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# Essays on Topics in International Trade and Affiliate Production of Business Services

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# **Essays on Topics in International Trade and Affiliate Production of Business Services**

by

Bridget Strand

B. A. New York University, 2002

M.A. University of Colorado, 2006

A thesis submitted to the Faculty of the Graduate School in partial fulfillment of the  
requirement for the degree of Doctor of Philosophy

Department of Economics

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This thesis entitled:

**Essays on Topics in International Trade and Affiliate  
Production of Business Services**

By Bridget Strand

has been approved for the Department of Economics

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Professor **James Markusen** Chair

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Professor **Keith Maskus**

Date: \_\_\_\_\_

**The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.**

# **Abstract**

**Strand, Bridget Nicole (Ph.D. , Economics, Department of Economics at the University of Colorado)**

## **Essays on Topics in International Trade and Affiliate Production of Business Services**

**Thesis directed by Professor James Markusen, Ph.D.**

Trade in services and foreign affiliate sales of services have grown tremendously over the last decade. The chapters within this thesis look at the differences needed in modeling trade and investment in professional and business services (Chapter 3), the impacts of country level regulatory and investment barriers (Chapter 2), methods of utilizing CGE modeling to simulate welfare gains from changes to the various types of regulatory costs (operating costs, entry costs, fixed costs for establishment abroad) while incorporating the observed complex investment and trade (Chapter 4) and finally also looking at the relationship between trade, foreign affiliate sales and the barriers to supplying services abroad (Chapter 5).

Barriers to trade in services are higher than for trade in goods. These include restrictions on foreign investment, restrictions on temporary movement of natural persons and regulatory measures that affect the entry and operations of foreign firms. Regulation can be discriminatory or non-discriminatory, but even in the latter case foreign services providers may face higher costs than local firms in complying with regulation.

The papers in this dissertation contribute new modeling techniques as well as new methods of looking at the available data.

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## **Chapter 1: Introduction**

Trade in services and foreign affiliate sales of services have grown tremendously over the last decade. The chapters within this thesis look at the differences needed in modeling trade and investment in professional and business services (Chapter 3), the impacts of country level regulatory and investment barriers (Chapter 2), methods of utilizing CGE modeling to simulate welfare gains from changes to the various types of regulatory costs (operating costs, entry costs, fixed costs for establishment abroad) while incorporating the observed complex investment and trade (Chapter 4) and finally also looking at the relationship between trade, foreign affiliate sales and the barriers to supplying services abroad (Chapter 5).

Barriers to trade in services are higher than for trade in goods. These include restrictions on foreign investment, restrictions on temporary movement of natural persons and regulatory measures that affect the entry and operations of foreign firms. Regulation can be discriminatory or non-discriminatory, but even in the latter case foreign services providers may face higher costs than local firms in complying with regulation.

The papers in this dissertation contribute new modeling techniques as well as new methods of looking at the available data.

From an empirical analysis and policy point of view services trade is different from goods trade. The barriers to trade in services are not well defined. They are usually related to behind the border regulation, bureaucratic red tape, and various forms of imperfectly competitive service production. These barriers often take the form of fixed costs that cannot meaningfully be translated into a tariff equivalent or marginal costs which vary significantly across industries and countries. Furthermore, services are heterogeneous, local non-traded inputs are used intensively in their production and the service is often produced in direct interaction with the customer, which can be a firm or an individual consumer. Therefore there is no such thing as a world market price for services.

Another complication is that it is not straight forward to aggregate trade costs in services. Fixed costs from complying with regulatory measures may not be additive, and one binding barrier may render the elimination of other barriers irrelevant. If modes of supply are complementary, trade barriers that restrict one mode of supply will in effect affect all modes, while if modes of supply are substitutes, restrictions on one mode can induce a shift to a less restricted mode, and have little effect other than diverting trade from the preferred mode of supply and increase costs. Identifying and quantifying the binding trade barriers are therefore the major challenge and most important goal for my dissertation. Binding trade barriers differ between sectors and modes of services delivery and need to be estimated by sector, based on in-depth sector studies. This type of analysis is out of scope for my own research due to the lack of available data, however, it will be a logical next step to undertake with the assistance of academic, governmental, and international organizations that are concerned with the implications of services trade barriers for growth, development, welfare, and competition.

Since most barriers to trade in services are behind-the-border regulatory measures, the challenges for the papers within my dissertation include:

1. Distinguishing between trade enhancing and trade restricting regulatory measures;
2. For the latter set of measures, distinguish between entry barriers and regulation that affects operating costs of companies;
3. Establish whether regulation affecting operating costs increases foreign services providers' costs more than local service providers';
4. Quantify entry barriers and operational costs due to regulation if possible, and if not, model the effects of these barriers through a CGE analysis.

The most important mode of trade in services in terms (by volume) is mode 3, commercial presence. Only a few OECD countries gather data on sales by foreign affiliates in a systematic way, and a comprehensive dataset on this mode from official sources is probably years away. The presence of vertical and horizontal services providers mandates obtaining the



highest level of sales data desegregation possible and BEA data for US bilateral trade in services is used in three of the four chapters to follow.

The identification and estimation of binding barriers to entry and trade flows requires detailed knowledge of the industry in question. My research focuses on business and professional services only as service sectors such as travel, tourism, transportation, telecommunications, and construction all warrant individual analysis of the barriers and regulatory restrictions. Within the business and professional services sector I complete industry level studies to identify the sources of barriers for that particular industry. While these are analyzed in Chapter 2 at a somewhat aggregated level, they are further looked at in Chapter 5 with the following questions in mind.

Questions of interest for the various service sectors/industries are:

- Are the services restricted for certain customers? How? Why? At the country level, what kind of market concentration exists? What is the import penetration and export shares for the industry? If there is a high level of import penetration, are there significant barriers to establishing commercial presence? It's likely as most firms would want to access markets with high demand. (OECD has this data)
- What is the predominant mode of supply? Why? Does it vary due to the characteristic of the destination country (other than barriers)? With the country of origin?
- How do the characteristics of firms in this industry vary from other industries?
- Are modes of supply complements, substitutes or independent?

A useful methodology for linking conceptual work and practical measures is to use theoretical models. Recent trade models that explain trade and investment patterns, including trade in intermediate goods and services, are typically complex and often impossible to solve analytically. A common strategy has been to solve the models numerically for various assumptions of parameter values and exogenous variables such as trade costs. Depending on the purpose of the analysis, partial equilibrium and general equilibrium models can be used. The former is often useful for sector studies and for estimating the impact of trade costs on trade, investment and labor flows, while general equilibrium models are more useful for analyzing

welfare effects of e.g. regulatory reform. Such work can start with guesstimates of entry barriers and trade costs and gradually introduce estimated trade costs as information becomes available. This is the path that my dissertation research takes and while the initial work involves rough empirical analysis, this moves to theoretical CGE modeling, and in the future to a more detailed empirical analysis of existing data on bilateral services trade and foreign affiliate sales data with specific variables measuring trade and establishment barriers for each industry across countries and time.

## **Chapter 2: The internationalization of services: effects of liberalization on U.S. FDI in producer services**

### **I. Introduction**

The relationship between multinational enterprises (MNEs), foreign direct investment (FDI), and trade has predominantly been focused on manufactured goods. Theoretical and econometric models have addressed issues such as trade barriers, intermediate goods, location choice, factor endowments, technology transfer, and human capital among others. Research on the service industry side of these issues however, has largely remained in the theoretical realm only. Empirical analysis has only become more accessible over the last five years and is still difficult due to incomplete and nonexistent trade and affiliate sales data at a country/sector level as well as the existence of behind the border barriers which are complex and not easily quantified once they are identified.

Issues surrounding trade and investment in services make up some of the more significant areas in international economics for current and future research and analysis. The topics range from liberalization negotiations to offshore outsourcing to technology and knowledge transfer in developing countries and have implications for studies in environmental and development economics as well.

In this paper, I provide a significant literature review highlighting the contributions, shortcomings, and areas of further work. Once I identify the goals for an analysis of the barriers to services trade and affiliate production, I will then describe how the current data restrictions make this paper a first step in the process of a panel study on services trade and FDI liberalization. My data analysis in this paper will test BEA data on U.S. FDI in services with an augmented knowledge capital model to determine the effects of size, endowments, investment restrictions, and political institutions on outward U.S. FDI in services

Investment in services is the largest component of global and U.S. FDI and is also the fastest growing. Over the period 1990-2002 FDI in the primary sector doubled, tripled in the manufacturing sector, and quadrupled in services. Over the same period the share of

manufacturing FDI fell from 42% to 32% while the share of services rose from 49% to 62%. (UNCTAD, 2004)

The large size of the service sector is not unique to the U.S. Services make up 57% of middle income countries' GDP, compared to 72% of high income countries' GDP (UN WIR, 2005). This has facilitated multinational enterprises' decisions to locate service affiliates in countries all over the world. Motivations for FDI in services are encompassed by the same general categories as FDI in goods: market-seeking, resource seeking, efficiency-seeking, and asset seeking. (Dunning, 2002) For U.S. outward FDI in services, most location decisions by MNEs were made for market or efficiency seeking reasons. FDI in producer services is seen to be fulfilling both of these goals. (Dunning, 2002)

The general sectors I will be analyzing are financial services and professional, technical, and scientific services. These encompass legal, insurance, accounting, engineering, advertising, information, and marketing among others. These all are within the category of producer services due to their intermediate nature as well as their intensive use of skilled labor and other knowledge based assets. This area of investment is increasing in value and importance in world trade. Business services accounted for over one third of FDI stock in 2002, up from about 15 percent in 1990. (UNCTAD, 2004) The unique element for FDI in producer services is that they serve both foreign and domestic companies and manufacturers. This range of firms utilizes these services creates a significant market for the MNEs supplying producer services.

Services investment is a source of debate at the national and global level. While a large percentage of FDI in services is between developed countries (similar to manufacturing FDI) there are a lot of potential welfare improvements that could be realized through services FDI in developing countries. This North-South type FDI in services has a lot of public fear and negative public perception. Developed countries have industry lobbies, media pundits, and labor groups that all voice their opposition to FDI in services industries. Their concerns range from intellectual property protection, skilled labor outflow abroad replacing jobs in the US to a "race to the bottom" argument about exploiting lower labor standards in developing countries. Developing countries are concerned with retaining control over national industries and utilities, as well as the fear that

an inflow of foreign skilled labor will increase wage gaps, hurting unskilled domestic laborers, and take away potential opportunities for domestic workers to gain valuable experience. The papers I discuss below all find support for the liberalization of trade and investment of services and illustrate where I am going to endeavor to contribute something new.

There are a number of theoretical models which attempt to model FDI. Usually the models consider a two country setting and manufactured goods. There are models which address horizontal investment and some that address vertical investment by MNEs. Markusen developed the Knowledge-Capital (KK) model (Markusen 1984, 1997) where both horizontal and vertical multinationals can exist and where country characteristics determine the type of FDI that is successful. Empirically Carr, Markusen, and Maskus (2001) tested the KK model with U.S. data on manufacturing FDI and found significant support for the theoretical model's results. I will be using the KK framework, with a few changes to assumptions, with my data on U.S. FDI in services. While I will argue that both vertical and horizontal investment in services exists in today's globalized world, vertical services FDI is very new and much smaller in size. Therefore I will assume that FDI in producer services is horizontal investment. With this setup I can determine whether an augmented KK model also describes the pattern of FDI in business producer services.

In addition to testing the KK model and measuring the effects of service liberalization, I will also examine the effects of various political institutional indicators on the level of FDI in services. It may be the case that certain political systems restrict services trade and investment more vigorously than others and that the political environment may influence the decision of a U.S. multinational when they are deciding where to invest. Initial investment in services is significant due to the need of commercial presence in the host country and the fixed costs associated with establishing one. Political risk and corruption are legitimate concerns when making such an investment abroad. The fear is not so much outright expropriation but rather the risk of policy changes that negatively affect the firm's revenue stream. The potential for a government to ex post facto enact distortive taxation, domestic content regulations, or additional regulatory measures may be correlated with the political institutions of a country. The inclusion of

some political variables may give some interesting results about determinants of FDI in services outside of the traditional economic sources.

Data availability is the most significant constraint on the empirical analysis of FDI in services. While UNCTAD and the OECD maintain very in depth databases on trade in services, data on FDI in services is lacking. UNCTAD country investment reports include annual stock and flow values for inward and outward FDI for either the destination/home country or industry of investment. There is no annual data broken down to the country by industry or industry by country level which is needed to avoid aggregation bias. The OECD database has similar aggregation problems. FDI stocks and flows are available for every OECD country at either the country level or at the industry level for individual countries but are not given for both the industry and country of origin/destination. U.S. inward and outward FDI, defined as sales of non-bank foreign affiliates, is detailed by the Bureau of Economic Analysis (BEA) through their extensive survey process. The BEA not only compiles annual data on sales of foreign affiliates by industry and country of origin/destination but also collects data on the employment, compensation, value added, imports, exports, and R&D of affiliates. The variety of available data is important for the decomposition of U.S. FDI determinants and impacts.

The most important contribution of my empirical analysis is the construction of measures for various barriers to investment in services for each country. As a first step this is going to be a rather rough measure due to the overwhelming amount of research required for a truly accurate measure. However, in order to be able to conduct future studies that can quantify monetary welfare benefits of liberalizing restrictions to investment in services it is necessary to begin with a more general analysis.

The literature reviewed in the section II outlines some of the difficulties with this type of analysis and the problems with creating rough measures of barriers to FDI in services. The intuition is that the countries that liberalize elements of their service sector during the time period studied will experience an increase in relative inward FDI, measured by sales of majority owned foreign affiliates in that country. Also, I predict that after controlling for size and other country-specific characteristics, the coefficient for service liberalization will remain positive and significant

eliminating the claim that developed countries are biasing the results. Section III covers the theoretical background and model, Section IV describes the empirical analysis, Section V details the data used in the analysis, Section VI discusses the results from the empirical analysis and Section VII concludes.

## **II. Literature Review**

Investment in producer services has been modeled theoretically by Markusen, Rutherford, and Tarr (2005) and empirically by Raff and von der Ruhr (2001). These papers introduce restrictions in host countries on trade and investment in services. Their studies are an important first step in understanding the effects that service sector liberalization has on U.S outward FDI in services; however they do not employ any empirical measures for the level of liberalization or restriction.

The task of quantifying the possible benefits from liberalization is overwhelming due to the nature of the types of restrictions on services. Dee and Hanslow (2000) complete an ambitious analysis of the estimated gains from eliminating barriers to trade and investment in services and comparing them to the estimated gains from eliminating barriers to trade in agriculture and manufacturing. They use a version of the Global Trade Analysis Program (GTAP) allowing for the addition of FDI, capital accumulation, and international borrowing and lending. They rename it FTAP for the foreign direct investment component and the model uses actual data to simulate firms' decision making and provides estimates for the gains from liberalization of the various sectors. The CGE model also incorporates increasing returns to scale and large-group monopolistic competition which Markusen, Rutherford, and Tarr (2005) also use when modeling FDI in producer services. Additionally, the model includes capital accumulation, and international borrowing and lending into the computer analysis.

Konan and Maskus (2005) also use a CGE model to quantify the different impacts from liberalization in services. They conduct an in depth study of goods and services liberalization in Tunisia and compare the different effects on welfare, outputs, and factor prices. This paper is one

of the first to move from theory to empirics. My initial contribution will build on this work and estimate the general effects on U.S. FDI of services liberalization across countries with different political institutions, factor endowments, levels of development, and sizes. The implications of my empirically analysis of the KK model will also help bridge the theory-empirical gap. Eventually, I hope to be able to quantify the effects on welfare through factor price changes as well as lost productivity through barriers to services investment and the informal sector in these industries.

The other area of literature that is relevant to my research concerns the relationship between FDI and political institutions. Janeba (2002) lends theoretical support for the claim that politically risky economies discourage investment. The combination of political stability, FDI, and economic growth is analyzed by Bengoa and Sanchez-Robles (2003). The most comprehensive study lending solid empirical evidence to the claim that political institutions play an important role in a multinational firm's decision to invest is the cross-sectional and panel estimates in Jensen (2003). He uses a sample of 114 countries over the period 1970-1997 and obtains the result that democratic governments attract as much as 70 percent more FDI as a percentage of GDP, even after controlling for other political and economic factors remains significant across all the various model specifications. Robustness tests confirm the relationship between democratic governance and FDI while the causal links are explored by testing the effects of democratic institutions on sovereign debt ratings. The belief behind Jensen's claim is that democratic governance reduces country risk which encourages FDI. The causal relationship is found to be significant, lending further support to the relationship between governmental institutions and FDI.

My analysis will include a few variables to try and assess the impact that political institutions has on U.S. outward FDI for both developing and developed countries and the simultaneous impact of the level of liberalization within the service sectors of the host economies. The theoretical links between FDI liberalization and aggregate welfare gains are well documented within the literature while solid empirical results at the country level are sparse. In the current global environment with concerns about offshoring and GATS, empirical studies of liberalization of restrictions to investment are important. The claim that political institutions are linked to FDI is also not without contention but has definite implications for policymakers, especially those



concerned with the size of the informal sector. The complex nature of these issues requires a careful look at the assumptions and methods used in any analysis.

The theoretical modeling of FDI in services requires some significant assumptions in order to capture the differences between goods and services FDI. Markusen, Rutherford, and Tarr (2005) use both static and dynamic simulation models to estimate the benefits that accrue through FDI in producer services. The basic assumptions in their have set the standard for this area of analysis: producer services are non-traded internationally, a larger variety of services reduces the costs for downstream industries, firm and national level differentiation exist, and conditions of increasing returns to scale and monopolistic competition categorize the production of these services. Additionally, Markusen et al. assume that producer services are intensive in skilled labor and knowledge based assets, which is a channel of technology and knowledge transfer to the host economy leading to productivity gains in domestic companies. Investment in these services is assumed to be subject to high transaction costs from various barriers to foreign involvement within the potential host economy, many of which are difficult to observe, measure, and quantify.

The simulation results for the initial comparative static model found that liberalization of producer services can lead to gains of 3 to 15 percent of GDP. The range of these gains depends on the parameters chosen for the simulation. The price difference between the supply price and the import price of Knowledge Capital (KK) is varied in this analysis, capturing the different levels of restrictions countries have on service imports. This increase in the price could come from red tape, regulatory fees, or other import costs. This is a pretty general way of modeling restrictions to investment. The immobility of labor is an assumption that hurts this model because foreign skilled labor will be used in affiliate production and it's imprecise to combine all foreign inputs into a single variable and give it one price.

The interesting result from the static model has to do with the prices of domestic skilled labor. Markusen et al. find that real wages increase as liberalization occurs and foreign firms enter. In the equilibrium this result implies that domestic skilled labor and the specialized foreign input are complements. This result also supports the theory of technology and knowledge transfer

accommodation through FDI. If the wages are being driven up by increases in productivity, domestic skilled workers at affiliates have benefited from the technology and knowledge transfers that are driving these productivity increases.

In order to estimate the impact of liberalization for the producer services for an extended time horizon Markusen, Rutherford, and Tarr (2005) create dynamic model. Liberalization is an unanticipated policy reform which allows FDI in the previously closed economy. This dynamic model assumes that the growth rate in the workforce, the rate of retirement, and the interest rate are all exogenous. In this dynamic setting, new workers can choose to enter the unskilled workforce or go to school where they become skilled workers. New skilled workers can choose to work for the domestic or foreign firms while a fraction of the existing skilled workers are immobile.

The dynamic simulations find that while the number of firms and the total factor productivity of the economy increase steadily from the point of liberalization, the income in the domestic industry declines for the first 5 years when domestic labor is largely immobile. Once the domestic industry stabilizes, wages are once again equalized across firms and the economy has experienced aggregate gains from liberalization. The domestic industry's catch up period follows the theoretical predictions from Markusen's knowledge capital model where the foreign knowledge capital spills over into the domestic industry increasing productivity and shifting resources toward the more efficient firms.

Moving from the purely theoretical models, Raff and von der Ruhr (2001) use U.S. data on both manufacturing and service FDI to test theoretical predictions of their model. In addition to the same assumptions that Markusen et al. made about producer services, Raff and von der Ruhr make an additional assumption that the quality of the service provided is most important characteristic for the competitiveness of a foreign service affiliate. Observing the quality of a service is complicated and problematic and there is significant potential for the firm to misrepresent the quality of the services they provide. The risk of a low quality service is one that local customers are initially unwilling to take. The value of this risk is considered to be the informational barrier for foreign service providers in the model. Risk mitigation occurs when customers in the host country are informed about quality of a foreign provided service. Rather

than model this quality and information issue in a theoretically complex manner the authors claim that downstream multinational firms from the same home country are assumed to be the channel through which customers become informed.

The substantiation behind this is that downstream firms are more likely to use services provided by firms from their home country. While information barriers to foreign direct investment are indeed a problem, the claim that prior FDI in manufacturing is the sole determinant of the level of recognition is improbable and the inclusion of proxy variables for informed consumers would improve the model's plausibility. The authors formally hypothesize that the stock of producer-service FDI in equilibrium increases at an increasing rate with the number of informed local customers. The percentage of informed customers is proxied by the ratio of inward manufacturing FDI from the service firm's home country to total manufacturing. In constructing their model this ratio must exceed a critical level in order for FDI to be increasing in the equilibrium.

Raff and von der Ruhr perform separate panel regressions for business services and FIRE (financial, insurance, and real estate services). Various interaction terms are also tested to determine whether or not initial critical levels of manufacturing FDI impact FDI in services. They use a random effects specification and add serial correlation corrections in additional robustness tests. A fixed effects model is not used due to missing observations; however, they also exclude time and country fixed effects which are an important method of eliminating bias in a cross-country time series of data. The model used assumes that all effects have a mean of zero and that the random error associated with each cross-section unit is uncorrelated with the other regressors, something that is not likely to be the case in a panel analysis of this data.

The results from the panel analysis show that the informational barrier to entry is easier to overcome in markets with a significant home country presence of downstream multinationals. They found that if U.S. - owned manufacturing exceeded 2% of host country GDP, the impact of host market size on U.S. business-service FDI is increasing. This is in line with the theoretical model which claims the critical share of informed customers is a major determinant of the success of foreign service providers within a host economy. The basic regressions in the

empirical analysis do advance the economic literature on FDI in services. However, the simple treatment of the barriers to FDI in services is clearly inadequate and the specification is problematic as well. Measuring and quantifying barriers to services is an integral part of understanding the impact of service liberalization on multinational firms' decisions to locate in a particular country.

In a widely cited and influential study, Dee and Hanslow (2000) compare estimates of the gains from eliminating barriers to trade and investment in services with the gains from eliminating all post-Uruguay Round barriers to trade in agriculture and manufacturing. They use an advanced computer program in order to integrate a large database into a complex model. The model, called FTAP, incorporates bilateral FDI, capital accumulation, international borrowing and lending into GTAP, a trade modeling program which already has a large database imbedded in it that includes all post-Uruguay round tariffs and NTBs on manufacturing and agricultural goods. The model disaggregates firms by location and then by ownership, which captures the existence of foreign affiliates. Each firm ownership type then makes its choice of intermediate inputs and investment goods from various sources. Investors in each economy divide their wealth between bonds, real physical capital, and land and natural resources in their country of residence. They then choose an industry to invest in and whether they want to invest in that industry at home or abroad. Investors who choose the foreign industry must decide on a specific country or region for their investment. Therefore, in line with the model in Markusen, Rutherford, and Tarr (2005) the FTAP model incorporates the firm-level product differentiation that is associated with monopolistic competition. The authors admit that the elasticities were chosen with the final elasticity of transformation in mind and also were chosen in order to obtain results that were comparable to experiments done with the GTAP model analyzing liberalization in agricultural and manufacturing trade.

