are not publicly listed in the host countries' stock exchanges and their shares are not publicly traded.

We find that all the pair-wise correlations are lower than the recommended 0.5 threshold, excepting the host country rule of law variable. We use two diagnostic tests, which are the variance inflation factor (VIF) and the tolerance analysis to detect any potential bias introduced by this high correlation. Individual VIF values are under 2, which are below the recommended cutoff point of 10, and all measures of tolerance are above the suggested cutoff point of 0.1 (Hair et al. 2010). Thus, the test results suggest that multicollinearity is not a problem. Consistent with our expectations, the correlations suggest that a foreign subsidiary holds intangible assets when it holds cash. The economic freedom of the host country is correlated with intangible asset holdings.

Hypothesis testing, results, and discussion

Table 2

We estimate multiple regressions with standard errors. Table 2 reports the estimates of the subsidiary-level intangible asset holdings. Model 1 shows control variables. Model 2 adds independent variables. Model 3 is a full model including both independent and control variables. Hypothesis 1 predicts a positive relationship between cash holdings and intangible asset holdings

and investments of a foreign subsidiary. This relationship is significant (β=0.19; p-value<0.001) and the sign is positive. Thus, hypothesis 1 is fully supported. Our finding is consistent with the prediction of the pecking order theory (Myers and Majluf, 1984). To a large extent, our empirical evidence is consistent with previous studies in the finance literature (Brown and Petersen, 2011).

Hypothesis 2, which predicts a positive relationship between host country economic freedom and intangible asset holdings, is fully supported. We find a significant and positive relationship (β=1.57, p-value<0.05). The majority of Western European countries have high economic freedom. However, transition countries have lower scores.

The test results of control variables also present interesting findings. Host country rule of law is significant but the sign is negative (β=-0.05, p-value<0.05). The coefficients of subsidiary size (β=0.78; p-value<0.01), subsidiary financial leverage (β=3.01; p-value<0.05) and subsidiary effective tax rate (β=0.21; p-value<0.01) are statistically significant and the signs are positive. However, subsidiary working capital is significant but negatively related to intangible asset holdings (β=-0.99; p-value<0.1). Subsidiary age and sectors are statistically insignificant.

It is argued that many intangible assets can generate cash flows like tangible assets. Intangible assets which generate substantial future cash flows may be suited to be financed by long-term debt. Furthermore, banks tend to provide financing for MNE subsidiaries which are more able to service their debts regardless of the collaterals they can provide. This might explain our finding on the positive relationship between subsidiary financial leverage and intangible assets. On the other hand, if intangible asset holdings are risky, the cost of borrowing becomes so high for these subsidiaries. They might not consider financing by long-term debt. They will have to resort to short-term or convertible debt instead to reduce the cost of borrowing (this is why we also control

for the potential impact of subsidiary working capital ratio, in which short-term debt is taken into account). However, we find that working capital is negatively related to intangible asset holdings. The overall finding is that the subsidiaries follow the pecking order theory (Myers and Majluf, 1984) in financing of intangible asset holdings, by using first cash holdings, then debt and finally equity.

The parent firm's degree of multinationality has no significant relationship to intangible asset holdings of foreign subsidiaries and the sign is negative. Parent firm size has no significant relationship to intangible asset holdings and investments and the sign is negative. Our finding suggests that it is not sufficient for MNE subsidiaries to rely on multinationality, economies of scale and scope and knowledge stock of their parent firms. This reinforces the necessity of developing and acquiring new knowledge in host countries, integrating with the existing knowledge stock of the parent firm, and exploiting the enhanced and integrated knowledge bundles (Nguyen, 2014, 2015; Nguyen and Rugman, 2015; Verbeke, 2013).

Interestingly, we find that the control variable of host country locations of offshore financial centres (a type of tax havens) exhibits no significant relationship to intangible asset holdings of MNE subsidiaries.

