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International Trade in Health Services: Assessing the Patterns of Trade in Global Healthcare Delivery

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INTERNATIONAL TRADE IN HEALTH SERVICES:
ASSESSING THE PATTERNS OF TRADE IN GLOBAL HEALTHCARE DELIVERY

by

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ABSTRACT

This dissertation will contribute to the research on international trade in health services through the analyses of three distinct but related topics within international trade in health services. We recognize that different countries have varying health system structures and that advances in transportation and communication have enabled individuals to seek care outside of their home country, allowed countries to invest in foreign health systems and created a market whereby US health systems are promoting their services abroad. However, we don't know which factors influence individuals, countries and institutions in seeking services and trade partners in the healthcare sector. This dissertation adds to the literature by bringing together the different Modes of trade in health services, using a new data source on FDI; and qualitatively assessing patterns of trade in health services between major US health systems and other countries.

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DEDICATION

I wish to dedicate this work to David L. McKee, PhD (deceased) and the Kent State University Department of Economics for introducing me to and continually inspiring my interest and passion for development economics.

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CHAPTER I - INTRODUCTION

A country's health status and economic performance are interlinked (Frenk, Health and the Economy: A Vital Relationship 2004). Not only is it clear that wealthier countries have healthier populations overall, but national income has a direct impact on a country's ability to develop strong health systems and provide health care resources for their populations (Frenk, Health and the Economy: A Vital Relationship 2004). Thus, access to healthcare and the overall performance of health systems vary across countries. This variation across international health systems has garnered increased interest due to several factors (Papanicolas 2013). From a demand perspective, global social developments including television and access to the internet, as well as ease of travel and migration, have provided populations in disparate countries information on health status and availability of services in other nations (Roberts 2008).

This research, organized as three separate articles, contributes to the literature on international trade in health services. Assessing international trade in health services has been challenging due to data limitations and thus, the literature is not fully developed. These three articles add to the literature focusing on the United States' role in global healthcare delivery trade.

Much research has been conducted on the comparative performance of international health systems (The World Health Organization 2000). This has resulted in health systems facing increasing pressure to provide services available elsewhere, as populations understand that their health systems could be improved (Roberts 2008). Further, this variation coupled with advances in technology, communication and transportation have created the opportunity for international trade in healthcare services

such as when individuals seek healthcare outside of their home country (Papanicolas 2013); or alternatively, when foreign healthcare organizations with expertise in certain clinical areas provide healthcare services abroad (Outreville 2007).

Structurally, international trade in services has been organized into four Modes of delivery by the World Trade Organization (WTO) as part of the General Agreement on Trade in Services (GATS) since 1995 (Adlung 2001). These four Modes of delivery include (with healthcare specific examples): cross-border supply of services such as telemedicine or other electronic health delivery (Mode 1); consumption of services abroad, for example when people travel outside of their home country for healthcare services (Mode 2); foreign direct investment, such as when a company from one country opens a new hospital or clinic abroad (Mode 3); and the movement of health professionals, including when physicians or nurses practice in countries other than their home country (Mode 4) (R. C. Smith 2009).

This research focuses on Modes 2 and 3 in the first two articles; and uses the framework of all four Modes in a case study format for the third article. The articles are organized as follows:

- Article 1: Assesses Mode 2 trade in healthcare services using the gravity Model of international trade.
- Article 2: Assesses Mode 3 trade in healthcare services (US institutions investing in hospitals abroad) using a unidirectional gravity Model of international trade. Since the interest is assessing US institutions investments in hospitals abroad, the Model will be unidirectional, meaning data will represent US investments as opposed to bi-directional flows between countries.

- Article 3: A case study of top US Hospitals' presence in international healthcare services trade, including international partnerships, investments, networks and consulting efforts.

CHAPTER II – LITERATURE REVIEW

The literature on trade theory in general is very deep and dates at least as far back to the work of Adam Smith (1776). While the literature on trade in healthcare services is relatively new, it continues to grow as healthcare becomes more globalized. It is important to understand the more general trade theory as it applies to this research since the fundamental question of why certain countries trade with each other over others is core to this analysis.

There are many theories of international trade, including, but not limited to Adam Smith's (1776) theory of trade grounded in absolute advantage, David Ricardo's (1817) Model of comparative advantage, Heckscher (1919) and Ohlin's (1924) factor endowment theory, Stolper and Samuelson's (1941) specific factor Model, the gravity Model introduced by Jan Tinbergan (1962), Paul Krugman's (1979) internal returns to scale and product differential Model, as well as others (Hosseini 2013).

More specifically, Adam Smith (1776) introduced the concept of absolute advantage, where he posited that an individual or a country should produce those goods for which it is best suited, meaning those in which its absolute costs are lower; and should trade for goods with countries that have an absolute advantage in producing other goods that the home country demands (R. Chandra 2004). Smith's (1776) theory showed that countries (or individuals) should specialize in those goods (or services) that they produce more efficiently in order to optimize resources. While Smith's work was, for its time, revolutionary, it failed to explain why countries that had an absolute disadvantage in most goods were still able to produce and benefit from trade (R. Chandra 2004). Ricardo (1817) extended Smith's theory of absolute advantage to answer this question.

Using the degree of absolute advantage as a measure to compare goods, Ricardo demonstrated how trade and specialization within trade is determined by comparative advantage (Ricardo 1817). Comparative advantage uses the concept of opportunity cost, or the amount of a good that must be given up in order to free up resources to produce another good to explain patterns of trade (Sawyer 2015).

Heckscher (1919) and Ohlin's (1924) Model, known more widely as the HO Model posits that trade is driven by variation in factor endowments across countries as opposed to differences in technology as viewed by Ricardo (Heckscher 1919) and (Ohlin 1933). Further, in HO theory the earnings of different factors are affected by trade (Wood 2009). The specific factor Model developed by Stolper and Sameuelson takes a different approach, extending the Ricardian Model to exemplify that trade increases an economy's consumption possibilities, but may also cause parts of that economy to experience losses (Stolper 1941). In 1962, Jan Tinbergan first used the gravity Model to assess patterns of international trade. This Model, based on Newton's Law of Gravitation, has been used extensively in economics and shows that bilateral trade between two countries is proportional to size as measured by gross domestic product (GDP), and inversely proportional to the geographic distance between them (Chaney, The Gravity Equation in International Trade: An Explanation 2011). Paul Krugman's increasing returns Model (1979) showed that rather than factor endowments or differences in technology, trade is caused by internal economies of scale (P. Krugman 1979). While each of these theories contributes significantly to our understanding of international trade, the majority of the literature is predicated on trade in goods.

While each of these theories has contributed significantly to trade theory overall, the gravity Model has unique attributes that lend to assessing patterns of trade in health services, the focus of this research. Again, the gravity Model predicts bilateral trade between countries based on their size and the distance between them (Keum 2008). Since we are assessing patterns of health services trade, which sometimes includes the movement of people, accounting for the distance impact on trade decisions is important. The gravity Model is often cited as one of the most empirically successful trade Models (Keum 2008). Reasons for its success include its predictive ability for bilateral trade flows, improved theoretical foundation incorporating Modern theories of trade and growing interest by economists in attempting to treat certain countries and/or regions as physical entities in a designated space (Frankel 1996).

Trade in services, in general, is still somewhat new relative to trade in goods (Adlung 2001). Historically, economists believed that services were not tradeable across borders or over great distances but advances in technology, communication and transportation have significantly changed the degree to which services can be traded internationally (The International Trade Centre n.d.). Oftentimes, services are thought of as intangible, obscure or potentially perishable, even requiring close proximity between provider and consumer (Kuznar 2005). Because of these nuances, factor mobility becomes key in services trade (Bhagwati 1996).Examples might include hotels and tourism, restaurants and food service, spas and grooming, or even healthcare (Kuznar 2005). In the United State, financial services, banking and insurance lead the exports of services trade (United States International Trade Commission 2016).

Services comprise the largest portion of the global economy (70 percent of global GDP) and include 60% of global employment (The International Trade Centre n.d.). Estimates show that trade in services represents approximately one quarter of total world trade (Loungani 2017). Services, unlike manufactured goods, are much more difficult to measure (The World Trade Organization 2010). In contrast to trade in goods, services are much less tangible with no physical evidence such as packages moving through customs with accompanying documentation. Thus, the codes that are recognized internationally and used to track trade such as commodity codes, content descriptions, data on quantity, origin and destination; and invoices are all missing from trade in services, making it very difficult to accurately track (Lindner 2001). Generally, services trade is measured using the balance of payment statistics (BOPS) for Modes 1, 2 and 4 and the Foreign Affiliate Statistics (FATS) for Mode 3 (The World Trade Organization 2010).

There has been significant interest in and attempted research around the growth of international trade in healthcare services (Herman 2009). Media attention has been drawn to the idea of patients travelling around the world to receive healthcare services, whether it be medical or cosmetic in nature (Herman 2009), with unsuccessful attempts to quantify the magnitude of this phenomenon. There is also great interest in and research surrounding the movement and relocation of health professionals, often referred to as "brain drain" (C. Hooper 2008). An evolving area of interest is the technological advancements allowing for the remote provision of healthcare services through telemedicine or virtual care capabilities either in an infrastructure building effort (Graham 2003), or by some of the world's most prestigious healthcare institutions simply acting on market demand for their services (The Med City Beat 2017). Likewise, foreign

direct investment (FDI) in healthcare is beginning to receive more attention but has historically been challenging to quantify (Smith 2004). As these examples show, trade in services is organized into the four previously described Modes of delivery by the WTO, Modes 1-4. This research focuses on Modes 2 and 3, though the more qualitative case study in article 3 could include any of the Modes of delivery. Thus, a brief definition pertaining to each Mode is indicated.

Mode 1: Cross-Border Supply of Services*:*

It is often helpful to think of each Mode of trade in services in terms of "what or who" is crossing an international border (Lautier 2014). In Mode 1, services cross international borders (Lautier 2014). More specifically, cross-border supply of services specific to healthcare includes items such as laboratory samples for pathology assessment, electronic diagnoses or second opinions, clinical consults and medical records review provided via traditional mail channels, telephonically or via electronic delivery of health services (Chanda, Trade in Health Services 2001). It also includes consulting services when the service is the only component crossing borders. Increasingly, countries use telehealth services, such as telepathology, teleradiology, telepsychiatry and tele-ICU among others (Chanda, Trade in Health Services 2001). Cross-border tele-consults have arisen as a means for US institutions such as the Mayo Clinic to provide their expertise abroad (Malagrino 2012). Additionally, major healthcare institutions, including the Cleveland Clinic and others, offer advisory services in areas including care pathway implementation, clinical operations, continuous improvement/LEAN, distance health, joint commission international readiness, patient experience assessments and training, quality and patient safety assessments and wellness

programming implementation (The Cleveland Clinic 2018). Done remotely, these services would be included in Mode 1; or could include a combination of Mode 1 and Mode 4 (movement of professionals) if US professionals provide consulting services abroad. Cross-Border supply of services can occur organization to organization (e.g. the Cleveland Clinic providing tele-consult services to a hospital system in another country; or direct to consumer, e.g. a person from another country seeking a remote consultation from the Cleveland Clinic or other foreign organization). There is not a comprehensive data source to measure Mode 1 trade in healthcare services.

Mode 2: Consumption of Services Abroad

In Mode 2, it is the consumer that crosses international borders (Lautier 2014). This is, perhaps, the Mode that has received the most attention, both through media outlets and in academic attempts to quantify and project its impact (Connell, Contemporary Medical Tourism: Conceptualization, Culture and Commodification 2013). There are many reasons why a person might decide to travel for healthcare services, including cost (e.g. they lack insurance, are under-insured or the procedure they are seeking is non-covered by insurance), access (long waiting times in their home country or procedure/service/expertise not available in their home country), quality (another country may have more advanced techniques, better outcomes or quality), diasporas, vacation coupled with medical care and privacy and confidentiality (M. a. Horowitz 2007). The ease of travel and information availability have made international travel for medical care more feasible (Carrera 2006). Because of the variation in reasons for health-related travel, the types of procedures sought and other considerations, definitions of health and medical tourism have arisen. Health tourism has been defined as

the act of traveling outside of a person's local environment to receive services focused on improvement or maintenance of the person's overall health and wellbeing (Carrera 2006). Medical tourism is considered a sub-set of health tourism and defined as the act of traveling outside of a person's local healthcare jurisdiction to receive medical intervention with the intent of maintaining or improving one's physical health (Carrera 2006). Developing countries increasingly attempt to attract the price conscious health or medical traveler leveraging their lower cost services (Hopkins 2010), while major US organizations compete for the international patient seeking the highest level of complex clinical care (Kehoe 2016).

Mode 3: Foreign Direct Investment

Recall that Mode 3 of the GATS includes commercial presence abroad, which can occur when a company from one country makes FDI in health services of another economy (e.g. when a foreign company invests in a domestic hospital or medical clinic) (Smith 2004). Specifically, FDI has been defined as those investments where there is a long-term relationship and related long standing interest and control by a firm or individual in one country in a firm located in another country (Smith 2004). Forms of FDI include equity capital, reinvestment of earnings from the 'host' country, and provision of long- and short-term intra-company loans" (Smith 2004). For example, in China, governments have promoted and attempted to attract FDI in the health services sector, including hospitals in order to improve healthcare in the region (Lin 2010). However, governments and country characteristics also curtail FDI through regulatory and structural factors (Chanda 2010). Of interest to many researchers and healthcare professionals are the determinants of country selection for FDI in the health sector (

(Outreville 2007) (Smith 2004) (Chanda 2001) (Drager 2002)). Most studies find that key determinants of country selection for FDI in healthcare services include government and regulatory environment, availability of healthcare resource inputs, the degree of risk and perception of a given country, existing healthcare infrastructure and cultural distance (Chanda 2010). Recent examples of FDI in healthcare services include the Cleveland Clinic's foray into hospital ownership and management in Canada, United Arab Emirates and most recently, the United Kingdom (Coutre 2017). This type of FDI has both critics and supporters. Critics point to a potential "two-tiered" health system that these new facilities might create (as in London where there is increased demand for private healthcare services outside of the National Health Service (NHS)) and supporters point to the advances in health system infrastructure that might be created for the host country (Mortensen 2008). As mentioned, FDI in healthcare services has been difficult to track, often relying on the FATS, which has limited participation (Waeger 2007).

Mode 4: Movement of Health Professionals

Perhaps the most researched aspect of international trade in healthcare services is the migration of healthcare workers. Healthcare is extremely labor intensive and must be adapted to the needs of the people that are being served in order to be effective (Buchan 2017). At the core of the healthcare delivery system is the healthcare workforce and no health system, be it national or global, can be effective without an adequate healthcare workforce (Buchan 2017). Oftentimes, health professionals, particularly those higher skilled such as physicians and nurses, leave their home countries in search of improved working conditions and career and salary advancements among others (The World Health Organization n.d.). The concern is generally around skilled health workers leaving

developing countries for the developed world and its impact on the health infrastructure of developing countries (Martineau 2004). This phenomenon is not new, having received significant attention by the WHO in the 1970s; and often being referred to as “Brain Drain” (Martineau 2004). On the other hand, education and availability of skilled health workers varies significantly between and within countries (Frenk 2010). There are four countries (China, India, Brazil, and the USA) that each have greater than one hundred fifty medical school training programs, but there are also thirty-six countries that have zero medical school training programs (Frenk 2010). This disparity in healthcare workforce is important not only for assessing the impact of migration but also for its impact on other aspects of trade in health services. While this research will not focus on the migration of healthcare workers, certain aspects will be assessed, specifically the temporary movement of health professionals from the US for health system infrastructure building in other countries (Innovation Diffusion as opposed to Brain Drain (Lissoni 2017)), such as the Cleveland Clinic’s hospital in Abu Dhabi, which performed the region’s first kidney, liver, lung and heart transplants from deceased donors in 2017 using prominent surgeons from around the world (Al Kuttab 2018).

CHAPTER III - ARTICLE 1: PATTERNS OF TRADE IN HEALTH SERVICES UNDER MODE 2 OF THE GATS (CONSUMPTION OF SERVICES ABROAD)

Introduction

This article examines patterns and determinants of international trade in health care services under Mode 2 of the GATS, which is consumption of services abroad; or individuals traveling outside of their home country to receive healthcare services. Recognizing that availability of healthcare services varies across countries, it is reasonable to assume that individuals will continue to leave their home country for certain services. However, their choice of location could be based on may factors (Lunt 2014). For example, residents of a developed country may seek treatment in a developing country due to lower costs (Connell 2013); while a resident from a developed country may look to another developed country for access to a more advanced procedure or service that is not available in their home country (Sobo 2009). However, once a patient decides to look outside of their home country for healthcare services, how do they determine where to go for the necessary care? The position of this article is that different types of distance impact the flow of healthcare services trade under Mode 2 of the GATS and this will be tested using the gravity Model of trade.

The gravity Model postulates that the flow of bilateral trade between countries is approximately proportional to size (based on GDP) while being inversely proportional to the distance between the two countries (Chaney, The Gravity Equation in International Trade: An Explanation 2011). While geographic distance is extremely important, there are other distance components that are likely to impact international trade in healthcare services. For this reason, the CAGE (Cultural, Administrative, Geographic and

Economic) framework (P. Ghemawat 2001) will be used to assess the impact of various distance factors on Mode 2 patterns of international trade.

Literature Review:

Medical tourism or the act of traveling to a different country for the primary purpose of receiving healthcare services has grown substantially as globalization has allowed for access to information and ease of travel (Connell 2013) (M. R. Horowitz 2007) (Esiyok, Cakar and Kurtulmusoglu 2017), though the principle of territoriality in healthcare continues to tamper demand for international medical travel (Carrera 2006). The terrirotiality principle when applied to healthcare means that nation states hold the overall authority and responsibility for ensuring access to adequate health care. This includes, for example, organizing and overseeing the health care delivery system, structuring its funding and more generally, advancing the health of the population within the country (Bertinato 2005). For that reason, we often say that healthcare is local (Klein, Hostetter and McCarthy 2017). However, there are times when healthcare is not local, times when patients seek healthcare outside of their local community, state or country due to cost, quality/capability or access issues in their local healthcare system (Dalen and Alpert 2019). The concept of healthcare related travel is not new (Smith 2009). In fact, people have traveled outside of their home country for healthcare or healing throughout time (Sobo 2009), but typically this was limited to the wealthy seeking the best healthcare in the world, most often in a developed country; or people traveling to natural or sacred sites (Sobo 2009). The cross-border travel for healthcare services that has evolved since the late 1990s is thought of differently, as it now includes what has been called “reverse globalization” where people of more developed countries seek care in less

developed countries due primarily to cost or access challenges in their home country (Connell 2013). While the overall phenomenon has received significant media attention, it has been very difficult to quantify and assess from an academic research perspective due to significant data limitations (Hopkins 2010) (Johnston 2010). Research that has been attempted has mostly focused on patient case studies (Miyagi 2012) or assessment of certain aspects of medical tourism which often includes industry structure such as facilitators or websites (Hanefeld, et al. 2015). The types of procedures that medical tourism patients seek has also been reviewed (Connell 2013) as has diaspora travel patterns (Lee 2010) (Hanefeld, et al. 2015). Less often, researchers have begun to assess the demand of international patients and the supply characteristics of destination countries (Esiyok, Cakar and Kurtulmusoglu 2017). On the patient demand side, reasons for medical travel have mostly pointed to the relative high cost of care in the home country (Connell 2006) (Gan 2011) (Smith, Martinez Alvarez and & Chanda 2011) (Turner 2007), the quality of care available compared to that of the destination country (Glinos, et al. 2010) (Esiyok, Cakar and Kurtulmusoglu 2017) or informal networks and recommendations (Hanefeld, et al. 2015). The supply side factors have included hospital accreditation (Smith and Forgione 2007) as well as geographic distance (Adams and Wright 1991) and cultural considerations (Glinos, et al. 2010) (Esiyok, Cakar and Kurtulmusoglu 2017). The interest of this research is different types of distance considerations, including cultrual, administrative, geographic and economic.