The influential nature of their paper is not the model, but the analysis of real data on observed barriers to trade and investment, bilateral trade flows, bilateral FDI stocks by sector, rates of return, the existing GTAP data on cost and structures of firms, and many country level characteristics. The program utilizes all this information and provides estimated gains from

liberalization. Other than the elasticities the only other unobserved variable is a quantitative measure of the barriers to services trade and investment which involved numerous steps to arrive at its final measure. The authors begin with estimates of price differentials for telecommunications and banking sectors compiled Findlay and Warren (2000) as an estimate for all services sectors in their analysis. It is not clear which direction the bias is in from this assumption as the authors do not clarify if the barriers in these two industries are higher or lower than other service sectors.

The results from the FTAP model estimates that the world gains at least US\$260 billion annually as a result of eliminating all post-Uruguay trade barriers in services, agriculture, and manufacturing. Of this, US\$50 billion and US\$80 billion are the estimates from liberalizing trade in agriculture and manufacturing, respectively. These results lend support to those committed to WTO liberalization talks concerning the traditional sectors. The remaining US\$130 billion in world gains result from the liberalization in services. This considerable amount is a bit misleading, as US\$100 billion of the gains are realized when China fully liberalizes. The agricultural and manufacturing gains attributed to China are not made explicit but intuitively the manufacturing gains could be a large percentage of the US\$80 billion in global gains.

The US\$260 billion in gains is calculated from the results of the FTAP model which states the percentage of GDP gained after liberalization. Indonesia, Malaysia, Philippines, China, and Taiwan are the biggest gainers from a percentage of GDP perspective while the EU, USA, Canada, Australia see very small percentage gains and Singapore experiences a loss. These results show that Southeast Asian countries seem to be driving the global gains from liberalization in services as well as in manufacturing and agriculture.

While the estimation of gains from the liberalization in services is an important piece in understanding the relationship between FDI in services and barriers to trade and investment in services, my analysis is more concerned with the realized impacts that liberalization in services has on FDI. Therefore, measuring the liberalization in service sectors is a vital issue. One of the most thorough analysis which attempts to quantify liberalization in services is a case study of Tunisia by Konan and Maskus (2005). They compare goods versus services liberalization using a CGE model which provides results for welfare, outputs, and factor prices. Liberalization in

services results in gains from two general sources: increased economic activity nationwide, and increased real returns to both labor and capital.

Konan and Maskus begin with a general model of a small open economy (Tunisia) with restrictions to foreign investment in the production of services. The distortions are assumed to raise the entry costs for foreign multinational firms who want to establish an affiliate in Tunisia and limit the rights of the foreign multinationals who are able to establish a commercial presence. The results from this benchmark environment are compared to a simulation that removes the barriers to investment. One distortion is defined as a cartel effect that effectively involves a markup on the price of the services due to market power of local firms. The excessive regulation of service providers within the sector or government ownership of the sector is the cause for this effect. The second distortion is a cost inefficiency effect which captures the resource loss due to barriers to services. This waste factor results in higher marginal costs. These two distortions combine to create the wedge between price and true marginal costs. Unfortunately, there is no way to separate the waste factor and the ad valorem markup components of the wedge. Konan and Maskus address this issue by varying the share of each distortion in the price-cost wedge in various simulations.

The data used in the model consists of import and export trade flows by region, sectoral tax and tariff rates, and elasticities of substitution and transformation. The benchmark trade elasticities are not provided in the data so the authors use values calculated in Konan and Maskus (2000) and Rutherford, Ruström, and Tarr (1995). All data is for 1995 and is assembled into relationships which model intermediate demand, final demand, and value added amounts. The barriers to trade and investment in services are measured through industry level studies and extensive discussions with industry experts and government officials, as well as economists studying the Tunisian economy.

Initially, they consider the liberalization of investment barriers in services with various weights for the ad valorem markup versus the resource loss components of the price-cost wedge. Welfare gains to liberalization are found to be increasing with the initial share of the resource loss component of the wedge. This is consistent with the fact that there are rents accruing to some

individuals in the economy from the markup, while the inefficiency causing barriers result in pure economic loss. The authors then compare investment barrier liberalization and border barrier liberalization to determine if one type of barrier is more costly than another. Investment barrier liberalization is found to be responsible for 75 percent of the total gains to service liberalization. Again, this result is in agreement with the theoretical predictions as most services are non-traded and border barriers and are likely to affect trade more than investment. The empirical confirmation of this theoretical suspicion has definite policy implications for governments worldwide.

A disaggregated analysis is performed next at the sector level to determine differences in gains to liberalization across sectors. From this analysis the results show that 41 percent of the welfare gains in liberalization are attributed to the transportation and financial sectors alone, which again has policy implications. The final analysis Konan and Maskus undertake is a comparison of goods liberalization and services liberalization. The results find additive gains with liberalization of both goods and services and surprisingly little change to the structure of the economy lending credibility to modeling services as an intermediate input. Overall, the potential welfare gains to liberalization of trade and investment in services are significant and positive for Tunisia. The conservative estimates show an increase in welfare and GDP of more than seven percent, which is more than three times the gains to goods liberalization only. Konan and Maskus set the bar for further country case studies of measuring the impacts of liberalization and in their combination of theory and data in a complex and elegant analysis.

All of these papers have diverse and valuable contributions to the literature on liberalization of trade and investment in services. In addition to the large impacts of liberalization, the political environment in host countries not only is endogenous to liberalization itself but also may independently affect a firm's decision to invest. This area of research is very meager. The theory of the effects of political risk on FDI is discussed in Janeba (2002). His analysis consists of adding the option to invest in multiple countries to the traditional two country model of multinational location choice and profit maximization with taxes and subsidies imbedded in it as well. The claim that non-credible governments can compensate by offering subsidies or tax

breaks to foreign firms is found to be weak when you allow the multinational firm to invest in other countries. Bengoa and Sanchez-Robles (2002) do an empirical analysis of FDI, economic freedom, and growth. They examine a panel of 18 Latin-American countries from 1970-1999 in order to estimate the effects of economic freedom on both inward FDI and GDP growth. Their results show a significant and positive relationship between the index of economic freedom and FDI as a share of GDP. This is related to the empirical findings that multinationals do not take advantage of low cost environments when there are higher levels of exogenous risk due to a lack of government credibility or stability.

Jensen (2003) executes a more detailed analysis in order to empirically attempt to quantify the relationship between political institutions and FDI. The majority of studies in this area try to estimate the effects of political institutions on overall economic growth. However, Jensen points out that the potential effects of these institutions on FDI are significant on their own. He claims that the credibility associated with democratic regimes is attractive to MNEs due to the smaller risk of nationalization, expropriation or distortive taxation. The initial investment required to establish a foreign affiliate is substantial and immobile. Expropriation is not a common occurrence; however, governments do renegotiate tax rates, vary tariff rates, impose capital controls, and endorse other policies which affect the profitability of foreign affiliates. The number of checks and balances associated with democratic institutions is a clear advantage to minimizing these risks.

The centerpiece analysis in this paper is a panel analysis with 114 countries for the period 1970-1997 with time and country fixed effects and panel-corrected standard errors and finds that the coefficient for democracy is again significant and positive and increases in FDI inflows as a percent of GDP range in value from 1.9% to 2.1%. For robustness, Jensen excludes OECD countries, drops the variable on GDP growth (it may be correlated with democracy), and uses a different democracy variable from an alternative source. The results are unchanged. While the regressions use aggregated data, which has the usual aggregation bias, the results show that democratic regimes have a significant and positive effect on inward FDI.



The political nature of liberalization makes the addition of these variables both intuitive and interesting. Their inclusion also lends an additional aspect to potential policy recommendations for host countries. This paper is only a first step in a multilateral analysis of the effects of restrictions to investment in services and it may raise more questions than it answers. It remains an important step in the direction of understanding this undeveloped research area.

### **III. Theoretical Background**

In the examination of the relationship between U.S. FDI in services and the liberalization of investment and trade in services abroad it is necessary to perform both a theoretical and an empirical analysis. The theoretical foundation and model underlying U.S. FDI in services and the effects of barriers to investment are an important part of my project even though my analysis is primarily empirical.

The theoretical intuition behind the relationship between the liberalization of service industries abroad and U.S. FDI in services comes from the literature relating to FDI in producer services (Markusen, Rutherford, and Tarr; 2005) as well as models of liberalization for specific economies (Konan and Maskus, 2005). Additionally, Markusen's knowledge capital (KK) model (Markusen, 1997) provides both insight and a theoretical foundation for my econometric model. Using a framework developed by Markusen, Rutherford, and Tarr (2005), professional and financial services are modeled as intermediate inputs in the production of a final good. The services are differentiated from one another and are also differentiated by firm origin. The knowledge intensity of services and subsequent productivity gains from technological innovation gives support to the claim of increasing returns to scale as characterizing service firms. Faini (1984) presents evidence for IRS in producer services and finds strong support for it; however, he does point out that the quantitative magnitude of the scale economies will vary across countries and firms.

It is assumed that there are only three inputs in the production of the final goods. These are skilled labor, a composite labor/capital factor, and business/producer services. Service production is skilled labor intensive regardless where it takes place. Unlike vertical manufacturing

FDI, the majority of MNE service production serves all types of firms in the host market and imports back to the U.S. are assumed to be negligible. In this context, the multinational service firm makes a cost minimizing decision on where to establish a foreign affiliate. This decision depends on the factor endowments, market size, political environment, barriers to investment and trade in services, factor prices, and firm specific issues such as global geographic strategies. Obviously, additional country characteristics will affect a firm's decision and these can be thought of as country-specific effects.

The knowledge capital model (Markusen, 1997) lends theoretical background to my analysis in various ways. Although services are intuitively and historically non-traded there is existence of both vertical and horizontal service affiliates abroad. As the information and communication technologies (ICT) revolutionized the way firms do business the benefits of vertical FDI became apparent. This is largely a new phenomenon as it requires significant levels of technology. Information intensive services which do not require personal contact can now be done anywhere in the world with an ICT infrastructure and workers with the necessary skills. Offshoring elements of production to foreign affiliates are no longer unique to manufacturing and are beginning to be utilized for a wide range of services. Some MNEs will outsource services abroad to non-affiliated companies and this is an area I will not be discussing and the data on such investment is not included in my data. Any vertical FDI in producer services is contained in my dataset and therefore while the values are a very small percentage of overall FDI their existence identifies an area for future analysis and data disaggregation. This idea is further supported by the fact that during the period 1997-2002 more than 70% of the imports of business, professional, and technical services into the U.S were imported from a foreign affiliate by the parent company. (UNCTAD, 2004) This indicates a significant relationship between FDI and trade in professional services in recent years and the likelihood of an even greater one going forward. Over the period of study in this analysis, the majority of FDI in services is market seeking and therefore horizontal. While the separation of vertical and horizontal MNEs is not possible in my empirical analysis I feel that it is important to substantiate my discussion of the KK model in the context of U.S. FDI in services.

The initial establishment of a service affiliate is going to be affected by investment barriers much more significantly than by trade costs because they are not facing competition from other importers in many cases where services cannot be provided through cross-border trade. This fact is why Markusen's traditional KK model can not fully apply in this analysis. The empirical estimation of the KK model in Carr, Markusen, and Maskus (2001) find that U.S. outward FDI is increasing in the sum of economic size between the parent and the host (similarity in size), the relative skilled labor abundance of the host country and the higher level of trade costs. They also find that U.S. foreign affiliate sales are decreasing with investment costs. Higher levels of trade costs reduced overall FDI but were offset by the market size effect which significantly increased horizontal FDI. Restrictions on the establishment of a service affiliate as well as the operations of a foreign service affiliate are hypothesized to have negative effects on U.S. FDI in services to that country. It is possible, however, that higher trade costs could have a positive effect on FDI in services as well due to the likely correlation between manufacturing FDI and FDI in producer services.

Considering the various types of restrictions and their applications is essential when modeling the cost effects of barriers to investment. Konan and Maskus (2005) disaggregate the total price wedge between the world market price/fair trade price and the actual price of for a specific service in order to determine the effect of various restrictions. They consider two different effects; the first of these is a cartel effect from establishment restrictions. This arises most often from excessive regulation that limits domestic and/or foreign participants in a service industry resulting in significant market power for the existing firms. The resulting market power leads to inefficiency, cartel behavior, and significant rents accruing to the owners of these firms and any officials they may be bribing, as the firms are able to charge a price above marginal cost.

An additional effect of restrictions to FDI in services is related to the firm's utilization of resources. Restrictions on domestic content, nationality or citizenship, percentage of foreign ownership allowed, reinvestment restrictions, excessively corruptive/time wasting bureaucratic procedures and any other barriers to investment which cost the firm time, money, or other resources are all elements of this waste factor. These added costs increase the marginal cost to

the firm and rather than the price differential leading to rents, it is a pure economic loss due to the reduction of resources in production.

Obviously, varying levels of enforcement and severity of restrictions will have more or less of a cartel effect or a resource loss effect. The magnitude of these effects is important for the explanation and discussion of the econometric results. My initial analysis of the data will quite basic as I will not include prices. At this stage in my research these are unobtainable for the entire panel but are needed to make quantitative claim about restrictions' effects on consumers' welfare, factor prices, and GDP. The various effects of different types of restrictions has been obvious to policy makers through anecdotal evidence but the liberalization of resource wasting restrictions may lead to larger aggregate gains than liberalizing the monopolized but efficient sectors (Konan and Maskus, 2005).

Political institutions and overall environment is also likely to affect the attractiveness of a particular country as a host location for US FDI. It is intuitive that government credibility is appealing to MNEs due to the perceived smaller risk of nationalization, expropriation or distortive taxation. (Jensen, 2003) Whether or not this credibility is associated with specific observable political variables is something I will try to begin to determine. The lack of international investment agreements for services results in many governments having the ability to affect the market power of firms in certain industries, enact discriminatory regulations (waste factor increased), and pursue further policies that negatively affect service affiliate's productivity and/or profitability. The slow process of GATS has not even addressed the absence of a dispute settlement process for service investment related issues, which only increases government's legal leverage to pursue discriminatory or "creeping expropriation" policies.

Certain service affiliates are more sensitive to political risk in that they require a presence in the country (non-tradability assumption holding) and the initial fixed costs of establishment are a significant sunk cost once undertaken. U.S. parent MNEs want to maximize the profits of their affiliates and will weigh the political risk of potential host countries' as it relates to the riskiness of recouping and profiting from their initial investment. The policy changes and restrictions discussed above may be thought to be more frequent in non-democratic countries due to fewer

checks on the power of the executive branch. In practice, it's crucial that the degree of democracy used in an empirical analysis is not be self-reported but is a combination of observed characteristics within the country's social, political, and judicial environments. In this respect, I expect that FDI in services will have a negative relationship with the "market power" within the government.

#### **IV. The Theoretical Model**

In order to account for both the ad valorem and fixed cost effects that arise from restrictions on FDI in services they must be integrated into the cost functions for multinational firms. Once this is achieved it is possible to make some theoretical assumptions about the signs of the variables in the empirical analysis. Following basic KK theory, a multinational firm in the home country  $i$  (US) is more likely to choose to invest in country  $j$  if country  $j$  has a larger market (GDP) and more skilled workers. In manufacturing affiliate production, high trade costs often lead to establishing an affiliate to serve the foreign market rather than satisfy demand through exports. Producer services on the other hand, are largely non-traded and therefore FDI in services responds most dramatically to changes in host country characteristics because the firm does not have the option of exporting to the market. Restrictions to investment in services are hypothesized to have a significant negative effect on FDI; however, the prevalence of a certain level of barriers to services investment in most countries may actually result in conflicting effects. While high levels of restrictions should deter FDI, low levels of restrictions may lead to increases in FDI. This possibility has implications for my data analysis as well as the theoretical predictions for certain variables and will be addressed.

While the theoretical model discussed here is not formally developed to the level that it is solvable in a complex general equilibrium sense, it does provide structural framework for my empirical analysis. I will specify a model that is very similar to the model in Markusen, Rutherford, and Tarr (2005) with adjustments to the cost functions for the foreign produced service and the removal of traded inputs.

Producer services are modeled as intermediate inputs which can be differentiated by type and by firm origin. There are two final goods in the model, X and Y, which are produced with two domestic factors, skilled labor(S) and a composite factor (L) and X is skilled labor intensive relative to Y. The factor endowments of S and L are assumed to be fixed and immobile across countries. The two final goods in the economy are X and Y, while the combination of domestic (ZD) and foreign (ZM) provided services enters into the production of X. The foreign provided service is a function of domestic skilled labor as well as the domestic composite factor and a foreign knowledge capital component. The prices for these are  $r$ ,  $w$  and  $P_H$  respectively.

The production functions for this model are as follows:

$$Y = S_y^{\alpha_y} L_y^{(1-\alpha_y)}$$

$$X = S_x^{\alpha_x} L_x^{\beta_x} Z_x^{(1-\alpha_x-\beta_x)}$$

$$Z_x = (ZD^\gamma + ZM^\gamma)^{1/\gamma} \text{ where :}$$

$$ZD = f(S_{zd}, L_{zd}) = \left[ \sum_k^{nd} zd_k^\delta \right]^{1/\delta} \text{ and } ZM = f(S_{zm}, L_{zm}, H) = \left[ \sum_l^{nm} zm_l^\varepsilon \right]^{1/\varepsilon}$$

$$S = S_x + S_y + S_{zd} + S_{zm}$$

$$L = L_x + L_y + L_{zd} + L_{zm}$$

$n_m = \text{number of foreign service providers}$

$n_d = \text{number of domestic service provider}$

The production of X is assumed to be skilled labor intensive relative to Y and therefore  $\alpha_x > \alpha_y$ . The elasticities of substitution are assumed to be symmetric across varieties of services and across domestic and foreign services in the baseline scenario. The costs for producing the domestic and foreign services determine the demand for the foreign services as well as whether a foreign affiliate would succeed in the market. These cost functions are as follows:

$$CD = (r, w) = cd(r, w)zd + fd(r, w)$$

where  $zd$  is the number of services a domestic firm  $k$  produces

$$CM = (r, w, p_h) = cd(r, w, p_h)zd + fd(r, w, p_h)$$

where  $zm$  is the number of services a foreign firm  $l$  produces

$MC^m = cm_l(1 + \lambda_l) = cm_l^*$  where  $\lambda_l$  is the resource waste factor from barriers to investment in services and  $cm_l^*(1 + v_{ml}) = pm_l$  where  $v_{ml}$  is the market power markup from barriers to investment in services

$MC^d = cd_k(1 + v_{dk}) = pd_k$  where  $v_{dk}$  is the market power markup for domestically protected firms

The demand for the foreign input H depends on the partial derivative of the cost function CD with respect to  $P_H$  respectively as well as the number of foreign firms producing services. This foreign input H includes knowledge capital such as technical expertise, engineering degrees, as well as physical capital such as computer systems, that the parent company exports to the affiliate for use in services production. In equilibrium, marginal revenue will equal marginal cost. The marginal revenue for foreign services is equal to the value of the service within the production of the final good X and is therefore straightforward to calculate.

$$MR_{zml} = p_x (\partial X / \partial z_m) = \epsilon p_{zml}$$

$$\epsilon p_{zml} = cm_l (1 + \lambda_l) (1 + v_{ml})$$

While these equilibrium equations are by no means a formal model they do provide the theoretical structure for my empirical analysis, lend support to the essence of my study.

## V. Empirical Analysis

The empirical analysis in the following section utilizes a database of panel data for 39 countries over the period 1984-2002. The data on services FDI (sales by US majority owned foreign affiliates-MOFAs) is collected by the Bureau of Economic Analysis (BEA) on an annual basis through extensive surveys of all U.S. multinational firms. While disaggregated data for FDI in services is available at the industry level for seven countries, in order to have information on a larger number of countries the data is aggregated into four categories of services. These are: wholesale services; professional, scientific and technical services (PST); financial services (except depository); and the remaining is simply labeled other services. In order to examine the effects of liberalization on U.S. FDI, I am only concerned with professional, scientific, and technical services and non-depository financial services. These services can all be identified as business services and are typically intermediate producer services such as insurance, accounting, engineering, legal, information, financial (non-depository), research and development and others. These categories represent a significant amount of the increase in FDI in services over the last decade. In fact, information services became their own category in 1999 after being

separated from the other professional services. These industries are also increasingly targeted for liberalization negotiations due to traditionally being highly restricted.

The dependent variable in the econometric model is U.S. foreign affiliate sales in the financial and PST service categories. It is generally accepted that market size is a consistent determinant of FDI and I will follow Carr, Markusen, and Maskus (2001) and use both the sum and the difference (or the difference squared) between US GDP and the host country's GDP as measures of how similarity and difference in economic size affect FDI in services. Following the theoretical assumption that services are more skilled labor intensive, I include another variable used by Markusen, Maskus, and Carr (1998) which is the difference between the share of skilled labor in the US and the host country. These shares are constructed using occupational employment data from the ILO. Following the results obtained by Raff and von der Ruhr (2001) I will also include a specification with the current or lagged value of U.S. foreign affiliate manufacturing sales as an independent variable. This variable could represent a level of information the multinational firm has about the host country market and will pick up the amount of FDI in services that may be following manufacturing FDI in order to supply intermediate services to those operations.

The dataset includes 741 country-year observations for the dependent variable. As one would expect there is a significant amount of variance in U.S. FDI in producer services across countries. This is essential to obtaining any interesting results; however, it also can result in econometric issues during analysis. Table 1 contains the sample mean for each country of U.S. FDI in producer services in millions of 1995 U.S. Dollars and Figure 1 illustrates the same data. Clearly, the level of investment to the United Kingdom is well above that of any other country, including the other major investment recipients such as Japan and Canada. For this reason I will exclude the United Kingdom from some specifications in order to determine whether it is driving any of the other results by being such a significant outlier.

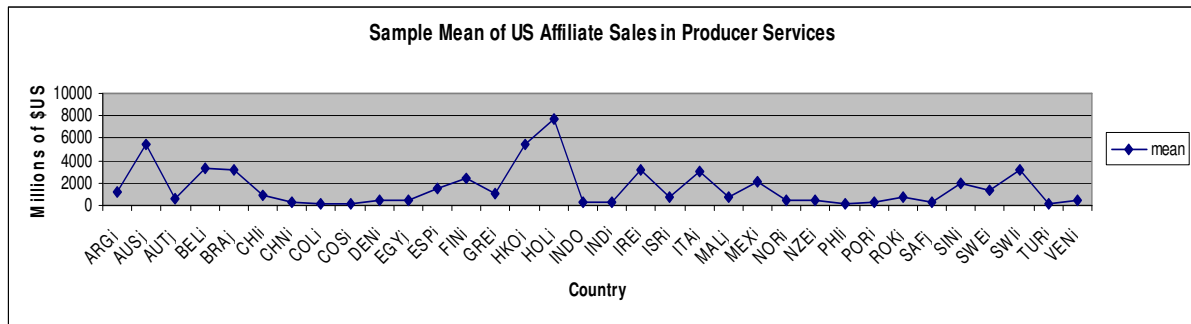
**TABLE 1**

Host Country and Sample Mean of U.S. FDI in Producer Services for 1984-2002							
<b>ARGj</b>	1238.39	<b>DENj</b>	454.42	<b>INDOj</b>	229.22	<b>PHIj</b>	208.50



<b>AUSj</b>	5437.90	<b>EGYj</b>	515.89	<b>INDj</b>	356.21	<b>PORj</b>	321.47
<b>AUTj</b>	601.16	<b>ESPj</b>	1440.71	<b>IREj</b>	3216.61	<b>ROKj</b>	823.44
<b>BELj</b>	3271.00	<b>FINj</b>	2403.11	<b>ISRj</b>	746.05	<b>SAFj</b>	363.63
<b>BRAj</b>	3169.47	<b>FRAj</b>	15929.37	<b>ITAj</b>	3031.21	<b>SINj</b>	1959.74
<b>CANj</b>	17329.89	<b>GBRj</b>	37540.05	<b>JAPj</b>	20228.89	<b>SWEj</b>	1328.42
<b>CHIj</b>	843.67	<b>GERj</b>	10682.53	<b>MALj</b>	808.84	<b>SWIj</b>	3117.37
<b>CHNj</b>	355.00	<b>GREj</b>	1003.89	<b>MEXj</b>	2153.94	<b>TURj</b>	124.56
<b>COLj</b>	222.58	<b>HKOj</b>	5500.32	<b>NORj</b>	437.21	<b>VENj</b>	514.56
<b>COSj</b>	219.58	<b>HOLj</b>	7748.31	<b>NZEj</b>	444.72	<b>TOTAL</b>	4021.34

**FIGURE 1: Sample Mean of Majority Owned US Affiliates' Sales in Producer Services**



In addition to the mean level of U.S. foreign affiliate sales having a significant range across the countries in the sample, the change in the level of FDI over the period 1984-2002 is undoubtedly also important for research in this area. Table 2 contains the percent change in the dependent variable, which is total foreign affiliate sales in producer services, for each country over two different time periods. The percentage change in U.S. FDI in producer services is calculated for the entire sample period as well as a sub-period of 1990-1998 which can help illustrate some of the patterns in the level of investment for a particular country.