Endogeneity tests

We perform additional tests to address the potential concerns on endogeneity. We use two-stage least square (2SLS) where we estimate the subsidiary-level cash holdings, host country economic freedom and rule of law in the first stage and use them to estimate intangible asset holdings in the second stage. We use an instrumental variable (IV) approach for the main regression. The IVs must satisfy the conditions of relevance and exogeneity (Reeb et al., 2012; Roberts and Whited,

2011; Wooldridge, 2009). We follow the suggestions by Wooldridge (2009) to search for instrumental variables which are correlated with the independent variables but unrelated to the dependent variable. We find that the subsidiary-level gross profit margin and the subsidiary-level cash holdings are exogenous. The correlation table (Table 1) shows that the subsidiary-level profit margin is significantly correlated to subsidiary-level cash holdings, thus confirms that they are exogenous. In the same manner, we use host country using Euro currency (a dummy variable) as IVs for host country economic freedom. The correlation table shows that host country using Euro currency is correlated to the host country economic freedom, thus confirms that they are exogenous.

In the first stage, we run the multiple regressions for the explanatory variables against IVs and save the prediction. The variables in the first stage are significant, and this indicates instrument variable acceptability. The new variables with the prediction from the first-stage regressions have been saved as the subsidiary-level cash holdings (predicted value), host country economic freedom (predicted value) for the regressions in the second stage. The result of the first-stage regression confirms that the subsidiary-level gross profit margin, host country using Euro currency are significantly related to the subsidiary-level cash holdings and host country economic freedom respectively.

In the second stage, we regress subsidiary-level intangible assets against the new predicted variables. We include the control variables of subsidiary characteristics (subsidiary size, age, financial leverage, working capital, and effective tax rate), parent firm characteristics (degree of multinationality, and size), host country factor (host location with OFC – a type of tax haven and rule of law) and sectors. The second-stage regression (full model) shows that the predicted values

of cash holdings and host country economic freedom are significantly and positively related to subsidiary-level intangible asset holdings. Overall, the results of the 2SLS regressions (Table 3) are consistent with those of the multiple regressions (Table 2). Control variables in Table 3 show similar relationships as reported in Table 2. We have no over-identifying restrictions because we have only one IV for each of the endogenous explanatory variables. This makes our models just have enough instruments. Thus, they are said to be just identified (Wooldridge, 2009).

Table 3

Robustness tests

We also conduct robustness tests to exclude alternative explanations. First, we run the interaction terms between cash holdings and host country economic freedom. They are insignificant. Due to space constraints, we do not report the results here.

Second, we test the moderating effects of parent-firm characteristics (degree of multinationality and size) on the relationship between cash holdings and intangible asset holdings of MNE subsidiaries. They are built upon the arguments of economies of scale and scope in the literature. The unreported results are insignificant.

Third, we test the moderating effect the host country as a location with offshore financial centre (OFC) on the relationship between subsidiary-level cash holdings and intangible assets holdings. We also test the moderating effects of subsidiary characteristics (subsidiary size, age and effective tax rate). They are based on theoretical arguments of the impacts of corporate taxation and location of offshore finance centres, and subsidiary-level economies of scale and scope, subsidiaries'

accumulation of knowledge and experience over time (organizational learning). The unreported results are insignificant.

The content analysis of an example for illustration

To obtain an in-depth understanding of the phenomenon, we use the content analysis method to examine the description of business activities, financial data, strategic report/ management discussion and disclosure notes in the full accounts of UK subsidiaries filed with the UK Companies House, given that they are among the largest percentage in our sample. This approach has been widely used in the accounting and international taxation literature (Bewley & Schneider 2013; Chen, Su & Wu 2010; Donohoe, McGill & Outslay 2012; Hageman & Bobek Schmitt 2014); however, it is not often used in the IB literature.

We find that the UK subsidiaries of US MNEs hold both large intangible and tangible physical fixed assets. The finding suggests that the locations of actual business activities in terms of value-added activities (e.g. manufacturing, marketing, sales, distribution and service provision, etc.) and the location of intangible and tangible assets are not separated from each other. The findings suggest the focus on efficiency and value creation aspects of MNE subsidiary strategy.

An example may help illustrate our findings. IBM United Kingdom Limited is one of the largest subsidiaries of IBM Corporation headquartered in the U.S, offering a broad range of integrated solutions, technology services and business consulting to clients in all industries, including large, small and midsize businesses. The income statement for the year ended December 31, 2014 showed that the subsidiary generated revenue of £3,672.2 million, of which domestic sales accounted for 78 percent and exports for 22 percent (IBM United Kingdom Limited, Full

Accounts, 2014, page 12-13). The total comprehensive income for the year was £385.9 million, a growth of eight percent from the previous year of £357.6 million.