Distance is a known factor in general tourism destination selection (Boniface, Cooper and Cooper 2016). In 1970, Williams and Zelinsky (Williams and Zelinsky 1970) conducted an analysis assessing the factors that affect tourist flows. The outcome of their

research led to three factors that are still important today: 1) geographic distances between countries (the greater the distance, the less tourism flow); 2) international connectivity (the sharing of business or cultural features between countries) and 3) the general attractiveness of one country over another. Further, research on tourism flows has repreatedly shown that distance and cost are major factors impacting tourists' destination decisions (J. Hooper 2015). However, healthcare related travel is different from general tourism and leisure travel (Snyder, Dharamsi and Crooks 2011). Individuals traveling to other countries for medical care could face significant stress of the medical procedure that is compounded by being away from their family, friends and support networks in addition to facing cultural and linguistic differences (Crooks, et al. 2010). Medical tourism specific research has found that geographic distance, costs, expertise, availability of treatment, informal networks and personal recommendations all impact consumers choice of destination and provider for healthcare services (Hanefeld, et al. 2015). Studies have focused on geographic distance (Adams and Wright 1991) (Ormond 2008) (Johnson and Garman 2015) until recently when cultural distance (Johnson and Garman 2015) (Esiyok, Cakar and Kurtulmusoglu 2017) and social networks (Hanefeld, et al. 2015) have been shown to be factors.

(Adams and Wright 1991), while studying rural Medicare beneficiaries in the United States and their hospital choices found that approximately sixty percent of patients selected the hospital nearest to them and travel patterns showed variability by age and severity of illness. (Ormond 2008) explains that those traveling internationally for healthcare services tend to select locations closer to their home country. (Hanefeld, et al. 2015) determined that "medical tourists" use a multi-step process driven by informal

social networks to make decisions on where to receive care, mostly because the industry lacks reliable information on quality and cost for decision making. Further, through their interview based research, they showed that geographic distance, healthcare costs, medical expertise and treatment availability were factors that influenced patients' determination on traveling for care but where they travel was primarily determined by informal networks (Hanefeld, et al. 2015). Each of these differs from this research in that specific origin and destination country factors were not quantitatively assessed. Understanding healthcare related travel flows from the perspective of patient demand and country supply side factors are important to healthcare organizations in setting their strategy in this emerging area.

Johnson and Garman (2015) and Esiyok, Cakar and Kurtulmusoglu (2017) have endeavored to quantitatively assess the factors determining medical tourism flows, as this research seeks to do. As stated previously, data can be challenging in assessing healthcare related travel due to the inconsistency of data capture across countries. Johnson and Garman (2015) limited their study to international medical travel to the United States using the US Office of Travel and Tourism Industries' Survey of International Air Travelers (SIAT) (Johnson and Garman 2015); and (Esiyok, Cakar and Kurtulmusoglu 2017) focused on inbound medical travel to Turkey leveraging data made available from the Turkish Ministry of Health. Johnson and Garman (2015) developed a macro-level Model that looked at the relationship between inbound medical travel to the United States combined with origin country level factors organized into multiple categories: population, economic, travel, cultural distance, education, health and healthcare (Johnson and Garman 2015). Their results showed that countries with greater outbound travel to

the United States tended to be more populated, had slower GDP growth, higher levels of internet users and more women in national parliaments (Johnson and Garman 2015). Additionally, countries with shorter air travel times, lower travel costs and existing visa waivers were associated with more medical travelers to the US (Johnson and Garman 2015). From a socio-demographic perspective, countries with more outbound medical travel to the US had an older and more educated population, longer life expectancy and lower child mortality (Johnson and Garman 2015). (Esiyok, Cakar and Kurtulmusoglu 2017) analyzed the relationship between the cultural factors of origin and destination countries on medical tourism and determined that cultural distance has an impact on the choice of medical tourism destination. They further identified that religious similarities are a determinant of medical tourism destination choice (Esiyok, Cakar and Kurtulmusoglu 2017). While both of these studies have similarities to this research, they are both different from each other and also vary from the intended research. For example, (Johnson and Garman 2015) specifically look at inbound travel to the United States with a focus on multiple independent variables, but without a dedicated focus on distance leveraging the gravity Model of trade. On the other hand, (Esiyok, Cakar and Kurtulmusoglu 2017) used a random effects Model with a Model structurally similar to the gravity Model, though their focus is on cultural distance as measured by a composite previously used by (Kogut and Singh 1988) based on cultural dimensions by (G. Hofstede, Cultures and Organizations 1997). While (Johnson and Garman 2015) and (Esiyok, Cakar and Kurtulmusoglu 2017) use some variables in common, there are also differences in variables, methodology and country of interest. As stated by (Esiyok, Cakar and Kurtulmusoglu 2017), there is not a clear consensus on the variables to include

when assessing the determinants of destination country choice for traveling patients. However, since research on international traveling patients and the determinants of country selection is evolving, it is important to understand and justify the use of selected variables in this and future research. The following table compares the variables used in (Esiyok, Cakar and Kurtulmusoglu 2017) and (Johnson and Garman 2015) given that they are the most recent and most similar to this research.

Table 1 Variables Included and Significant in Similar Research

Dependent Variable(s)	Johnson and Garman, 2015 (1)	Esiyok, Cakar and Kurtulmusoglu 2017 (2)	Significant in Model (1)	Significant in Model (2)
Presence of any inbound medical travel from a given country to the United States	✓			
Annual volume of inbound medical travellers from a given country to the United States	✓			
Number of international patients from country i at time t to Turkey		✓		
Independent Variables				
Population size (millions)	✓	—		
Per capita GDP	►	✓		•
Annual GDP growth	✓	—		
Change in per capita GDP	►	—		
Exports	►	—		
Internet use	✓	—		
Cellular telephone use	►	—		
Labour participation rate	►	—		
Services trade	✓	—	•	
Women in government	✓	—		
Air departures	►	—		
Air travel time	✓	—	•	
Air travel cost	✓	—	•	
Visa waiver	✓	—		
Outbound travel	✓	—	•	
English	►	—		
Secondary school enrollment	✓	—		
Post-secondary school enrollment	►	—		
Literacy	►	—		
Child mortality	►	—		
Life expectancy	✓	—		
Measles immunization (%)	►	—		
Negative TB success	►	—		
Population 65+	►	—		
Total healthcare expenditure (THE), percentage of GDP	►	—		
Per capita total healthcare expenditure, PPP	✓	—		
Per capita government spending on healthcare, PPP	►	—		
Government healthcare expenditure (total government spending)	►	—		
Government healthcare expenditure, percentage of THE	►	—		
Public healthcare expenditure, percentage of THE	►	—		
Out-of-pocket healthcare expenditure, percentage of private THE	✓	—		
Private healthcare expenditure, percentage of THE	►	—		
Prepaid health plans, private percentage of THE	►	—		
Hospital bed density	►	—		
Physician density	►	—		
Cultural distance between country i and Turkey	—	✓		
Squared cultural distance between country i and Turkey	—	✓		•
Religious similarity between country i and Turkey	—	✓		•
Ratio of Turkish diaspora population residing in country i to total population of country i	—	✓		•
Physical distance between country i and Turkey	—	✓		•
Ratio of number of inbound tourists from country i visiting Turkey to the total of number inbound tourists to Turkey	—	✓		•
✓ Included in final model				
► Assessed but not included in final model				
— Not part of study				

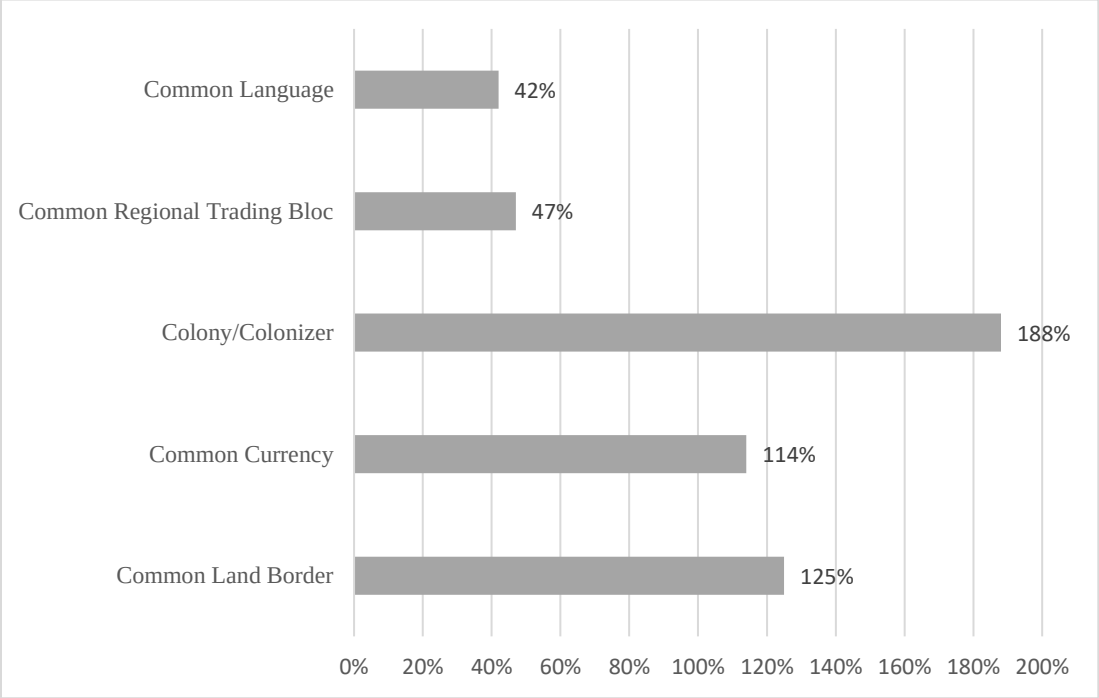
As noted, neither study used the classical gravity Model to assess the determinants of country selection or patterns of international healthcare travel, though both studies incorporated some types of physical distance variables or proxies; and other distance variables. This study differs in that it takes an approach from economics and extends the gravity Model of trade for analysis of international healthcare travel patterns. In addition to its role in assessing international trade, the gravity Model has been used extensively to analyze tourism flows (Boniface, Cooper and Cooper 2016) particularly when seeking to assess the role of distance factors on tourism (Morley, Rosello and Santana-Gallego 2014). The gravity Model is often used to assess the validity of the distance decay theory which predicts the effect of distance on cultural or spatial factors, often applied to international travel (McKercher 2003). The distance decay effect projects that travel between countries will be highest when they are relatively close geographically, then decline exponentially as distance between countries increases (McKercher 2003). The gravity Model, however, is used to assess trade patterns, demonstrating that bilateral trade between countries is approximately proportional to size as measured by their GDP and inversely proportional to the geographic distance between the two countries (Chaney 2013). Though Tinbergen (1962) was the first to use the gravity Model to describe international trade flows (Anderson 2010), it was used originally in the 19th century by Ravenstein (1889) to assess migration patterns (Anderson 2010). Based on Newton's law of universal gravitation which states that any particle of matter within the universe attracts other particles with a gravitational force that varies directly by the product of their masses and inversely based on the squared distance between them (Newton 1846) , the gravity Model essentially measures mass using

countries' gross domestic product (GDP) (Feenstra and Taylor 2008). The gravity Model or gravity equation becomes a reduced form equation established based on a framework of demand and supply relationships (Karemera, Oguledo and David 2000). There is significant empirical evidence to support the gravity equation, which ultimately predicts that large countries, as measured by GDP will trade the most and that trade will decline as physical distance between them increases (Feenstra and Taylor 2008). The evidence to support the gravity Model often shows that it predicts anywhere from one half to two-thirds of the variation in trade between country pairs; and typically a one percentage point increase in an economy's size is predicted on average to lead to a .7-.8 percentage point increase in total trade volume (P. Ghemawat, Differences Across Countries: The CAGE Distance Framework 2007). Geographic distance has the opposite effect, meaning a one percentage point increase in the distance between the capitals of two countries typically decreases trade between the two by an estimated one percentage point (P. Ghemawat, Differences Across Countries: The CAGE Distance Framework 2007). Being very established, the gravity Model has a set of variables that have stood up over time and are often included in analyses of trade (Yotov, et al. 2016). In addition to geographic distance, these include country adjacency, whether or not a common language is shared, colonial links, whether or not there is common currency, whether or not there is common legal structure, whether countries are landlocked and other variable related to institutions, infrastructure and migration flows (Asia-Pacific Research and Training Network on Trade 2008). Data on the supporting variables are easily accessible through CEPII (CEPII 2020) as used in Head, et al (2010) and have been extensively used thereafter. For example, variables such as common language, common regional trading bloc,

colony/colonizer relationship, common currency and common land border have been shown to significantly impact trade between countries (P. Ghemawat 2007). Figure 1 shows estimated effects of similarities in these variables on bilateral trade:

Figure 1. *Estimated Effects of Similarities in Certain Variables on Trade Between Countries.*

Source: (Ghemawat and Mallick 2003)



Other types of distance beyond geographic can impact international trade and migration. Because of this, many researchers have applied the CAGE distance framework by Ghemawat (2007) when attempting to analyze non-geographic distance effects. The CAGE Distance framework is made up of multiple dimensions of distance including cultural, administrative/political, geographic and economic (P. Ghemawat 2007). The cultural distance dimension includes attributes of a country or society that are focused on interactions among its people as opposed to the state (P. Ghemawat 2007). Variation in cultural attributes between countries has been shown to decrease economic exchanges

between them (P. Ghemawat 2007). The administrative distance dimension within the CAGE distance framework addresses laws, policies and other institutional factors related to political or governmental processes (P. Ghemawat 2007). Administrative distance variables can have varying degrees and direction of effect on trade. As explained by Ghemawat (2007), India and Pakistan are a good example where they share past colonial ties, have a common land border and linguistic similarities. Yet, trade between them is significantly less than what is predicted by gravity Models because of long-standing hostility between them (P. Ghemawat 2007). Thus, factors that increase administrative distance such as policies put forth by individual governments or relationships between governments must be considered in addition to traditional gravity variables (P. Ghemawat 2007). Geographic distance is probably the most universally understood and often is the variable thought of when people think of "distance" (P. Ghemawat 2007). However, geographic distance should be expanded beyond the calculation of physical distance between capitals of two cities—physical distance often raises the cost of transportation if the goods, services or people need to be transported as part of the transaction (P. Ghemawat 2007). Common land border, differences in time zones and climate variation among others can also be included in geographic distance (P. Ghemawat 2007). Economic distance addresses economic mechanisms that are not included in cultural, administrative or geographic distance dimensions such as per capita income or factors of production in addition to the often cited economic size as measured by GDP (P. Ghemawat 2007). Examples of common gravity variable categories organized according to the CAGE distance framework are shown in Table 2. While the general structure of the gravity Model and its variables as well as the CAGE distance framework provide a guide

as to variables for inclusion in assessing patterns of trade, including services trade where transportation of people over great distances is required, the healthcare aspect of this study makes it unique. To the author's knowledge, this is the first time the gravity Model of trade combined with the CAGE distance framework has been used to assess factors impacting destination for international healthcare services received outside of one's home country.

Table 2 *Common Gravity Variables Organized in the CAGE Distance Framework*

Source: (P. Ghemawat 2007)

	Cultural	Administrative	Geographic	Economic
Country Pairs (bilateral)	Common Language	Colonial ties	Physical Distance	Rich-Poor differences
	Ethnicity Variation	Shared regional trading bloc	Land border	Natural resource variation
	Common Religion	Common currency	Time zone variation	Financial resource variation
	Degree of Trust	Political hostility	Difference in climates and diseases	Human resource variation
	Variation in values, norms and dispositions			Infrastructure variation
				Information or knowledge variation
Countries (unilateral or multilateral)	Insularity	Nonmarket or closed economy	Landlocked geography	Economic size
	Traditionalism	Extent of home bias	Internal navigability	Per-capita income level
		Membership in international organizations	Geographic size	
		Weak institutions or corruption	Geographic remoteness	
			Weak transportation or communication systems	

Data and Methods:

Data on health-related travel expenditures are available through the World Bank's Trade in Services Database, leveraging BOPS, found here: https://datacatalog.worldbank.org/dataset/trade-services-database. The database is an attempt to fill the void of data on this topic by combining multiple sources of services trade data including the OECD, Eurostat, UN and IMF, using a mirroring technique (The

World Bank n.d.). The data set is incomplete and comes with many challenges. For example, since the data is measured in monetary value of expenditures on health-related travel, we do not know if an individual traveled for the purposes of receiving healthcare, or potentially fell ill while in another country and had to seek healthcare services. However, the World Bank's Trade in Services Database is the most robust data set available for assessing these patterns across countries. There are other data sets such as the Office of Travel and Tourism Industries of the International Trade Administration, US Department of Commerce's Survey of International Air Travelers (SIAT) used by Johnson and Garman (2015). However, the SIAT is focused on travelers into and out of the United States only (Johnson and Garman 2015). While the US medical travel patterns are of interest in this study, a broader analysis of medical travel patterns is priority. The Interagency Task Force on Statistics of International Trade in Services has been working to develop reporting structure for trade in services under the GATS, but a limited number of countries have reported in this consistent manner as of this writing and imports of services are often lacking (Johnson and Garman 2015) and (The United Nations, Task Force on International Trade Statistics n.d.). Thus, the World Bank's Trade in Services Database was selected as the data for the dependent variable.

The study uses ordinary least squares (OLS) regression in line with other gravity Models of trade where most variables are transformed using natural logarithm (Bacchetta, et al. 2012). Because of the multiplicative orientation of the gravity equation, the oft used methodology for estimating the gravity equation includes taking the natural logarithms of certain variables resulting in a log-linear equation that is then estimated by OLS regression (Bacchetta, et al. 2012). There is debate about using OLS versus Poisson

Pseudo Maximum Likelihood (PPML) because estimating gravity equations in the additive form by OLS can cause variability in the presence of heteroscedasticity according to Silva and Tenreyro (2006). However, the author has opted to use the traditional gravity Model utilizing logarithmic transformation with OLS, checking for heteroskedasticity. OLS has been shown to be reasonable and reliable if the following conditions are met: there is not perfect multicollinearity among any of the independent variables; the error term is independently distributed and normal with mean zero and homoskedasticity; the underlying Model is linear; and the error term is not correlated with any of the independent variables (Shepherd 2011). STATA version 15 (STATA n.d.) is used for all analyses.

Hypotheses include:

H_1: Geographic distance effects Mode 2 trade in healthcare services.

H_2: Cultural distance effects Mode 2 trade in healthcare services.

H_3: Administrative distance effects Mode 2 trade in healthcare services.

H_4: Economic distance effects Mode 2 trade in healthcare services

In following previous research, certain variables will be retained in all regressions, which are quite common to gravity Model analyses (Carrere 2006). These include the following:

Geographic distance, shared borders, common language, colonial ties, time difference, population and GDP.

The basic gravity Model specification is (ARTNet 2008):

$$X_{ij} = K \frac{Y_i Y_j}{t_{ij}}$$

Where:

Xij= exports from i to j; or total trade (i.e $X_{ij} + X_{ji}$)

Y= economic size (GDP)

t =Trade costs/Distance and other Factors

K= Constant

However, the empirical equation used in the basic gravity Model is represented by the following (Anukoonwattaka 2016):

$$\ln X_{ij} = b_0 + b_1 \ln(Y_i) + b_2 \ln(Y_j) + b_3 \ln(t_{ij}) + e_{ij}$$

Typical proxies for "t" (trade costs, distance and other factors) include geographic distance, adjacency, common language, colonial links, common currency, whether a country is an island or landlocked, variables for institutions, infrastructure, migration flows and tariff barriers (Anukoonwattaka 2016). As previously mentioned, it has not been as common to include different types of distance beyond those identified. However, cultural distance has recently been integrated to medical travel analyses by Esiyok, et al (2017). Drawing from multiple disciplines and the existing research, this study will leverage the CEPII gravity database (CEPII 2020) for common gravity Model variables but will extend the traditional gravity Model layering in the CAGE distance framework and selecting applicable variables from medical travel related research.

For purposes of this research, the dependent variable will be international trade in healthcare services under Mode 2 of the GATS as measured by the value ($M million USD $) of health-related expenditures reported in BOPS and available in the World Bank's Trade in Services Database, which is reported in origin-destination country pairs. The data available cover the time period 2000-2011 in terms of data on health-related travel expenditures. As mentioned, there is no clear consensus as to variables to include when assessing patterns of trade in healthcare services, specifically patient selection patterns for receipt of healthcare service abroad (Esiyok, Cakar and Kurtulmusoglu 2017). This study will draw on multiple disciplines and the most recent research to construct a modified gravity Model organized according to the CAGE distance framework as shown in Table 3, which includes data sources.