**TABLE 2**

<b>Percent Change in US FDI in Producer Services</b>		
<b>Country</b>	<b>1984-2002</b>	<b>1990-1998</b>
Argentina	874.883	4225.633
Australia	284.068	131.423

Austria	316.126	176.072
Belgium	365.006	43.656
Brazil	1109.090	519.809
Canada	104.366	13.455
Chile	1310.106	680.329
China	8955.641	2306.343
Columbia	1135.378	456.467
Costa Rica	688.584	86.116
Denmark	119.667	100.393
Egypt	-88.478	49.291
Finland	529.033	15.931
France	49.903	163.746
Germany	483.998	156.978
Greece	143.922	72.450
Hong Kong	34.825	107.004
India	235.283	87.996
Indonesia	286.014	3396.720
Ireland	274.365	1303.263
Israel	46.776	38.647
Italy	8518.302	342.994
Japan	723.200	234.735
Korea	2894.026	305.915
Malaysia	5131.452	4346.098
Mexico	963.699	327.948
Netherlands	104.910	57.756
New Zealand	380.572	216.341
Norway	311.977	451.874

Philippines	1204.109	715.767
Portugal	109.475	146.304
Singapore	1317.549	111.100
South Africa	576.211	3713.180
Spain	33.374	74.891
Sweden	239.620	482.730
Switzerland	267.419	110.063
Turkey	62.355	-4.092
United Kingdom	89.017	119.163
Venezuela	554.617	970.770

The countries which have large differences in these two statistics are often those who enjoyed large increases in U.S. FDI in the years since 1999, endured a crisis in one of the years used in the calculation (Argentina), or had either very low or unusually high values of FDI in 1984 and then experienced a jump or drop in FDI for various reasons. While the use of country fixed effects is obviously necessary for this type of panel analysis, these statistics give some additional information about the emerging importance of this type of investment in countries all over the world.

The contribution of my analysis is dependent on assembling a dataset various restrictions to foreign direct investment in services. I am not attempting to provide new industry or sector benchmark data; however, all new areas of analysis must begin with an initial analysis of the issue in question.

## **VI. Data for Analysis**

### **VI.1 Measuring Restrictions to Investment in Services**

To attempt to estimate the effects of liberalization I have to construct measures of existing barriers to investment and trade in services that will serve as the variables of interest in

this analysis. There is no single source for data on barriers to trade and investment in services and a desired result of all my work is a coherent compilation of restrictions to foreign involvement in the service industries I am examining. For this project I will use GATS schedules of commitments, as well as documents from the UN, World Bank, and the USTR on each country in my dataset in order to create a general services investment restrictions variable for my analysis.

There are many types of restrictions in service industries, any many are not easily observed or quantified. The major restrictions and their sub-categories include:

#### Foreign ownership restrictions

- No foreign equity
- Less than 30% foreign ownership
- Between 30-50% foreign ownership
- Between 50-100% foreign ownership

#### Citizenship and/or residency restrictions

- All workers
- Chairman and all the Board of Directors
- Required for professional license/certification
- Percentage of board/managers

#### Anti-Competitive practices

- Monopolies in service industries
- Cartel behavior
- No new firms allowed

#### Discriminatory practices

- Licenses and/or number of foreign firms restricted differently from domestic
- Restricted to certain economic zones
- Full access restricted in other ways
- Economic needs test for foreign firms

#### Financial restrictions

- Capital controls
- Restrictions on reinvestment

Resource waste and/or inefficiency causing restrictions

- Rampant corruption
- Excessive bureaucratic red tape

Other resource wasting restrictions (lack of transparency, bribery, etc)

- Programs affecting services provision (0=best, 1=none)
- Privatization of service industries (0=best, 1=none)
- Liberalization of services industries
- Economic reform affecting service industries

Carefully specifying the barriers to investment in services is essential in determining the magnitude of the cost to the multinational firm or to the host country consumers due to lack of efficiency and/or market power. Therefore, an important element of any analysis is to attempt to aggregate with as little bias as possible the various types of restrictions for a given country in a given area of analysis.

Different types of barriers to foreign direct investment in services affect firms in various ways. Restrictions can either be concerned with the establishment of a firm (commercial presence is necessary for the provision of many services) or with the operation of a firm that is already established. Additionally, restrictions can be discriminatory in nature, applying only to foreign firms, or they can be nondiscriminatory and apply to the domestic firms as well. Within these general classifications each restriction is unique in its application and enforcement, creating further difficulties in measurement and application. Each type of restriction results in diverse market effects and this is ideally accounted for in the construction of these measures. In this initial analysis, it is not possible to quantify the different cost and productivity effects of the various restrictions specified; however, it is possible to identify the sign and significance of individual restrictions effects on the level of U.S. FDI in producer services. I leave for future work the task of incorporating factor and services prices into the analysis.

Once the work of identifying restrictions on foreign investment in services is completed to the best of my ability, the next step is choosing weights to represent the restrictiveness of a particular barrier. Previous work in this area has generally modeled barriers to trade and investment in services as imposing an additional cost on the firm or the consumers which appears as a price wedge. This is often referred to as the tariff equivalent of a restriction. Unfortunately, these studies often use only one sector to represent the price wedge for all business service industries.

In my research I gathered and read documents on laws, treaties, published research, international agreements or disputes and any other information from legitimate sources concerning a wide range of industries. Due to the available of usable data I focused on the following industries: accounting, legal, engineering, architecture, computer software, data management/processing, communications, financial services (non-retail depository banking), insurance, and general scientific R&D. In order to weight each barrier for each country-year I used the available data to capture not only the restrictiveness of a barrier but also its coverage to the sectors listed above. Due to incomplete data for all sectors for all countries I only accounted for the data I did have. This is a significant issue for the residency/citizenship requirements in particular. Many countries have residency and/or citizenship restrictions on members of the Board of Directors, CEOs, and even for any licensed professionals in their accounting, legal, and engineering sectors that are much more restrictive than for other business services. While there are certainly discrepancies and subjective elements in this initial effort at creating a panel dataset on services restrictions I feel it is complete enough to perform an econometric analysis and hopefully obtain results that direct the next step in this area of research.

## **VI.2 Political Institution Variables**

The second part of the econometric model is measuring the effect of host country political variables. Using data from the Polity IV database, I will look at whether a country's degree of democracy or autocracy affects the level of U.S. FDI in services. The two variables of interest are Democracy which ranges from 1 to 10 (strongly democratic) and Autocracy which also ranges from 1 to 10 (strongly autocratic). These variables depend on the regulation and competitiveness of "recruiting" and electing the country's chief executive, the constraints on the chief executive (judicial, legislative, etc.) and the ability for the public to participate in the political system (regulation, class discrimination, corruption, etc). There is no overlap of categories for the two variables however there are coding issues when there is missing data or a war and the Polity IV database eliminates these and creates a *Polity2* variable which has a scale from -10 to 10 and eliminates the potential for data analysis problems with their coding. In addition to including the *Polity2* variable I will also include a variable *Durable* that is the number of years since the last regime change, which is defined as a change in the regime variable (Democracy or Autocracy) of 3 points or more. This variable may capture some the effects of political crises, coups, and other regime changing events on the level of FDI in services industries.

## **VII. Econometric Model**

Using panel data for the econometric estimation creates additional issues in this analysis but is the desired estimation technique for the data being utilized. Fixed time (year) and country specific effects must be included in the model to control for proper error handling and elimination of outlier effects. These are especially important for countries which underwent serious changes during the period in question. To improve the fit of the model, and account for widely differing variances across variables, I use a weighted least squares technique with the country and time specific fixed effects.

While I previously explained the weighting of the variables for each restriction I also created an indicator variable for each restriction in order to do some preliminary regressions.

These regressions may provide early inference as to whether the existence of a restriction affects the level of U.S. FDI. While these regressions will not lend any robust results they are useful in an analysis of this undeveloped research field. After displaying these preliminary regressions I will discuss a series of nine regressions using the weighted restriction variables. For each series of regressions I first include all the variables with some level of variance and then use a stepwise method of eliminating insignificant variables to arrive at what I call a refined analysis.

In addition to the baseline and refined regressions I also include the value of U.S. foreign affiliate manufacturing sales in a third specification. I then perform the same three specifications replacing country fixed effects with geographical regional effects that cover North America, Latin America, the European Region, and Asia. While the geographic regional coefficients are included in these results the country fixed effects are suppressed. The final three regressions exclude the United Kingdom but include country fixed effects in order to identify potential outlier effects on the results from the full sample.

### **VIII. Results of the Econometric Analysis**

The existence of variance in both the values of the independent variables as well as the dependent variable is the foundation for this regression analysis. In the previously discussed tables (Tables 1 and 2) the summary statistics for the dependent variable are presented. As previously mentioned I initially perform regressions using indicator variables for each of the restrictions. While these results may exhibit correlation among the variables due to the existence of many of the same restrictions across most of the sample, I feel it is interesting to see if these results contribute to my notions of what is necessary for a more in depth analysis.

Table 3 below includes the regression results using the indicator variables on the full sample with country fixed effects as well as a specification using the geographical variables in place of the country fixed effects. The results for the country fixed effects model are not very conclusive because much of the information was picked up by the country effects. The regional model produces much more encouraging results where restrictions to establishment (residency



requirements for all workers, the entire Board of Directors, or all professionally certified workers) are found to have negative effects on FDI in producer services. In addition, less than full access to consumers and firms, severe foreign equity/ownership limitations, and reinvestment restrictions for foreign firms also have significant negative influences on U.S. FDI in this simple analysis. An interesting result from this is that monopoly and cartel behavior deter investment while corruption does not. Behaviors or policies that more directly affect establishing or operating an affiliate in a producer service industry are going to have much more influence on the decision to operate a foreign affiliate by the parent company in the U.S. than political parties or the overall political ideals. This idea as well as the possibility that some restrictions may actually increase investment due to: their existence conveys some level of institutional development, or that they were enacted after a period of increasing investment in order to protect against risky capital that may flow into the country. Obviously, these are country specific issues that can only be touched on in a multilateral analysis such as this one, however, they are important and will play a significant role in future research in this area of study.

**TABLE 3**

<b>Dependent Variable: Total Sales in Services by U.S. Foreign Affiliates</b>					
<b>Country Fixed Effects</b>			<b>Regional Indicator Variables</b>		
<b>Number of obs = 680</b>		<b>R-Squared: 0.8758</b>	<b>Number of Obs: 661</b>		<b>R-Squared: 0.7151</b>
<b>Variable</b>	<b>Coefficient</b>	<b>P-Value</b>	<b>Variable</b>	<b>Coefficient</b>	<b>P-Value</b>
Privatization of Services Industries	46161.43	0	Privatization of Services Industries	856.9646	0.391
Liberalization of Services Industries	2857.887	0.212	No foreign ownership/equity	-1716.973	0
Economic reform affecting services	1099.669	0.507	Less than 30%	519.6308	0.36
Sum of reform variables	-49736.01	0	Less than 50%	766.8831	0.051
No foreign ownership/equity	1756.835	0.503	More than 50%	-330.4141	0.518
Less than 30%	84.13994	0.945	All workers must be	-557.9743	0.216

			residents/citizens		
Less than 50%	2965.205	0.089	Board members	-2882.206	0
More than 50%	-2408.628	0.037	Residency/Citizenship for prof. cert.	-2230.965	0.003
All workers must be residents/citizens	874.0428	0.519	Chairman/President	4187.178	0
Board members	886.8905	0.761	Monopolies in service industries	-5138.218	0.005
Residency/Citizenship for prof. cert.	-4063.632	0.308	Cartel behavior	-4120.356	0
Chairman/President	7065.67	0.003	No new firms allowed	2392.998	0
Cartel behavior	-8886.921	0.054	Discriminatory licensing	1642.858	0.008
No new firms allowed	4598.165	0.035	Restricted access	-4589.112	0.002
Discriminatory licensing	9277.207	0	Full access	-552.7669	0.118
Restricted access	1254.543	0.802	Economic needs tests	567.8938	0.254
Full access	1723.834	0.316	Rampant corruption	1004.003	0.099
Economic needs tests	548.4011	0.751	Excessive bureaucratic red tape	553.9989	0.486
Rampant corruption	-3184.351	0.476	Other resource wasting	1734.88	0.001
Excessive bureaucratic red tape	1982.918	0.552	Capital controls	-325.7459	0.477
Other resource wasting	4240.851	0.12	Reinvestment restrictions	-2049.956	0
Reinvestment restrictions	1497.401	0.446	Diff. in skilled labor endow.	2780.999	0.258
Diff. in skilled labor endow.	4403.359	0.328	Diff in GDP	-2.646927	0
Diff in GDP	-0.7769959	0.073	Sum of GDP	3.426778	0
Sum of GDP	1.999075	0	Latin America	-1559.68	0.142
Constant	-13856.7	0.01	Asia	-2542.382	0.003
			North America	4492.097	0
			European Region	-2318.132	0.004
			Constant	1176.097	0.502

The rest of the regressions presented and discussed in this paper include the weighted variables (0-1) for each restriction. All regressions use the weighted least squares technique and include time and country fixed effects except for the specifications 4-6 which contain regional dummies instead. Table 4 contains the first three specifications. The baseline specification does not support the KK model predictions for the difference in GDP and skilled labor endowments with insignificant coefficients for both variables. This is likely due to country fixed effects picking up the GDP and labor endowment differences. Privatization programs, restrictions of more than 50% foreign ownership, citizenship/residency restrictions for the CEO and board, and full access to the market are all found to have significant positive effects on the level of U.S. FDI in producer services. Restrictions of less than 50% ownership, mandatory chairman residency, professional licensing residency requirements, cartel behavior, and restrictions blocking any new foreign firms have significant negative effects. These results do make sense and are a good start in determining where to work on disaggregating the restrictions to the industry level as well as which restrictions to focus on obtaining better quantitative data for. It is also true that the baseline results have statistically insignificant coefficients for some variables that should have effects on the level of foreign affiliate sales from an economic point of view,. Hopefully, once these restrictions can be quantified, economic and statistical significance will be in line with one another.

The refined regression has the same significant variables as above but also finds that corruption, capital controls, GDP sum, and skilled labor difference have significant positive effects while bureaucratic red tape and GDP difference have negative effects. This seems to support the KK model assumption that U.S. FDI flows largely to similar sized countries. It's my opinion that the positive coefficients for corruption could be due to substituting foreign affiliate production for cross border trade in services. A corrupt government may be more easily dealt with from within rather than afar where bureaucratic red tape is cost increasing for the affiliate and its negative effect is also expected. The results are quite encouraging that certain restrictions on residency, ownership, establishment, as well as particular government/administration behaviors that affect

foreign service providers, have significant negative effects on the amount of FDI in producer services that flows into a specific country.

The final specification in Table 4 includes manufacturing affiliate sales as an additional independent variable. This follows the theory that some services investment is following manufacturing investment into a country in order to provide the producer services necessary for those manufacturing affiliates. The results show that manufacturing FDI does have a strong positive influence on services FDI and there are similar results for the restriction variables as were in the previous specifications.

**Table 4**

Full Sample: Time and Country Fixed Effects, Weighted Least Squares											
Dependent Variable: Total Affiliate Sales in Producer Services (millions of 1995 USD)											
Baseline Regression				Stepwise Refined Baseline Regression				Affiliate Sales in Goods Included: Baseline			
Number of Obs: 646	R-Squared: 0.815			Number of Obs: 646	R-Squared: 0.822			Number of Obs: 636	R-Squared: 0.823		
Independent Variable	Coef.	t-stat	p	Independent Variable	Coef.	t-stat	p	Independent Variable	Coef.	t-stat	P
Constant	-34476	-4.5	0	constant	9906.95	1.49	0.14	Constant	-15103	-2.2	0.03
privatization program in place	2802.45	2.51	0.01	privatization program in place	3069.15	2.93	0	Rsales	0.18955	6.88	0
lib_prgm	-802.22	-0.3	0.74	less than 50% foreign ownership	-7915.1	-3.7	0	privatization program in place	2552.16	2.55	0.01
zero foreign equity/ownership allowed	-1608.9	-0.5	0.64	less than 100% foreign ownership	11798.9	2.89	0	less than 30% foreign ownership	-1556.3	-0.9	0.38
less than 50% foreign ownership	-6177.9	-2.4	0.02	all employees must be residents	5783.26	2.43	0.02	less than 50% foreign ownership	-9812.2	-4.3	0
less than 100% foreign ownership	14119.9	2.83	0.01	CEO and Board of Directors must be residents	12454.4	4.82	0	all employees must	5796.67	2.09	0.04

								be residents			
all employees must be residents	6957.07	2.59	0.01	residency required for professional license	-9353	-3	0	CEO/Board of Directors must be residents	9754.01	3.56	0
CEO and Board of Directors must be residents	12995.2	4.7	0	Chairman/CEO/Pres. only must be a resident	-17213	-4.6	0	residency required for professional license	-11329	-3.6	0
residency required for professional license	-9411.9	-2.6	0.01	cartel behavior observed	-11103	-4	0	monopolies present	1272.88	0.53	0.6
Only Chairman/CEO/President resident	-16058	-4	0	no new foreign firms allowed	-10746	-2.8	0.01	cartel behavior observed	-7791.8	-2.5	0.01
monopolies present	672.415	0.25	0.8	full access for foreign firms	6601.21	1.9	0.06	no new foreign firms allowed	-8972.9	-2.3	0.02
cartel behavior observed	-12467	-4	0	rampant corruption observed/noted	9540.91	2.89	0	licensing discrimination against foreign firms	1233.98	0.55	0.58
no new foreign firms allowed	-10875	-2.3	0.02	bureaucratic red tape observed/noted	-10229	-4.2	0	full access for foreign firms	1058.97	0.32	0.75
licensing discrimination against foreign firms	-214.55	-0.1	0.93	level of democracy/autocracy (+ is democracy)	-695.78	-6.7	0	economic needs test required for establishment	2087.4	1.02	0.31
restricted	4282.37	0.76	0.45	capital controls	4582.91	2.7	0.01	rampant	8368.2	2.58	0.01

areas of operation for foreign firms								corruption observed /noted			
full access for foreign firms	9589.2	2.58	0.01	Sum of US and host country GDP	2.85174	6.23	0	bureaucratic red tape observed /noted	-8078.4	-3	0
economic needs test required for establishment	-305.84	-0.1	0.89	Difference between US and host GDP	-0.0001	-3	0	other resource wasting restrictions exist	-5062.4	-1.7	0.09
rampant corruption observed/noted	11690.9	3.22	0	trade cost index for host country	41.2352	1.13	0.26	level of democracy/autocracy (+ is democracy)	-590.25	-5.9	0
bureaucratic red tape observed/noted	-10107	-3.5	0	overall investment cost index for host country	-8.8594	-0.4	0.72	capital controls	4911.08	2.94	0
other resource wasting restrictions exist	1924.94	0.49	0.62	difference in skilled labor between US and host	11777.9	2.09	0.04	sum of US and host country GDP	0.11075	0.21	0.83
level of democracy/autocracy (+ is democracy)	-721.42	-6.3	0					Difference between US and host GDP	0.91327	1.65	0.1
regime durability	1.8452	0.07	0.95					trade cost index for host country	25.029	1.01	0.31
capital controls	5725.82	2.13	0.03					overall investment cost index for host country	31.9808	0.88	0.38

reinvestment restrictions	-2556.3	-0.8	0.43					Diff. in skilled labor between US and host	12728.3	2.36	0.02
sum of US and host country GDP	1.77859	3.83	0								
Difference between US and host GDP	-0.0816	-0.2	0.88								
trade cost index for host country	25.6416	0.7	0.49								
overall investment cost index for host country	9.71802	0.38	0.7								
difference in skilled labor between US and host	17862.5	3.22	0								

Table 5 includes a similar three specifications using regional dummies instead of country fixed effects. The baseline and refined results do not vary much in terms of significant variables but do vary a bit in the coefficients' values. All ownership restrictions, monopoly prevalence, cartel behavior, residency requirements for both the CEO AND the Board of Directors, GDP difference and capital controls all have negative effects on FDI in producer services. In contrast, corruption, residency requirements for the CEO and for professional licensing, discriminatory licensing procedures and the sum of the two countries' GDPs have positive effects on US foreign affiliate sales in services. Durability of the political regime also has a positive effect while the polity variable has a negative effect. While we may expect a positive effect for democracy over autocracy the specification of the variable (-10 to 10) may have an effect. The positive influence of a stable government illustrates the possibility that it is the risk of change in rule and not the political regime that concerns investors. The regional dummies all have positive and significant coefficients and these do not change from the baseline to the refined regression results in their

magnitude. The third specification includes foreign affiliate sales as an independent variable with much less significant results which is not that surprising with the exclusion of country fixed effects. Overall, the use of regional dummies with the investment restrictions has excellent potential and the results are quite promising.