The balance sheet as at December 31, 2014 showed that the subsidiary carried total assets of £4,344.3 million, of which non-current assets was of £1,388.6 million and current assets of £2,955.7 million. A detailed analysis revealed an interesting finding, in which it had more intangible assets than tangible assets as outlined in our earlier argument that firms have invested more in intangible assets than tangible assets. Specifically, tangible assets were £230.8 million while intangible assets were £282.2 million (accounting for 16.62% and 20.32% respectively of total non-current assets of £1,388.6 million). Its cash and cash equivalents was £14.5 million (accounting for 0.49% of total current assets of £2,955.7 million) (IBM United Kingdom Limited, Full Accounts, 2014, page 15). It did not have any short-term debt and long-term debt finance from external financial institutions. The total liabilities were £1,943.3 million. Total equities were £2,401.0 million, of which retained earnings were £725.3 million. There was no new share issuance.

The subsidiary had a net positive cash position and loaned this cash to the Treasury Centre, namely, IBM International Treasury Services Company in Ireland. The subsidiary invested and borrowed cash internally. Given the cash position, any liquidity risk was minimal. In case the subsidiary needed to borrow from the Treasury Centre, the interest rate of short-term intra-firm loan was structured on a short-term three-month or six-month loan based on a three-month or six-month London Interbank Offered Rate (LIBOR) rate plus certain basis points for risk premium (IBM United Kingdom Limited, Full Accounts, 2014). The directors did not recommend a dividend payment to the parent firm. During the year, the subsidiary made a number of acquisitions.

We find that with the availability of internal financial resources and the access to internal capital markets (Treasury Centre in Ireland acts as an in-house bank – a type of internal capital markets, for a comprehensive discussion, see Rugman, 1980; Nguyen & Rugman, 2015), IBM United Kingdom Limited can advance monies to fund research and development (R&D) activities and then recharged to the U.S. HQs. The strategic report in the full accounts of 2014 stated that "IBM United Kingdom Limited has carried out product development projects at laboratories in various locations throughout the UK, on behalf of IBM Corporation and its subsidiaries. The expenditure incurred on these projects in the year of £410.2 million was recharged to IBM Corporation" (IBM United Kingdom Limited, Full Accounts, 2014, page 6).

The content analysis of the subsidiary's full accounts showed that the availability of internal financial resources, especially cash holdings is an important financing source for self-creating innovation through R&D activities and/or acquiring external intangible assets through acquisitions. Given that R&D is costly and risky, debt is poorly suited to fund R&D (for a survey, see Hall and Lerner 2010).

The full accounts also stated that "UK expertise and skills continue to be in demand from the IBM group, as such export revenues, which are derived from sales of services, including research and development, to companies in the IBM group overseas, rose by 3.9 percent compared to 2013" (IBM United Kingdom Limited, Full Accounts, 2014, page 3). In other words, the subsidiary has utilized host country institutional factors to support the knowledge-creating activities, through self-creation. The subsidiary has also engaged in acquisitions mainly within the UK to acquire complementary intangible assets from other firms.

DISCUSSION

Implications for theory

First, our core theoretical contribution is to combine the pecking order theory in the finance literature with the institution theory to formulate a new theory to explain key factors affecting intangible asset holdings of MNE foreign subsidiaries. Specifically, we theorize, empirically test, and establish the link between the use of cash holdings to finance the self-creation and/or the purchases of intangible assets (a type of knowledge-based FSA). Subsidiaries may encounter difficulties in raising external funds from banks, other intermediaries and equity markets due to the lack of collateral value of intangible assets and the hard-to-measure nature in monetary value terms of intangible assets. They rely on cash holdings (liquid assets) which is in line with the prediction of the pecking order theory (Myers and Majluf, 1984). In addition, we also show the important role of host country economic freedom in facilitating intangible asset holdings.

Second, we contextualize our research using a new dataset of European subsidiaries of US MNEs (Michailova, 2011). Our findings focus on the efficiency and value creation aspects in their strategic decision of intangible asset holdings and investments (Penrose, 1956). In this way, our work confirms the centrality of efficiency and value creation aspects of MNE subsidiaries, which emphasize new knowledge development at the subsidiary level (Rugman and Verbeke, 2001).