Table 3 *Independent Variables Organized According to CAGE Framework*

Characteristic	Variable	Source
Cultural	Power Distance	Hofstede Insights (Hofstede n.d.)
	Individualism	Hofstede Insights (Hofstede n.d.)
	Shared Religion	CEPII GeiDist Database
	Shared Language	CEPII GeiDist Database
	Diaspora Population	United Nations Migrant Stock
Administrative	Common currency	CEPII GeiDist Database
	Common Legal System	CIA World Factbook
	Political Stability and Absence of Violence	World Bank Governance Indicators
	Colonial ties	CEPII GeiDist Database
Geographic	Geographic Distance	CEPII GeiDist Database
	Shared Borders	CEPII GeiDist Database
	Time difference	CEPII GeiDist Database
Economic	Total Population	World Bank

Table 3 (continued).

Characteristic	Variable	Source
	Hospital Beds per 1,000 People	World Bank Health Statistics
	Density of Physicians per 1,000 People	WHO Density of Health Professionals
	Health expenditure, government (% of total)	World Bank Health Statistics
	Out-of-pocket health expenditure (% of total)	World Bank Health Statistics
	Health expenditure total (% of GDP)	World Bank Health Statistics
	Life Expectancy at Birth	World Bank Health Statistics
	GDP (US $$)	CEPII GeiDist Database
	Hospital cost per day	World Health Organization

Cultural distance is not often measured in gravity Models of trade outside of the dummy variables for shared religion and language. For that reason, the current study draws on the work of Esiyok, et al (2017) for consideration of cultural variables to include in this Model. Esiyok, et al (2017) along with many other researchers have used Hofstede's (1980) cultural dimensions as measures for cultural distance between countries. Esiyok, at al (2017), following work by Kogut and Singh (1988) created a cultural index to measure the cultural difference between countries, using all four dimensions as proposed by Hofstede (1980), including power distance, individualism-collectivism, uncertainty avoidance and masculine-feminine (Esiyok, Cakar and Kurtulmusoglu 2017) and (G. Hofstede 1980). However, this approach has been questioned because such simplified indices can reduce explanatory power and serves as a weak proxy of cultural distance (Hakanson 2010) and (Shenkar 2001). Beugelsdijk, Ambos and Nell (2018) discuss this issue and offer guidance as to whether to use a

composite index for cultural distance, or alternatively to use a single, or multiple individual dimensions. In line with their recommendations, each Hofstede (1980) cultural dimension was reviewed to determine its perceived applicability in a Model measuring determinants of country choice for patients traveling internationally for healthcare services. The power distance dimension measures the degree to which those with less power institutionally or organizationally are accepting of the fact that power is not distributed equally (Hofstede and Bond 1997). Individualism-collectivism measures the propensity of people to look out for themselves and their immediate family as opposed to people organizing into groups or collectives and look out for each other more broadly in exchange for loyalty (G. Hofstede 1980). The uncertainty avoidance dimension addresses the extent to which ambiguity is viewed as a threat by people causing them to create beliefs and institutions that help avoid ambiguous situations (G. Hofstede 1980). Lastly, the masculine-feminine dimension measures the degree to which cultures are focused on success, material goods and money (masculine) versus caring for others and overall quality of life (feminine) (G. Hofstede 1980). Based on this understanding, it is postulated that the power distance and individualism-collectivism dimensions are most predictive of cultural attributes related to healthcare decision making and these two dimensions are included in the study as the difference between country i and country j for each variable. Data on Power Distance and Individualism-Collectivism were extracted from Hofstede Insights (Hofstede n.d.) and the variance was calculated for each country pair for both dimensions, then applying the natural log for each. Following traditional gravity Models a dummy variable for shared religion and shared language are also included. Lastly, a variable is calculated to measure diaspora population by determining

the percentage of people living in the destination country that are from the origin country of the total population of the origin country. These five metrics represent the cultural distance composite for this research.

Administrative distance is structured similar to that recommended by Ghemawat (2007) in the CAGE Distanced Framework. Two metrics are retrieved from the CEPII gravity database (CEPII 2020), common currency and colonial ties. Both are included as dummy variables. When making healthcare decisions, legal structure of destination countries has been shown to be important due to the serious nature of medical procedures and potential retribution in the case of medical error (Steklof 2010). Therefore, a dummy variable is included for common legal system as provided by CIA World Factbook (Central Intelligence Agency n.d.). Additionally, political stability has repeatedly been shown to impact tourism destination choices (Yazdi and Khanalizadeh 2016) and would likely impact medical travel decisions as well. This is addressed by including a variable measuring political stability and absence of violence provided in the World Bank Governance Indicators (The World Bank n.d.). According to the World Bank the metric "measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism" and it is an estimate that ranges from approximately -2.5 (weak) to 2.5 (strong). Unlike other variables that measure the distance between countries by calculating the variance between county i and country j, this variable is reflected separately for the destination country only as a control variable because it is expected that regardless of the political stability of an origin country, those seeking healthcare services abroad will not want to travel to countries with weak political stability. Collectively, these metrics make-up the administrative distance category.

Geographic distance is likely the most researched distance component, particularly with the gravity Model of trade. In line with the CAGE Distance Framework and traditional gravity Modeling, geographic distance is included in the Model. It is provided in the CEPII database and is calculated as the distance between capitols for country pairs. The natural logarithm of this variable is used so as to follow the gravity equation. Additionally, a dummy variable is used from the CEPII database indicating whether or not country pairs share borders and a variable also from the CEPII that measures the time difference between country pairs is included and is represented in natural logarithmic form.

Lastly, the Economic distance category includes multiple variables, many specific to healthcare. In keeping with traditional gravity Models and with specific research on this topic by Garman and Johnson (2015) and Esiyok, et al (2017), GDP, purchasing power parity (PPP) adjusted is included in this Model. Data is provided in the CEPII database in current international $ and is used separately for country i and j in the Model in natural logarithmic form for 2011. Similarly, population for both countries i and j is included, also from the CEPII gravity database and also in logarithmic form from 2011. The CAGE Distance Framework recommends the use of variables that measure human, natural and infrastructure resources in the economic category. This is extremely important in this assessment of determinants of country selection for the purposes of healthcare services. In theory, those seeking healthcare services abroad would travel for reasons noted earlier, including cost, quality/outcomes and access (Connell 2013) so they are likely to choose countries with strengths in healthcare resources that are lacking in their home country. There are no perfect proxies for determining this. Variables available

and that have been selected include hospital beds per 1000 people (World Bank Health Statistics), physician density per 1000 people (World Health Organization), % Public Health Expenditure as a % of Total Health Expenditure (World Bank), Out of Pocket Health Expenditure as a % of Total Health Expenditure (World Bank), Total Health Expenditure as a % of GDP (World Bank), Life Expectancy at Birth (World Bank), and Hospital Cost per day (World Bank), all for the destination country. Data were used for 2011 or the nearest year available.

The equations for this analysis will include:

Geographic distance, shared borders, common language, colonial ties, time difference and GDP.

The equations for this analysis will include:

Equation 1 (Geographic):

$$\text{Log } Xij = b_0 + b_1 \log GDP_i + b_2 \log GDP_j + b_3 \log dist_{ij} + b_4 \text{ borders} + b_5 \text{ language} + b_6 \text{ colonial} + b_7 \text{ time\_difference} + b_8 \text{ population}_i + b_9 \text{ population}_j + u_{ij}$$

Equation 2 (Administrative):

$$\text{Log } Xij = b_0 + b_1 \log GDP_i + b_2 \log GDP_j + b_3 \log dist_{ij} + b_4 \text{ borders} + b_5 \text{ language} + b_6 \text{ colonial} + b_7 \text{ time\_difference} + b_8 \text{ population}_i + b_9 \text{ population}_j + b_9 \text{ Currency} + b_{10} \text{ Legal} + b_{11} \text{Political}_i + u_i$$

Equation 3: (Cultural)

$$\text{Log Xij} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{time\_difference} + b_8 \text{population}_i + b_9 \text{population}_j + b_{10} \text{Power}_{ij} + b_{11} \text{Individual}_{ij} + b_{12} \text{Religion} + b_{13} \text{Diaspora} + u_{ij}$$

Equation 4 (Economic):

$$\text{Log Xij} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{time\_difference} + b_8 \text{population}_i + b_9 \text{population}_j + b_{10} \text{HospitalBeds}_i + b_{11} \text{Physician}_i + b_{12} \text{PublicExpend}_i + b_{13} \text{OOP}_i + b_{14} \text{Total}_i + b_{15} \text{LifeExpectancy}_i + b_{16} \text{HospitalCost}_i + u_{ij}$$

Table 4 *Variable Descriptions*

Xij	Natural log of value ($M) of health-related expenditures in country i by resident of country j
GDP_i	Natural log of GDP (US$$) in destination country (i)
GDP_j	Natural log of GDP (US$$) in origin country (j)
Distance	Natural log of the geographic distance between country i (destination) and j (origin)
Population	Natural log of the total population for both Country i (destination) and j (origin)
Borders	Whether or not country i and country j share contiguous borders
Language	Whether or not country i and country j share a common language
Colonial	Whether or not country i and country j have colonial ties
Currency	Whether or not country i and country j share a common currency
Legal	Whether or not country i and country j share a common legal system
Time Difference	Natural log of the number of hours difference in time between Country i (destination) and j (origin)
Political	Country i's political and absence of violence score

Table 4 (continued).

Power	The absolute value of the difference between Country i (destination) and j (origin)'s Power Distance scores as defined by Hofstede
Individual	The absolute value of the difference between Country i (destination) and j (origin)'s Individualism scores as defined by Hofstede
Religion	Whether or not country i and country j share a common religion
Diaspora	Number of persons from country j residing in country i as a percentage of the population of country j
HospitalBeds	Natural log of Hospital beds per 1,000 in country i
Physician	Natural log of Physician density per 1,000 in country i
PublicExpend	Natural log of Health expenditure, public (% of total) for country i
OOP	Natural log of Out-of-pocket health expenditure (% of total) for country i
Total	Natural log of Health expenditure total (% of GDP) for country i
LifeExpectancy	Natural log of Life Expectancy at Birth for country i
Hospital Cost	Natural log of Hospital Cost per Day for country i

Additionally, a regression analysis is run incorporating all variables from cultural, administrative, geographic and economic as independent variables. Understanding whether geographic, cultural, administrative or economic distance factors have the greatest impact on Mode 2 trade in health services will allow a quantitative mechanism for health systems to target outreach to certain countries for growth.

Results:

The first regression addresses geographic distance, incorporating other gravity variables. The adjusted R^2 for the Model was .50, and tests for collinearity were normal, however hettest using STATA showed heteroskedasticity. The Model was rerun using hetregress with results shown in table 5 (1).

Table 5 *Regression Results, Equations 1-5*

VARIABLES	(1) $M	(2) $M	(3) $M	(4) $M	(5) $M
GDP Importing (Destination)	0.667***	0.661***	0.458***	1.072***	0.812***
	(0.038)	(0.048)	(0.044)	(0.174)	(0.177)
VARIABLES	(1) $M	(2) $M	(3) $M	(4) $M	(5) $M
GDP Exporting (Origin)	0.287***	0.275***	0.247***	0.299***	0.246***
	(0.036)	(0.037)	(0.036)	(0.041)	(0.038)
Population Importing (Destination)	-0.087**	-0.080	0.034	-0.487***	-0.287
	(0.042)	(0.056)	(0.043)	(0.180)	(0.186)
Population Exporting (Origin)	0.241***	0.254***	0.280***	0.241***	0.296***
	(0.040)	(0.040)	(0.039)	(0.041)	(0.041)
Contiguity	0.792***	0.765***	0.623***	0.761***	0.528***
	(0.090)	(5.318)	(0.091)	(0.093)	(.094)
Common Official Language	0.658***	-0.330***	0.629***	0.611***	0.577***
	(0.107)	(0.464)	(0.106)	(0.110)	(0.110)
Colony	0.187*	0.196**	-.007	0.174*	-.080
	(0.096)	(0.096)	(0.097)	(0.010)	(0.102)
Distance	-0.588***	-.625***	-.438***	-0.595***	-0.429***
	(0.048)	(.051)	(0.050)	(0.052)	(0.055)
Time Difference	-0.008	-.006	-0.016	-0.017	-0.035**

Table 5 (continued).

VARIABLES	(1) $M	(2) $M	(3) $M	(4) $M	(5) $M
Common Currency		0.111			0.012
		(.080)			(0.086)
Political Stability Importing		-0.024 (.054)			0.102 (0.072)
Common Legal		-0.133** (0.054)			-.131* (0.068)
Power Distance			.005*** (0.001)		0.004** (0.002)
Individualism			-0.007*** (0.002)		-0.006*** (0.002)
Diaspora Population			0.091***		0.120***
			(0.012)		(0.012)
Common Religion			0.432*** (0.109)		0.576*** (0.123)
Health Expenditures (% GDP) Importing (Destination)				-0.450***	-.878***
				(0.183)	(0.199)
Government Health Expenditure Importing (Destination)				-0.271 (0.177)	-.098 (0.181)
OOP Expenditures Importing (Destination)				-.150* (0.079)	-0.083 (0.078)
				0.266***	0.372***

Table 5 (continued).

VARIABLES	(1) $M	(2) $M	(3) $M	(4) $M	(5) $M
Beds/1,000				(0.074)	(0.078)
Life Expectancy				-.340	0.118
				(0.866)	(0.861)
Physicians/1000				-.167	-0.237**
				(0.116)	(0.117)
Cost per IP Day				-0.266*	-0.257*
				(0.145)	(0.145)
Observations	2,755	2,755	2,755	2,755	2,755
Adj R-squared	0.505	0.505	0.521	0.523	0.543

Source: Author's calculations using Mode 2 data set. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

As shown and as expected based on gravity Model predictions, GDP of both the importing (destination) and exporting (origin) countries is statistically significant and positive. This confirms that the value of trade in Mode 2 of the GATS (consumption of services abroad) increases as GDP of both importing and exporting countries increases. Also in line with gravity findings in general, the dummy variables for contiguity and official common language are significant and positive. This is not surprising as in the case of people traveling for healthcare services, contiguous countries would ease travel burden and common language is critical in communicating complexities of healthcare needs. Distance, as expected, is significant and negative, meaning that the value of trade in Mode 2 of the GATS decreases as the geographic distance between countries increases. People tend to choose locations that are closer proximity when traveling for healthcare needs. Keep in mind that the data could include those people travelling for other reasons that fell ill during their travel versus selected a certain destination

specifically for healthcare services. Lastly, population of the exporting country is significant and positive, yet population of the importing, while significant, shows a negative relationship. Colony and time difference variables lack significance, although colony's level is .051.

Equation 2 incorporates additional administrative variables into the gravity Model. Similar to the geographic analysis, equation two's adjusted R^2 was .50, multicollinearity was not present but heteroskedasticity was again present. Heteroskedasticity exists in all Models, thus hetregress was used throughout the remaining analyses. In the administrative factors, similar results were shown as in the geographic analysis in that GDP for both countries remained significant and positive. However, population of the exporting country remained significant and positive while population of the importing country is not significant at the .01, .05 or .10 levels. and is negative. Contiguity, common language and colony are all positive and significant. However, the only administrative control variable showing positivity is common legal system. This makes sense from the perspective of medical malpractice and legal recourse should a traveling patient have unexpected outcomes as a result of care delivered. As in the previous Model, common currency and time difference are insignificant. Also, somewhat surprisingly, political stability and absence of violence is not significant.

The gravity Model incorporating cultural variables had a slightly higher adjusted R^2 at .52 and lacked collinearity upon testing. After adjusting for heteroskedasticity, the Model had similar results to the first two. Specifically, GDP remains positive and significant as projected by the gravity Model. Population of the exporting country remains positive and significant, but population of the importing country once again lacks

significance. Distance is again significant and negative as expected. Contiguity, common language and common religion are all significant and positive. However colony loses significance in this Model. As shown, Hofstede's dimensions of power distance and individualism are both significant, though power distance is positive and individualism is negative. As has been documented by others, diaspora has a significant and positive impact on Mode two trade in health services.

Equation four incorporates economic factors and specific healthcare economic and resource controls. This Model's adjust R^2 is also slightly higher than the first two analyses and similar to Model 3 at .52. Although collinearity is not present, heteroskedasticity is present. After adjusting for that via hetregress, results show very similar patterns with GDP for both importing and exporting countries being positive and significant, and population continuing the pattern of exporting country being positive and significant, while importing country population is negative and significant in this Model. Contiguity and common language remain positive and significant; colony is significant at the <.10 level only and is positive. Distance is again, as expected, negative and significant. In terms of economic variables, total health expenditures as a percentage of GDP for the importing country is negative and significant. This would signify that trade in healthcare services under Mode 2 is higher when the importing (destination) country has relatively lower spending on healthcare as a percentage of its GDP. Interestingly, the variable measuring what percentage of health expenditures is paid by the government (versus private) is not significant; out of pocket spending is significant only at the <.10 level. Hospital beds per 1000 is positive and significant, yet physicians per 1000 and life expectancy are not. Cost per inpatient bed day is significant at the <.10 level only. To the

author's knowledge, this is the first time a cost metric for inpatient stays has been incorporated to a gravity Model measuring medical travel. If patients were price sensitive, we would expect that variable to be significant. However, due to the way this measure is structured (estimated hospital internal costs per day) and the discordance between cost and price for healthcare services, the variable may not have as strong of an impact as expected.

A final regression was run incorporating all variables from each of the cultural, administrative, geographic and economic Models. In this Model, the adjusted R^2 increased to .54 and after correcting for heteroskedasticity, this Model is generally consistent with the results of previous Models. GDP and distance are significant with the expected signs as predicted by gravity theory. Population of the exporting country remains significant and positive while population of the importing country is not significant. Contiguity (+), common language (+), power distance (+), individualism (-), health expenditures as a percentage of GDP in the importing country (-), beds per 1000 (+) in the importing country and common religion (+) are all significant with signs as indicated, which is what was seen in the other regression results. However, in this Model, time difference has gained positivity and is negative, also as expected; and physicians per 1000 is now significant and negative. In addition to population of the importing country, colony, political stability, government health expenditures as a percentage of total, out of pocket expenditures, life expectancy, and common currency remain insignificant predictors of Mode two trade in health services. Common legal system is significant in this Model, though only at the level <.10.

Conclusions:

This research shows that the gravity Model of trade holds when assessing international travel for medical care. Consistent with gravity predictions, GDP of both importing and exporting countries remained significant and positive throughout all Models, while distance was significant and negative in all Models. Other traditional gravity Model variables including contiguity and common language were also consistently significant and positive; while colony and time difference showed weaker and more limited significance. Overall, international medical travel fits gravity predictions, meaning the volume of medical travel based on USD $M is directly proportional to the masses of country pairs as measured by their respective GDPs and inversely proportional to the distance between them (ARTNet 2008). Larger countries as measured by GDP are shown to have more services trade in international medical travel (Mode 2 of the GATS). These findings are in contrast to the often projected "north-south" pattern of medical travel under Mode 2 where patients are thought to leave higher income countries for provision of healthcare services in lower income countries due to cost of care in their home country (Crush and Chikanda 2015).

The negative distance association cannot be over emphasized. International medical travelers are likely to choose locations where the geographic distance is minimized, after controlling for other factors. Additionally, when choosing a destination for medical services, common language is very important. The significance of common legal system could also point to the importance of medical malpractice concerns to traveling patients and retribution if medical errors are experienced.

Similar to Esiyok (2017), this study reinforces that spending on international medical related travel is predicted by cultural factors. Specifically, Hofstede's power distance and individualism dimensions are predictive, with spending on international medical travel between countries increasing as the distance between power distance scores increases; and increasing as the distance between country individualism scores decreases. Perhaps more interesting and confirmatory is the positive association of diaspora population from the exporting country residing in the importing country as a percentage of the total population of the exporting country. Esiyok (2017) also showed a positive association based on diaspora. Also like Esiyok, common religion is positive and significant in our Model.