**Table 5**

Regional Dummies: Time Fixed Effects, Weighted Least Squares											
Dependent Variable: Total Affiliate Sales in Producer Services (millions of 1995 USD)											
Baseline Regression				Stepwise Refined Baseline Regression				Affiliate Sales in Goods Included: Baseline			
Number of Obs: 646		R-Squared: 0.598		Number of Obs: 646		R-Squared: 0.601		Number of Obs: 636		R-Squared: 0.699	
Independent Variable	Coef.	t-stat	P	Independent Variable	Coef.	t-stat	p	Independent Variable	Coef.	t-stat	P
Constant	7242.92	2.09	0.04	Constant	5470.06	1.87	0.06	Constant	7010.03	2.38	0.02
Privatization program in place	-555.68	-0.5	0.63	less than 30% foreign ownership	-5526.5	-4.8	0	Rsales	0.24362	14.2	0
zero foreign equity/ownership allowed	2818.19	1.51	0.13	less than 50% foreign ownership	-6110.3	-4.6	0	privatization program in place	-1370.5	-1.4	0.17
less than 30% foreign ownership	-8049.4	-5.4	0	less than 100% foreign ownership	-12055	-5.8	0	less than 30% foreign ownership	-5929.8	-4.7	0
less than 50% foreign ownership	-9699.5	-5.5	0	CEO and Board of Directors must be residents	-10030	-7	0	less than 50% foreign ownership	-6539	-4.2	0
less than 100% foreign ownership	-18080	-7	0	residency required for professional license	7629.73	5.4	0	less than 100% foreign ownership	-14177	-6.4	0
all employees must be residents	-1705.6	-0.9	0.35	only Chairman/CEO/President must be a resident	8488.32	7.22	0	all employees must be residents	239.168	0.15	0.88
CEO and Board of Directors must be residents	-10654	-7.1	0	monopolies present	-10885	-6.5	0	CEO and Board of Directors must be residents	-6777.2	-5	0
residency required for professional	11879.1	6.71	0	cartel behavior	-5236	-3.6	0	residency required for professional license	8519.37	6.02	0



license				observed							
only CEO/President must be a resident	6439.7 4	4.65	0	licensing discrimination against foreign firms	4727.97	4.81	0	only CEO/President must be a resident	240.253	0.19	0.8 5
monopolies present	-8426.2	-3.6	0	corruption observed	10875.5	7.18	0	monopolies present	873.048	0.46	0.6 5
cartel behavior observed	-7585.9	-4.4	0	level of democracy or autocracy (+ democracy)	-383.77	-4.4	0	cartel behavior observed	1458.72	0.89	0.3 8
no new foreign firms allowed	-9202.3	-4.5	0	regime durability	94.3685	9	0	no new foreign firms allowed	-8733	-5	0
licensing discrimination against foreign firms	6741.5 6	5.31	0	capital controls	-6745.4	-6.8	0	licensing discrimination against foreign firms	4359.26	4.02	0
restricted areas of operation for foreign firms	4282.6 4	1.05	0.29	reinvestment restrictions	3599.62	3.44	0	restricted areas of operation for foreign firms	-245.88	-0.1	0.9 4
full access for foreign firms	-1743.1	-1.2	0.25	sum of US and host country GDP	3.58276	13.3	0	full access for foreign firms	2244.02	1.68	0.0 9
economic needs test required for establishment	-1384.1	-1.1	0.26	Difference between US and host GDP	-3.815	-14	0	economic needs test required for establishment	-4677.2	-4.3	0
Corruption observed	11020. 9	6.3	0	overall investment cost index for host country	-57.771	-1.7	0.09	corruption observed	1475.51	0.91	0.3 6
bureaucratic red tape observed/noted	51.253 7	0.03	0.98	difference in skilled labor between US and host	-10473	-2.2	0.03	bureaucratic red tape observed/noted	-4158.3	-2.7	0.0 1
other resource wasting restrictions exist	1569.3 4	0.81	0.42	Latin America	10377.2	7.48	0	other resource wasting restrictions exist	848.466	0.51	0.6 1
level of democracy or autocracy (+ is democracy)	-460.06	-4.3	0	North America	10521.7	7.1	0	level of democracy or autocracy (+ is democracy)	-336.68	-3.6	0
regime durability	119.75 5	8.99	0	Asia	4806.16	3.54	0	regime durability	84.261	7.5	0
capital controls	-4678.5	-4.3	0	European region	9015.28	7.75	0	capital controls	-2362	-2.4	0.0 2
reinvestment restrictions	2909.5 2	2.18	0.03					reinvestment restrictions	1940.39	1.81	0.0 7

sum of US and host country GDP	3.2333 5	10.6	0					sum of US and host country GDP	0.17032	0.49	0.6 2
Difference between US and host GDP	-3.4281	-12	0					Difference between US and host GDP	-0.5863	-1.8	0.0 7
trade cost index for host country	13.421 4	0.44	0.66					trade cost index for host country	10.2064	0.38	0.7
overall investment cost index for host country	-117.5	-2.8	0.01					overall investment cost index for host country	-60.026	-1.6	0.1 1
difference in skilled labor between US and host	-14725	-2.8	0.01					difference in skilled labor between US and host	-7277.3	-1.6	0.1 1
Latin America	13458. 2	8.43	0					Latin America	7221.6	5.05	0
North America	11434. 7	6.72	0					North America	-7052.2	-3.7	0
Asia	7210.7 8	4.41	0					Asia	7770.61	5.41	0
European region	9368.1 1	7.96	0					European region	4637.21	4.34	0

The final set of regressions exclude the United Kingdom from the sample in order to see if there are any observable outlier effects within the regression results. Table 6 includes three specifications: baseline, refined, and including manufacturing foreign affiliate sales. The interesting element that is immediately clear is that there is very little difference between the results of the specifications. Additionally, there does not seem to be any glaring differences between the signs of the significant variables with the earlier regressions. Ownership restrictions, cartel behavior, licensing discrimination, bureaucratic red tape, other resource wasting restrictions, and capital controls all have negative effects on FDI in producer services. Residency requirements for CEO and Board of Directors and professional licensing, monopoly prevalence, full access to the market, economic needs tests, corruption, and GDP sum all have positive effects. These positive influences may seem initially counterintuitive although clearly they are rather consistent throughout the various samples and specifications. Furthermore, they support the reality that all economies have some restrictions to services investment and these do not deter a multinational because they are widely recognized and accepted (until GATS is completed at least).

Again, further research may be able to isolate the types of regulations that signal strong institutions in the producer service industries from those which do not really threaten investment due to lack of price/cost effects. Undoubtedly, the inclusion of prices will allow for a much more in depth analysis as well as identify and quantify various welfare effects from the removal of restrictions.

**Table 6**

Full Sample excluding UK: Country and Time Fixed Effects, Weighted Least Squares											
Dependent Variable: Total Affiliate Sales in Producer Services (millions of 1995 USD)											
Baseline Regression				Stepwise Refined Baseline Regression				Affiliate Sales in Goods Included: Baseline			
Number of Obs: 627		R-Squared: 0.813		Number of Obs: 627		R-Squared: 0.814		Number of Obs: 617		R-Squared: 0.816	
Independent Variable	Coef.	t-stat	p	Independent Variable	Coef.	t-stat	p	Independent Variable	Coef.	t-stat	P
Constant	-12695	-2.9	0	constant	-17508	-4.6	0	constant	-15679	-4	0
privatization program in place	-546.46	-0.9	0.36	less than 30% foreign ownership	-7339.6	-7.6	0	rsales less than 30% foreign ownership	0.05667	3.19	0
less than 30% foreign ownership	-7240.4	-6.2	0	less than 50% foreign ownership	-4650	-3.6	0	ownership less than 50% foreign ownership	-6967.3	-6.8	0
less than 50% foreign ownership	-4962.9	-3.5	0	CEO and Board of Directors must be residents	2786.4	1.8	0.07	ownership CEO and Board of Directors must be residents	-4501.6	-3.4	0
less than 100% foreign ownership	-224.37	-0.1	0.94	residency required for professional license	6854.55	3.71	0	residency required for professional license	2913.17	1.83	0.07
all employees must be residents	1389.2	0.89	0.37	monopolies present	3119.73	2.38	0.02	license monopolies present	6069.2	3.24	0
CEO and Board of Directors must be residents	2862.86	1.77	0.08	cartel behavior observed	-8658.3	-5	0	monopolies present cartel behavior observed	2516.25	1.75	0.08
residency required for professional license only	5764.49	2.72	0.01	no_new	-8813.7	-4.1	0	cartel behavior observed	-7986.4	-4.4	0
Chairman/CEO/President must be a resident	1717.72	0.7	0.49	no new foreign firms allowed	3729.54	2.07	0.04	no new foreign firms allowed	-8164.2	-3.3	0
monopolies present	2670.25	1.73	0.09	licensing discrimination against foreign firms	-6051	-4.9	0	licensing discrimination against foreign firms	-5146.4	-4	0

cartel behavior observed	-8808.9	-4.9	0	economic needs test required for establishment	4928.83	4.25	0	full access for foreign firms economic needs test required for establishment	2800.76	1.51	0.13
no new foreign firms allowed	-8848.3	-3.4	0	rampant corruption observed/noted	9133.76	5.1	0	rampant corruption observed/noted	5860.9	4.87	0
licensing discrimination against foreign firms	-5809.1	-4.5	0	bureaucratic red tape observed/noted	-3026.6	-2	0.05	bureaucratic red tape observed/noted	8799.2	4.7	0
full access for foreign firms	3639.53	1.78	0.08	other resource wasting restrictions exist	-8785.7	-5.1	0	other resource wasting restrictions exist	-3438.3	-2.2	0.03
economic needs test required for establishment	5643.11	4.46	0	level of democracy/autocracy (+ is democracy)	-356.49	-6.2	0	level of democracy or autocracy (+ is democracy)	-8502.3	-4.7	0
Corruption observed	9071.52	4.68	0	capital controls sum of US and host country GDP	-1697.1	-1.7	0.08	capital controls sum of US and host country GDP	-361.52	-6.3	0
bureaucratic red tape observed/noted	-2550.9	-1.6	0.12	Difference between US and host GDP	0.8392	3.18	0	Difference between US and host GDP	-2204.3	-1.5	0.14
other resource wasting restrictions exist	-9639.2	-5	0	trade cost index for host country	0.1694	0.58	0.56	trade cost index for host country	1051.91	0.58	0.56
level of democracy/autocracy (+ is democracy)	-348.96	-5.2	0	overall investment cost index for host country	31.0872	1.66	0.1	overall investment cost index for host country	0.34429	1.15	0.25
regime durability	-1.6077	-0.1	0.92	difference in skilled labor between US and host	8212.79	2.71	0.01	difference in skilled labor between US and host	0.56181	1.76	0.08
capital controls	-2599.5	-1.7	0.09		-17508	-4.6	0		17.7939	1.24	0.22
reinvestment restrictions	1541.87	0.83	0.41						19.1484	0.92	0.36
sum of US and host country GDP	0.7427	2.71	0.01						8429.36	2.75	0.01
Difference between US and host GDP	0.30514	0.97	0.33								
trade cost index for host country	21.7533	1.49	0.14								

overall investment cost																				
index for host country	20.4935	0.97	0.33																	
difference in skilled labor																				
between US and host	7717.23	2.43	0.02																	

## V. Summary and Conclusions

This analysis is a first step in the emerging area of foreign direct investment in business and producer services and the subsequent effects that country specific restrictions have to this investment. There are a number of potential welfare gains from increased levels of investment in these services as they serve as important channel of technology and knowledge transfer to developing economies. FDI in services is the largest and fastest growing area of international investment and liberalization in these industries has only begun in the last couple of decades for the most developed countries and is just getting started in emerging markets and developing economies. I use data on U.S. foreign affiliate sale in producer services for a panel of 39 countries and for the years 1984-2002.

Using an econometric model with country fixed effects and weighted least squares I am able to identify certain restrictions which negatively affect the level of U.S. investment in producer services as well as identify those restrictions which either send a positive signal or simply do not concern the multinational firms which are choosing to invest in these sectors.

Excessive restricting of foreign ownership, residency requirements for the CEO and Board of Directors, cartel behavior, monopoly power, and resource wasting barriers to FDI are all found to have significant negative effects on U.S. FDI in services across varying econometric specifications. Corruption, residency requirements for professional licensing, economic needs tests, residency for chairman only, durability of the political regime and financial restrictions do not seem to statistically deter U.S. FDI in this analysis. The lack of significance of other restrictions should not necessarily be interpreted as a lack of importance. Cross-correlations, omitted variables and misspecification could all be responsible for the insignificance of these

variables. More likely, the inability to accurately capture the intensity of these restrictions on a 0-1 weighted scale is accountable.

Obviously the addition of factor and service price data would allow for a much more complex analysis and one which can quantify the welfare gains to removing effectively prohibiting restrictions to investment. Also, the results for the political variables are disappointing, and future analysis either needs to find better variables for political institutions or perhaps analyze more completely where the countries in the sample fall in the -10 to 10 scale of the Polity2 variable. Clearly, data is the most imperative issue in this analysis and the next step includes incorporating factor prices where possible and refining the variable for the restrictions with additional data. The incorporation of intellectual property rights protection may also yield interesting results due to the technology intensive nature of some of producer services, and especially in the decision to export rather than invest. Relationships between producer services affiliate sales, technology licensing, and intellectual property rights protection have such potential for future work. I feel that this rough initial analysis is nevertheless a contribution to this field of research as it identifies more clearly where to focus research in the future. Additionally, the economic intuition behind the effects of restrictions to foreign investment in producer services is by and large confirmed at this early level of analysis and significant effects of particular effects are acknowledged and discussed.

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## Chapter 3

### **Adapting the Knowledge-Capital Model of the Multinational Enterprise to Trade and Investment in Business Services**

**Co-authored with James Markusen**

#### **I. Introduction**

Trade and foreign direct investment (FDI) in business services has received a lot of attention from economists, politicians, and business journalists. It is not quite clear why this is the case, but we suspect that there is a concern about the loss of skilled and semi-skilled white-collar jobs to developing countries. There was a certain level of controversy and resistance to low-skilled manufacturing jobs being offshored, but the potential loss of skilled jobs in information technology to foreign workers is an even greater perceived threat to workers in developed countries.

It is indeed the case that trade and FDI in business service have increased greatly in the last few years. Statistics are presented in Table 1 and will be discussed more below. It is also clear that much of the increased activity is mediated by multinational firms, whether that is actual FDI (we measure sales of foreign affiliates) or intra-firm trade between parent and affiliate.

Economists have wondered, discussed, and argued for years about how to define services and even more so when determining how to incorporate services into international trade and investment analyses. They have also pondered whether services sectors require any new or different theory as opposed to those used for goods trade and investment analysis. At the general level of Debreu-type general-equilibrium models, the abstract theory does not need to make a distinction between goods and services, whatever the latter might be. An objective of this paper is to enquire about an appropriate theory of trade and FDI in services. It is quite possible that no particularly new theory is required, that an adaptation will do, and this is indeed our view. The motivation for our inquiry into this issue is twofold. First, trade and FDI in services has become an important policy issue, so it deserves to be examined not only empirically but also

theoretically as the latter gives structure to the former. Second, the types of restrictions that impede trade and FDI in services and subsequently raise costs to potential service providers are generally quite different from those that impede trade in goods and they have different effects on service providers' decisions to enter a foreign market in a particular manner (cross-border trade versus establishing a commercial presence). We will duck the issue of defining services entirely by concentrating on what the US Bureau of Economic Analysis defines to be business services in their actual data.

Specifically, we are going to use Markusen's (2002) knowledge-capital model of the multinational enterprise (discussed later) to try to fit many of the stylized facts about trade and investment in business services. We argue that this model is relevant and that straightforward adaptations of the model make it a good candidate for analyzing services.

Throughout the paper we focus on the offshoring of services to foreign affiliates. We will not differentiate effects on captive offshoring (within the ownership of the firm) to offshore outsourcing (outside the boundaries of the firm's ownership). This is an old question which has been revitalized recent by new approaches (e.g., Antrás 2003) and it is unfortunately beyond the scope of this paper. The structure of the paper is as follows. Section two presents a short primer on barriers to trade and investment in services. Then we present a general discussion about the characteristics of trade in business services that are essential to modeling services and how they differ from those in goods trade. The model itself follows, and the paper concludes by presenting a set of simulation results and their interpretations.

## **II. Barriers to Trade and Investment in Services: A Primer**

Trade in services encompasses a wide variety of industries, different modes of supply, and both intermediate and final demand. Analyses of trade in services often focuses on the role of services as an input into manufactured goods production and where the role of the multinational in trade in services is likely to be an important one. In addition, services are also intermediate inputs into final service production. There is also an increasing large and important range of services provided directly to the consumer which is experiencing continual expansion

due to constant increases in global internet access.

Barriers to trade and investment in services can be roughly broken down into what we could call “natural” economic costs and “policy-imposed” costs. For the former, we are thinking of things like communications and transport costs (workers flying between countries), language, customs, time zones, the need for face-to-face interaction and so forth. Clearly great improvements in communications technology and more speculatively the wide spread adoption of English as a shared second language have reduced these natural barriers and have been responsible for much of the great increase in trade. Our discussion here will concentrate on the second category, since they are more under the control of governments and consistently prevalent across developed and developing countries. A much more in depth and exhaustive treatment of these issues is found in Hoekman (2006).

Policy-induced barriers, henceforth “barriers” for this section, to trade in services take diverse forms and therefore affect service suppliers’ cost functions differently. Regulatory policies, in addition to explicit and implicit barriers to trade in services, generally fall into one of five basic categories. First, there can be quantity-based restrictions imposed on services suppliers that explicitly restrict the volume of services imported, similar to a quota. The use of a fixed number of licenses available or access to only certain firms or sectors also falls into this category. If a “quota” type policy is only applied to imported services, then we would expect to see more multinationals establishing affiliates in the market (all other things equal). This is similar to a “tariff jumping” activity discussed in traditional theories of the multinational firm. On the other hand, price control restrictions can be implemented which affect a firm’s variable costs. These may take the form of a price floor or ceiling and not affect foreign suppliers differently than domestic firms; however, they are still costly and create an inefficient level of services supplied.

Thirdly, there are numerous barriers to establishment that restrict foreign supply of services due to the high costs of establishing a commercial presence. Policies regarding licensing procedures, requirements and fees can be prohibitive. Bureaucratic red tape, requirements for local management or lack of transparency all have detrimental effects on the fixed costs of establishing commercial presence for multinationals. These may create a substitution effect with

multinationals supplying the service from abroad rather than establish an affiliate. In addition to fixed costs increases firms may also be concerned about risks from opacity of the government or regulators. For instance, governmental departments which control license allocation can decide how difficult or easy it is to obtain information surrounding licensing procedures and requirements. These concerns may create additional incentives for firms to serve the market via cross-border trade. However, it is possible that these policies may also affect the ability to supply the services across the border, which would complicate the firm's decision.

Fourthly, barriers to trade and establishing commercial presence in services may take the form of restricting the use of inputs. This category can include restrictions on workers, required percentages of locally produced material inputs, as well as barriers or limits on the use of networks or media for promotion and/or marketing purposes. These policies can greatly increase the costs of operations for foreign suppliers and may be prohibitive to entering the market. Even with economies of scale the increased cost of production is likely to be a deterrent to establishing an affiliate. If the majority of restrictive services trade policies fall into this category we would expect multinational firms to prefer cross-border trade rather than establish an affiliate in order to supply services to that particular market.

The last category of restrictions encompasses the various domestic regulatory barriers that take many forms and are often overlooked when discussing impediments to trade and investment. These include policies regulating professional qualification, residency and citizenship restrictions, obligatory membership in local professional association, juridical requirements, and limitations of inter-professional cooperation. While the policies and regulations may not explicitly target foreign firms they often have this effect in practice. Regulations on professional qualifications are important domestic policies to have so as to guarantee a level of skill and professionalism to consumers. However, when these policies require residency, citizenship, or involve re-certification for professionals with comparable certifications from another country, they become costly. While they are not explicit barriers to trade these policies severely increase the fixed costs (time and money) for a firm establishing commercial presence and may be prohibitive as well. A number of regulatory policies also restrict foreign service suppliers through the lack of

transparency and other difficulties encountered through the bureaucratic process of obtaining licenses. Particularly in developing countries, the licensing processes are complex and non-transparent. These processes are barriers to foreign firms in terms of added costs and increased risk. The fixed costs of entry and market access are increased and depending on the licensing allocation, variable operating costs may also be affected from required paperwork or reoccurring licensing fees.

Another set of issues (or subset of point three above) prevalent in both developing and developed countries are legal policies governing the form of establishment for foreign service suppliers. These act as barriers to firms wanting to establish a foreign affiliate and often reflect market power distortions within the sector. Policies often prevent wholly owned subsidiaries and instead allow specific numbers and locations of branches. They also serve to regulate partnerships, joint-ventures, and foreign ownership percentages. This genre of regulatory policies may have significant effects on a firm's decision to serve a market through cross-border trade or an established affiliate. It is also possible that very open regulatory policies may lead to a firm establishing an affiliate to provide services for the host market and for other markets in the region (export-platform FDI). Overall, it should be stressed that regulatory policies are needed in professional industries in order to insure against fraud and to protect consumers. The problems arise when regulatory policies impose significant fixed and operational costs on foreign entrants into the market. At that point the regulators are creating or exacerbating market inefficiencies and distortions leading to welfare and productivity losses.

Undeniably, foreign service suppliers encounter barriers from explicit trade policies, establishment and market access policies, domestic regulation, as well as other internal policies affecting the costs of supplying services in a country. The effects that these have on the supply of services are intricate and difficult to filter out. Unlike tariffs, most restrictions to services trade are behind the border and are not clearly quantifiable. Additionally, the effects of policies restricting services trade and affiliate production have complex interactions. They can affect the choice of mode of supply, the quality of the services provided, additional investment in complimentary industries, as well as productivity and economic growth within the economy in question. This

complex nature of issues surrounding trade in services is motivating the plethora of research into this area; however, the lack of data makes analysis arduous.

Data on barriers are largely non-existent and furthermore, data on trade flows and foreign affiliate sales at a disaggregated level are unavailable for the majority of trading partners. There have been recent attempts to improve data collection on cross-border trade in services among OECD countries; nevertheless, data on foreign affiliate sales in services is limited to very few countries and are not disaggregated at the sector level. Pressure on national statistical offices to collect and disseminate services data at the sector level must continue to be applied by academia, international organizations, and the private sector. Without data it is impossible to make any real analysis of the effects that regulatory and trade policies have on the sale and import of services from foreign suppliers. Likewise any potential effects on welfare, growth, or productivity are indiscernible with any accuracy.

Trade in services is different from trade in goods in many different ways. The most obvious distinction is that freight and transportation costs are not a core cost for services suppliers. Additionally, trade in services often requires face to face interaction with the consumer or client, which is why establishing commercial presence or the temporary movement of personnel is almost always necessary. Therefore, foreign affiliate sales of services are a significant portion of total trade in services, and further, affiliate imports from and exports to parents (intra-firm trade) also constitutes a large amount of producer services trade. The US Bureau of Economic Analysis publishes data on affiliated and unaffiliated cross-border trade as well as US foreign affiliate sales in services.

Table 1 takes a quick look at the data from 1999 and 2005 and it is clear that the role of the multinational in trade in services is a significant one. The first set of numbers is sales totals in millions of 2000 US dollars for US majority-owned foreign affiliates for all industries, private services and the private services sub-sectors of information, financial and professional services. The following set is the sales of foreign majority owned affiliates in the US for the same set of industries. The next two sets of data are the values of cross-border trade in the same industries, also in millions of 2000 US dollars. Exports and imports are broken into affiliated and non-

affiliated trade. Business, professional and technical services (BPT) includes advertising, management and technical consulting, computer system design, architecture, engineering, accounting, legal services and other business services. These are industries that are often highly regulated and are the exact same industries included in the professional, scientific, and technical (PST) category of services within the foreign affiliate sales data. The BEA collects data on foreign affiliate activity separately from how trade accounts are recorded which is why the names are different; however the data is completely comparable.