Our study presents an interesting finding is that host country location of offshore financial centre (tax haven) per se is not an incentive for intangible asset holdings in our tests of its direct effect or moderating effect. In this way, our perspectives differ from previous studies which examine the phenomenon from an international tax perspective in which tax avoidance/ profit shifting and value appropriation are primary motives. It is argued that parent firms relocate valuable intangible assets from the US to low-tax jurisdictions/ offshore financial centres by using special purpose entities for tax planning purposes. We show that host country economic freedom is a more important factor (higher coefficient with significant relationship).

Third, our examination of the financing of intangible asset holdings is an original feature because this phenomenon has been largely under-researched in the literature. We find that European subsidiaries of US MNEs which generate earnings overseas retain their profits as reflected in their cash holdings. Cash holdings are used to fund intangible asset holdings through self-creation or purchases. This is known as permanently reinvested earnings. As such, our findings also contrast to previous studies in the finance and international taxation literatures which argue that holding cash abroad leads to deferment of tax payment in the past years (Blouin et al., 2012; Foley et al., 2007).

Implications for practice

Our findings provide important implications for managers of parent firms and foreign subsidiaries. Firstly, cash holdings are an important financial resource when subsidiaries consider financing knowledge-based intangible asset holdings. This is an effective and sustainable financing strategy. Intangible assets are a source of international competitiveness to assure sustainable growth of subsidiaries.

Second, our study also provides important implications for policy makers. Host country governments are recommended to develop policies, which encourage foreign subsidiaries to invest in intangible assets because they are sources of innovation, economic growth, and productivity gains (Andrews and de Serres, 2012; Baldwin et al., 2011). In an era with increasing calls for protectionism, our findings suggest that governmental institutions interested in increasing the knowledge-based intangible assets should facilitate economic freedom, free trade and investment liberalization.

Limitations and suggestions for future research

Our study has several limitations, which might serve as avenues for future research direction. First, we observe and explain the phenomenon by using a cross-sectional dataset of the largest European subsidiaries of US MNEs. Nevertheless, the selection of research context and research design provides a fruitful case and generates interesting findings. Thus, it invites opportunities for future research to extend our study further using a panel data. Future studies may contextualize the research setting by using foreign subsidiaries of European, Japanese and other Asian MNEs operating in Europe, and compare the results with our findings.

Second, we examine the subsidiary-level cash holdings and host country institutional factors. Future research may extend our study by examining whether a subsidiary's intangible asset holdings are affected by information asymmetries between subsidiaries and external financing sources, such as external creditors and considering the effects of other institutional factors, such as financial development conditions. Third, while our study uses quantitative techniques, follow-up research may use the case study method.

CONCLUSIONS

In this study, we find that subsidiaries act strategically in knowledge-based intangible assets holdings by combining and utilizing their cash holdings/ liquid assets and host country economic freedom to support the self-creation and/or the purchases of intangible assets. We develop a new theory to explain the phenomenon by combining the pecking order theory in the finance literature and the institution theory. We have shed new lights into this important phenomenon from a strategic perspective.

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Table 1: Descriptive statistics and Pearson correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Subsidiary-level cash holdings (log)	4.10	2.88	1														
2. Host country's economic freedom	7.54	0.27	0.03	1													
3. Host country's rule of law	86.26	9.14	0.03	.67***	1												
4. Subsidiary size (log)	14.71	1.19	0.11	0.01	0.06	1											
5. Subsidiary age (log)	3.08	1.00	-0.04	-0.05	-0.13	0.13	1										
6. Subsidiary financial leverage	0.08	0.14	0.09	0.14	0.11	.29***	0.04	1									
7. Subsidiary working capital	0.21	0.24	-0.02	-0.12	0.04	-0.06	-0.07	-0.04	1								
8. Subsidiary effective tax rate	0.11	1.69	0.02	0.07	0.03	0.03	-0.09	0.01	-0.06	1							
9. Parent firm's degree of multinationality (log)	5.88	0.89	0.05	-0.09	-0.01	0.07	-0.12	0.09	-0.03	-0.01	1						
10. Parent firm size (log)	11.10	1.26	-.29***	-0.15	-0.13	.17**	-0.03	-.18**	-0.07	0.05	-0.01	1					
11. Host country with offshore financial centre (a type of tax haven)	0.26	0.44	.22**	0.07	0.14	0.12	-0.01	0.09	.35***	0.04	0.02	-0.05	1				
12. Sectors	0.59	0.49	-.25***	-0.14	-0.09	-0.01	-0.01	-0.02	0.04	0.10	-0.05	-0.14	-.22***	1			
13. Subsidiary gross profit margin	9.31	17.11	.19**	.31***	.16**	.21**	0.06	0.05	0.03	0.07	0.03	0.01	.34***	-.26***	1		
14. Host county's use of Euro currency	0.60	0.49	-0.05	-0.61***	-0.14	0.06	-0.03	-0.06	.35***	-0.01	0.03	0.12	.32***	0.11	-0.01	1	