Unlike Johnson and Garman (2015), who looked only at the US inbound medical travel, this study did find significant predictors in the economic domain, specifically health expenditures as a percentage of GDP of the importing country was negative and significant, meaning Mode 2 trade in health services increases as the importing country spends less on healthcare as a percentage of its GDP. While larger countries (measured by GDP) tend to trade more with each other, the destination countries for medical travel tend to spend less on healthcare relative to their GDP. Further inpatient beds/1000 is significant and positive, which shows that Mode two healthcare services trade increases as the number of inpatient beds per 1000 in the importing (destination) country increases. Taken together, this could point to the relative efficiency of destination country health systems, those that spend less on healthcare as a share of their GDP but have a higher capacity as measured by inpatient beds/1000 are more likely to have higher trade in international medical travel. Further cost per inpatient bed day was weakly significant

and negatively related. While there isn't a perfect proxy for healthcare prices, this association is in line with predictions that medical travelers would seek lower cost healthcare services.

In closing, this research was subject to limitations, mainly the data source available for measuring volume of international medical travel. As mentioned previously, the BOPS dataset measures the $ value of travel for medical services, but could be skewed by reporting, e.g. travel could have been for other reasons, but travelers fell ill while traveling and required medical care. However, it is the most comprehensive data set available to measure worldwide medical travel under Mode 2 of the GATS as of this research. Using the BOPS data, it is evident that the gravity Model holds in predicting international medical travel, which is significant for health systems planning their strategy for attracting international patients. In addition, this research challenges the assumption that most medical travel is north-south in nature. And, to the author's knowledge, this is the first time the gravity Model of trade has been applied to analyze patterns of international medical travel. Further research is recommended as data becomes more widely available.

CHAPTER IV – ARTICLE 2: PATTERNS OF TRADE IN HEALTH SERVICES UNDER MODE 3 OF THE GATS (COMMERCIAL PRESENCE ABROAD)

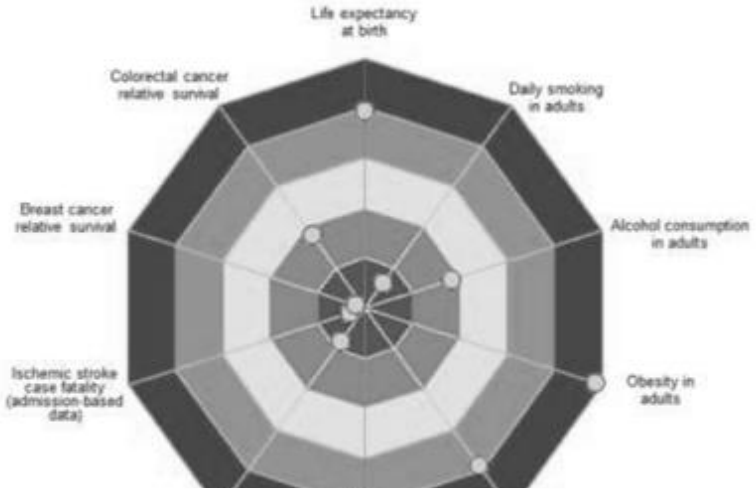
Introduction:

The second article will assess patterns of trade under Mode 3 of the GATS, commercial presence abroad or FDI. The primary goal of the research is to understand determinants of country selection for US firms' international investment in the healthcare sector. In many countries, healthcare is considered to be a fundamental human right and largely financed through public funds (Chaudhuri 2012). Thus, foreign direct investment in healthcare has been somewhat minimal historically, but the implementation of the GATS has led to easing of restrictions on FDI in healthcare services in some countries (Outreville 2007). FDI in the healthcare sector is viewed both positively and negatively with critics citing the potential for a "two-tiered" system as a result of FDI; and proponents pointing to the improved health system infrastructure, information sharing and ultimately improved overall health (Outreville 2007). However, due to lack of adequate data sources, there has been limited research on this topic. Leveraging a private database, this research will contribute to the literature on the determinants of country selection for healthcare FDI by US institutions using the gravity Model of trade.

The US is known for being the highest cost healthcare system in the world, without necessarily realizing the benefit of added life expectancy (OECD 2019), which may cause skepticism about what its healthcare institutions have to offer citizens of other countries from a trade perspective. However, if we look further, when compared to the Organization for Economic Cooperation and Development (OECD) peers, the US excels at the "fixing or saving" aspect of healthcare as opposed to the "preventing or managing"

aspect as shown in Figure 2 (OECD 2015). Major US institutions are often sought for those seeking the best care for conditions not easily treated at less advanced facilities. For example, the Mayo Clinic and the Cleveland Clinic are thought of as two of the best healthcare institutions in the world (Miller 2019). At the Cleveland Clinic, they had over 3,000 international patients treated at their main campus in Cleveland, OH in 2018, 41% of which came from the Middle East (The Cleveland Clinic Foundation State of the Clinic 2018). This is down from several years ago before they partnered to open a hospital in Abu-Dhabi in 2016 that saw approximately 1,180 patients a day from over 60 countries that year (The Cleveland Clinic 2017).

Figure 2. US Comparison to Other OECD Countries on Health Indicators.



Note: The closest the dot is to the center "target", the better the country performs. The countries in the inner circle are in the top quintile among the best performing OECD countries, while those in the outer circle are in the bottom quintile. Source: OECD Health at a Glance 2015.

Additionally, with the changing reimbursement structure for healthcare services in the United States resulting from the Affordable Care Act, many US healthcare institutions are searching for viable options to improve their financial performance (Rosenbaum 2011). Many of the top US healthcare systems have established some type of international healthcare strategy, ranging from consulting services to FDI (R. J. McHugh 2017). Table 5 shows examples of FDI by US healthcare organizations abroad, focused on major US academic medical centers which are those most likely to have a comparative advantage in complex healthcare delivery (Chandra and Staiger 2017) (fDi Markets 2017) .

Table 6 *US Healthcare System FDI, Select Examples*

Source: (fDi Markets 2017)

Date	Parent Company	Destination Country	Description
Sep 2006	Cleveland Clinic	UAE	Cleveland Clinic (USA) and Mubadala Development (Abu Dhabi) signed an agreement to establish a preeminent world-class hospital in Abu Dhabi to be known as Cleveland Clinic Abu Dhabi.
Oct 2015	Cleveland Clinic	UK	US-based Cleveland Clinic, which owns and operates hospitals and healthcare center, plans to open a new facility in London, UK. The company will open a six-story clinic which represents its latest effort to expand its services abroad from its main campus in the US.
Sep 2003	Johns Hopkins Medicine	UAE	establishment of medical reference laboratory services at Dubai Healthcare City (DHCC); provision of continuing medical education in the field of medical diagnostics at DHCC; research activities
Sep 2010	Johns Hopkins Medicine	Malaysia	US-based Johns Hopkins, a teaching and research medical institution, is establishing a medical school and 600-bed hospital in Serdang, Selangor in Malaysia. The cost of the project is estimated at RM1.8bn.

Table 6 (continued).

Date	Parent Company	Destination Country	Description
Feb 2005	Mayo Foundation for Medical Education & Research	UAE	Opening a new facility in Dubai Healthcare City. A Mayo Clinic heart specialist and team of support staff will evaluate patients with heart conditions seeking further evaluation, diagnosis and follow-up care. This new service represents a joint project with Dubai Healthcare City (DHCC) and also will consist of cardiovascular research and continuing cardiovascular education.
Feb 2011	Mayo Foundation for Medical Education & Research	Ecuador	US-based Mayo Clinic has opened an information office in Ecuador, its fourth international administrative services location. It will provide information about the company and help with scheduling an appointment and travel assistance. Mayo Clinic is a not-for-profit group practice, which provides diagnostic, treatment and surgical services.
Mar 2007	The University of Texas	Spain	An official opening ceremony of the new MD Anderson International Spain facility has taken place. The Madrid center is the only international subsidiary the M. D. Anderson Cancer Centre, the world's leading cancer research and care institution, has worldwide. MD Anderson Spain started activities six years ago. The size of its facilities is that of a clinic, whereas the Houston Hospital is the size of a small city focused on cancer treatment. MD Anderson Houston's head has stated there are strong chances of a similar complex being set-up in Madrid in the future.
Aug 2007	The University of Texas	Spain	MD Anderson Espana have announced that they are to open a second hospital complex in Madrid in 2013. The hospital complex is to have three elements, namely: a hospital; a foundation dedicated to teaching and research; and a hotel for patients and their families. The decision to open another center in Madrid was due to the large volume of Europeans who were travelling to Texas to use the services of the MD Anderson Cancer Centre.

Table 6 (continued).

Date	Parent Company	Destination Country	Description
Apr 2006	University of Pittsburgh Medical Center (UPMC)	Italy	The University of Pittsburgh Medical Center (UPMC) has initiated a partnership with the Italian government, the Region of Sicily and Italy's National Research Council to create a $398 million Biomedical Research and Biotechnology Center (BRBC). The center will be located in Sicily.
Jan 2011	University of Pittsburgh Medical Center (UPMC)	China	Pennsylvania-based University of Pittsburgh Medical Center (UPMC) will open an office in Beijing, China. The move is a result of the company's objective for a bigger push to do business in China, where the government is trying to Modernize health care. UPMC has identified potential projects in Beijing, Shanghai and Suzhou. The company operates health system and academic medical centers in the US.
Jun 2014	University of Pittsburgh Medical Center (UPMC)	Italy	US-based University of Pittsburgh Medical Center, a healthcare provider, has opened a new outpatient diagnostic center in Chianciano Teme, Italy. The facility is located at the Terme di Chianciano Spa and offers a range of diagnostic services for liver and digestive disorders. The center expects to attract patients from across Italy and beyond.

The United States typically has a comparative advantage in the production of goods and services that are human and physical capital intensive, yet these organizations have an even higher abundance of highly-educated labor force and sophisticated equipment and processes for delivering complex care with superior outcomes (Wolak 2011). This study is not an endeavor in determining comparative advantage of US healthcare organizations compared to international healthcare organizations, but the idea of comparative advantage as termed by Ricardo (1817) helps to illuminate why certain US health systems are involved in international trade in health services (receipt of

international health travelers, FDI, etc) whereas most are not. While it is clear that interest in FDI by US health systems is growing, the factors that determine their country selection when making FDI and other health services trade decisions remain unclear. This study seeks to contribute to the literature by assessing these patterns of trade using the gravity Model.

Literature Review:

As this research looks to assess the determinants of country selection for FDI in healthcare, specifically by US health systems, it is prudent to understand the reasons why certain US health systems might consider FDI. There is limited academic research on this topic. However, Merritt, et al (2008) compiled research on US academic health centers (AHCs) offshore activities. They conducted telephone interviews, website searches and literature reviews to understand the activities of sixteen different AHCs and major teaching hospitals in the US (Merritt, et al. 2008). They identified four primary reasons for US AHC and major teaching hospital's offshore activities, including: attracting patients from outside of the US, which has been a profitable venture for US institutions who are able to attract patients to their facilities; developing an international reputation and brand; advancing the organization's research and education missions; and providing another avenue of financial benefit to the organization (Merritt, et al. 2008). Interestingly, Merritt, et al (2008) identified that most of the US AHCs have created separate legal entities to manage their international ventures as a risk management technique and as a means to separate their core US tax-exempt services from international for profit. As these organization develop their global strategy there appear to be multiple paths (Merritt, et al. 2008). These include becoming a global AHC with a portfolio that included clinical

education and research in multiple international locations; becoming a global service provider in a certain service line or lines (cancer, transplant, cardiovascular) in multiple international locations; becoming a transnational health sciences center that provides major degrees supported by research with international affiliations; and becoming a global network with relationships that establish referral pathways back to the US institution (Merritt, et al. 2008). Further, since the attacks on the US on September 11, 2001, US institutions have seen a decline in international patients due to restrictions on travel into the US (Ackerly, Udayakumar and Taber 2011) , which could encourage their commercial presence abroad. Research has pointed to the fact that patients traveling to the US for complex care was the initial step in major US AHCs developing a presence abroad by continuing to develop international relationships through offering consulting services, managing international facilities and offering expertise and developing joint ventures and wholly-owned entities in international locations (Rosson and Hassoun 2017). Additionally, McHugh, et al (2017) assessed the size and scope of non-patient collaborations by US health systems related to international patient volumes and found that the majority of international collaborations are focused on educational programs followed by consulting and advisory services, management services and lastly owned patient care or educational facilities in an international location. In their study, owned facilities (which would include FDI) represented about 10% of US health system collaborations (McHugh, et al. 2019). However, what is not clear in the literature are the determinants of country selection for FDI by US healthcare organizations.

Due to the inadequacy of available data sets on FDI, there is limited comprehensive research on the patterns of FDI in the healthcare sector. However, studies

exist attempting to explain determinants of healthcare FDI that are specific to certain countries such as India where Chanda (2010) showed that factors including high initial establishment costs, low health insurance coverage rates, manpower shortages, high cost of medical equipment, and regulatory deficiencies have limited the amount of healthcare specific FDI in India; and Hooda (2015) showed that foreign direct investment in Indian hospitals has mostly been used in tertiary/quaternary services in metropolitan areas with investment for primary health services, health system infrastructure and specifically rural areas lags (Hooda 2015). A multitude of studies exist that assess determinants of FDI in general (not healthcare specific) across countries (Kahouli 2015) (B. Blonigen 2005) and others. Of the limited research available assessing determinants of FDI in the healthcare sector, a study by (Zinn 1994) is somewhat similar to this research, but differs in many important ways. (Zinn 1994) assessed the factors that impact US firms' decisions to compete in international markets and proposed that those factors are primarily host country receptivity and market growth potential. However, their research was not specific to FDI, did not use the gravity Model and did not include many variables of this research. (Smith 2004) and (Outreville 2007) are the two most comprehensive studies on this topic, the first being a review of the literature and the second being an assessment of the determinants of FDI by some of the largest multi-national corporations in the healthcare sector with a focus on developing countries. (Smith 2004) analyzes the issues surrounding FDI in healthcare via a literature review, but focuses more specifically on the health and economic impact of health sector FDI through the lens of low and middle income countries, which is very different than this research that focuses on the determinants for FDI in the health sector. The work, however, is important in that it

defines the financing of health services as being either from within a country, such as a tax, or from outside such as commercial finance official aid or non-governmental finance (Smith 2004). Further, (Smith 2004) explains that commercial financial flows can include portfolio or equity investments, commercial loans, or FDI. Additionally, (Smith 2004) defines FDI as an investment that includes a long term relationship and degree of lasting interest or control by a firm from one country in a firm of another country. (Smith 2004) also highlights the risks and benefits of FDI in the health sector including the idea that accepting FDI in the health sector could bring with it expertise and resources that a country is lacking thereby strengthening its health system, (Chanda, Trade in Health Services 2001), (Zhang 2002). Risks according to (Smith 2004) include the pulling of human resources to the higher paying or better equipment possessing foreign firm; and the creation of a two-tier health system, one of higher quality predominantly for the wealthy and the other for the poor (Pollock 2000). These risks are the primary reasons that certain governments opt to limit FDI in the health sector (Smith 2004). The work by (Outreville 2007) is most similar to this study, but also has key differences. As mentioned, (Outreville 2007) sought to identify key determinants of and favored locations for FDI by healthcare multi-national corporations (MNCs) in developing countries. (Outreville 2007) shared that the determinants of FDI in healthcare are the same as for FDI in non-healthcare sectors and include cultural distance, country risk level, governance, level of socio-economic development and the availability of quality inputs. (Outreville 2007) also identifies corporations from the United States as being the major players in terms of FDI in the hospital sector. Unlike this study, (Outreville 2007) used data from company websites and compiled a list of forty-one developing economies

where MNCs have locations. Also dissimilar to the current study, (Outreville 2007) used the eclectic or OLI paradigm by (Dunning 1977). The Dunning Model asserts that international activities of MNCs are based on the value of an interaction between three variables which include ownership-specific advantages (technological, managerial and marketing for example); location-specific advantages of host countries (such as geographic and/or cultural distance, education, telecommunications, legal, potential size of market); and market internalization (exploitation of resources for global activities) (Outreville 2007). Further, (Outreville 2007) reinforces the necessity of strong governance, low country risk and economic/political stability as determinants for incoming FDI. Because the size of the host country is known to be a factor in FDI decisions, GDP per capita and population size were also used by Outreville (Outreville 2007). Using Spearman rank correlations, (Outreville 2007) showed that the highest correlation with country FDI selection was human capital. GDP per capita was also significantly correlated as well as political and country risk; whereas corruption was the weakest correlation (Outreville 2007). Lastly, (Outreville 2007) identified the following countries as the most preferred developing nations for FDI in the healthcare sector: Hong Kong, Singapore, Mexico and China.

The gravity Model of trade has been used extensively to assess FDI patterns (Falk 2016) (Zwinkels and Beugelsdijk 2010) (Fratianni, Marchionne and Oh 2011). Literature related to FDI in general finds that traditional gravity factors combined with cultural distance factors, labor endowments and trade agreements are robust determinants of FDI flows (Blonigen and Piger 2011). The traditional gravity Model is formed on the basis of Newton's Law of Gravitation and predicts bilateral trade between countries on the basis

of their economic size (based on GDP) and the geographic distance between them (Chaney 2013). Traditional predictors in gravity Models that have been tested over time other than GDP and distance include whether or not there is a common language, common border, whether countries are landlocked or an island and whether or not they share a common colonizer (DeRosa 2008).

Falk, 2016 also used the fDI markets database that this research uses, coupled with the gravity Model to assess FDI patterns, albeit in the hospitality industry. Based on the gravity Model, Falk (2016) projects that larger economies as measured by their GDP should exchange greater FDI activity and increasing geographic distance will reduce FDI activity between countries. While this has been shown to be true in the literature , information and communication technologies (ICT) have also Moderated the negative effect of geographic distance (Tang and Trevino 2010). Additionally, Ghemawat (2001) identifies different types of distance factors beyond geographic distance that impact FDI flows. These include administrative, cultural and economic in addition to geographic, known as the CAGE distance framework (P. Ghemawat 2001).

While Falk (2016) assessed FDI determinants in hospitality using number of FDI projects in the hotel industry as the dependent variable, the research is the most similar to the research conducted here. Therefore, a detailed review of Falk (2016) was conducted for guidance as to variable selection as there is no clear identification of additional variables beyond the traditional gravity variables. Falk (2016) used the following predictors: statutory tax rates, minimum hourly wages, business regulation indicators, FDI regulatory restrictiveness index, strength of legal rights index, fixed broadband internet subscribers per population, life expectancy, AIDS/HIV prevalence; and the

following gravity dummy variables: contiguity, common language and colonial link. Falk (2016) excludes non-significant variables in the final specification, including AIDS/HIV, life expectancy, corporate taxes and strength of legal rights. According to Falk (2016) common language, business regulation (measured as the time required to start a business or the cost of enforcing contracts), hourly wage costs, and the total tax rate had the most impact on FDI in the hospitality sector. However, in contrast to the existing literature, Falk (2016) found that the corporate tax rate in the host country was not significant and therefore was excluded from the final Model.

Data and Methods:

Data on FDI in healthcare is sparse, largely relying on the FATS, which is inadequate. A private data set available for purchase through fDi markets (fDi Markets 2017) was acquired for this research. The data set contains investments (US $) by US firm, by country and project for the years 2003-2017. In total, there are 157 observations within the healthcare sector, limited to hospitals, physician clinics and diagnostic centers.

For purposes of this research, the dependent variable will be international trade in healthcare services under Mode 3 of the GATS (FDI) as measured by the value ($M) of healthcare-related FDI by US institutions. There are 157 unique investments for the time period 2003-2017. The database was purchased in July, 2017. Therefore, a full year of data from 2017 is not included. Total investment over the time period is $4.8B ($US). The dataset is specific to the healthcare sector and includes multiple types of corporate investors. For this study, the author mapped each corporation to one of the following types: Life Sciences/Vendors, Health Systems or Other using publicly available information on each organization. Since the primary interest of this research is health

system FDI this step was necessary. However, the full data set will be used as part of the analysis.