**Table 1**

<b>Outward US Foreign Affiliate Sales-all countries</b>			
	1999	2005	% change
Total Sales-All Industries	2316654.8	3276024.4	41.41%
Total Private Services	353200.0	528000.0	49.49%
Information	63236.5	97069.9	53.50%
Finance & Insurance	86337.1	140341.6	62.55%
Finance	32330.4	43847.0	35.62%
Insurance	54006.6	96495.7	78.67%
PST	65290.2	97490.9	49.32%
Sales in Total Private Services = 15.25% and 16.12% of All Industries Sales in 1999 and 2005 respectively			
PST- Professional, Scientific, and Technical Services			
All data are in millions of 2000 US dollars			
<b>Inward Foreign Affiliate Sales-all countries</b>			
	1999	2005	% change
Total Sales-All Industries	1831561.1	2213172.5	20.84%
Total Private Services	293500.0	389000.0	32.54%
Information	46440.3	48138.5	3.66%
Finance & Insurance	95840.7	104308.3	8.84%
Finance	15651.8	25458.9	62.66%
Insurance	80188.9	78849.4	-1.67%
PST	15757.0	49648.7	215.09%
Sales in Total Private Services = 16.02% and 17.57% of All Industries Sales in 1999 and 2005 respectively			
PST- Professional, Scientific, and Technical Services			
All data are in millions of 2000 US dollars			
<b>Cross-Border Trade- All countries-Exports</b>			
	1999	2005	% change
All Industries	1287247.6	1586285.5	23.23%
All Industries-Affiliated	194697.1	186463.5	-4.23%
All Industries-Unaffiliated	1092550.5	1399822.0	28.12%
Total Private Services	265100.0	368000.0	38.82%
Total Private Services-Affiliated	32952.4	44441.2	34.86%
Total Private Services-Unaffiliated	73245.5	101278.7	38.27%
Financial Total	17789.3	31626.3	77.78%
Financial-Affiliated	4087.2	4312.0	5.50%
Financial-Unaffiliated	13702.2	27314.3	99.34%
Insurance Total*	3119.2	6011.5	92.73%
BPT Total	54683.1	73911.2	35.16%
BPT-Affiliated	26379.5	37062.1	40.50%
BPT-Unaffiliated	28303.5	36849.1	30.19%
Imports of total private services = 20.59% and 23.19% of trade in all industries in 1999 and 2005 respectively			



*Insurance transactions are considered unaffiliated by BEA			
BPT-Business, Professional, and Technical Services			
(Table 1 continued)			
<b>Cross-Border Trade- All countries-Imports</b>			
	1999	2005	% change
All Industries	1543920.8	2177244.7	41.02%
All Industries-Affiliated	186215.3	231946.0	24.56%
All Industries-Unaffiliated	1357705.5	1945298.8	43.28%
Total Private Services	183000.0	282000.0	54.10%
Total Private Services-Affiliated	25670.2	35340.6	37.67%
Total Private Services-Unaffiliated	31048.8	53285.4	71.62%
Financial Total	9623.2	11105.6	15.40%
Financial-Affiliated	6130.7	5192.0	-15.31%
Financial-Unaffiliated	3492.5	5913.6	69.32%
Insurance Total*	9593.9	25064.2	161.25%
BPT Total	28238.2	42913.2	51.97%
BPT-Affiliated	19462.0	29868.1	53.47%
BPT-Unaffiliated	8776.1	13045.1	48.64%
Imports of total private services = 11.85% and 12.95% of trade in all industries in 1999 and 2005 respectively			
*Insurance transactions are considered unaffiliated by BEA			
BPT-Business, Professional, and Technical Services			

The data on foreign affiliate sales illustrates the importance of services in all affiliate activity. Private services represent about 15-17 percent of total sales by all foreign affiliates. Over the period 1999-2005 affiliate sales in information, insurance, and professional services have all experienced growth above that of the overall average for all industries. Sales by foreign owned affiliates in the US have experienced higher than average growth for finance and professional services but have not seen growth in insurance or information. Interestingly, affiliated exports overall have had negative growth while affiliated services exports have grown significantly. This may be representing the ability of multinationals to utilize home country services in their manufacturing and services operations abroad. Home country bias has always been an assumption in trade models, but it also plays a role in multinational production processes.

The trade data shows that the share of affiliated trade in business, professional and technical services is much greater than the shares for finance, private services, or all industries.

Combined with the increased growth in both exports of these services and foreign affiliate sales in the same industries (professional, scientific, and technical for the foreign affiliate data) this illustrates the importance of multinational companies in the supply of professional and business services worldwide. Unaffiliated services trade has increased as well in this area and the fact that there has been all this growth in affiliate sales and trade in these highly regulated sectors stresses the need for research into trade restricting policies.

The data on financial services reveals patterns that follow multinational theories about location of production. Outward sales of financial services (US owned foreign affiliates' sales abroad) are growing much more rapidly than affiliated financial services exports. On the other hand, exports of unaffiliated financial services are growing rapidly, likely due to the availability of online financial services and final consumption abroad by households. Additionally, domestic firms in foreign countries have been granted more access to foreign financial services through deregulation and this also likely contributes to the significant growth in unaffiliated trade in financial services. Similarly, inward sales (foreign owned affiliates' sales in the US) and unaffiliated imports of financial services are experiencing significant growth while affiliated imports are actually decreasing. The importance of final demand at the household level is apparent in the huge rates of growth in unaffiliated imports and exports of financial services. Therefore, the patterns of affiliate supply of financial services seem to follow the theory that horizontal investment displaces affiliated trade. The figures also support a complimentary relationship between commercial presence and cross-border trade; US firms may establish commercial presence to services firms abroad and then supply additional services via cross-border trade. In terms of offshored financial services, the levels of affiliated imports are actually decreasing, which clearly does not support fears of increased levels of US jobs going abroad.

The data on trade and foreign affiliate sales in insurance also shows evidence of the effects of deregulation. Trade in insurance services have skyrocketed over the period looked at in the table and outward sales of insurance have also increased very significantly, while inward sales have decreased. Insurance providers have also been able to capitalize on the growth of global internet access and household consumption of insurance products is likely a large

determinant of the increases in traded insurance services.

The role of cross-border services trade for multinationals enters into this discussion as many US manufacturing MNEs demand many different producer services. Horizontal MNEs demand services at home and abroad, and they prefer to use the same service supplier for cost and reputation reasons. This demand has driven US service providers to expand abroad in similar fashion as manufacturing MNEs have for the past 25 years. Certain industries, such as telecoms and financial services have largely become deregulated in most developed countries. There is a great deal of foreign affiliate activity in these industries. Professional services are more regulated and foreign ownership is often restricted or prohibited. In these industries there can be an increase in cross-border trade to supply services to home country firms abroad. In addition it is quite possible that firms established in another country may decide to provide additional service products to other firms or households. This occurs as the horizontal MNE gains knowledge of the market, regulatory issues, consumer demand, and the economy's infrastructure. Rather than establish a new affiliate it may be easier and more profitable for the firm to provide the additional services from the home country headquarters.

In terms of measuring the restrictiveness of a policy there are three approaches that have been used in the literature: frequency indexes, price impact measures, and quantity based measures. Frequency indexes are comprised by creating a list of barriers that are in place for each sector (ideally) for the import of each service (mode 1 or 3) in each country. The country with the most or least restrictive/protectionist regime for each sector and mode is chosen to be the benchmark for that sector. Tariff equivalents are calculated by comparing country coverage ratios to the benchmark country. The problems with this approach are the arbitrary establishment of benchmark tariff equivalent, the inability to differentiate between barriers that are binding (restrict trade) and those which are not binding due to their redundancy, and most problematic is that the importance of barriers and therefore the level of restrictiveness of a particular barrier does not vary as there is no weighting.

Price impact measures assume that world prices should be equal and therefore one can use econometric methods to estimate price gaps due to restrictions. If data on prices is actually

available this is an excellent case study technique however this is not the case. Other than the lack of data there are other issues: differences in quality that will be captured by price differentials as well, price changes from barriers depend on the elasticity of demand and of supply of that service which also vary, lastly it has been shown that the resulting price wedge often has a rent component and a waste component. The rent component is the increased profits enjoyed due to imperfect competition while the waste component is the resource waste accruing from the restrictions and welfare claims depend on the magnitude of these components. Finally, quantity based approaches compare actual levels of trade flows to potential (or benchmark) levels. This approach often uses the gravity equation, controlling for many of the knowledge-capital model variables as well as measures of “cultural distance”. The problems encountered with this approach again arise from the lack of data on bilateral services trade or foreign affiliate sales. Even with accurate data calculating tariff equivalents from an observed gap in trade is flawed as omitted variables unquestionably also contribute to the difference in observed and predicted trade flows.

### **III. Characteristics of Trade in Business Services to Capture in a Formal Model**

Here is a wish list of characteristics we might like to have in theoretical models of offshoring and trading white-collar services. Much of this is a revision and extension of a similar section in Markusen (2006), since the focus and objectives of the present volume are quite similar to those of the 2005 Brookings Trade Forum. Readers are referred to that volume (Brainard and Collins 2006) for a wide-ranging set of papers on offshoring white-collar services.

- (A) Expansion of trade at the extensive margin: new services produced and traded due to innovations in communications and technology or institutions (e.g., legal restrictions, privatization, and GATS commitments).

This poses a number of challenges to theory, especially the fact that we are talking about non-marginal changes and discrete movements of something being non-traded to potentially lots of trade. Traditional comparative-static analysis is of little use: it focuses on marginal changes in activities which are already in use in the benchmark. This problem has attracted a lot of recent

interest in trading intermediate goods as well, for example Hummels, Ishii and Yi (2001), Yi (2003), and Markusen and Venables (2007). Related work motivated by income distribution effects is found in Feenstra and Hanson (1996, 1997).

(B) Vertical fragmentation of production: the new traded services tend to be intermediates, but may be upstream, downstream, or not part of a sequence.

Traded white-collar services often have a number of important characteristics that cannot be captured in the simplest off-the-shelf models which assume a set of final goods. One is that they may be firm-specific transactions rather than bought and sold on arm's-length markets. Another is that they may form part of a particular production sequence, such as being a well-defined upstream (design) or downstream (after sales service) component of overall production.

(C) Location-specific and other complementarities

Thirdly, there may be crucial complementarities among different elements of the production chain, such as between skilled labor and telecommunications equipment and infrastructure. In some cases, it may be the case that services must be produced in the same location as where they are used in downstream or upstream manufacturing activities. Markusen (2006) coined the term "location-specific complementarities" to describe this. This doesn't mean that services, or at least the downstream end product, cannot be traded. It does suggest however, that a national presence may be required; that is, a firm has to open a local office or branch in a foreign country in order to service firms and consumers in that country. These considerations may also imply another type of complementarity, one that is between liberalization in services and increase trade in goods (Markusen, 1983).

(D) Clear distinction between trade and foreign investment in services

Much of international service activity is carried out by multinational firms with local offices abroad. For this reason there must be a clear and plausible distinction between what is trade and what is affiliate production. Similarly, there needs to be a clear distinction between what is a barrier to trade and what is a barrier to foreign investment (establishing a foreign commercial presence). In some cases a particular policy may be only a barrier to one form of entry while others may be a barrier to both types of entry and there will be different outcomes for the market

depending on how the policy/regulation effects entry decisions.

(E) Agglomeration of complementary intermediate services

Related to, but somewhat distinct from point (C), is the issue of whether or not the intermediate business services themselves are more productive when located near to each other, as opposed to just being located near the final user. It might be beneficial for a user firm to be located close to a firm specializing in networking hardware as well as one specializing in the networking software. It may also be beneficial for the latter firms to be located near one another as they require similarly skilled workers and service many of the same clients. This relationship can be modeled using an input-output structure among the service firms, as in Venables (1996). This issue is somewhat beyond the scope of this paper, but it does raise some concerns for small economies. In particular, it raises the possibility of multiple equilibria and that whatever location gets a head start remains ahead. There is a potentially large market failure here that could call for strong government support for creating a local agglomeration (e.g., the business park concept). Related ideas are found in Markusen (1989), Francois (1990a,b) and Markusen, Rutherford and Tarr (2005).

#### **IV. Adaptation of the Knowledge-Capital Model**

Markusen's (2002) knowledge-capital model is a framework which allows national firms, horizontal multinationals, and vertical multinationals to arise endogenously depending on country and technology characteristics. Firms are assumed to possess knowledge-based assets which are alternatively called knowledge capital. Three central assumptions define the model. First, the services of knowledge-based assets can be easily used in foreign location (transportability or fragmentation). Second, the creation of knowledge capital is skilled-labor intensive relative to production. Third, knowledge capital has a jointness (non-rival) property in that it can be used in multiple locations simultaneously without reducing the value of the capital in any particular location. Although this was originally conceived in the context of manufacturing, it seems perfectly appropriate for studying trade versus foreign investment in services.

Suppose we begin with a simple two-final-good, two-factor, two-country Heckscher-Ohlin

model and then allow each good to geographically fragment into two separate production activities. Further, one of those two activities, denoted services (S) may be allowed to geographically fragment into a more skilled-labor-intensive “headquarters” activity and a less-skilled-labor-intensive “office” activity.

If we assume free trade in goods, just considering free versus prohibitive fragmentation costs in services means that we do not need to specify which is the upstream and which is the downstream activity. For a much more comprehensive treatment of this case, see Markusen and Venables (2007). Here are the principal features of the model.

- (1) Two factors of production: skilled (H) and unskilled (L) labor  
Direct use of H and L in production is referred to as value added (VA)
- (2) Two final goods, three production activities
  - AG - unskilled-labor intensive agriculture
  - MAN - skilled-labor intensive manufacturing
  - SER - intermediate services used in MAN and AG
- (3) SER - can fragment into
  - HQ headquarters, may serve several offices
  - OF office, produces the deliverable for the client
- (4) Two economies, country i and country j
- (5) There are three generic “types” of services firms, each of which may be located in either country, hence there are six firm types in total
  - N - national firms, provide services to domestic manufacturers, may possibly be allowed to “export” to other country
  - M - multinational firms, have physical production presence in both countries, essentially a “horizontal” multinational
  - V - vertical firm, with headquarters in one country, a single office located in the other, may possibly be allowed to export back to the home country.
- (6) There are “trade costs” for N and V firms supplying services abroad (skilled

workers have to fly abroad in one direction or the other).

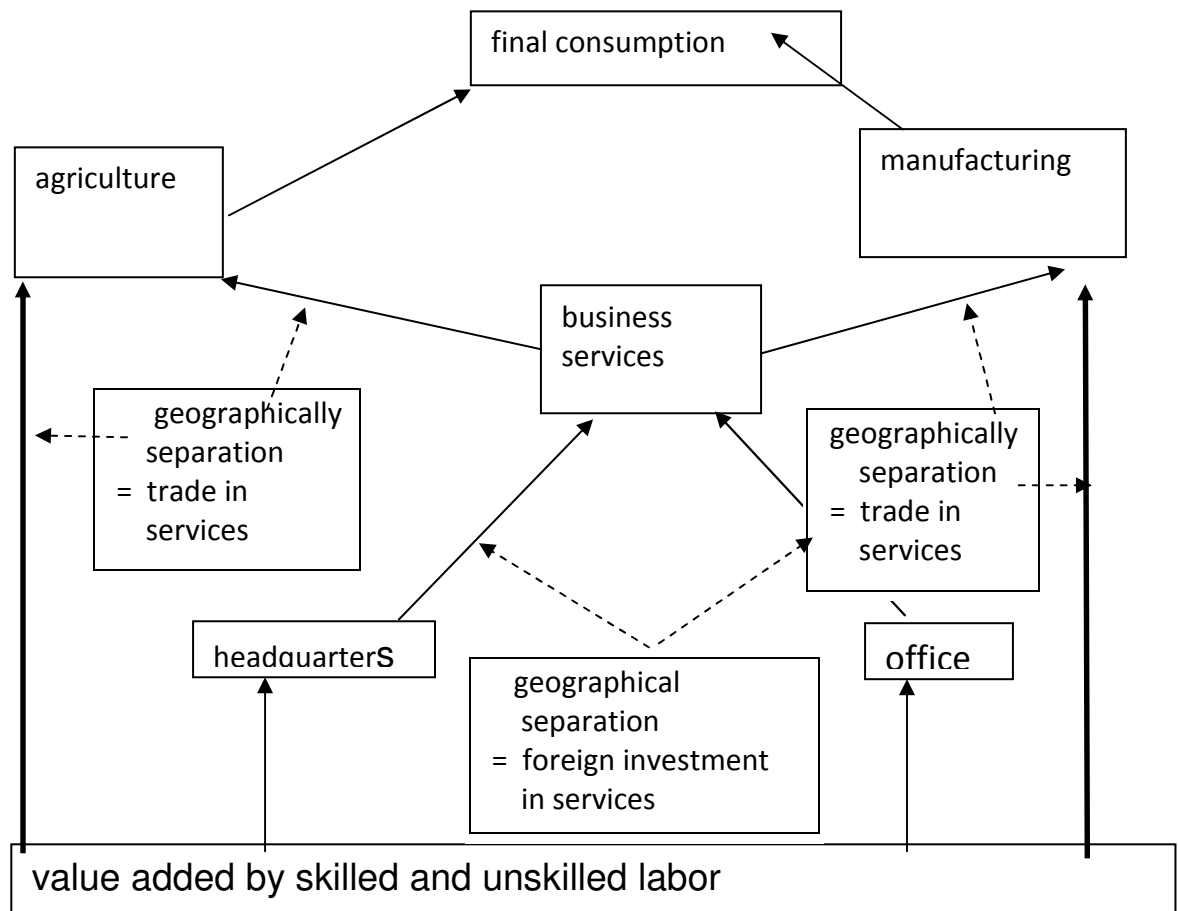
- (7) There are firm-level scale economies arising from jointness of knowledge-based assets: fixed costs for an M firm are less than double the fixed costs of N or V firms.
- (6) Services are differentiated or “specialized”, each produced with increasing returns to scale. A wider range of available services increases real productivity for final manufacturers, or lowers their price index for composite services.

To expand on the last point a bit, it is assumed that one unit of two different services is more beneficial to X firms than two units of only one of the services. For example, using two specialized lawyers for a day (e.g., one taxation and one contracts specialist) is better than having two days from a general-purpose lawyer than does many types of legal work including tax and contract law. Fixed costs limit the degree of specialization and diversity than can exist in equilibrium for a small country, and thus access to the larger world market is always productive. Our modeling of services as differentiated intermediate goods follows Ethier (1982) and Markusen (1989).

The model with the two types of fragmentation is illustrated in Figure 1. Consumption comes from the agricultural and manufactured final goods. Manufacturing and agriculture are composed of “value added” (direct contributions of skilled and unskilled labor) and services. It *may* be possible to do these in different locations, implying that *trade in services* is feasible. Services consist of a headquarters and an office. It *may* be possible to do these in different locations, implying that *foreign investment in services* is feasible.



**Figure 1: Structure of production**



We are interested in four equilibria, referred to as “regimes”. Some regimes may not be technologically feasible or profitable, or they may not be allowed by regulation. Thus when we refer to trade and investment costs, we will generally be using these terms broadly to include technological and other (e.g., the requirement of face-to-face interaction) “natural” factors and also government rules, regulations, and taxes. In all four regimes, final goods can be traded for a small cost of 0.1%. The four are as follows:

- NN - No trade, no foreign investment (i.e., no M or V firms) allowed
- TN - Trade in services (exports by N firms) allowed, no investment allowed
- NI - No trade in services feasible or allowed, but investment feasible/allowed.

TI - Trade and investment in services both allowed

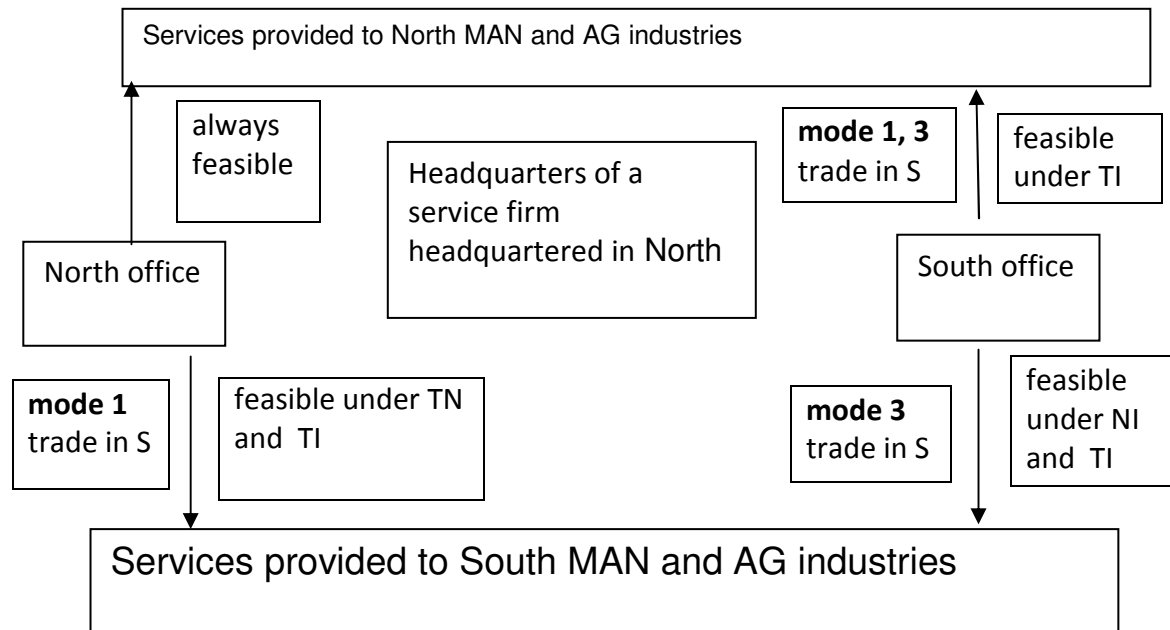
By “trade in services allowed”, we do have a small trade costs of one percent, otherwise we have the well-known problem of indeterminacy with three goods and one factor being traded. This one percent is actually important as we will note shortly. By investment allowed, we similarly have a small added fixed cost, set at 2.5%, for a type-V firm over a type-N firm (about 0.6% of total costs), also to prevent some amount of indeterminacy, plus it seems an eminently reasonable assumption that setting up a foreign firm incurs added fixed costs. Fixed costs for a two-office horizontal firm are set at 1.25 times the fixed costs of a type-N firm.

We can think of TN as allowing geographic fragmentation between services and manufacturing, but not allowing fragmentation within a service into headquarters and office. Under NI trade but not investment is feasible/allowed. Regime TI allows both to occur. TN permits what WTO terminology refers to as Mode 1 trade in services: cross border trade that does not involve an investment and involves minimal movement of persons. NI and TI permit what is called Mode 3, the establishment of a commercial presence (typically by a foreign direct investment) abroad. NI could occur, for example, if there are no government restrictions, but face-to-face contact is required so that investment via a foreign office is possible but exports of services are infeasible. So once again, when we use words like “permitted”, “allowed” or “liberalization” we are referring just as much to developments in technology and communications as to changes in government-imposed barriers.

Figure 2 gives an example of the service provision by one firm, located in the North. The top box is a manufacturing or agriculture firm located in the North and the bottom an manufacturing or agricultural firm located in the South. The domestic service firm has a headquarters in North (middle box of the diagram). It may have a domestic office in North which provides services to Northern firms (this is always allowed). That Northern office may provide services to Southern manufacturing firms, if trade in services (Mode 1) is allowed. The Northern firm may also establish a Southern office if investment in services is allowed (Mode 3). It can then provide services to local firms under regimes NI or TI. It can also provide exports services back to the Northern manufacturing firms under TI (both Modes 1 and 3 allowed), but not under

NI.

**Figure 2: Types of trade in services for a North service firm**



This completes the general description of the model. One crucial feature of the model is choice of factor intensities for the different activities. We have experimented with this a lot, and there are some differences in results of course. In this paper, we use a very “symmetric” calibration, such that manufacturing and agriculture both devote an equal share of expenditure to services (20 percent), manufacturing and services have factor intensities symmetrically located around the average world endowment, and (integrated) services factor intensities are exactly at the world average endowment.

Headquarter factor intensities for services are very skilled labor intensive and office production unskilled labor intensive. We calibrate to an elasticity of substitution among services of 4, which in turn implies that 25 percent of the value of services goes to fixed costs and 75 to variable costs. For the factor intensities of these services to add up to the average world endowment ratio, this is going to imply that the intensity ratio for headquarters is more remote from the world average than the ratio of office production. This is going to imply that symmetry will be broken when investment in services is allowed. Numbers are the H/L shares (all functions

Cobb-Douglas) used in the numerical simulation model to follow, with the overall “world” endowment normalized to 1.0

Fixed costs of service firm headquarters	4.00
Value added in manufacturing (direct use of H and L)	3.00
Overall manufacturing (value added plus intermediate services)	2.33
Overall service provision (headquarters plus office)	0.67
Overall agriculture (value added plus intermediate services)	0.43
Value added in agriculture (direct use of H and L)	0.33

Note that the overall factor intensities in manufacturing and agriculture are reciprocals ( $2.33 = 1/0.43$ ). Thus manufacturing and agriculture are symmetric around overall services which in turn equal the world endowment ratio.

The second step is to calibrate a numerical model used to solve for these equilibria. This is done by assuming that the countries are identical, and that foreign production (type M and V firms) is not allowed, and that trade in services by N firms is prohibitively costly. This scenario is then a benchmark equilibrium in which there is no geographic fragmentation of service production. Services are supplied solely to final-goods producers in the same country. Units are chosen such that the number of national firms in each country is equal to one, and production of each final good and production of services in each country is equal to one. There is no trade in services allowed and, since the countries are identical, there is no trade in final goods either in this benchmark. Thus all trade quantities are zero in the calibrated equilibrium.