Note: n = 150, p*<0.1, p**<0.05, p***<0.01, 2-tail test.

Table 2: Multiple regression results

Variables	Model 1	Model 2	Model 3
(Constant)	1.26	5.20	-6.38
	(2.71)	(5.24)	(6.28)
Independent variables			
Subsidiary cash holdings (log)		0.26***	0.19***
		(0.06)	(0.06)
Host country economic freedom		0.91*	1.57**
		(0.69)	(0.84)
Control variables			
Subsidiary size (log of assets)	0.83***		0.78***
	(0.15)		(0.15)
Subsidiary age (log)	0.07		0.07
	(0.17)		(0.16)
Subsidiary financial leverage	2.97**		3.01***
	(1.26)		(1.21)
Subsidiary working capital	-1.21*		-0.99*
	(0.68)		(0.67)
Subsidiary effective tax rate	0.25***		0.21***
	(0.10)		(0.09)
Parent firm's degree of multinationality (log of number of foreign subsidiaries)	-0.12		-0.09
	(0.19)		(0.18)
Parent firm size (log of employees)	-0.16		-0.01
	(0.14)		(0.15)
Host country rule of law			-0.05**
			(0.02)
Host location with offshore financial centre (a type of tax haven)	0.43		0.33
	(0.44)		(0.43)
Sectors	-0.62		-0.26
	(0.36)		(0.36)
R-square	**0.32**	**0.10**	**0.39**
Adjusted R-square	**0.28**	**0.08**	**0.34**
F-change	**7.56*** **	**8.27*** **	**7.42*** **

Notes: n = 150. Variables are shown with unstandardized coefficients followed by standard errors in brackets. *p<0.1; **p<0.05; ***p<0.01.

Table 4: Two-stage least square (2SLS) regression results

	First stage	**First stage**	**Second stage**
Variables	**Subsidiary cash holdings**	**Host country economic freedom**	**Subsidiary intangible asset holdings**
(Constant)	-4.40***	7.74	-4.75
	(0.25)	(0.02)	(9.93)
Instrumental and independent variables			
Subsidiary gross profit margin	0.03***		
	(0.01)		
Host country's use of Euro currency		-0.33***	
		(0.03)	
Subsidiary cash holdings (predicted value)			0.59*
			(0.33)
Host country's economic freedom (predicted value)			1.59*
			(1.17)
Control variables			
Host country rule of law			-0.03**
			(0.01)
Subsidiary size (log of assets)			0.81***
			(0.15)
Subsidiary age (log)			0.00
			(0.17)
Subsidiary financial leverage			3.14**
			(1.24)
Subsidiary working capital			-0.88
			(0.70)
Subsidiary effective tax rate			0.23**
			(0.10)
Parent firm's degree of multinationality (log)			-0.13
			(0.18)
Parent firm size			-0.15
			(0.14)
Host country rule of law			-0.03**
			(0.01)
Host location with offshore financial centre (a type of tax haven)			0.45
			(0.47)
Sectors			-0.44
			(0.37)
R-square	**0.03**	**0.36**	**0.36**
Adjusted R-square	**0.03**	**0.36**	**0.31**
F-change	**5.95*** **	**85.76*** **	**6.52*** **

Notes: n = 150. Variables are shown with unstandardized coefficients followed by standard errors in brackets. *p<0.1; **p<0.05; ***p<0.01.