After mapping all investments and adding World Bank classifications for geographic region and country income group (The World Bank 2018) the following summary data were tabulated:

Table 7 *US Firm Healthcare Sector FDI 2003-2017 by Geographic Region and Country*

East_Asia_Pacific		Europe_Central_Asia		South Asia	
China	$ 780.20	Italy	$ 412.90	India	$ 966.95
Malaysia	$ 637.35	UK	$ 266.17	Total	$ 966.95
Indonesia	$ 199.90	Spain	$ 258.10		
Vietnam	$ 162.40	Bulgaria	$ 70.00	Middle_East_NorthAfrica	
Philippines	$ 114.40	Portugal	$ 61.00	UAE	$ 120.00
Japan	$ 94.90	Ireland	$ 28.70	Egypt	$ 90.00
Singapore	$ 9.60	Switzerland	$ 24.80	Bahrain	$ 25.70
South Korea	$ 7.90	Netherlands	$ 20.50	Saudi Arabia	$ 10.60
New Zealand	$ 7.00	France	$ 17.20	Lebanon	$ 4.80
Taiwan	$ 2.90	Russia	$ 15.60	Total	$ 251.10
Total	$ 2,016.55	Germany	$ 5.00		
		Czech Republic	$ 2.00		
		Denmark	$ 0.50		
		Total	$ 1,182.47		

Latin_America_Caribbean		Sub_Saharan_Africa	
Costa Rica	$ 100.00	Ethiopia	$ 100.00
Mexico	$ 56.30	Swaziland	$ 49.40
Brazil	$ 15.80	Ghana	$ 2.70
Ecuador	$ 15.30	Kenya	$ 2.70
Jamaica	$ 8.80	Nigeria	$ 2.70
Chile	$ 5.50	Total	$ 157.50
Panama	$ 5.50		
Belize	$ 4.80	North_America	
Cayman Islands	$ 4.80	Canada	$ 16.50
Total	$ 216.80	Total	$ 16.50

US $(M)

Table 8 *US Firm Healthcare Sector FDI 2003-2017 by Income Group and Country*

Upper_Middle		Lower_Middle		High_Income	
China	$ 780.20	India	$ 966.95	Italy	$ 412.90
Malaysia	$ 637.35	Indonesia	$ 199.90	UK	$ 266.17
Costa Rica	$ 100.00	Vietnam	$ 162.40	Spain	$ 258.10
Bulgaria	$ 70.00	Philippines	$ 114.40	UAE	$ 120.00
Mexico	$ 56.30	Egypt	$ 90.00	Japan	$ 94.90
Brazil	$ 15.80	Swaziland	$ 49.40	Portugal	$ 61.00
Russia	$ 15.60	Ghana	$ 2.70	Ireland	$ 28.70
Ecuador	$ 15.30	Kenya	$ 2.70	Bahrain	$ 25.70
Jamaica	$ 8.80	Nigeria	$ 2.70	Switzerland	$ 24.80
Panama	$ 5.50	Total	$1,591.15	Netherlands	$ 20.50
Belize	$ 4.80			France	$ 17.20
Lebanon	$ 4.80			Canada	$ 16.50
Taiwan	$ 2.90			Saudi Arabia	$ 10.60
Total	$1,717.35	Low_Income		Singapore	$ 9.60
		Ethiopia	$100.00	South Korea	$ 7.90
		Total	$100.00	New Zealand	$ 7.00
				Chile	$ 5.50
				Germany	$ 5.00
				Cayman Islands	$ 4.80
				Czech Republic	$ 2.00
				Denmark	$ 0.50
$US (M)				Total	$1,399.37

Because of the interest in US health system FDI summary statistics using the health system only group were also summarized and show the following:

Table 9 *US Health System FDI in Healthcare Sector, 2003-2017 by Geographic Region and Country*

East_Asia_Pacific		Latin_America_Caribbean	
Malaysia	$ 581.10	Belize	$ 4.80
China	$ 23.20	Cayman Islands	$ 4.80
Total	$ 604.30	Ecuador	$ 4.30
		Total	$ 13.90
Europe_Central_Asia			
Italy	$ 400.60	**Middle_East_N_Africa**	
Spain	$ 103.60	UAE	$ 13.00
UK	$ 54.40	Total	$ 13.00
Total	$ 558.60		
		Sub_Saharan_Africa	
		Ghana	$ 2.70
$US(M)		Total	$ 2.70

Table 10 *US Health System FDI in Healthcare Sector, 2003-2017 by Income Group and Country*

Upper_Middle			Lower-Middle	
Malaysia	$	581.10	Ghana	$ 2.70
China	$	23.20	Total	$ 2.70
Belize	$	4.80		
Ecuador	$	4.30		
Total	$	613.40		
High_Income				
Italy	$	400.60		
Spain	$	103.60		
UK	$	54.40		
UAE	$	13.00		
Cayman Islands	$	4.80		
Total	$	576.40	$US(M)	

As shown, US health system FDI during the time period 2003-2017 represents approximately twenty percent of the total US firm FDI in the healthcare sector and is limited to fewer countries.

Drawing from the literature on healthcare FDI and FDI more generally for explanatory variables, this research will use the gravity Model of trade to identify determinants of country selection by US healthcare organizations for FDI and will look specifically at US health system FDI as a subset of the total healthcare organizations. Supporting Ghemawat's assertions that distance falls into multiple categories, the research will be based on different types of distance factors organized according to the CAGE distance framework (P. Ghemawat 2001). The following table shows the variables included in the Models and corresponding source.

Table 11 *Independent Variables Organized According to CAGE Framework*

Characteristic	Variable	Source
Cultural	Uncertainty Avoidance	Hofstede, G (G. Hofstede 1980)
	Shared Religion	CEPII GeiDist Database
	Shared Language	CEPII GeiDist Database
Administrative	Common currency	CEPII GeiDist Database
	Colonial Ties	CEPII GeiDist Database
	Common Legal System (Civil, Common, Customary, Religious or Mixed)	CIA World Factbook
	Political Stability and Absence of Violence	World Bank Governance Indicators
	GATS Commitment: Medical	The World Trade Organization
	Corporate Tax Rate	Tax Foundation
Geographic	Geographic Distance	CEPII GeiDist Database
	Shared Borders	CEPII GeiDist Database
Economic	Total Population	World Bank
	Hospital Beds per 10,000 People	World Bank Health Statistics

Table 11 (continued).

Characteristic	Variable	Source
Economic	Density of Physicians per 10,000 People	WHO Density of Health Professionals
	Density of Nursing Staff per 10,000 People	WHO Density of Health Professionals
	Out-of-pocket health expenditure (% of total)	World Bank Health Statistics
	Health expenditure, government (% of total)	World Bank Health Statistics
	Health expenditure total (% of GDP)	World Bank Health Statistics
	Life Expectancy at Birth	World Bank Health Statistics
	GDP (US $$)	CEPII GeiDist Database
	Hospital cost per day	The World Health Organization

Cultural distance has sometimes been ignored, or not fully captured in gravity Models of trade outside of the dummy variables for shared religion and language (Harms and Shuvalova 2016). However, we know that cultural factors play a role in international trade in services (Harms and Shuvalova 2016). Because health is such a cultural factor, culture must be measured in this study. Kogut and Singh's cultural index (Kogut and Singh 1988) was considered. However, raw scores on Hofstede's dimensions were ultimately selected so as to see the influence of different dimensions, due to the criticism of using an index (Konara and Mohr 2019) and because of specific market selection for FDI research showing lack of significance of the Kogut and Singh (1988) index (Dow and Ferencikova, 2010). Each of the four Hofstede dimensions, power distance, individualism, uncertainty avoidance and masculinity-femininity were reviewed for inclusion. Ultimately, uncertainty avoidance was selected based on work by Dow and

Karunaratna (2006). Uncertainty avoidance is included as a distance variable calculated as the absolute value of the distance between uncertainty avoidance scores between county i and country j following Dow and Karunaratna (2006). The uncertainty avoidance dimension by Hofstede (1980) measures the degree to which ambiguity is viewed as a threat by people causing them to generate beliefs and institutions that help avoid ambiguous situations. In line with more traditional gravity Models of trade. A dummy variable for whether or not country i and country j share a common language is included in the cultural distance composite as well as a dummy variable to measure whether or not country i and country j share a common primary religion.

Administrative distance follows closely to recommendations by Ghemawat (2007) where colonial ties, common currency and a measure of political hostility are included. A dummy variable for common legal system is added given that FDI or having a commercial presence abroad would likely be impacted by the legal system of the importing country at some point. Additionally, a measure specific to the GATS commitment in medical services as provided by the World Trade Organization is included in the analysis. Unfortunately, there is not a common database that includes details on whether or not a country allows FDI in the healthcare sector. The GATS commitment for medical services is used as a proxy absent the preferred data. Since our dataset includes FDI in healthcare, observations will only be included for those that allow or have allowed FDI in the healthcare sector. Political hostility is measured using the World Bank's governance indicators for political stability and absence of violence for the importing country given that US health institutions would likely be less willing to engage in FDI in countries with weak political stability scores. Lastly, following Falk (2016) and

because of findings by McHugh, et al (2017) showing that US organizations' international pursuits are typically for profit, the corporate tax rate of country i is incorporated as part of the administrative category.

In line with traditional gravity Modeling, geographic distance includes both the calculated geographic distance between capitals of countries i and j as provided by CEPII (2020) and a measure of whether or not countries have shared borders, also provided by CEPII. These measures have been widely researched and used in gravity Models of trade, specifically in analyses of FDI (Falk, 2016).

The economic composite will include multiple variables that are both common to gravity Models of trade and that serve as proxies for health-related resources. As in most gravity Models, total population for country i and country j is used. Additionally, life expectancy for the importing country is included in the Model. Also for the importing country, health-related resources are important to this study. Therefore, density of physicians, nurses and hospital beds are included as separate variables. Health system financing in the importing country is important. In that regard, health expenditures as a percentage of GDP are incorporated as well as out of pocket expenditures as a percentage of total health spending. GDP for both country i and j are included in the Model.

Using a similar framework as article 1 (CAGE Distance) Hypotheses include:

H_1: Geographic distance affects Mode 3 trade in healthcare services.

H_2: Cultural distance affects Mode 3 trade in healthcare services.

H_3: Administrative distance affects Mode 3 trade in healthcare services.

H_4: Economic (Health factors) distance affects Mode 3 trade in healthcare services.

In following previous research, certain common gravity variables will be retained in all regressions (Carrere 2006). These include the following: geographic distance, shared borders, common language, colonial ties, time difference, population and GDP.

The basic gravity Model specification is (ARTNet 2008):

$$X_{ij} = K\,\frac{Y_i\,Y_j}{t_{ij}}$$

Where:

Xij= exports from i to j; or total trade (i.e $X_{ij} + X_{ji}$)

Y= economic size (GDP)

t =Trade costs/Distance and other Factors

K= Constant

However, the empirical equation used in the basic gravity Model is represented by the following (Anukoonwattaka 2016):

$$\ln X_{ij} = b_0 + b_1 \ln(Y_i) + b_2 \ln\left(Y_j\right) + b_3 \ln\left(t_{ij}\right) + e_{ij}$$

Typical proxies for "t" (trade costs, distance and other factors) include geographic distance, adjacency, common language, colonial links, common currency, whether a country is an island or landlocked, variables for institutions, infrastructure, migration flows and tariff barriers (Anukoonwattaka 2016).

The equations for this analysis will include:

Equation 1:

$$\text{Log Xj} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{population}_i + u_j$$

Equation 2:

$$\text{Log Xj} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{population}_i + b_8 \text{Currency} + b_9 \text{Legal}_i + b_{10} \text{Legal}_j + b_{11} \text{Political}_i + b_{12} \text{Political}_j + u_j$$

Equation 3:

$$\text{Log Xj} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{population}_i + b_8 \text{Power}_{ij} + b_9 \text{Individual}_{ij} + b_{10} \text{Religion} + u_j$$

Equation 4:

$$\text{Log Xj} = b_0 + b_1 \log \text{GDP}_i + b_2 \log \text{GDP}_j + b_3 \log \text{dist}_{ij} + b_4 \text{borders} + b_5 \text{language} + b_6 \text{colonial} + b_7 \text{population}_i + b_8 \text{HospitalBeds}_i + b_9 \text{Physician}_i + b_{10} \text{PublicExpend}_i + b_{11} \text{OOP}_i + b_{12} \text{Total}_i + b_{13} \text{LifeExpectancy}_i + u_j$$

Table 12 Variable Descriptions

Log Xj	Natural log of value ($M) of FDI in country i by US institution
Log GDP_i	Natural log of GDP (US$$) in destination country
Log GDP_j	Natural log of GDP (US$$) in origin country
Population_i	Natural log of total population in destination country
Population_j	Natural log of total population in origin country

Table 12 (continued).

Log Distance$_{ij}$	Natural log of the geographic distance between country i (destination) and j (US)
Borders	Whether or not country i and country j share contiguous borders
Language	Whether or not country i and country j share a common language
Colonial	Whether or not country i and country j have colonial ties
Currency	Whether or not country i and country j share a common currency
Legal	Whether or not country i and country j share a common legal system
Political	Country i's political and absence of violence score
GATS	Whether or not country i has a GATS commitment for medical services
Uncertainty	The absolute value of the difference between country i and country j's uncertainty avoidance score as provided by Hofstede
Religion	Whether or not country i and country j share a common religion
HospitalBeds	Natural log of Hospital beds per 10,000 in country i
Nursing	Natural log of Nursing density per 10,000 in country i
Physician	Natural log of Physician density per 10,000 in country i
PublicExpend	Natural log of Health expenditure, public (% of total) for country i
OOP	Natural log of Out-of-pocket health expenditure (% of total) for country i
Total	Natural log of Health expenditure total (% of GDP) for country i
LifeExpectancy	Life Expectancy at Birth for country i

Additionally, a regression analysis will be run incorporating all independent variables from composite Models. Understanding whether geographic, cultural, administrative or economic distance factors have the greatest impact on Mode 3 trade in health services will allow a quantitative mechanism for health systems identify partner countries for growth.

Results

Table 13 *Regression Results, Equations 1-5*

VARIABLES	(1) $M	(2) $M	(3) $M	(4) $M	(5) $M
GDP Importing (Destination)	-0.267** (0.135)	-0.325 (0.210)	-0.310** (0.128)	0.019 (.112)	0.035 (0.148)
GDP Exporting (Origin)	1.216 (1.042)	1.124 (1.114)	1.076 (1.011)	0.131 (1.090)	-.440 (1.107)
Population Importing (Destination)	0.213* (0.121)	0.227 (0.207)	0.147 (0.120)		
Distance	1.04** (0.505)	1.524** (.549)	0.063 (0.568)	0.582 (0.546)	.490 (0.729)
Contiguity	1.24 (1.129)	1.705 (1.167)	.798 (1.070)	0.666 (1.153)	0.346 (1.141)
Common Official Language	-0.681** (0.314)	-0.352 (0.359)	-1.080** (0.375)	-.602 (0.401)	-0.550 (0.490)
Colony	0.743* (0.423)	0.913* (0.464)	0.928** (0.402)	0.615 (0.457)	0.648 (0.485)
Political Stability Importing		0.265 (0.346)			
GATS Medical		0.833** (0.397)			1.073** (0.482)
Corporate Tax Rate		-0.386 (0.499)			-0.620 (0.623)
Common Currency		0.416 (1.580)			-0.319 (1.496)

Table 13 (continued).

Hofstede Uncertainty Avoidance			-0.015 (0.013)		0.009 (0.016)
Common Religion			-4.788** (1.513)		-2.510 (1.856)
Nursing per 1000 (Destination)				-.228 (0.269)	-0.101 (0.289)
Physicians per 1000 (Destination)				-1.040** (0.393)	-1.047** (0.418)
Life Expectancy (Destination)				0.182*** (0.064)	0.228*** (0.066)
Hospital Beds/1000 (Destination)				-0.032 (0.296)	-0.752* (0.398)
OOP Expenditures Importing (Destination)				1.037** (0.504)	0.721 (0.564)
Current Health Expenditure as a % of GDP					0.519 (0.081)
Observations	142	142	142	142	142
Adj R-squared	0.06	0.08	0.10	0.15	0.23

Source: Author's calculations using Mode 3 data set. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The standard gravity Model without additional control variables showed a relatively low adjusted R^2 at .06. Tests for collinearity (vif) and heteroskedasticity (hettest) verified lack of multicollinearity and heteroskedasticity. The results, however, were interesting from a gravity perspective. GDP of the destination country was significant but negative and distance was also significant but positive. These are both opposite of what the gravity Model would predict with US healthcare organization FDI in

healthcare increasing as distance increases; and increasing as the destination country's GDP decreases. The other significant variable was common language, but it was negative, meaning FDI is higher when countries do not share a common language. Population, GDP of the origin country, contiguity and colony are all insignificant in this Model. These initial results would say that the gravity Model of trade does not hold with respect to US healthcare organization FDI in health services.

The second regression in the CAGE framework assessed administrative factors. Tests for collinearity and heteroskedasticity were conducted and heteroskedasticity was not present. However, common legal system was removed from the Model due to collinearity. After removing common legal system, the tests for collinearity were normal. As in the first regression, distance is significant and positive. The other significant variable is GATS Medical, which is positive. Colony is not significant at .051. All other variables, including GDP are insignificant in this Model. While the R^2 value increased to .08 which is higher than the first regression, it remains relatively low in predicting the determinants for US healthcare organization FDI in health services. However, like the first regression it shows that normal gravity predictions are not held.

In the third regression, collinearity was not present. However, heteroskedasticity was present based on hettest. Thus, the Model was run using hetregress. The adjusted R^2 was .10 which is higher than the previous two Models. After running the hetregress Model, results showed somewhat similar findings as regression one where GDP of the destination country was significant but negative. However, in this Model distance was insignificant. Common language retained its significance as in regression one. Colony and common religion were also significant in this Model, colony being positive and

religion being negative. Population, GDP of the origin country, distance, contiguity and Hofstede's uncertainty avoidance were all insignificant. Again, this Model shows that gravity predictions do not hold for US healthcare organization's FDI in health services.

The fourth regression incorporated economic factors specific to healthcare. Tests for heteroskedasticity were normal but collinearity was present. Ultimately, hospital cost per day, healthcare expenditure as a % of GDP, government health expenditure as a % of total and population were all removed from the Model to correct for multicollinearity. After making these changes, the adjusted R^2 was .15, which is higher than the previous Models. Results were somewhat different, however. The only significant variables in this Model were physicians per 1000 population and life expectancy. Physicians per 1000 was negative, meaning US healthcare organization FDI in health services increases as the physicians per 1000 population in the destination country decreases. In theory, this could make sense in that many US healthcare organizations, particularly those in life sciences or other industries invest in countries that have less robust healthcare infrastructure. Life expectancy was significant and positive, showing that US healthcare organizations' FDI in health services increases as the destination country's life expectancy increases after controlling for other factors. This would seem to be in conflict with the direction of the physicians per 1000 at first glance, but a country doesn't necessarily need to have a high physicians per 1000 in order to have a higher overall life expectancy. All other variables including classical gravity Model variables (distance, GDP, etc) are insignificant, again showing that gravity theory does not hold in predicting patterns of FDI in health services by US healthcare organizations.

In the final Model using all US healthcare organizations, all CAGE variables were included, but tests again showed collinearity. However, heteroskedasticity was not present. Population was again removed from this Model as well as government health expenditures as a % of total and common legal system based on VIF testing. This Model showed an adjusted R^2 of .23, meaning it is predicting 23% of the variation in US healthcare organization FDI in health services. Again, GDP and Distance was insignificant after controlling for other variables, indicating that gravity predictions are not holding. However, physicians per 1000 continues to be significant and negatively associated with US healthcare organization FDI in health services; and life expectancy remains significant and positive. Not surprisingly, GATS Medical is significant and positive. While we do not have a comprehensive listing of countries that allow FDI in health services, and specifically in hospitals, the GATS Medical variable served as a proxy to identify those countries that are more open to FDI in their healthcare sector. It shows that US Healthcare organizations FDI in health services increases as countries have signed the GATS for medical sector.