Tables 2, 3 and 4 show the world Edgeworth box for our two-country model, where each point in the box is a division of the total world endowment between the two countries, with country  $i$  measured from the south-west (sw) corner. Countries differ in size but have identical relative factor endowments along the sw-ne diagonal, and have similar sizes but different relative endowments along the nw-se diagonal.

Table 2 shows the shares of service firms headquartered in country  $i$ , with the share headquartered in country  $j$  one minus this amount (alternatively, the share in country  $j$  is given by the cell which is a reflection through the center point). Table 3 gives that share of services

produced in country  $i$ . Four scenarios are computed in each case. The first scenario does not allow trade or investment in services, so the active firm types are national firms  $N_i$  and  $N_j$ . We see that both the share of firm headquarters and the share of services produced are related mostly to country size (and of course track one another closely), but are not equal across countries or between headquarters and output shares along the nw-se diagonal, once the countries are sufficiently different in size. The points in which the shares are 50-50 are in fact part of the factor-price equalization set for the world economy. Once outside of the set, the skilled-labor-abundant country will have a lower skilled wage, and hence will have a larger number of smaller-output firms: fixed costs are skilled-labor intensive and variable costs unskilled-labor intensive. For example, in the northwest corner, country  $i$  has 0.691 share of firms and 0.433 share of services output. Therefore, product variety and hence productivity will be higher in country  $i$  which exactly balances the lower quantity in country  $i$ , and both countries have identical welfare along the nw-se diagonal as a consequence of the symmetry in the model.

**Table 2: Share of service firms headquartered in country i (origin: sw corner)**

No trade or investment in services

i's share of skilled labor	0.9	0.691	0.728	0.755	0.777	0.795	0.812	0.829	0.858	0.910
	0.8	0.541	0.579	0.610	0.638	0.662	0.705	0.756	0.807	0.858
	0.7	0.458	0.485	0.500	0.551	0.603	0.654	0.705	0.756	0.801
	0.6	0.386	0.416	0.449	0.500	0.552	0.602	0.653	0.704	0.742
	0.5	0.320	0.352	0.398	0.449	0.500	0.551	0.602	0.648	0.680
	0.4	0.258	0.296	0.347	0.398	0.448	0.500	0.551	0.584	0.614
	0.3	0.199	0.244	0.295	0.346	0.397	0.449	0.500	0.515	0.542
	0.2	0.142	0.193	0.244	0.295	0.338	0.362	0.390	0.421	0.459
	0.1	0.090	0.142	0.171	0.188	0.205	0.223	0.245	0.272	0.309
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

Trade but not investment in services

i's share of skilled labor	0.9	0.691	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.8	0.106	0.579	0.810	1.000	0.842	0.796	0.860	0.919	1.000
	0.7	0.000	0.240	0.500	0.578	0.654	0.727	0.782	0.860	1.000
	0.6	0.000	0.000	0.422	0.500	0.578	0.621	0.727	0.796	1.000
	0.5	0.000	0.160	0.346	0.422	0.500	0.578	0.654	0.840	1.000
	0.4	0.000	0.204	0.273	0.379	0.422	0.500	0.578	1.000	1.000
	0.3	0.000	0.140	0.218	0.273	0.346	0.422	0.500	0.760	1.000
	0.2	0.000	0.081	0.140	0.204	0.158	0.000	0.190	0.421	0.894
	0.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.309
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

Investment but not trade in services

i's share of skilled labor	0.9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.654	0.570
	0.8	1.000	1.000	1.000	1.000	1.000	0.523	0.518	0.496	0.466
	0.7	1.000	1.000	0.527	0.526	0.526	0.525	0.523	0.465	0.000
	0.6	1.000	1.000	0.527	0.527	0.526	0.526	0.472	0.470	0.000
	0.5	1.000	0.710	0.527	0.527	0.500	0.473	0.473	0.290	0.000
	0.4	1.000	0.530	0.528	0.474	0.474	0.473	0.473	0.000	0.000
	0.3	1.000	0.535	0.477	0.475	0.474	0.474	0.473	0.000	0.000
	0.2	0.534	0.504	0.482	0.477	0.000	0.000	0.000	0.000	0.000
	0.1	0.430	0.346	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

Both trade and investment in services allowed

i's share of skilled labor	0.9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.8	1.000	1.000	1.000	1.000	1.000	0.790	0.853	0.920	0.930
	0.7	1.000	1.000	0.504	0.579	0.652	0.723	0.787	0.850	0.907
	0.6	0.938	0.102	0.428	0.504	0.579	0.632	0.717	0.785	0.623
	0.5	0.732	0.209	0.355	0.428	0.500	0.572	0.645	0.791	0.268
	0.4	0.377	0.215	0.283	0.368	0.421	0.496	0.572	0.898	0.062
	0.3	0.093	0.150	0.213	0.277	0.348	0.421	0.496	0.000	0.000
	0.2	0.070	0.080	0.147	0.210	0.000	0.000	0.000	0.000	0.000
	0.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	$O_i$		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
		i's share of unskilled labor								

The second box in Tables 2 and 3 lowers the costs for cross-border trade in services to one percent and again, of course,  $N_i$  and  $N_j$  are types of firms active. As a consequence, firm headquarters and output move in the same direction for a given country, but not exactly (outside the FPE set) due to the difference in factor intensities of fixed and variable costs as just discussed in the previous paragraph. What we see is that allowing trade in services leads to a big shift in service firm location and production away from the smaller country, regardless of whether it is skilled or unskilled-labor abundant. This is the complementarity or agglomeration effect discussed above, combined with the one-percent trade costs. With indeterminacy in production under completely free trade with three goods and two factors, the indeterminacy is broken by the small trade cost, and the services will agglomerate in the larger country, a result well-known in the economic geography literature. An outcome with service firms divided in proportion to country size with equal relative endowments is not an equilibrium in the presence of even very small trade costs, since the aggregate productivity of the service sector will be higher in the country with more diversity (or the price index for the composite service good will be lower in the large country).

**Table 3: Share of total services produced in country i (origin: sw corner)**

No trade or investment in services

I's share of skilled labor	0.9	0.433	0.555	0.620	0.674	0.722	0.767	0.811	0.858	0.910
	0.8	0.354	0.473	0.547	0.602	0.653	0.704	0.756	0.807	0.858
	0.7	0.308	0.421	0.500	0.551	0.602	0.653	0.705	0.756	0.820
	0.6	0.272	0.380	0.449	0.500	0.551	0.602	0.654	0.704	0.790
	0.5	0.239	0.342	0.398	0.449	0.500	0.551	0.602	0.658	0.761
	0.4	0.210	0.296	0.346	0.398	0.449	0.500	0.551	0.620	0.728
	0.3	0.180	0.244	0.295	0.347	0.398	0.449	0.500	0.579	0.692
	0.2	0.142	0.193	0.244	0.296	0.347	0.398	0.453	0.527	0.646
	0.1	0.090	0.142	0.189	0.233	0.278	0.326	0.380	0.445	0.567
		$O_i$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

I's share of unskilled labor

Trade but not investment in services

I's share of skilled labor	0.9	0.433	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	0.8	0.054	0.473	0.778	1.000	0.842	0.796	0.860	0.919	1.000
	0.7	0.000	0.206	0.500	0.578	0.654	0.727	0.782	0.860	1.000
	0.6	0.000	0.000	0.421	0.500	0.578	0.621	0.727	0.796	1.000
	0.5	0.000	0.160	0.345	0.421	0.500	0.579	0.655	0.840	1.000
	0.4	0.000	0.204	0.273	0.379	0.422	0.500	0.579	1.000	1.000
	0.3	0.000	0.140	0.218	0.273	0.346	0.422	0.500	0.794	1.000
	0.2	0.000	0.081	0.140	0.204	0.158	0.000	0.222	0.527	0.946
	0.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.567
		$O_i$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

I's share of unskilled labor

Investment but not trade in services

I's share of skilled labor	0.9	0.422	0.546	0.613	0.670	0.720	0.767	0.814	0.868	0.919
	0.8	0.346	0.463	0.540	0.597	0.650	0.713	0.766	0.820	0.872
	0.7	0.298	0.411	0.499	0.553	0.606	0.659	0.713	0.767	0.837
	0.6	0.260	0.368	0.446	0.499	0.553	0.606	0.661	0.714	0.805
	0.5	0.226	0.333	0.393	0.446	0.500	0.554	0.607	0.667	0.774
	0.4	0.195	0.286	0.339	0.394	0.447	0.501	0.554	0.632	0.740
	0.3	0.163	0.233	0.287	0.341	0.394	0.447	0.501	0.589	0.702
	0.2	0.128	0.180	0.234	0.287	0.350	0.403	0.460	0.537	0.654
	0.1	0.081	0.132	0.186	0.233	0.280	0.330	0.387	0.454	0.578
		$O_i$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

I's share of unskilled labor

Both trade and investment in services allowed

I's share of skilled labor	0.9	0.000	0.662	1.000	1.000	1.000	1.000	1.000	1.000	1.000
		$O_i$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8



0.8	0.000	0.227	0.660	1.000	1.000	0.790	0.853	0.920	1.000
0.7	0.000	0.000	0.504	0.579	0.652	0.723	0.787	0.850	1.000
0.6	0.000	0.000	0.428	0.504	0.578	0.632	0.717	0.786	1.000
0.5	0.000	0.155	0.354	0.428	0.500	0.572	0.646	0.845	1.000
0.4	0.000	0.214	0.283	0.368	0.422	0.496	0.572	1.000	1.000
0.3	0.000	0.150	0.213	0.277	0.348	0.421	0.496	1.000	1.000
0.2	0.000	0.080	0.147	0.210	0.000	0.000	0.340	0.773	1.000
0.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.338	1.000
$O_i$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

I's share of unskilled labor

The third boxes in Tables 2 and 3 give the case where investment but not trade becomes feasible or allowed. This regime type is common in many professional service sectors due to the prohibitive regulatory barriers imposed. In this case there are type  $M_i$  and  $M_j$  firms over much of the box, but also some national firms in the larger country when the countries are of very different sizes (sw and ne corners of the box). Now we see quite a different pattern of where headquarters are concentrated (Table 2) and where service production is unconcentrated (Table 3). Headquarters are a fixed cost that depends only on factor prices: its services are a joint input across plants and thus the headquarters location for a type-M firm does not depend on market size. Thus we see that headquarter concentration depends almost entirely on relative factor endowments in the third panel of Table 2, with concentration in the skilled-labor-abundant country.

Table 3 shows that service production (panel 3) under investment liberalization follows a close relationship to country size as in the other cases. But it is much less concentrated than in the trade-liberalization case (panel 2), and is much closer to the no trade, no investment case (panel 1). A firm's headquarters is in the skilled-labor-abundant country, and it has outputs in its two offices closely related to each market's size. The headquarters pattern in the Edgeworth box is opposite to that in the case of trade liberalization (panel 2, Table 2).

The final experiment, the bottom panels of Tables 2 and 3, shows the effect of both trade and investment liberalization due to technical change or regulation. Now type  $V_i$  and  $V_j$  firms dominate when the skilled-labor abundant country is relatively small (headquartered in that country) and national firms dominate when the countries are similar in relative endowments or the

skilled-labor abundant country is large (headquarters in that country). The pattern of production (panel 4, Table 3) and trade (not shown) in services closely resembles that in the case of trade but not investment in services allowed (panel 2, Table 3).

Although the pattern of firm location and production of services varies quite a bit among our four scenarios, the gains from liberalization in all three scenarios are similar. This is shown in the three panels of Table 4, where numbers are the proportional change in welfare relative to the no trade, no investment benchmark scenario. It is interesting that in the great majority of cells, both countries are strictly better off. We will return to this point in a minute. The only significant difference is that the gains under investment but not trade in services (panel 2) are small than under the other two liberalizations. This is easily understood. Costless (or almost costless) trade is always preferred to having to invest a second fixed cost. However, it is not very meaningful to compare the welfare under these scenarios, since it may be technical feasibility requires face-to-face contact, such that trade in services is simply infeasible and branch-office production via investment is the best we can do. Changes in factor prices are also similar in the three liberalization scenarios (not shown). In the majority of cells both factors gain in both countries. However, the scarce factor can lose when the country is large. This is discussed and explained more in Markusen (2006).

**Table 4: Proportional welfare gains for country i over no trade, no investment in services( shaded cells: welfare strictly increases for both countries**

Trade but not investment in services

i's share of skilled labor	0.9	0.043	0.239	0.103	0.049	0.036	0.026	0.018	0.011	0.007
	0.8	0.099	0.044	0.095	0.056	0.032	0.023	0.018	0.014	0.011
	0.7	0.050	0.000	0.044	0.039	0.033	0.027	0.022	0.018	0.018
	0.6	0.109	0.041	0.051	0.044	0.038	0.032	0.027	0.023	0.026
	0.5	0.108	0.060	0.058	0.051	0.044	0.038	0.033	0.032	0.036
	0.4	0.106	0.076	0.068	0.059	0.051	0.044	0.039	0.056	0.049
	0.3	0.103	0.090	0.078	0.068	0.058	0.051	0.044	0.095	0.103
	0.2	0.125	0.105	0.090	0.076	0.060	0.041	0.000	0.044	0.219
	0.1	0.153	0.125	0.103	0.106	0.108	0.109	0.050	0.129	0.043
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

i's share of unskilled labor

Investment but not trade in services

i's share of skilled labor	0.9	0.072	0.051	0.024	0.015	0.008	0.004	0.000	0.000	0.000
	0.8	0.034	0.061	0.037	0.027	0.018	0.011	0.006	0.002	0.000
	0.7	0.042	0.035	0.033	0.027	0.021	0.016	0.010	0.006	0.005
	0.6	0.052	0.042	0.039	0.033	0.027	0.021	0.016	0.011	0.014
	0.5	0.062	0.051	0.047	0.040	0.033	0.027	0.021	0.019	0.022
	0.4	0.075	0.065	0.057	0.048	0.040	0.033	0.027	0.030	0.031
	0.3	0.089	0.079	0.067	0.057	0.047	0.039	0.033	0.039	0.040
	0.2	0.097	0.094	0.079	0.065	0.050	0.047	0.042	0.021	0.050
	0.1	0.097	0.097	0.099	0.092	0.085	0.079	0.072	0.052	0.031
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

i's share of unskilled labor

Both trade and investment in services allowed

i's share of skilled labor	0.9	0.018	0.156	0.103	0.049	0.036	0.026	0.018	0.011	0.007
	0.8	0.012	0.026	0.083	0.056	0.033	0.023	0.018	0.014	0.010
	0.7	0.106	0.024	0.044	0.039	0.033	0.027	0.022	0.018	0.017
	0.6	0.106	0.040	0.051	0.044	0.038	0.032	0.027	0.023	0.026
	0.5	0.105	0.059	0.058	0.051	0.044	0.038	0.033	0.032	0.037
	0.4	0.103	0.076	0.068	0.059	0.051	0.044	0.039	0.055	0.052
	0.3	0.101	0.090	0.078	0.068	0.058	0.051	0.044	0.089	0.075
	0.2	0.122	0.105	0.090	0.076	0.061	0.041	0.020	0.091	0.182
	0.1	0.153	0.125	0.103	0.106	0.108	0.109	0.050	0.010	0.192
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8

i's share of unskilled labor

Before closing, some comments on these welfare and factor-price effects are in order.

The biggest caveat is that the optimistic scenario that almost every one gains except when the

countries are very different in relative endowments or size is partly dependent on the symmetry of the model, in which services have a “neutral” factor intensity and both final goods use services as inputs equally. Earlier work shows that when services enter only one sector, the ability to trade or invest in foreign service production has many more non-Pareto-improving outcomes, both between and within countries. Typically, the country that is relatively specialized in the sector using services is the loser (if there is one) from introducing trade and/or investment in services. This trade causes a loss of effective monopoly power for this country, and it suffers a negative terms-of-trade effect (Markusen and Venables 2007).

## **V. Summary and Conclusions**

This paper offers an approach for modeling trade and foreign investment in services and for both identifying and estimating the costs to the world economy of various barriers to services. We begin with a discussion about the various barriers to both cross-border trade and to establishing a foreign commercial presence via FDI. We argue that the typical barriers are often quite different from those for trade and FDI in goods, and so a whole new empirical approach is needed.

Paralleling the need to develop a data base, we need to think about a conceptual framework for the problem. After identifying some of the characteristics that we think must be included in a modeling framework, we then argue that Markusen’s (2002) knowledge-capital model is a good vehicle for a start. It captures and exploits many of the properties of knowledge-based assets that are surely at least as important for services as for manufacturing (where physical capital is often more important).

We contend that some simulations of that model are instructive. Liberalizations, or technical improvements that reduce costs, may occur for cross-border trade and/or for FDI, in the latter case via lowering the fixed costs of establishing a foreign subsidiary. Falling trade costs alone obviously encourage trade only, while falling investment costs encourage the creation of multi-office horizontal multinationals with local offices serving local customers. When both fall,

vertical multinationals, with a skilled-labor intensive headquarters in one country and a less-skilled-labor-intensive office in the other country serving both markets, can arise.

Results are obviously dependent on a range of assumptions, especially factor intensities of various activities (true in any theory model). The simulation results are thus suggestive and certainly not definitive. In spite of this, we think that they are quite useful for further analyses and research. Results indicate that the relocation of service firm headquarters and the relocation of offices varies a great deal whether it is trade costs, investment costs, or both that fall. Some of the general results which we feel will hold up under many alternative parameterizations are as follows.

Decreasing trade but not investment costs obviously moves the production of services and the number of service firms headquartered in a country in the same direction. Services production and firm numbers tend to become more concentrated in the larger country, due to the complementarity among services (a larger range of services makes the final-goods sectors more productive). We see this empirically at the city level, with places like London, New York, and Singapore becoming large business services centers. Concentration of headquarters and service production reacts much less to differences in relative factor endowments between the countries. This is one result, however, that is clearly tied to our assumptions: in particular, that services are needed equally in both final-goods sectors. See Markusen (2006) for an asymmetric case in which the services are only used in one final-goods sector.

Decreasing investment costs but not trade costs has little effect on the location and concentration of services production, but a big effect on headquarters locations. Headquarters become much more concentrated in the skilled-labor-abundant country, with difference in country size playing quite a minor role.

Liberalizing both trade and investment in services leads to a pattern of service production that closely resembles that for liberalization in trade only; that is, service production is concentrated in the large country, with relative endowments playing a minor role. The pattern of headquarters location could be characterized as “in between” the trade and investment only liberalization scenarios (bottom panel of Table 2). Both differences in size and in relative

endowments play a role, with headquarters concentrated in large and/or skilled-labor-abundant countries.

Interestingly however, the pattern of welfare and factor-price changes are much less sensitive to which mode of services supply is liberalized or where costs fall. Regardless of whether it is trade costs or fixed costs of investment that are falling, the system finds very different channels of arbitrage, but rather similar welfare consequences in the end. It is the case that the welfare benefits are greater for liberalization of trade than for liberalization of investment (Table 4). This is due to the added fixed costs of a second office in horizontal investment whereas eliminating trade costs means that a firm can costlessly add supply to a foreign market. In a sense, the model is going to produce a finding that trade liberalization is more beneficial than investment liberalization by assumption. However, this point is not very relevant if there are natural barriers to trade in services, such as the need for face-to-face contact, which cannot simply be eliminated by policy changes. The welfare numbers we get for liberalization of both trade and investment in services (Table 4, bottom panel) look quite similar to the benefits we get from liberalizing trade alone (top panel). To the extent that barriers to trade are policy imposed and not natural, this suggests that trade liberalization is particularly valuable as it avoids the fixed costs of establishing a foreign commercial presence.

## COMPUTER CODE

\$TITLE: WE4.GMS SIX FIRM TYPE, ITERATIVE SOLUTION  
\* CALIBRATED TO COUNTRIES IDENTICAL  
\* same as WE4.GMS except also sub elas = 1

### PARAMETERS

```
ENDUKI
ENDSKI
ENDUKJ
ENDSKJ
TC
SUBSIDY
SIGMA
REALWI
REALWJ
REALZI
REALZJ
MK
INEFI
INEFJ
SCALE
EXT
TCS
SQ0, SP0
FNI, FNJ, FMI, FMJ, FVI, FVJ;

FNI=1; FNJ=1; FMI=1; FMJ=1; FVI=1; FVJ=1;

ENDUKI = 1;
ENDSKI = 1;
ENDUKJ = 1;
ENDSKJ = 1;
TCS = 1;
SUBSIDY = 0;
SIGMA = 4;
MK = 1/(SIGMA-1);
INEFI = 1;
INEFJ = 1;
SCALE = 1.2;
EXT = 1/(SIGMA - 1);

SQ0 = 15/(6** (SIGMA/(SIGMA-1)));
SP0 = 20/(SQ0*6);

DISPLAY SQ0, SP0;

$ONTEXT
$MODEL:BASE

$SECTORS:
YI YJ
XI XJ
SI SJ
NI NJ
```

SMII SMIJ SMJJ SMJI  
MI MJ  
SVI SVJ  
VI VJ  
EYI EYJ  
EXI EXJ  
ESI ESJ  
ESVI ESVJ  
UI UJ

\$COMMODITIES:

PYI PYJ  
PXI PXJ  
PSI PSJ  
PSII PSIJ  
PSJJ PSJI  
PSVI PSVJ  
PSEI PSEJ  
PVEI PVEJ  
FCI FCJ  
FCMI FCMJ  
FCVI FCVJ  
PSKI PSKJ  
PUKI PUKJ  
PUI PUJ

\$CONSUMERS:

CONSI CONSJ  
ENI ENJ  
EMI EMJ  
EVI EVJ

\$PROD:YI s:1.0 a:4  
O:PYI Q:100.0  
I:PUKI Q: 60.0  
I:PSKI Q: 20.0  
I:PSI Q:SQ0 P:SP0 a:  
I:PSII Q:SQ0 P:SP0 a:  
I:PSJI Q:SQ0 P:SP0 a:  
I:PSVI Q:SQ0 P:SP0 a:  
I:PSEJ Q:SQ0 P:SP0 a:  
I:PVEJ Q:SQ0 P:SP0 a:

\$PROD:YJ s:1.0 a:4  
O:PYJ Q:100.0  
I:PUKJ Q: 60.0  
I:PSKJ Q: 20.0  
I:PSJ Q:SQ0 P:SP0 a:  
I:PSJJ Q:SQ0 P:SP0 a:  
I:PSIJ Q:SQ0 P:SP0 a:  
I:PSVJ Q:SQ0 P:SP0 a:  
I:PSEI Q:SQ0 P:SP0 a:  
I:PVEI Q:SQ0 P:SP0 a:

\$PROD:XI s:1 a:4



```

O:PXI      Q:100.
I:PUKI     Q:20
I:PSKI     Q:60
I:PSI      Q:SQ0  P:SP0  a:
I:PSII     Q:SQ0  P:SP0  a:
I:PSJI     Q:SQ0  P:SP0  a:
I:PSVI     Q:SQ0  P:SP0  a:
I:PSEJ     Q:SQ0  P:SP0  a:
I:PVEJ     Q:SQ0  P:SP0  a:

$PROD:XJ   s:1  a:4
O:PXJ      Q:100.
I:PUKJ     Q:20
I:PSKJ     Q:60
I:PSJ      Q:SQ0  P:SP0  a:
I:PSJJ     Q:SQ0  P:SP0  a:
I:PSIJ     Q:SQ0  P:SP0  a:
I:PSVJ     Q:SQ0  P:SP0  a:
I:PSEI     Q:SQ0  P:SP0  a:
I:PVEI     Q:SQ0  P:SP0  a:

$PROD:SI   s:1
O:PSI      Q:(30*FNI**EXT)
I:PUKI     Q:18  A:ENI   T:MK
I:PSKI     Q:12  A:ENI   T:MK

$PROD:SJ   s:1
O:PSJ      Q:(30*FNJ**EXT)
I:PUKJ     Q:18  A:ENJ   T:MK
I:PSKJ     Q:12  A:ENJ   T:MK

$PROD:NI   s:1
O:FCI      Q:10
I:PUKI     Q:2
I:PSKI     Q:8

$PROD:NJ   s:1
O:FCJ      Q:10
I:PUKJ     Q:2
I:PSKJ     Q:8

$PROD:SMII s:1
O:PSII     Q:(30*FMI**EXT)
I:PUKI     Q:18  A:EMI   T:MK
I:PSKI     Q:12  A:EMI   T:MK

$PROD:SMIJ s:1
O:PSIJ     Q:(30*FMI**EXT)
I:PUKJ     Q:18  A:EMI   T:MK
I:PSKJ     Q:12  A:EMI   T:MK

$PROD:SMJJ s:1
O:PSJJ     Q:(30*FMJ**EXT)
I:PUKJ     Q:18  A:EMJ   T:MK
I:PSKJ     Q:12  A:EMJ   T:MK

$PROD:SMJI s:1

```

```

O:PSJI    Q:(30*FMJ**EXT)
I:PUKI    Q:18  A:EMJ    T:MK
I:PSKI    Q:12  A:EMJ    T:MK

$PROD:MI   s:1
O:FCMI    Q:(10)
I:PUKI    Q:(1*SCALE)
I:PSKI    Q:(6*SCALE)
I:PUKJ    Q:(1*SCALE)
I:PSKJ    Q:(2*SCALE)

$PROD:MJ   s:1
O:FCMJ    Q:(10)
I:PUKI    Q:(1*SCALE)
I:PSKI    Q:(2*SCALE)
I:PUKJ    Q:(1*SCALE)
I:PSKJ    Q:(6*SCALE)

$PROD:SVI  s:1
O:PSVJ    Q:(30*FVI**EXT)
I:PUKJ    Q:18  A:EVI    T:MK
I:PSKJ    Q:12  A:EVI    T:MK

$PROD:SVJ  s:1
O:PSVI    Q:(30*FVJ**EXT)
I:PUKI    Q:18  A:EVJ    T:MK
I:PSKI    Q:12  A:EVJ    T:MK

$PROD:VI   s:1
O:FCVI    Q:10
I:PUKI    Q:(2*1.025)
I:PSKI    Q:(8*1.025)

$PROD:VJ   s:1
O:FCVJ    Q:10
I:PUKJ    Q:(2*1.025)
I:PSKJ    Q:(8*1.025)

$PROD:EYI
O:PYJ     Q:99.9
I:PYI     Q:100
$PROD:EYJ
O:PYI     Q:99.9
I:PYJ     Q:100
$PROD:EXI
O:PXJ     Q:99.9
I:PXI     Q:100
$PROD:EXJ
O:PXI     Q:99.9
I:PXJ     Q:100

$PROD:ESI
O:PSEI    Q:(30*FNI**EXT)
I:PSI     Q:(30*FNI**EXT*TCS)
$PROD:ESJ
O:PSEJ    Q:(30*FNJ**EXT)
I:PSJ     Q:(30*FNJ**EXT*TCS)

```

\$PROD:ESVJ  
O:PVEJ Q:(30\*FVI\*\*EXT)  
I:PSVJ Q:(30\*FVI\*\*EXT\*TCS)

\$PROD:ESVI  
O:PVEI Q:(30\*FVJ\*\*EXT)  
I:PSVI Q:(30\*FVJ\*\*EXT\*TCS)

\$PROD:UI s:1.0  
O:PUI Q:200.  
I:PXI Q:100.  
I:PYI Q:100.

\$PROD:UJ s:1.0  
O:PUJ Q:200.  
I:PXJ Q:100.  
I:PYJ Q:100.

\$DEMAND:CONSI  
D:PUI Q:200  
E:PUKI Q:(100\*ENDUKI)  
E:PSKI Q:(100\*ENDSKI)  
E:PSI Q:0.03  
E:PSII Q:0.03  
E:PSJI Q:0.03  
E:PSVI Q:0.03  
E:PSEJ Q:0.03  
E:PVEJ Q:0.03

\$DEMAND:CONSJ  
D:PUJ Q:200  
E:PUKJ Q:(100\*ENDUKJ)  
E:PSKJ Q:(100\*ENDSKJ)  
E:PSJ Q:0.03  
E:PSJJ Q:0.03  
E:PSIJ Q:0.03  
E:PSVJ Q:0.03  
E:PSEI Q:0.03  
E:PVEI Q:0.03

\$DEMAND:ENI  
D:FCI

\$DEMAND:ENJ  
D:FCJ

\$DEMAND:EMI  
D:FCMI

\$DEMAND:EMJ  
D:FCMJ

\$DEMAND:EVI  
D:FCVI

\$DEMAND:EVJ  
D:FCVJ

```
$OFFTEXT
$SYSINCLUDE MPSGESET BASE
```

```
BASE.ITERLIM = 5000;
OPTION MCP = PATH;
OPTION SOLPRINT = OFF;
PUI.FX = 1;
```

```
PSI.L = 1.25;
PSJ.L = 1.25;
PSII.L = 1.25;
PSIJ.L = 1.25;
PSJJ.L = 1.25;
PSJI.L = 1.25;
```

```
SETS I /1*90/
      J /1*9/
      K /1*9/;
```

```
PARAMETERS
  DEV, ITERN
  REPORTN(*, J, K)
  REPORTE(*, J, K)
  REPORTI(*, J, K)
  REPORTY(*, J, K);
```

```
LOOP(J,
LOOP(K,
```

```
ENDSKI = 2.0 - 0.2*ORD(J);
ENDSKJ = 0.2*ORD(J);
ENDUKI = 0.2*ORD(K);
ENDUKJ = 2.0 - 0.2*ORD(K);
```

```
NI.L = 1; NJ.L = 1;
MI.L = 1; MJ.L = 1;
VI.L = 1; VJ.L = 1;
SI.L = 1; SJ.L = 1;
SVI.L = 1; SVJ.L = 1;
SMII.L = 1; SMIJ.L = 1;
SMJJ.L = 1; SMJI.L = 1;
```

```
DEV = 1;
```

```
LOOP(I$(DEV GT 0.0003),
```

```
FNI = MAX(NI.L, 0.0001);
FNJ = MAX(NJ.L, 0.0001);
FMI = 0.0001;
FMJ = 0.0001;
FVI = 0.0001;
```

```

FVJ = 0.0001;
TCS = 50;

OPTION SOLPRINT = OFF;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

DEV = MAX(ABS(FNI-NI.L), ABS(FNJ-NJ.L), ABS(FMI-MI.L), ABS(FMJ-MJ.L),
          ABS(FVI-VI.L), ABS(FVJ-VJ.L));
ITERN = ORD(I);

);

OPTION SOLPRINT = ON;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

REPORTN("ITERN", J, K) = ITERN;
REPORTN("DEV", J, K) = DEV;
REPORTN("NI", J, K) = MAX(NI.L, 0.0001);
REPORTN("NJ", J, K) = MAX(NJ.L, 0.0001);
REPORTN("MI", J, K) = MAX(MI.L, 0.0001);
REPORTN("MJ", J, K) = MAX(MJ.L, 0.0001);
REPORTN("VI", J, K) = MAX(VI.L, 0.0001);
REPORTN("VJ", J, K) = MAX(VJ.L, 0.0001);
REPORTN("XI", J, K) = MAX(XI.L, 0.0001);
REPORTN("XJ", J, K) = MAX(XJ.L, 0.0001);
REPORTN("SI", J, K) = MAX(SI.L+SMII.L+SMJI.L+SVJ.L, 0.0001);
REPORTN("SJ", J, K) = MAX(SJ.L+SMJJ.L+SMIJ.L+SVI.L, 0.0001);
REPORTN("EXI", J, K) = MAX(EXI.L, 0.0001);
REPORTN("EXJ", J, K) = MAX(EXJ.L, 0.0001);
REPORTN("ESI", J, K) = MAX(ESI.L, 0.0001);
REPORTN("ESJ", J, K) = MAX(ESJ.L, 0.0001);
REPORTN("ESVI", J, K) = MAX(ESVI.L, 0.0001);
REPORTN("ESVJ", J, K) = MAX(ESVJ.L, 0.0001);
REPORTN("PSKI", J, K) = PSKI.L/PUI.L;
REPORTN("PSKJ", J, K) = PSKJ.L/PUJ.L;
REPORTN("PUKI", J, K) = PUKI.L/PUI.L;
REPORTN("PUKJ", J, K) = PUKJ.L/PUJ.L;
REPORTN("WELI", J, K) = UI.L;
REPORTN("WELJ", J, K) = UJ.L;

);
);

DISPLAY DEV;
$LIBINCLUDE XLDUMP REPORTN WORLDEC4 SHEET1!A3

LOOP(J,
LOOP(K,

ENDSKI = 2.0 - 0.2*ORD(J);
ENDSKJ = 0.2*ORD(J);
ENDUKI = 0.2*ORD(K);
ENDUKJ = 2.0 - 0.2*ORD(K);

```

```

NI.L = 1; NJ.L = 1;
MI.L = 1; MJ.L = 1;
VI.L = 1; VJ.L = 1;
SI.L = 1; SJ.L = 1;
SVI.L = 1; SVJ.L = 1;
SMII.L = 1; SMIJ.L = 1;
SMJJ.L = 1; SMJI.L = 1;

DEV = 1;

LOOP(I$(DEV GT 0.0003),

FNI = MAX(NI.L, 0.0001);
FNJ = MAX(NJ.L, 0.0001);
FMI = 0.0001;
FMJ = 0.0001;
FVI = 0.0001;
FVJ = 0.0001;
TCS = 1.01;

OPTION SOLPRINT = OFF;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

DEV = MAX(ABS(FNI-NI.L), ABS(FNJ-NJ.L), ABS(FMI-MI.L), ABS(FMJ-MJ.L),
          ABS(FVI-VI.L), ABS(FVJ-VJ.L));

ITERN = ORD(I);

);

FNI$(NI.L LT 0.1) = 0.0001;
FNJ$(NJ.L LT 0.1) = 0.0001;
FMI$(MI.L LT 0.1) = 0.0001;
FMJ$(MJ.L LT 0.1) = 0.0001;
FVI$(VI.L LT 0.1) = 0.0001;
FVJ$(VJ.L LT 0.1) = 0.0001;

OPTION SOLPRINT = ON;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

REPORTE("ITERN", J, K) = ITERN;
REPORTE("DEV", J, K) = DEV;
REPORTE("NI", J, K) = MAX(NI.L, 0.0001);
REPORTE("NJ", J, K) = MAX(NJ.L, 0.0001);
REPORTE("MI", J, K) = MAX(MI.L, 0.0001);
REPORTE("MJ", J, K) = MAX(MJ.L, 0.0001);
REPORTE("VI", J, K) = MAX(VI.L, 0.0001);
REPORTE("VJ", J, K) = MAX(VJ.L, 0.0001);
REPORTE("XI", J, K) = MAX(XI.L, 0.0001);
REPORTE("XJ", J, K) = MAX(XJ.L, 0.0001);
REPORTE("SI", J, K) = MAX(SI.L+SMII.L+SMJI.L+SVJ.L, 0.0001);
REPORTE("SJ", J, K) = MAX(SJ.L+SMJJ.L+SMIJ.L+SVI.L, 0.0001);
REPORTE("EXI", J, K) = MAX(EXI.L, 0.0001);
REPORTE("EXJ", J, K) = MAX(EXJ.L, 0.0001);
REPORTE("ESI", J, K) = MAX(ESI.L, 0.0001);

```

```

REPORTE("ESJ", J, K) = MAX(ESJ.L, 0.0001);
REPORTE("ESVI", J, K) = MAX(ESVI.L, 0.0001);
REPORTE("ESVJ", J, K) = MAX(ESVJ.L, 0.0001);
REPORTE("PSKI", J, K) = PSKI.L/PUI.L;
REPORTE("PSKJ", J, K) = PSKJ.L/PUJ.L;
REPORTE("PUKI", J, K) = PUKI.L/PUI.L;
REPORTE("PUKJ", J, K) = PUKJ.L/PUJ.L;
REPORTE("WELI", J, K) = UI.L;
REPORTE("WELJ", J, K) = UJ.L;

```

```

);
);

```

```

$LIBINCLUDE XLDUMP REPORTE WORLDEC4 SHEET2!A3

```

```

LOOP(J,
LOOP(K,

```

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ENDSKI = 2.0 - 0.2*ORD(J);
ENDSKJ = 0.2*ORD(J);
ENDUKI = 0.2*ORD(K);
ENDUKJ = 2.0 - 0.2*ORD(K);

```

```

NI.L = 1; NJ.L = 1;
MI.L = 1; MJ.L = 1;
VI.L = 1; VJ.L = 1;
SI.L = 1; SJ.L = 1;
SVI.L = 1; SVJ.L = 1;
SMII.L = 1; SMIJ.L = 1;
SMJJ.L = 1; SMJI.L = 1;

```

```

DEV = 1;

```

```

LOOP(I$(DEV GT 0.0002),

```

```

FNI = MAX(NI.L, 0.0001);
FNJ = MAX(NJ.L, 0.0001);
FMI = MAX(MI.L, 0.0001);
FMJ = MAX(MJ.L, 0.0001);
FVI = 0.0001;
FVJ = 0.0001;
TCS = 50;

```

```

OPTION SOLPRINT = OFF;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

```

```

DEV = MAX(ABS(FNI-NI.L), ABS(FNJ-NJ.L), ABS(FMI-MI.L), ABS(FMJ-MJ.L),
ABS(FVI-VI.L), ABS(FVJ-VJ.L));

```

```

ITERN = ORD(I);

```

```

);

```

```

FNI$(NI.L LT 0.1) = 0.0001;
FNJ$(NJ.L LT 0.1) = 0.0001;

```

```
FMI$(MI.L LT 0.1) = 0.0001;
FMJ$(MJ.L LT 0.1) = 0.0001;
FVI$(VI.L LT 0.1) = 0.0001;
FVJ$(VJ.L LT 0.1) = 0.0001;
```

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OPTION SOLPRINT = ON;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;
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REPORTI("ITERN", J, K) = ITERN;
REPORTI("DEV", J, K) = DEV;
REPORTI("NI", J, K) = MAX(NI.L, 0.0001);
REPORTI("NJ", J, K) = MAX(NJ.L, 0.0001);
REPORTI("MI", J, K) = MAX(MI.L, 0.0001);
REPORTI("MJ", J, K) = MAX(MJ.L, 0.0001);
REPORTI("VI", J, K) = MAX(VI.L, 0.0001);
REPORTI("VJ", J, K) = MAX(VJ.L, 0.0001);
REPORTI("XI", J, K) = MAX(XI.L, 0.0001);
REPORTI("XJ", J, K) = MAX(XJ.L, 0.0001);
REPORTI("SI", J, K) = MAX(SI.L+SMII.L+SMJI.L+SVJ.L, 0.0001);
REPORTI("SJ", J, K) = MAX(SJ.L+SMJJ.L+SMIJ.L+SVI.L, 0.0001);
REPORTI("EXI", J, K) = MAX(EXI.L, 0.0001);
REPORTI("EXJ", J, K) = MAX(EXJ.L, 0.0001);
REPORTI("ESI", J, K) = MAX(ESI.L, 0.0001);
REPORTI("ESJ", J, K) = MAX(ESJ.L, 0.0001);
REPORTI("ESVI", J, K) = MAX(ESVI.L, 0.0001);
REPORTI("ESVJ", J, K) = MAX(ESVJ.L, 0.0001);
REPORTI("PSKI", J, K) = PSKI.L/PUI.L;
REPORTI("PSKJ", J, K) = PSKJ.L/PUJ.L;
REPORTI("PUKI", J, K) = PUKI.L/PUI.L;
REPORTI("PUKJ", J, K) = PUKJ.L/PUJ.L;
REPORTI("WELI", J, K) = UI.L;
REPORTI("WELJ", J, K) = UJ.L;
```

```
);
);
```

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$LIBINCLUDE XLDUMP REPORTI WORLDEC4 SHEET3!A3
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```
LOOP(J,
LOOP(K,
```

```
ENDSKI = 2.0 - 0.2*ORD(J);
ENDSKJ = 0.2*ORD(J);
ENDUKI = 0.2*ORD(K);
ENDUKJ = 2.0 - 0.2*ORD(K);
```

```
NI.L = 1; NJ.L = 1;
MI.L = .0001; MJ.L = .0001;
VI.L = 1; VJ.L = 1;
SI.L = 1; SJ.L = 1;
SVI.L = 1; SVJ.L = 1;
SMII.L = 0; SMIJ.L = 0;
SMJJ.L = 0; SMJI.L = 0;
```

```
DEV = 1;
```



```

LOOP(I$(DEV GT 0.0003),

FNI = MAX(NI.L, 0.0001);
FNJ = MAX(NJ.L, 0.0001);
FMI = 0.0001;
FMJ = 0.0001;
FVI = MAX(VI.L, 0.0001);
FVJ = MAX(VJ.L, 0.0001);
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FNJ$(NJ.L LT 0.01) = 0.0001;
FMI$(MI.L LT 0.01) = 0.0001;
FMJ$(MJ.L LT 0.01) = 0.0001;
FVI$(VI.L LT 0.01) = 0.0001;
FVJ$(VJ.L LT 0.01) = 0.0001;

NI.L$(NI.L LT 0.01) = 0.000;
NJ.L$(NJ.L LT 0.01) = 0.000;
MI.L$(MI.L LT 0.01) = 0.000;
MJ.L$(MJ.L LT 0.01) = 0.000;
VI.L$(VI.L LT 0.01) = 0.000;
VJ.L$(VJ.L LT 0.01) = 0.000;
SI.L$(NI.L LT 0.01) = 0.000;
SJ.L$(NJ.L LT 0.01) = 0.000;
SMII.L$(MI.L LT 0.01) = 0.000;
SMIJ.L$(MI.L LT 0.01) = 0.000;
SMJJ.L$(MJ.L LT 0.01) = 0.000;
SMJI.L$(MJ.L LT 0.01) = 0.000;
SVI.L$(VI.L LT 0.01) = 0.000;
SVJ.L$(VJ.L LT 0.01) = 0.000;
TCS = 1.01;

OPTION SOLPRINT = OFF;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

DEV = MAX(ABS(FNI-NI.L), ABS(FNJ-NJ.L), ABS(FMI-MI.L), ABS(FMJ-MJ.L),
          ABS(FVI-VI.L), ABS(FVJ-VJ.L));

ITERN = ORD(I);

);

$ONTEXT
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FNJ$(NJ.L LT 0.1) = 0.0001;
FMI$(MI.L LT 0.1) = 0.0001;
FMJ$(MJ.L LT 0.1) = 0.0001;
FVI$(VI.L LT 0.1) = 0.0001;
FVJ$(VJ.L LT 0.1) = 0.0001;
$OFFTEXT

OPTION SOLPRINT = ON;
$INCLUDE BASE.GEN
SOLVE BASE USING MCP;

```

```

REPORTY("ITERN", J, K) = ITERN;
REPORTY("DEV", J, K) = DEV;
REPORTY("NI", J, K) = MAX(NI.L, 0.0001);
REPORTY("NJ", J, K) = MAX(NJ.L, 0.0001);
REPORTY("MI", J, K) = MAX(MI.L, 0.0001);
REPORTY("MJ", J, K) = MAX(MJ.L, 0.0001);
REPORTY("VI", J, K) = MAX(VI.L, 0.0001);
REPORTY("VJ", J, K) = MAX(VJ.L, 0.0001);
REPORTY("XI", J, K) = MAX(XI.L, 0.0001);
REPORTY("XJ", J, K) = MAX(XJ.L, 0.0001);
REPORTY("SI", J, K) = MAX(SI.L+SMII.L+SMJI.L+SVJ.L, 0.0001);
REPORTY("SJ", J, K) = MAX(SJ.L+SMJJ.L+SMIJ.L+SVI.L, 0.0001);
REPORTY("EXI", J, K) = MAX(EXI.L, 0.0001);
REPORTY("EXJ", J, K) = MAX(EXJ.L, 0.0001);
REPORTY("ESI", J, K) = MAX(ESI.L, 0.0001);
REPORTY("ESJ", J, K) = MAX(ESJ.L, 0.0001);
REPORTY("ESVI", J, K) = MAX(ESVI.L, 0.0001);
REPORTY("ESVJ", J, K) = MAX(ESVJ.L, 0.0001);
REPORTY("PSKI", J, K) = PSKI.L/PUI.L;
REPORTY("PSKJ", J, K) = PSKJ.L/PUJ.L;
REPORTY("PUKI", J, K) = PUKI.L/PUI.L;
REPORTY("PUKJ", J, K) = PUKJ.L/PUJ.L;
REPORTY("WELI", J, K) = UI.L;
REPORTY("WELJ", J, K) = UJ.L;