Because this research is interested specifically in US health system FDI in health services, an additional Model was run using only the FDI of US health systems to determine whether the same results hold when limited to health system investment as compared to the broader healthcare organization investment. The basic gravity Model including GDP of origin and destination, distance, contiguity, common language and colony status was run with investment as the dependent variable. Contiguity was eliminated for collinearity. After that adjustment, the adjusted R^2 was negative .29; and none of the included variables were significant. There are limited observations (15) for

investment made by US health systems. Thus, analysis was conducted for significance with variables within the CAGE framework and none of the available variables were found to be significant. However, based on summary data alone, we can see that the majority of US health system FDI during the time period of the data set was made in upper middle-income countries ($613.4M USD) followed by high income countries ($576.4 M). There was smaller investment ($2.7 M) in lower middle-income countries (Ghana) and no investment in low income countries at all. Further, the East-Asia/Pacific region has received the majority of investment by US health systems ($604.3 M USD), mostly in Malaysia ($581.1 M USA) with the remainder in China; followed by the Europe and Central Asia region with Italy ($400.6 M) receiving the majority of FDI during the time period, followed by Spain ($103.6 M USD) and the UK ($54.4 M USD).

Conclusions:

While it appears that gravity predictions do not hold for US health system FDI in health services and that individual variables that are typical predictors of FDI are not significant in this case, the results are difficult to interpret because of other factors beyond our control. For example, US health systems have made FDI in certain countries, but oftentimes the FDI made is not the true cost of the facility being built. Using Cleveland Clinic as an example, they made an investment in Cleveland Clinic Abu Dhabi, but that investment was a fraction of the total investment in that facility as Cleveland Clinic joint ventured with another party (non-US based) and was contracted for management of the facility. These practical and strategic steps taken by US health systems could dramatically impact results of this study. Qualitative considerations assessed in article 3 could shed more light on this topic.

However, when looking at overall FDI by US health related organizations, distance was shown to be positive and significant in several Models, though not all. This would be the opposite of gravity predictions. Theoretically, this makes sense for healthcare services, particularly when the investing party provides the same or similar services in a different country. The further away the operations from FDI, the less likely the foreign institution is to cannibalize services at their home institution (Shah, et al. 2014). Drawing on theory from economic geography, this could be in line with central place theory and the range of goods (or services) as well as the central place's sphere of influence relative to healthcare services delivery (P. Krugman 1993). Further, the lack of significance of contiguity also supports this assertion that healthcare organizations' FDI tends to be in countries that are further away in terms of geographic distance. Additional research on this finding could provide further illumination of US healthcare organizations' FDI patterns. Other findings such as significance of common language (negative association) and colony (positive association) in some of the Models is interesting. While this points to common official language being less important for Mode 3 trade in healthcare service than other forms of health services trade, the significance and positivity of colony shows some relationship to the country pairs ever having a colonial relationship. Economic indicators also show significance in determining investment decisions abroad. FDI in healthcare services will increase as physicians per 1,000 population in the destination country decreases and potentially the same for hospital beds per 1,000 (significant only at the <.1 level in one Model). This would point to US healthcare organizations investing in countries with less healthcare infrastructure and resources. However, due to the mixture of healthcare organizations (life sciences and

other vendors as well as health systems), this result could be skewed. Also important is the significance of out of pocket expenditures (positive) in Model 4. This would appear to show that US healthcare organizations invest more heavily in countries where the citizens have higher out of pocket spending as opposed to government spending.

A consistently positive predictor of US healthcare organizations' FDI in health services is whether or not the destination (importing) country has signed a medical services component of the GATS. The fact that not all countries are open to trade in health services and explicitly do not allow FDI in health and hospital services is extremely important to US healthcare organizations' investment decisions and could be the primary influence for the gravity Model not holding in predicting patterns of FDI in health services. Typical trade patterns could be disrupted by laws and regulations against FDI in health services, thereby encouraging US healthcare organizations to invest in other, more FDI friendly countries. Another repeatedly significant and positive finding was the association of life expectancy in the importing country. This would suggest that US healthcare organizations tend to invest in health services in countries with higher overall life expectancy. Taken together with the findings on physicians per 1,000 and hospital beds/ 1,000 this could be an indicator of efficiency selection, meaning countries that have less healthcare resources, but higher life expectancy.

Further research is recommended to more fully determine the patterns of country selection by US healthcare organizations for healthcare related FDI. The small sample of US health systems' FDI and the intricacies of the joint venture partnerships should be reviewed qualitatively to provide further elucidation on these issues. However, this study is the first to use the gravity Model of trade to assess patterns of trade in Mode 3 of the

GATS; and while the gravity Model theory does not necessarily hold, it shows the importance of GATS commitments relative to medical care.

CHAPTER V : ASSESSING INTERNATIONAL TRADE IN HEALTH SERVICES: A SCOPING REVIEW AND CASE STUDY APPLICATION TO TOP US HOSPITALS

Introduction:

The third article in this series employs a qualitative case study method to fill the void in the current literature pertaining to US healthcare organizations' approach to international trade in healthcare services across all 4 Modes of the GATS. Because of lack of data, a comprehensive understanding of how US health systems approach international health services strategy is not evident. Since it would not be feasible to assess all US health systems, a selection of health systems is made for this research.

Globalization or the interdependence of world economies spurred by cross-border trade in goods and services as a result of improvements in communications and transportation is known to have impacted many industries both in the US and worldwide (Peterson Institute for International Economics 2020). However, its impact on healthcare appears to be growing as US health systems establish their roles in the global economy (Ackerly, Udayakumar and Taber 2011). There are different manners in which US health systems can participate in the global economy. This study focuses on international trade in health services according to the World Trade Organization's General Agreement on Trade in Services (GATS) and how major US healthcare systems establish their international strategy within the GATS framework. The GATS includes four Modes of trade: Cross-Border Supply of Services (Mode 1); Consumption of Services Abroad (Mode 2); Foreign Direct Investment (Mode 3); and Movement of Health Professionals (Mode 4) (The World Trade Organization 2010). Each of these Modes is leveraged in different ways by various health systems.

The United States is not known for its efficient healthcare delivery system (OECD 2019). However, many of these studies take a macroeconomic viewpoint in analyzing the overall US health system compared to that of other countries. Indeed, the US has significantly higher costs per capita than other OECD countries and lags behind in life expectancy and other key metrics (OECD 2019). However, that doesn't mean that the US doesn't have some of the best healthcare institutions in the world when viewed at a microeconomic level, comparing firms or health systems. Thus, we are increasingly seeing major US healthcare organizations involved in international trade pursuits, including Mayo Clinic, Cleveland Clinic, MD Anderson and others, mostly well-branded AMCs. While economic theory tells us that those health systems with a comparative advantage over certain international healthcare providers would be most likely to trade, it is difficult to establish with certainty those health systems with comparative advantage based on limited data. However, there are different healthcare rankings for US health systems. For example, Table 14 depicts the *US News & World Report* Honor Roll Hospitals for 2017-2018. US News rankings, while imperfect, are one of the most robust manners in which hospitals are compared. As shown and expected based on previous research, academic medical centers (AMCs) make up the majority of the top US hospitals based on US News Ranking. The US News & World Report Adult Hospital Honor Roll identifies the top 20 hospitals with the best performance across multiple service lines (US News & World Report 2018).

Table 14 *US New and World Report Honor Roll Hospitals, 2017-2018*

Rank	Name
1	Mayo Clinic, Rochester, Minnesota
2	Cleveland Clinic
3	Johns Hopkins Hospital, Baltimore
4	Massachusetts General Hospital, Boston
5	UCSF Medical Center, San Francisco
6	University of Michigan Hospitals and Health Centers, Ann Arbor
7	Ronald Reagan UCLA Medical Center, Los Angeles
8	New York-Presbyterian Hospital, New York
9	Stanford Health Care-Stanford Hospital, Stanford, California
10	Hospitals of the University of Pennsylvania-Penn Presbyterian, Philadelphia
11	Cedars-Sinai Medical Center, Los Angeles
12	Barnes-Jewish Hospital, St. Louis
13	Northwestern Memorial Hospital, Chicago
14	UPMC Presbyterian Shadyside, Pittsburgh
15	University of Colorado Hospital, Aurora
16	Thomas Jefferson University Hospitals, Philadelphia
17	Duke University Hospital, Durham, North Carolina
18	Mount Sinai Hospital, New York
19	NYU Langone Medical Center, New York
20	Mayo Clinic Phoenix

Mayo Clinic is selected for this study given their top overall performance as a US New Honor Roll Hospital. However, the best hospitals that specialize in certain service lines, would be unlikely to make the honor roll list because of specialization within one or a few service lines. With that in mind and with the logic that the US' top performing hospitals would be the most likely to have a comparative advantage in healthcare services, the overall top hospital in terms of US News Honor Roll hospitals (Mayo Clinic) as well as the overall top hospital in cardiology and cardiovascular surgery (Cleveland Clinic) and the overall top hospital in oncology care (University of Texas MD Anderson) were selected for case study on their approach to international strategies according to the four Modes of the GATS. A mix of data and sources is used including

fDi data used in article 2, publicly available data through organizational websites, annual reports and other communications analyzed using MAXQDA as well as detailed literature review. This study will contribute to the literature by expanding on the limited existing research on US healthcare institutions' approach to international trade in health services as part of their overarching strategy.

The primary research questions are:

- How do Leading US Healthcare Organizations Approach International Strategies According to the Four Modes of the GATS?
- Which countries are most common trading partners for leading US healthcare organizations?

Literature Review:

The literature on US health system's strategy in international trade is limited. Of the available literature, none of the research uses the framework of the GATS or viewpoint of international trade. Lack of data makes it difficult to quantitatively assess these patterns. However, there are a handful of qualitative studies that are relevant and that this research draws upon. Studies include those focused on understanding the international strategies of US health systems such as this research (Merritt, et al. 2008) and (McHugh, et al. 2019), assessing the resource requirements that go into the international partnerships at a leading AMC (Rosson and Hassoun 2017) and more general commentary on the opportunities and challenges for AMCs in global medicine (Ackerly, Udayakumar and Taber 2011). Ackerly, et al (2011) provided a perspective on the opportunities in global medicine for AHCs. While their work takes more of a global health viewpoint, they identify the need for international public-private partnerships

including AHCs and specifically cite an opportunity for AHCs in consulting and advisory services, cobranding arrangements, management services arrangements, joint ventures in international care delivery facilities, and others (Ackerly, Udayakumar and Taber 2011). They cite AHCs strengths in integrated delivery systems, evidence-based medicine, and advanced technologies as advantages that AHCs have over other healthcare competitors which supports the idea that certain AHCs have a comparative advantage in delivering the highest level of healthcare services (Ackerly, Udayakumar and Taber 2011). However, Ackerly, et al, (2008) support the concept of using this advantage as a means to support areas with unmet needs as opposed to revenue generation. At the same time, they understand the revenue generation needs of AHCs, particularly faced with reduced reimbursement domestically, and an increasingly competitive space for international, lucrative patients (Ackerly, Udayakumar and Taber 2011). Ultimately, Ackerly, et al (2008) note that by supporting globalization of clinical services through various mechanisms (e.g. consulting, management, or care delivery), AHCs can monetize their knowledge and experience to help offset their challenges locally (Ackerly, Udayakumar and Taber 2011).

Rosson and Hassoun (2017) take a different approach, assessing the resource requirements at a major US AMC to support international collaborations. While their research differs from this study, it does offer insightful information, including an example from Johns Hopkins International (JHI) a separate LLC created by Johns Hopkins Medicine specifically for international collaborations (Rosson and Hassoun 2017). The services of JHI are described as a trajectory which started with international consulting and has progressed over time to include affiliations, operations of clinical service lines

and hospital management arrangements (Rosson and Hassoun 2017). They also develop a segmentation methodology for assessing the level of engagement of US hospitals in the international space. The four levels include: “Sideline Observer” or those that treat patients from other countries at their US facilities; “Getting Engaged” which includes the activities of Sideline Observers plus capacity to provide consulting services and training/educational programs; “Focused Initiatives” are those that have moved beyond Getting Engaged and now offer those services in addition to having a physical presence abroad, many advisory engagements and research collaborations; and “Prolific Presence” are organizations that have advanced beyond these levels and have a dominant consulting offering for international healthcare organizations, branded medical schools, hospitals or other facilities in diverse arrangements including co-branding, join ventures and FDI/ownership (Rosson and Hassoun 2017). This framework is helpful in thinking about the evolution of international strategies and partnerships. While their focus is in global services, they stipulate that Johns Hopkins International has another division “Patient Services” that focuses on international patients treated at JHM in the US (Rosson and Hassoun 2017). Lastly and perhaps most importantly in their research, is that they find a significant resource requirement involved in order to succeed in international collaborations (Rosson and Hassoun 2017).

Merritt, et al (2008) compiled a summary of the international clinical, education and research programs of US AHCs (note AHC and AMC are often used interchangeably) and major teaching hospitals (MTH) and tied these programs to the underlying mission of the organizations. Key insights from their work include the fact that US AHC’s and MTH’s international strategies can vary significantly and range from

a small number of education and/or training programs to significant investment in facilities to deliver patient care (Merritt, et al. 2008). They identify a four stage development path that most AHCs follow in their international strategies starting with educational and training programs, then consulting and advisory services, then management services (to hospitals, medical schools or education and research centers) and lastly developing, partnering or owning facilities for patient care, education or research in international locations (Merritt, et al. 2008). Similar to Rosson and Hassoun (2017), Merritt, et al (2008) also segmented international participants, but used only three categories, "Getting Engaged" "Limited/Focused Initiatives" and "Significant Initiatives". Interestingly, at the time of their writing, both the Cleveland Clinic and MD Anderson (both part of this research) were categorized as "Significant Initiatives" whereas Mayo Clinic (also part of this research) was categorized as "Limited/Focused Initiatives" (Merritt, et al. 2008). Merritt et al (2008) cite the September 11, 2001 attacks and visa restrictions, as did Ackerly, et al (2011) as being a driver of AHCs focusing their international strategies as it created a barrier to patients traveling to the US for care. Merritt, et al (2008) also cites examples relative to this research including Cleveland Clinic's commitment to invest in and manage Cleveland Clinic Abu Dhabi, which has since opened; MD Anderson's partial ownership and development partner in MD Anderson International Espana, a cancer center in Madrid, Spain; and Mayo Clinic's ownership and operations of a cardiovascular clinic in Dubai. They also reference that the majority of US healthcare organizations' international activity outside of Europe is taking place in developing and emerging economies (Merritt, et al. 2008). Merritt, et al (2008) pointed to four reasons that US healthcare organizations pursue international partnerships

and strategies, including attracting patients from international locations, Building a strong international reputation and brand, Further enhancing the research and education mission, and providing additional sources of revenue to the institution. As stated by Rosson and Hassoun (2017), Merritt et al (2008) also confirm that most institutions create a separate legal entity to manage their international services.

(McHugh, et al. 2019) conducted the most recent study that is somewhat similar to this research. They assessed the size and scope of what they called "non-patient collaborations" by US health systems and the corresponding impact on international patient volumes at their domestic hospitals. They indicate that "thousands" of international patients travel to US based AMCs annually for healthcare and that this provides additional volume for AMCs in treatments that are more rare and ultimately leads to improved innovation diffusion (McHugh, et al. 2019). McHugh (2019) also use the framework of the GATS and reference the fact that outside of Mode one (consumption of services abroad), international trade in health services has received relatively little attention or academic research. Like previous research Merritt, et al (2008) Ackerly, et al (2011), McHugh (2019) points to AMCs as having a comparative advantage due to their renowned training and research; and breakthrough treatments for the most complex conditions. According to McHugh (2019) and in line with research by others (Rosson and Hassoun 2017) and (Merritt, et al. 2008) international collaborations by US AMCs occur in several ways consulting and advisory services; management services; and joint or sole ownership of healthcare delivery or educational facilities. These are identified as "non-patient collaborations" as opposed to Mode one where patients receive services at an international location (McHugh, et al. 2019). Like previous

research, US healthcare institutional motivation for participating in international health collaborations include enhancement of the brand, cross-subsidization of the core services (US based services), supporting the educational mission and for diversification of revenue streams (McHugh, et al. 2019). McHugh, et al (2019) conducted interviews and relied on data from the US Cooperative for International Patient Programs (USCIPP), which is a non-profit cooperative made up of approximately forty-five US hospitals working to expand international patient reach (McHugh, et al. 2019). They found that 83% of organizations had a minimum of one international educational program; and 70% had "outbound" programs where US clinicians and providers travel abroad for purposes of teaching (McHugh, et al. 2019). In terms of consulting and advisory services, approximately 50% of the organizations were involved in this type of activity abroad; followed by 20% being involved in management services; and 10% having ownership in healthcare delivery or educational facilities; almost 18% had no existing international collaborations even though the cooperative is focused on growing international patient volumes (McHugh, et al. 2019). Participants were segmented into "large" or "small" depending on the volume of international patient admissions in the previous year (McHugh, et al. 2019). Findings suggest that those with a large international patient program are more likely to offer consulting/advisory services, management services and to have their international programs structured under a separate entity (McHugh, et al. 2019). Interestingly, only 5% of participants offered all types of non-patient collaborations and the majority tended to focus on educational programs only (30%) (McHugh, et al. 2019). Ultimately, the development of non-patient collaborations internationally is viewed as an evolutionary process starting with educational programs

and potentially extending through ownership in care delivery and educational facilities (McHugh, et al. 2019).

Data and Methods:

This research summarizes and analyzes findings from the three identified organizations using content analysis to identify trends in top US healthcare organizations' international healthcare strategies. The content analysis was conducted and supported by data analysis software, MAXQDA. Multiple documents and data sources were used that are generally publicly available, including organizational annual reports, websites, news articles and data as provided by fDi markets. Information was coded and thematically grouped using MAXQDA. The focus was on the four Modes of the GATS (cross-border supply of services, consumption of services abroad, foreign direct investment and movement of health professionals) and trading country relationships due to their relevance to the main research questions. The data were reviewed multiple times, with a top-down approach (the researcher systematically coding using the established coding methodology) (Krachler and Greer 2015).

As discussed, the Cleveland Clinic, Mayo Clinic and MD Anderson were selected for this study because of their renowned reputation and likelihood of comparative advantage from a trade in health services perspective. In order to gain an understanding of trade in health services under the different Modes of the GATS, organizations included in the study must have a comprehensive international strategy. As indicated by other research (Merritt, et al. 2008), each of the organizations included in this study has a robust international strategy. For purposes of our research, international activities were categorized according to the GATS. However, these are mapped to specific healthcare

organizational strategies based on this research and that of others (Rosson and Hassoun 2017) (Merritt, et al. 2008) (McHugh, et al. 2019).

Table 15 *GATS Mode of Trade in Services Mapped to US Healthcare Organizational International Strategic Activities*

GATS Mode	International Strategy
Cross-border supply of services	Consulting, Research, Education, Remote second opinions
Consumption of services abroad	Patients traveling to US for healthcare services
Foreign direct investment	Ownership in medical or healthcare educational facilities abroad either fully or as part of a joint venture
Movement of health professionals	Consulting, training or often management services arrangements

Results:

It is helpful to summarize the results for each institution in order to understand the differences in strategic approach.

Cleveland Clinic: The Cleveland Clinic, located in Cleveland, Ohio (primary location) is a 5,000 bed health system with locations across the US, an outpatient center in Toronto, Canada, a joint venture 364 bed hospital in Abu Dhabi and a soon to be opened 185 bed hospital in London, UK (The Cleveland Clinic 2019). In 2018, the Cleveland Clinic provided 7.9 million outpatient visits, 238 thousand inpatient admissions and 220 thousand surgeries and procedures across its locations. Enterprise wide they have 3,953 physicians and scientists, 59 thousand caregivers (including physicians and scientists) and have operating revenues of $8.9 billion with $296 million in research funding (The

Cleveland Clinic, 2019). Their caregivers are centered at their main locations in Ohio, but are dispersed worldwide as follows: US (91%), Canada (<1%), Abu Dhabi (1%) and London (<1%). Of their total international caregivers 95% are in Abu Dhabi.

Mode 1- Cross-border supply of services:

- The primary ways in which the Cleveland Clinic participates in international trade in health services via Mode 1, cross-border supply in services are: international collaborations for training or research, consulting services, clinical partnerships and remote second opinion services. Their international consulting services include care path implementation, clinical operations, continuous improvement and LEAN, distance health (MyConsult second opinions, ePathology, eRadiology), Joint Commission International readiness, patient experience assessment and training, quality and patient safety assessment and training and wellness program implementation (The Cleveland Clinic 2018).
- Cleveland Clinic also has clinical affiliations with international facilities through Cleveland Clinic Connected where they share best practices in clinical guidelines, provide their remote second opinion services for patients (MyConsult) and pathology and radiology second opinion or interpretations (ePathology and eRadiology). Its first collaboration of this kind on an international basis is with Luye Medical Group and Shanghai New Hong Qiao International Medical Center in China which was announced in 2018 (The Cleveland Clinic 2018). Shanghai New Hong Qiao International Medical Center will have access to the Cleveland Clinic's treatment protocols and

educational materials under the arrangement. They will also provide second opinion services for patients of Shanghai New Hong Qiao International Medical Center as needed (The Cleveland Plain Dealer 2018).

Mode 2- Consumptions of Services Abroad:

- In 2018, Cleveland Clinic had 3,123 unique international patients seek care at their main campus in Cleveland, Ohio. These patients came from many parts of the world, but the majority (41%) came from the Middle East followed by Latin America (24%), Canada (11%), Far East (8%), Europe (7%) and Other (9%) (The Cleveland Clinic 2019). International patients represent less than 1% of the Cleveland Clinic's annual unique patients (2 million) as of 2018 (The Cleveland Clinic 2019); and is trending downward since 2015 when the number of unique international patients was 4,700 with greater than 50% originating from the Middle East (The Cleveland Clinic 2016). Of note is that Cleveland Clinic Abu Dhabi opened in 2016 and 2016 was the first year since 2008 that Cleveland Clinic saw a drop in the number of international patients (The Cleveland Clinic 2017). Additionally, with the opening of Cleveland Clinic Abu Dhabi, Cleveland Clinic's international patients at main campus from the Middle East continues to decline as a share of total international patients (The Cleveland Clinic 2017).
- Cleveland Clinic Abu Dhabi has 1,380 unique international patients in 2018 which represents 1% of their total unique patients; and it is 44% of the international patient volume seen at main campus in Cleveland, Ohio (The Cleveland Clinic 2019). The majority of patients are from Saudi Arabia (18%) followed by Kuwait (15%), Bahrain (8%) Oman (6%), USA (5%), Pakistan (4%),

Egypt (3%), United Kingdom (2%) and all Other (representing <1% each) (39%) (The Cleveland Clinic 2019). According to Cleveland Clinic Abu Dhabi , greater than 50% of its international patients come from members of the Cooperation Council for the Arab States of the Gulf or Gulf Cooperation Council (GCC), which includes (other than United Arab Emirates) Saudi Arabia, Kuwait, Qatar, Bahrain, and Oman (The Cooperation Council for the Arab States of the Gulf 2020) (The Cleveland Clinic 2019).

- Though the Cleveland Campus saw a decline in international patients of approximately 1,500 annually from 2015 to 2018, after combining Cleveland Clinic Abu Dhabi's international business with the Cleveland Clinic main campus the total international patients business is down 120 patients from 2015 to 2018, keeping in mind that patients from the UAE are no longer considered international (The Cleveland Clinic 2019).
- Data on international patients visiting Cleveland Clinic Canada (Toronto) is limited, likely because that campus offers outpatients services only (The Cleveland Clinic 2019).
- Cleveland Clinic also has representatives in international locations for purposes of assisting patients with accessing the Cleveland Clinic. Countries where these representatives are located are listed in Table 16.

Table 16 *Cleveland Clinic In-Country Representative Locations*

Bahamas
Dominican Republic
Guatemala and El Salvador
India
Panama, Honduras and Costa Rica
Peru and Ecuador
Saudi Arabia

Mode 3- Foreign Direct Investment

- Cleveland Clinic has invested in international facilities. According to fDi markets (2017), during the time period of 2004-2017, Cleveland Clinic made the following FDI in health services: $3.4 million for Cleveland Clinic Abu Dhabi in 2006; and $51.8 million for Cleveland Clinic London in 2015. Cleveland Clinic Canada (Toronto) was opened in 2006 and likely had FDI before the start of fDi markets tracking in 2004.
- Cleveland Clinic Abu Dhabi is a joint venture with Mubadala Development Company (Mubadala Development Company 2020) for a 364-bed hospital. Since its opening in 2016, it has become the only multiorgan transplant program in the United Arab Emirates, having performed over forty organ transplants since 2017, including heart, liver, lung and kidney. Focus has now shifted to developing a comprehensive cancer center (The Cleveland Clinic 2019). While opening a hospital in Abu Dhabi has been correlated to a decrease in international patients traveling to Cleveland Clinic's main campus in Cleveland, Ohio from the Middle East, it has increased total Cleveland

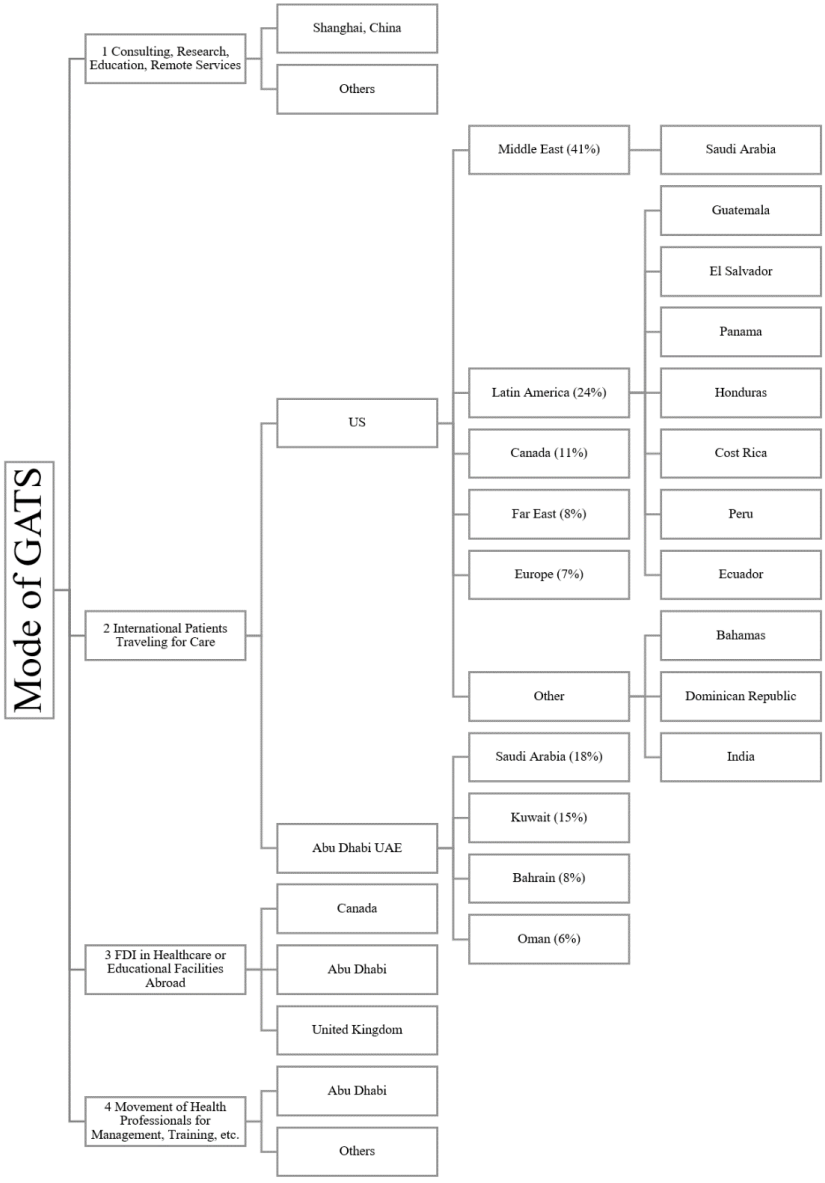
Clinic volumes overall, with Abu Dhabi reporting 583,500 patient encounters in 2018 (The Cleveland Clinic 2019).

- Cleveland Clinic London is scheduled to open in 2021, planned as a 185-bed hospital. As of 2018, there are currently 69 Cleveland Clinic caregivers employed for the London based hospital with projections of 1,100 by the time it opens in 2021 (The Cleveland Clinic 2019). In these arrangements, oftentimes Cleveland Clinic main campus executives and physicians are relocated to the international location for the purposes of continuity in leadership, quality and for training local staff and physicians (The Cleveland Clinic 2020).

Mode 4- Movement of Health Professionals:

- As mentioned, Cleveland Clinic's Model when it opens international locations is to move executives and clinical/physician experts and leaders to the international location as part of ongoing management services arrangements, training or to fulfill clinical or leadership needs. In both Abu Dhabi and London, this has occurred, moving clinical expertise from the US to those locations. Typically, the assignments last several years and certain team members then return to the US (The Cleveland Clinic, 2020).

Figure 3. *Cleveland Clinic International Trade in Health Services by Mode of the GATS.*



Mayo Clinic: The MayoClinic, located in Rochester, Minnesota (primary location) is a multi-hospital health system with locations across the US outside of MN including Arizona and Florida (The Mayo Clinic 2019), consistently ranked as one of the best health systems in the US (US News & World Report 2018). In 2018, the Mayo Clinic provided care to 1.2 million distinct patients with 130,000 having a surgical procedure.

Enterprise wide they have 4,878 physicians and scientists, 65 thousand caregivers (including physicians and scientists) and have operating revenues of $10.6 billion (The Mayo Clinic 2019). Patients from 138 countries outside of the US sought care at the Mayo Clinic in 2018. Their caregivers are centered at their main locations in the US. Mayo Clinic's international strategies have primarily included attracting patients to its domestic locations and using its Mayo Clinic Care Network (MCCN), similar to clinical affiliations where international health systems have access to Mayo Clinic's clinical protocols and remote consults (The Mayo Clinic 2019). They currently have international clinical affiliations through MCCN with hospitals and health systems in China, Mexico, Saudi Arabia, South Korea, Singapore, United Arab Emirates and the Philippines (The Mayo Clinic 2019).

Mode 1- Cross-border supply of services:

- Cross-border supply of services through MCCN has been Mayo's primary foray into international trade in healthcare services outside of Mode 2. Again, hospitals and health systems that are part of MCCN typically have access to Mayo's clinical protocols and pathways and/or participation in remote second opinion services. Hospitals and health systems pay a fee to Mayo Clinic to be included in this network. There are domestic participants as well as international. The international participants are included on the map below:
- Additionally, Mayo Clinic has active consulting and advisory services in multiple international locations. Table 21 provides a summary as of the time of this research. Their consulting and advisory services range from greenfield

hospital development to service line and center of excellence development (The Mayo Clinic n.d.).

Figure 4. *Mayo Clinic Care Network.*

Source: Mayo Clinic, 2020

Table 17 *Mayo Clinic International Consulting and Advisory Services as of 1/2020*

Source: The Mayo Clinic, 2020

Service	Location
Greenfield hospital development	**Rabat, Morocco**
Greenfield hospital development	**Doha, Qatar**
Greenfield hospital development	**Abu Dhabi, United Arab Emirates**
New hospital commissioning	**Panama City, Panama**
Primary care system development	**Kuwait City, Kuwait**
Women's health service line development	**Shanghai, China**
Cancer center of excellence development	**Hangzhou, China**
Cardiac rehab center of excellence development	**Beijing, China**
Cardiac surgery center of excellence development	**Lima, Peru**

- Beyond partnerships strictly with healthcare providers through MCCN, Mayo Clinic is also trading via Mode 1 with other non-provider partners. These ventures typically include healthcare related organizations (non-providers of care delivery) leveraging Mayo's clinical knowledge for various functions. Examples include the following:

Table 18 *Mayo Clinic International Non-Provider Ventures*

Source: The Mayo Clinic, n.d.

Partner	City and Country	Description
Huimei	Beijing, China	Provides Mayo Clinic's clinical knowledge to health care providers in China. Huimei also has a subsidiary that refers patients to Mayo Clinic. Hillhouse Capital and Mayo Clinic established this new company.
Valurise Health Solutions, Inc. (VHS)	Shanghai, China	VHS has integrated Mayo Clinic clinical knowledge into their Health Risk Management services and products offered to employers and insurers that service Greater China.
WuXi AppTec Group	Shanghai, China	WuXi AppTec Group and Mayo Clinic Laboratories partnered to develop new clinical tests and offer Mayo Clinic laboratory tests to providers and patients in China.

Table 18 (continued).

Partner	City and Country	Description
Mikropis	Slovenia	"Mikropis' 24alife offerings deliver personalized solutions that set healthy lifestyle goals and provides education, activities and motivation to achieve a healthier and happier life. The venture with Mayo Clinic offers 24alife users access to Mayo Clinic's expert content and research in addition to the extensive knowledge base of education, physical activity, nutrition and stress management information already incorporated in 24alife. Mayo Clinic's knowledge is embedded in 24alife to provide a comprehensive well-being interactive tool."

Mode 2- Consumptions of Services Abroad:

- Mayo Clinic data on international patients is much more limited than that of the Cleveland Clinic. However, it is published that the Mayo Clinic had patients from 138 different countries visit their main campus for healthcare services in 2018 (The Mayo Clinic 2020). Further, they have established local offices in various countries for the purposes of handling appointments for local patients that wish to travel to the US to Mayo Clinic for care. Staff members speak the local language and can request appointments as well as make travel arrangements. The

representatives are located in the following countries: Canada, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama and Peru (The Mayo Clinic, 2020). Mayo also has referral facilitators that are independent of their organization, but work with them to request appointments for patients that desire to travel to Mayo. Those arrangements exist in China and India (The Mayo Clinic, 2020).

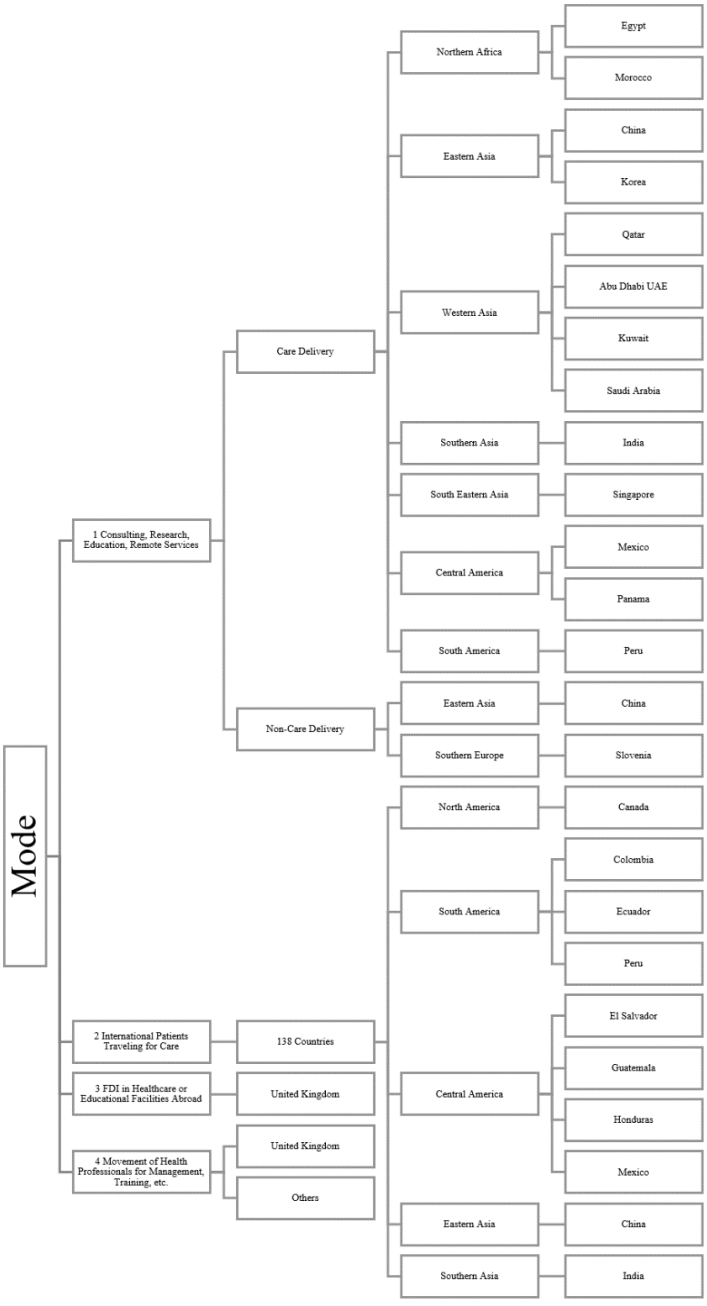
Mode 3- Foreign Direct Investment:

- In 2019, Mayo announced a joint venture with Oxford University Hospitals to open a clinic focused on preventive care outside of the National Health Service (NHS) (MedCity Beat 2019). The clinic will be based on Mayo Clinic's executive health program designed for those that desire to be proactive about their preventive health (Mayo Clinic 2019). Mayo clinic points out that "The facility's core medical team, who are drawn from the U.K. and the U.S., will be salaried, meaning they are not paid on the volume of patients seen or tests performed. The physicians are experts in general and preventive medicine, executive stress and burnout, sleep medicine and travel health, and will have direct access to the expertise of thousands of physicians and scientists at Mayo Clinic and Oxford University Clinic" (Mayo Clinic, 2019). The description of the clinic sounds similar to a concierge type practice that will not accept NHS insurance but will offer private plans and personalized, advanced screening and diagnostics (Mayo Clinic, 2019).

Mode 4- Movement of Health Professionals:

- The extent to which Mayo Clinic participates in this Mode of international services trade is unclear. This type of trade could occur as part of their clinical affiliations in MCCN or other arrangements, but data is not available to support this Mode. It is clear that as part of the Oxford University partnership in London, there will be some movement of health professionals based on insights from the Mayo Clinic (The Mayo Clinic 2020).

Figure 5. *Mayo Clinic International Trade in Health Services by Mode of the GATS.*



MD Anderson: MD Anderson, located in Houston, Texas (primary location) is a cancer specific hospital consistently ranked as the best cancer care in the US (US News & World Report 2018). It is a multi-location system with locations across the US and internationally. In 2018, MD Anderson provided care to 142 thousand distinct patients with 29 thousand inpatient admissions (MD Anderson, 2019). Enterprise wide they have operating revenues of $4 billion (MD Anderson, 2019). MD Anderson's international strategies have primarily included attracting patients to its domestic locations and using its MD Anderson Cancer Network, to grow its international relationships. MD Anderson has clinical affiliations in Istanbul, Turkey; Sao Paulo, Brazil and Madrid, Spain though each of these has a different structure (MD Anderson, 2019).

Mode 1- Cross-border supply of services:

- Much like the Mayo Clinic, MD Anderson has been most active in this Mode of international trade in health services, leveraging their MD Anderson Cancer Network that has multiple international participants as indicated in Table 19. These facilities are considered "Associate Members" of the MD Anderson Cancer Network and are co-branded clinical collaborations with the cancer programs at international hospitals (MD Anderson n.d.)

Table 19 *MD Anderson Cancer Network International Participants*

Participant	**City/Country**
Hospital Israelita Albert Einstein	Sao Paulo, Brazil
Vehbi Koc Foundation American Hospital	Istanbul, Turkey
MD Anderson Radiation Treatment Center at American Hospital	Istanbul, Turkey

- Another way in which MD Anderson participates in Mode 1 trade is through their "Sister Institutions" (Table 20) in which they have education and research-based relationships centered in oncology.

Table 20 *MD Anderson Cancer Sister Institution Research and Education Partnerships*

Organization	City/Country
Clinica Alemana De Santiago	Santiago, Chile
Hospital De Amore	Barretos, Brazil
Instituto De Cancerologia Clinica Las Americas	Medellin, Colombia
Chinese University of Hong Kong	Hong Kong, China
Chulalongkorn University	Bangkok, Thailand
Hunan Cancer Hospital	Hunan, China
Kyoto University	Kyoto, Japan
Peter Maccallum Cancer Centre	Melbourne, Australia
Thailand Consortium	Thailand
Tianjin Medical University Cancer Institute & Hospital	Tianjin, China
Tokyo Oncology Consortium	Tokyo, Japan
Yonsei University Medical Center	Seoul, Korea
American University in Beirut	Beirut Lebanon
Chaim Sheba Medical Center	Tel Hashomer, Israel
Italian Alliance Against Cancer	Rome, Italy
Karolinska Institutet	Stockholm, Sweden
King Hussein Cancer Center	Amman, Jordan
Norwegian Cancer Consortium	Oslo, Norway
Rigshospitalet, Copenhagen University Hospital	Copenhagen, Denmark

- Additionally, MD Anderson in Houston is paid for certain services provided to the joint venture facility in Spain (Darwin 1998).

Mode 2- Consumptions of Services Abroad:

- Current data are not available on the number of international patients traveling to MD Anderson for healthcare services. However, data from 1997 reported over 3,300 international patients (Darwin, 1998). MD Anderson has an established

international center that supports patients with obtaining visas, travel assistance, housing arrangements, etc. The services are offered with interpreters for the following languages: Arabic, French, Mandarin, Spanish, and Vietnamese (MD Anderson n.d.). The education and research partnerships in Mode 1 trade often support Mode 2 trade by raising awareness and brand recognition. Further, MD Anderson expanded its facility in Madrid, Spain due to the number of international patients traveling to that location from the European area (fDi Markets, 2017).Historically, Spain, Latin America and the Middle East were the regions that MD Anderson focused on to attract international patients (Darwin, 1998).

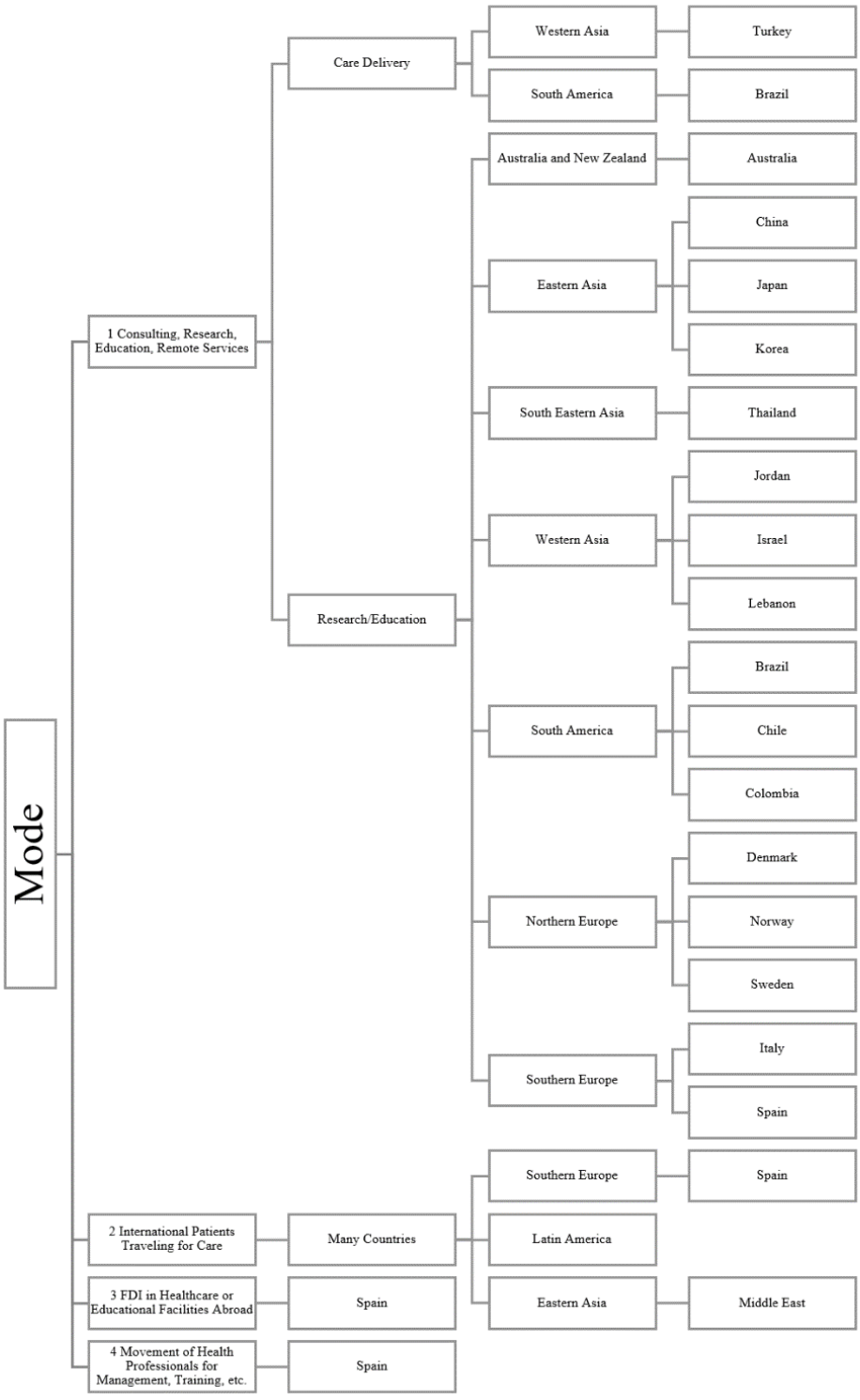
Mode 3- Foreign Direct Investment:

- MD Anderson has made investment in facilities internationally. As reported by fDi markets (2017), MD Anderson invested in a facility in Madrid, Spain of approximately $50 million in 2007 with plans for expansion, though they did not invest equity originally, yet had an equity interest (Darwin 1998). At this time, this is MD Anderson's only international FDI activity, though it has partnerships in other international locations (MD Anderson 2019). M.D. Anderson partnered with organizations in Spain to form a holding company that formally owns the cancer and radiation centers in Spain (Darwin 1998). They also collaborated to offer an insurance product for care in either Madrid or Houston (Darwin 1998).

Mode 4- Movement of Health Professionals:

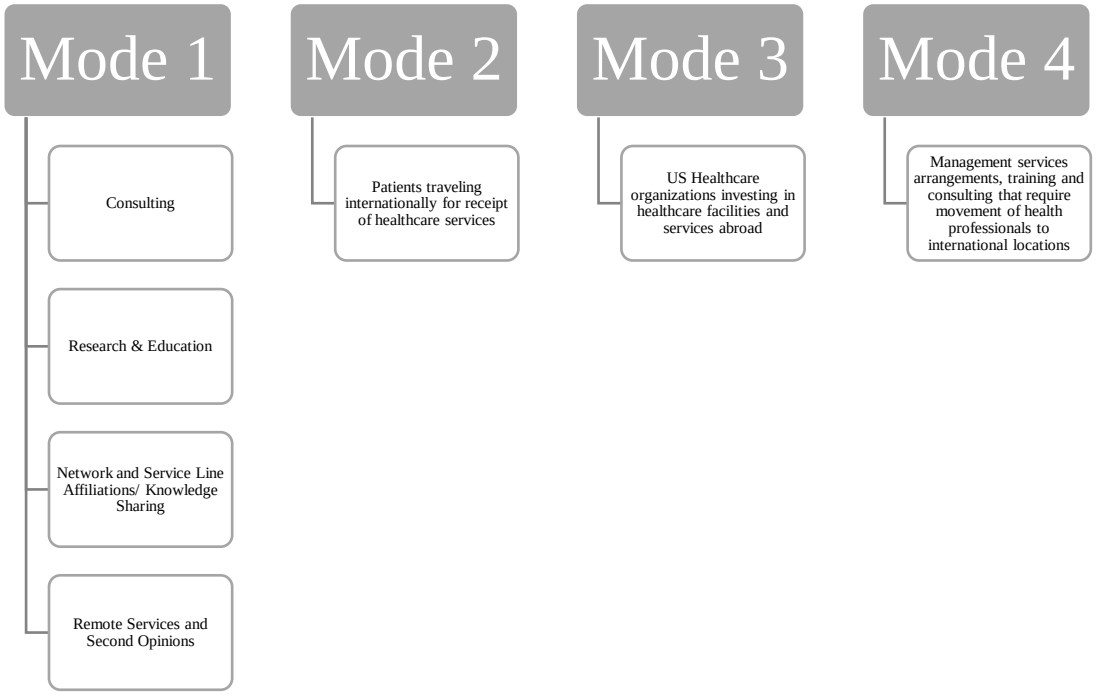
- Mode 4 trade by MD Anderson is somewhat difficult to identify and quantify. While they may have movement of health professionals as part of their consulting, cancer network or sister institution relationships, details are not available.

Figure 6. *MD Anderson International Trade in Health Services by Mode of the GATS*.



Conclusions:

The Cleveland Clinic, Mayo Clinic and MD Anderson all have robust international strategies as defined by the four Modes of the GATS, yet even though these three institutions are often ranked as among the best in the world, their strategies and evolution in the international space are somewhat different. It is clear from this research and previous that there are different strategies and tactics used by US health systems to develop an international strategy. These activities have been defined previously, but this research has aligned the broad strategies with the four Modes of the GATS to assess US healthcare organizations' role in international trade in health services.



The establishment of international strategies for trade in healthcare services appears to follow an evolutionary process that begins with Mode 1 trade (cross-border supply of services). This has been recognized by other researchers in regard to health system segmentation (Merritt, et al. 2008) (Rosson and Hassoun 2017) but never attached

to the Mode of trade in services. Mode 1 trade is often used for establishing global brand recognition and has been shown to drive increases in Mode 2 trade for major US healthcare organizations (McHugh, et al. 2019) showing that the different Modes of trade are interconnected. This study takes this a step further and shows that Mode 2 trade in healthcare services can often lead to Mode 3 and 4 trade in healthcare services as well. Specifically, before 2016 the Cleveland Clinic received over half of their international patient volumes from the middle east (The Cleveland Clinic 2016). After opening Cleveland Clinic Abu Dhabi in 2016, Mode trade in health services from the middle east to the Cleveland Clinic's main campus declined significantly (The Cleveland Clinic 2019), however, their international services volumes at Abu Dhabi nearly offset this loss; and their volumes from the UAE far surpass international volumes in Cleveland (The Cleveland Clinic 2019). Further, MD Anderson's only FDI activity is in Spain, which also was a major contributor of MD Anderson's international patients traveling to Houston before MD Anderson Espana's opening. The identified cannibalization of Mode 2 trade in health services after engaging in Mode 3 trade in a destination country likely impacts other US healthcare organizations whose services are viewed by international patients from the FDI destination country as a substitute to the services they can then receive locally. Thus, Mode 3 becomes a strategic advantage for the investing health system, but detracts from Mode 2 trade for other US health systems.

There appears to be a process by which relationships are established through cross-border supply of services, including brand recognition, which feeds Mode 2 consumption of healthcare services abroad and at a certain point, Mode 2 volumes are significant enough and coupled with other factors, it makes strategic sense to pursue FDI

or other joint venture, co-branding or management arrangements for international healthcare facilities. Mode 4 is often connected to Mode 3 services as health professionals move to the international location to support management agreements, training and clinical service line development. Cleveland Clinic Abu Dhabi is a great example of this where the Cleveland Clinic transplant surgeons and supporting clinical staff were moved to Abu Dhabi to prepare for, train and operate multiple organ transplant programs, making Cleveland Clinic Abu Dhabi the only multi-organ transplant program in the UAE (The Cleveland Clinic 2019). While these appear to be trends, it is still difficult to quantitatively assess patterns because so few US healthcare organizations participate in Mode 3 trade in health services.

Modes 1 and 2 are much more dispersed in terms of country partners. Health systems appear to cast a wide net in order to increase relationships, brand and ultimately Mode 2 volumes. Mode 1 activities seem to be somewhat mission driven of the AMC, including educational and research partnerships that could benefit countries with less health system infrastructure. Examples include MD Anderson's educational and research partnerships through their "Sister Institutions" (MD Anderson 2019) that includes countries such as Colombia, Thailand and other upper middle income countries as defined by the World Bank (2019). Notably, all of MD Anderson's sister institutions are in high or upper middle-income counties. Consulting services and network development (Mayo Clinic Care Network, MD Anderson Cancer Network) are another manner in which US health systems participate in Mode 1 trade in services. In total, this Mode has diverse partners internationally, with MD Anderson focusing in Turkey and Brazil for their care network and Mayo focusing in Asia, the Middle East and Latin America.

Mode 2 has historically been the very competitive and lucrative Mode of trade in services for US healthcare organizations. As shown, all three of the healthcare systems in the study have representatives in multiple countries for purposes of referring to their US based hospitals and coordinating services for those patients. Latin America, the Middle East and Asia are all generally targeted by US healthcare organizations. However, distance has been shown to impact patient decisions for location of healthcare services and as more US healthcare organizations participate in FDI, we can expect Mode 2 trade to decrease, not just for those organizations.

Mode 3 trade is much more targeted and limited. Cleveland Clinic's FDI in Canada, Abu Dhabi (UAE) and now the United Kingdom along with Mayo Clinic's small FDI in partnership with Oxford University Clinics in the United Kingdom and MD Anderson's FDI in Spain could lead us to believe that major US AMCs that have a comparative advantage in health services delivery tend to target high income countries for FDI. However, the sample is small and it is difficult to draw general conclusions. Mode 4 has limited data upon which to identify patterns, but it is clear that Mode 4 trade in health services by US health systems is tied to Modes 1 and specifically to Mode 3.

In closing, globalization of healthcare services is increasingly taking place. Availability of information and ease of communication and travel have allowed reduced search costs to find the best provider of healthcare services as well as reduced transportation costs where transportation is necessary (Segouin, Hodges and Brechat 2005). Those that excel at health delivery, such as major AMCs in the United States are expanding their international strategies in each of the four Modes of the GATS. Organizational strategies in these Modes appear to evolve and advance over time.

However, FDI (Mode 3) while in its infancy, has the potential to decrease Mode 2 not only for the organization making FDI, but for other US based health systems as well. Further, it appears from this research that US health systems target high income countries (FDI), or at a minimum, upper-middle income countries for their international partnerships. Thus, healthcare capacity building for the low-income countries does not appear to be part of the strategy.

CHAPTER VI : DISCUSSION OF THE THEMES AND FINDINGS OF THE THREE ARTICLES

This research was made up of three separate but related articles. Article 1 reviewed the determinants of country selection for Mode 2 trade in health services, where patients consume healthcare services abroad, using the gravity Model of trade. Article 2 also used the gravity Model of trade but assessed determinants of country selection for foreign direct investment (Mode 3 of the GATS) by US healthcare organizations. Finally, article 3 was a qualitative study using MAXQDA to identify how three major US health systems are engaging in international trade in health services within the GATS framework; and with which countries those organizations generally partner. While the gravity Model of trade held for Mode 2 trade in health services, it was less predictive for Mode 3 trade in health services. Specifically, Mode 2 trade in services was shown to be predicted by size of the trading partners as measured by GDP and inversely correlated with the geographic distance between them. However, Mode 3 trade found GDP to be insignificant and distance, when significant was positive, meaning FDI increased as distance between countries increased (recognizing that Mode 3 was assessed for US healthcare organizations only) which is opposite of what would be expected under the gravity Model. However, there are reasons for these anomalies in Mode 3. First, Mode 3 trade in health services such as FDI in the healthcare or hospital sector is highly regulated and can be disallowed in certain countries. While our study included only observations where FDI had occurred, an accurate proxy for the regulatory environment specific to healthcare isn't available. Commitment under the GATS for medical services was used and interestingly it was significant and positive throughout, meaning FDI increased as

countries had a GATS commitment for medical services. It is possible that the significant regulation of the healthcare industry across countries, may skew the gravity Model's predictive ability relative to FDI. Second, FDI is measured in terms of USD $M made by the named US healthcare organization. However, practically speaking, there are other ways in which US healthcare organizations accomplish ownership or operations of healthcare facilities abroad, such as through joint ventures, co-branding or management arrangements. These various arrangements as identified in article 3 are core strategies, but there is not a way to quantitatively adjust for the impact this has on the $M USD investment by US healthcare organizations. Thus, our results may be impacted by this.

In each of the Modes of trade in services under the GATS, we can think of who (or what) is crossing the international border. For example, Mode 1 is cross-border supply of services such as consulting or education, Mode 2 is patients traveling for healthcare services, Mode 3 is flow of capital across borders via FDI and Mode 4 is movement of health professionals. Because different things are moving across international borders as part of the services trade (services, people, capital, health professionals) the determinants of country selection for each Mode could vary. That has been witnessed in this research. In Mode 2 when patients are making the decision on which country to receive services, distance is important because a person (or people) are physically traveling internationally for care. Thus distance was significant and negatively correlated with spending on international travel for medical services as was contiguity; whereas when capital is moving across international borders (FDI, Mode 3) distance seemed less important through its lack of significance, but when it was significant, it was positive, meaning greater distance between the domestic country and the importing (FDI

receiving) was associated with higher FDI. This very clearly could be related to the type of service healthcare is and the organizations making the FDI. If they invest too close to home, they could cannibalize services at their primary hospital or health system. Likewise, when patients are making the country selection for medical services, they choose countries similar to their own in terms of income level, common language, common legal structure, cultural similarities (Hofstede's power distance), presence of diaspora population and common language common religion. However, when US healthcare organizations are the decision maker and it is FDI (capital) crossing the international border, these similarities do not appear to be as important except for common colony as some point over history. Common language and religion do not show the same significance when it is a different decision maker investing capital. Interestingly, political stability didn't appear to have an impact on either Mode 2 or Mode 3, but that could be related to the samples used for both analyses which may have included only more politically stable countries.

Economically, patients traveling for healthcare services or traveling and receiving healthcare services tend to choose countries with lower spending on healthcare as a percentage of their GDP (though similar in total GDP to their home country) but with more hospital beds per thousand population. This could be an indicator of economic efficiency in healthcare delivery, meaning those countries that spend less on healthcare as a percentage of their GDP but still have capacity in terms of high hospital beds per thousand are identified as being more efficient. Likewise, when Mode 3 is assessed for economic factors, there appears to be some degree of efficiency consideration with FDI increasing to those countries with a higher life expectancy but with lower physicians per

1,000 population. We could assume that these countries either have a generally healthier population; or they are more effective at producing health as measured by life expectancy while having fewer health resources in terms of physicians per thousand.

The quantitative outcomes and differences across Mode 2 and Mode 3 patterns of trade are different in terms of their outcomes. Adding the qualitative assessment of major US healthcare organizations helps to tie the quantitative results with real-world activities. In practice, Mode 1 trade in services, cross-border supply of services manifest as consulting and advisory, educational and research, network and service line development, non-patient care partnerships, and remote services such as second opinions. Mode 2 trade in services includes patients traveling internationally for the purpose of receiving healthcare, presumably related to cost, quality or access to healthcare in their home country. This is an extremely competitive and lucrative business for major US organizations. Mode 3 involves US (or domestic) organizations participating in foreign direct investment abroad, but in reality, this can occur in different ways. It is rare to see a US healthcare organization invest in and be 100% owner of a foreign healthcare facility. Typically, this is accomplished through joint ventures or co-branding with a related management agreement (that could fall under both Modes 1 and 4). Additionally, Mode 4 seems to most commonly be attached to Mode 1 (consulting, research or other partnerships) or Mode 3 (management agreement to run a hospital in which the US organization invested in such as Cleveland Clinic Abu Dhabi). Ultimately, US healthcare organizations studied in this research appear to target high or upper middle-income countries for their partnerships and investment; and their strategies across the four Modes

of the GATS are interconnected, progressing from Mode 1-4, with Mode 3 being minimal so far, but negatively impactful to Mode 2 when it occurs.

CHAPTER VII – CONCLUSIONS

International trade in healthcare services, while not new, has a relative void in the literature mostly due to lack of data sources to support analyses of trade in services (Lindner 2001). With the advances from globalization, healthcare services have become tradeable over large distances. Whether trade occurs via Mode 1 such as a second opinion delivered via virtual health platforms where a patient in one country can access the services of a renowned specialist in another country; or if the service is delivered via Mode 2 where the patient physically travels from one country to another to receive the healthcare services directly, available options for individuals to seek out the best healthcare they can afford are many (Lautier 2014). Modes 3 and 4 offer additional aspects of trade to advance the foreign country's healthcare system; or as a more lucrative strategy for domestic healthcare systems looking to become a global provider of care (Lautier 2014). Understanding these patterns of trade in healthcare services is an important step for both developed and developing countries. This research has contributed to the void in the literature, with a focus on the US healthcare system's trade but also identifying the factors that contribute to health services trade between countries, namely showing that the gravity Model holds in predicting Mode 2 trade in health services; while other factors are at play in determining country selection for FDI by US healthcare organizations; and US healthcare organizations participate in the international healthcare landscape in varying, interconnected ways.

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