);
);

```

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## **Chapter 4: Modeling Entry and Operational Barriers to Trade in Producer and Business Services**

### **I. Introduction**

In this paper I will introduce a new CGE model which allows for the incorporation of both variable and fixed trade costs for services and also has two different service sectors entering the production processes. The objective is to present an alternative model for analyzing how barriers to the provision of professional and business services abroad affect the decisions of multinational companies and the factor prices in both countries. The model uses simulated data and is therefore more of a demonstration of a new way to capture the differences in consumption and production of professional services and the barriers that impact their provision from the theory guiding models for goods trade and FDI. Section II provides theoretical and empirical background and discusses data issues that impact the analysis of services trade and affiliate production. Section III and IV goes over the various regulatory restrictions that affect trade in services and the model's background. Section V outlines the innovative aspects of the model while Section VI covers the models structure. Section presents four different experiments and Section VII concludes.

### **II. Background**

The literature often assumes that business and “producer services” are purely intermediate goods. In the model presented below there are two separate services sectors, Y and B services. Sector Y produces an intermediate service input into final goods production and it is also a final service consumed within the economy by individual consumers. This aspect of the model captures household consumption of business services which is often overlooked in modeling services. Personal consumption of services is often restricted in economics literature to tourism, transportation, education and health services. While these are indeed important sectors for household consumption, the growth of the information communication technology sector has

allowed numerous additional business and professional services to be provided to the individual consumer in most developed countries as well as developing countries with solid technological infrastructure. Many households routinely conduct transactions in financial, accounting, insurance, and computer services. The Y sector includes financial, banking, and insurance services, among others which can be consumed by households as well as firms.

The other service sector in the model, B, is purely representative of intermediate services and is initially limited to be an input into the production of Y and not the manufacturing or agricultural sectors directly. This is intended to represent the usage of services such as research and development, computer and software engineering, architectural engineering and other highly skilled professional services not consumed by households.

While the interactions of services types within the model presented below may seem at first to be overly complex, it is straightforward once the notation and model assumptions are understood. The different production and consumption behavior for professional and business services requires additions to traditional trade models that incorporate FDI and trade. A number of assumptions concerning multinational activity have been found to be in contrast to what is shown empirically where the data does not support the theory. For example, it is often maintained that cross-border supply of services and foreign affiliate sales of services are substitute methods of supplying services abroad. This is based on the contention that when a host country has high trade costs for an imported service, a foreign exporting firm will establish a commercial presence to services the market (if it is a valuable market. Likewise, if there are high investment costs to establishing an affiliate, the firm will supply the services through exporting from the home country. It is a fact that data does support this tariff jumping activity of manufacturing multinationals; however, services multinationals encounter different restrictions to entry depending on the specific industry. Most restrictions to services are behind the border which creates a rationale for substitution from uncertainty surrounding the fixed costs of establishing commercial presence in the host country.

The possibility of a complementary relationship between cross-border trade and foreign affiliate production has most often been discussed in terms of vertical multinational activity.

However, for business and professional services a new type of complementarity has arisen for multinational firms. Multinationals which establish commercial presence in order to supply a particular service to the host economy may then more easily engage in selling of additional parent or affiliate produced services through cross-border trade. A German Bundesbank paper that utilized detailed bank level data found significant increases in cross-border sales of financial services through established foreign affiliates and also found evidence that the relationship between trade and FDI in financial services (with one of the two supplies already established) was significantly impacted by the regulatory regime in place in the host country. (Buch and Lipponer 2004) These modern trade complexities are even further advanced when the non-regulatory types of trade barriers and restrictions are considered as affecting the supply of services abroad.

One of the goals of the model in this paper is to simulate these various of relationships, and establish an important step in properly analyzing how the regulatory and other restrictions to trade and foreign affiliate sales of professional services impact the decisions of MNEs, factor prices, and subsequently the quality and cost of those services in the foreign country. This is the only way to determine what benefits may accrue from the removal or relaxation of the various types of barriers to each method of supply.

Investment in services is the largest component of global and U.S. FDI and is also the fastest growing. Over the period 1990-2002 FDI in the primary sector doubled, tripled in the manufacturing sector, and quadrupled in services. Over the same period the share of manufacturing FDI fell from 42% to 32% while the share of services rose from 49% to 62%. (UNCTAD, 2004) The large size of the service sector is not unique to the U.S. Services make up 57% of middle income country's GDP, compared to 72% of high income country's GDP (UN WIR, 2005). This has facilitated multinational enterprises' decisions to locate service affiliates in countries all over the world. Motivations for FDI in services are encompassed by the same general categories as FDI in goods: market-seeking, resource seeking, efficiency-seeking, and asset seeking. (Dunning, 2002) For U.S. outward FDI in services, most location decisions by MNEs were made for market or efficiency seeking reasons. (Dunning, 2002) FDI in producer

services is seen to be fulfilling both of these goals. Business and producer services include financial services, insurance services, and professional, technical, and scientific services. The latter encompass legal, insurance, accounting, engineering, architecture, advertising, R&D, consulting and marketing among others. These all are within the definition of producer services that assumes intermediate potential and an intensive use of skilled labor and other knowledge based assets. This area of investment is increasing in value and importance in world trade. Business services accounted for over one third of FDI stock in 2002, up from about 15 percent in 1990. (UNCTAD, 2004) The unique element for FDI in producer services is that they serve both foreign and domestic companies and manufacturers. This range of firms utilizes these services creates a significant market for the MNEs supplying producer services.

Investment in producer services has recently spawned a number of papers, lead by the theoretical analysis of Markusen, Rutherford, and Tarr (2005). The gravity model is used by a number of economists as they assess its use in predicting trade in services however empirical assessments in foreign affiliate activity in services are infrequent due to the lack of data. (Egger 2005; Egger and Pfaffermayr 2004; Findlay and Warren 2000; Walsh 2006)

The task of quantifying the possible benefits from liberalization is difficult with good data and this is certainly not the case for barriers to trade in services. The contribution of my model will hopefully encourage the use of available data while simulating interactions where the data is still lacking. Eventually, incorporating actual data into this CGE approach it will be possible to quantify the effects on welfare through factor price changes as well as lost productivity through barriers to services investment and the informal sector in the industries being analyzed.

### **III: Restrictions and barriers to trade and investment in Services**

As previously noted, the majority of barriers and restrictions to trade in services are difficult to observe and quantify due to the majority being behind the border elements of regulation and governance. Recently, international organizations and trade promoting agencies have begun to try to compile various measures of the regulatory barriers to trade in services as well as any non-regulatory trade costs imposed on services suppliers. Their job is complicated by



the use of various modes of supply for trade in services and the lack of data on the activity of foreign affiliates that I referred to earlier in this paper.

There are many types of restrictions in service industries, any many are not easily observed or quantified. The major restrictions and relevant sub-categories of interest for potential future analyses, as well as the type of barrier they impose are:

- Foreign ownership restrictions- Market access barriers
  - No foreign equity
  - Less than 30% foreign ownership
  - Between 30-50% foreign ownership
  - Between 50-100% foreign ownership
- Citizenship and/or residency restrictions- Market access barriers
  - All workers
  - Chairman and all the Board of Directors
  - Required for professional license/certification
  - Percentage of board/managers
- Anti-Competitive practices- Increase fixed and variable costs
  - Monopolies in service industries
  - Cartel behavior
  - Tax benefits or subsidies granted to domestic incumbents
  - No new firms allowed
- Discriminatory practices/restrictive domestic regulation for all entrants – Market access barriers that also raise fixed costs of entry
  - Licenses and/or number of foreign firms restricted differently or not from domestic firms in the same industry
  - Restricted to certain economic zones or other geographic areas
  - Type of enterprise restricted for foreign firms
  - Economic needs test for foreign firms

- Financial restrictions – more of a developing country issue that can affect profitability due to the loss of earning interest on profits re-invested elsewhere
  - Capital controls
  - Restrictions on reinvestment
- Resource waste and/or inefficiency causing restrictions – fixed cost inefficiency waste that may also affect cross-border trade (mode 1)
  - Rampant corruption
  - Excessive bureaucratic red tape
  - Lack of transparency in any of the required licensure or entry steps
  - Lack of mutual recognition for professional certifications
  - Other resource wasting restrictions ( bribery, etc)

Obviously, this reads more like a regulatory data wish list under the current conditions of country/industry specific data availability. However, there is finally an understanding among international and national organizations of the importance of trade in services and if nothing else, a strong desire to obtain a clear and informative picture of the status quo concerning regulatory and other restrictions to the various modes of supplying services to other countries.

Regulatory barriers to trade in services predominantly interact with the fixed costs of entry into the market. This is quite different from the ad valorem mark-up that has been used in the majority of research estimating the gains from liberalizing services trade. This is an area that is still in its infancy in terms of empirical estimations due to the data issues that by now may seem to sound like an excuse, however, the lack of panel data should not prohibit research into the proper accounting of restrictions to trade in services and the attempts to model the relationships using available economic modeling tools.

#### **IV: Background for model**

The CGE model I have created incorporates some of the newest “tricks” for modeling monopolistic competition and increasing returns to scale technology. These methods are

necessary due to the computer program's method of obtaining equilibrium solutions. James Markusen is responsible for a great deal of the programming tricks introduced in this model, however, the incorporation of numerous sectors exhibiting IRS with monopolistic competition and product differentiation as well as both variable and fixed trade and inefficiency costs is my novel contribution to this area of work.

I use GAMS software for the model and the model is programmed using a higher language written by Thomas Rutherford called MPS/GE, which stands for mathematical programming system for general equilibrium. MPS/GE uses the MCP solver in GAMS but permits extremely efficient shortcuts for modelers which greatly reduces human errors in coding as well as time spent typing out equations with multiple nests and complicated price indices. As a short introduction to those unfamiliar with these programs I will outline the most important aspects of using MPS/GE. First and most important for my model, the program has routines for calibrating and writing all constant-returns CES and CET functions with up to three levels of nesting each. The modeler specifies the nesting structure, substitution elasticities, and a representative point on the function, consisting of output quantities, input quantities and prices. This representative point and associated price vector uniquely determine the function, and MPS/GE then generates the cost function (or expenditure function).

Additionally, many of the required market-clearing and income-balance equations are written automatically by MPS/GE so the modeler doesn't have to worry about doing so which reduces the potential human errors that can easily occur when a modeler writes out dozens of equations. If there is a tax or markup, for example, the revenues must be assigned to some agent and will be allocated automatically to that agent by the income-balance properties of the coding. If you have incorrectly coded the activities, MPS/GE automatically checks for and ensures the product-exhaustion and income-balance requirements required for any CGE models and the modeler is forced to correct their mistakes before the model will pass to the solver. My use of the MPS/GE language will become even clearer as we get into the specifics of the model.

As I previously mentioned, incorporating economic realities of producer services production is not as straightforward as one might expect. While methods of incorporating

monopolistic competition have been successfully used in a number of studies (Konan & Markusen; Markusen, Rutherford and Tarr; Konan and Van Assche) methods for incorporating Dixit-Stiglitz differentiation have been largely unsuccessful once the model is expanded beyond simple 2 good 2 country models with only one firm type. James Markusen discovered a method that allows the model to incorporate endogenous numbers of differentiated services into the MPS/GE programming language.

This technique relies on two steps. The first is the consumers are endowed with a least a fraction of every potential good. This does not affect the calibrated solution but prevents the demand price from going off to infinity and crashing the model. The second and more complicated step involves the production sectors of goods or services which have differentiated services inputs. First the model solves for homogeneous goods equilibrium with a fixed markup as given in the monopolistic-competition framework and with free entry and exit of firm given this markup rule.

After solving the homogeneous goods case, the equilibrium number of firms is used to adjust the quantity field on output of a group to reflect the value of product differentiation within the group. Box 1 below summarized how to get the right number of firms when solving the model. Differentiation is perfectly measured by the number of symmetric firms, and the value of this product diversity is exactly equivalent to a Hicks-neutral technical shift in the output quantity of the homogeneous good. The modeler sets an initial guess at the equilibrium number of firms and this is set equal to a fixed technology parameter on the production function and the model is solved.

- The model solves for equilibrium with a fixed markup as given by monopolistic-competition
- The equilibrium number of firms adjusts the quantity field on output of a group to reflect the value of product differentiation.
- Value of product diversity is exactly equivalent to a Hicks-neutral technical shift in the output quantity of the good.
- Initial guess equilibrium number of firms = fixed technology parameter and the model is solved
- Parameter is adjusted again to equal the solution value of firm numbers, and the model is solved again.

### **Box 1: How to get the “Right” Number of Endogenous Firms?**

Then parameter is then adjusted again to equal the solution value of firm numbers, and the model is solved again. This iterative method is repeated in a loop until there is a close convergence between the technology parameter and the number of firms in the solution. This may take 10 iterations or it may take 50 iterations but a solution with convergence is an economic equilibrium.

### **V: Model Specification**

I will include the model’s code in the appendix but will go over the models components here in order to clarify the structure. Figure 1 below can also be used for reference.

Countries: Two countries I and J; endowments can be varied to illustrate various sized countries or asymmetric factor endowments

Factors of production: L- low skilled labor; R-routinely skilled service workers; H-highly educated and highly skilled services workers

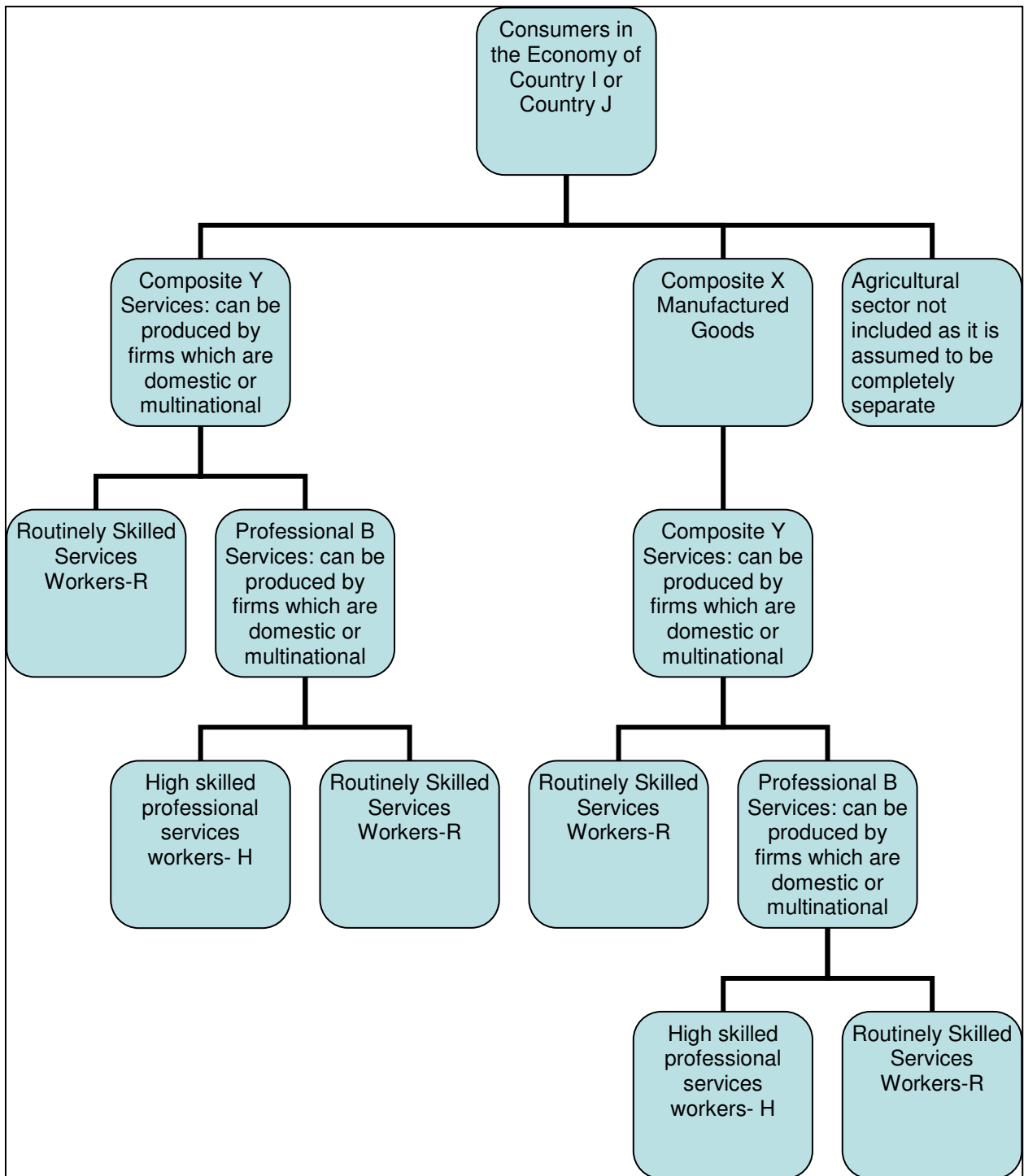
Goods/Services Sectors: Three production sectors

X: Final good for consumption, inputs include L labor and Y producer services.

Y: Service sector which is a producer service into X production as well as a services for final consumption by individuals in the economy (representative consumers), inputs include R workers as well as B services.

B: High skilled services sector which is only an intermediate input into Y production, inputs are both R service workers and H service workers.

**Figure 1: Production Diagram for Model**



Firm Types: There are domestic (D) and multinational (M) firms for both Y and B services. X is only produced domestically but can be exported. Domestic B and Y firms also can export while M firms are engaging purely in horizontal multinational activity and selling their

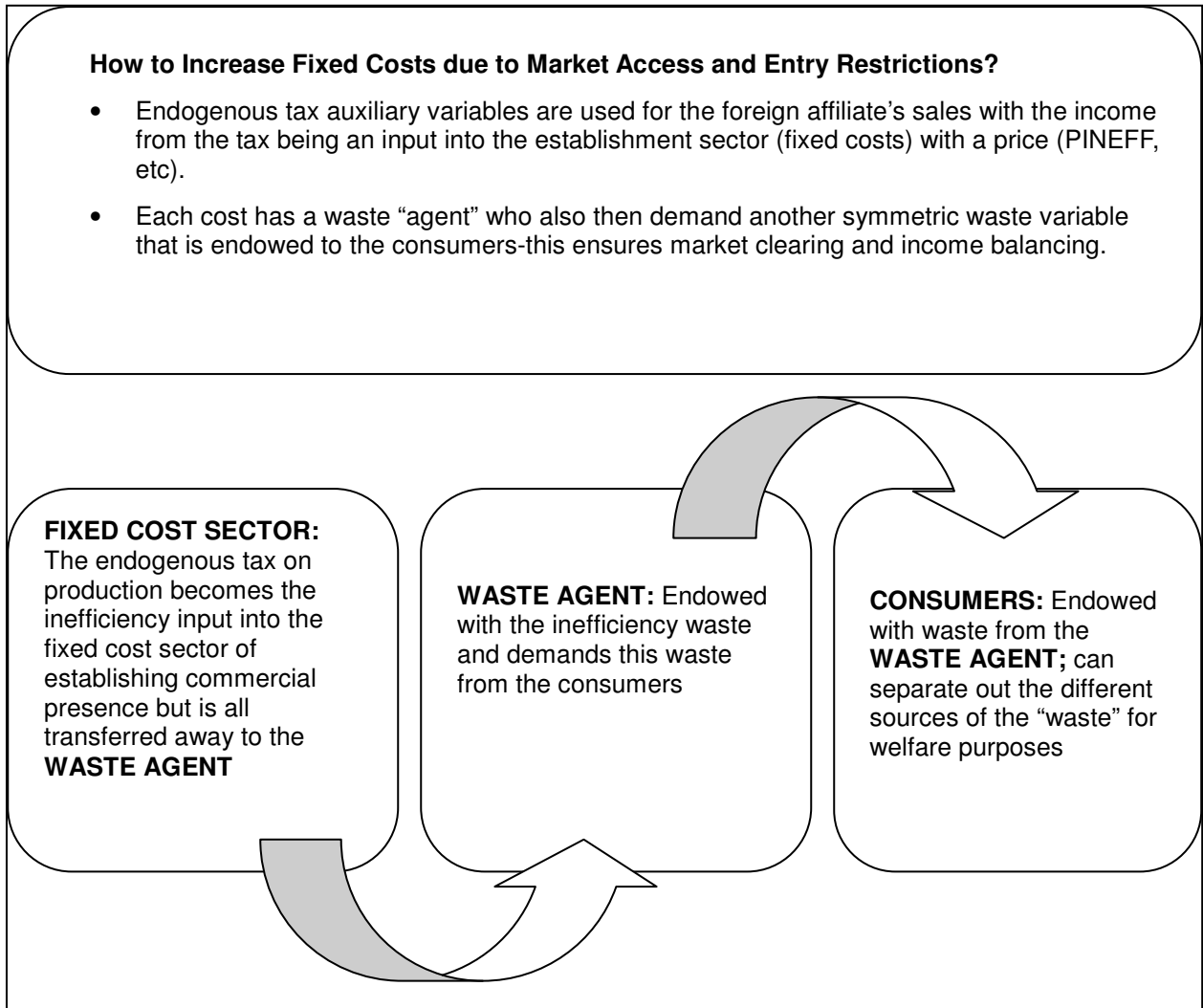
services abroad as well as at home. X firms can source Y services from four different firm types: MYI, MYJ, DYI, and DYJ. Y firms can source B services from only two firm types as I make the assumption that Y firms only utilize home country B services. Therefore a multinational Y firm from country I (MYI) in country J can only purchase B services from country I's domestic B firms (DBI) which export to J or from multinational B firms (MBI) who have established a commercial presence in J.

Firm Owners: Y firms are "owned" by entrepreneurs who are really an agent used to receive mark-up revenue which is then spent on the fixed costs of establishing the firms-which is the sector that determines the number of firms in equilibrium. The B firms have similar agents which are the Business owners of the professional services firms.

Consumers: Both countries have a representative consumer who is endowed with labor and demands the goods X and Y while also receiving utility from their consumption.

Trade Costs/Investment Costs: There are three endogenous inefficiency costs which represent restrictions to trade and foreign affiliate sales in services Parameters FDIYI, FDIYJ, FDYBI, and FDIBJ are used to set a quantity of inefficiency costs in the fixed costs sectors for multinational firms in the Y and B sectors. Auxiliary variables and their associated constraints are used to keep the model in equilibrium. The quantity of this loss is then assigned to an agent- BCAT or WASTE- for Y and B loss respectively and consumers are then endowed with this loss in order for all the income balance equations to be satisfied. . Refer to Figure 2 below for a visual interpretation of the waste allocation.

**Figure 2: Allocation of the inefficiency waste within the model**



The B sector also has a fixed cost trade cost of exporting that is separate from the ad valorem variable trade cost. This is controlled by the parameters MODE1I and MODE1J reflecting the mode of supply in question and has an associated auxiliary variables of TRADEI and TRADEJ. This inefficiency loss is then assigned to an agent and then also endowed to consumers as BLOSSI/J. This may be a bit much to understand as written but will be helpful as you read through the model code in the appendix.



## VI: FOUR EXPERIMENTS

There are four simulations (of the dozens I initially did while working on this paper) that show the flexibility of the model. These four are summarized in Table 1 below and then discussed individually. In addition, summary tables (Tables 2 and 3) will provide a view of the impacts on the prices, wages, and welfare for country I and country j across the various simulations.

**Table 1: Four Experiments in Trade and Investment Costs in Professional and Business Services**

Experiment	Endowments	Trade Allowed	FDI Allowed	Trade Costs	FDI Costs	Simulation
1	Identical	Yes	Yes	Low	Low	Experiment reduces the variable trade costs for Y from 100% to 1% modeling full trade liberalization for Y services.
2	Identical	No	Yes	N/A	Simulated	Experiment increases the Y services sector FDI inefficiency costs from 1% to 10% illustrating the impact of inefficiency when commercial presence is required for supplying services abroad.
3	Variable: Country i has 3x more H workers and Country J has 3x more R workers	Yes	Yes	Low	Low	Experiment decreases the costs of FDI in B services from 10% to 1% modeling liberalization in the highly skilled services supply through commercial presence.
4	Same as #3	Yes	Yes	Simulated	Low	Experiment reduces the variable trade costs for Y from 100% to 1% modeling full trade liberalization for Y

						services under a regime with low costs to FDI in all services.
4	Same as #3	Yes	Yes	Simulated	High	Experiment reduces the variable trade costs for Y from 100% to 1% modeling liberalization for traded Y services under a regime with high costs to FDI in all services.

The first experiment I will discuss has the countries set with identical endowments. FDI inefficiency costs are very low in both sectors (B and Y) and Mode 1 entry costs are also very low (essentially zero). The variable trade costs for the B sector are high and the experiment consists of lowering the variable trade costs for the Y sector from 100% to 1% for both countries simultaneously. This experiment models situations where FDI is the preferred mode of supply for both Y and B services due to high variable trade costs in both types of services. In the model presented above, this simulation is done by specifying two loops, the first loop reduces the trade costs and then for each value of the trade costs the iterative firm solution loop performs 50 iterations to arrive at a solution.

The solution does not provide any surprises as exports of Y increase substantially as the trade costs are reduced. The higher level of exported Y services does not affect the price of Y services; however it does result in the price of X decreasing due to the increased flexibility in the availability of Y services for X production. The professional B services are solely produced by multinationals which also explains the decrease in the price of X from increased trade in Y services as the production of Y services requires B services from the same country of origin. The simulations show that returns to labor increase for all worker types and welfare for both countries increases about 8% from the combination of cheaper X goods and higher wages for all three worker types. Since the countries are identical, the welfare gains are also equal showing bilateral gains from trade liberalization.

### Experiment #2

The second experiment also assumes identical countries in terms of labor endowments and size. There is no trade in Y or B services allowed in the benchmark and this simulation illustrates the effects of regulations requiring commercial presence for the supply of a service. These are common across the globe as many developing and developed countries choose to regulate foreign supplied services by requiring the services to be produced within the borders. Initially, I assume FDI costs for B services to be low (as this is the only mode of supply) and then increase the inefficiency costs for FDI in Y services from 0% to 10% of Y services' fixed costs.

The initial production effects are that production of B and Y services increases and the production of X goods decreases. This occurs due to the wage effects from the increased inefficiency costs. High skilled workers in the B services sector are the biggest losers here as they experience significant wage decreases as their product becomes less expensive due to increased level of production. Routine skilled workers also experience wage decreases and remain the lowest paid workers throughout the scenarios. Low skilled laborers do not escape the fallout and also see wage drops of over 40% due to their participation in the fixed cost sector of establishment (for services production through affiliates) and the decreased level of X goods production.

The price of X increases 70% to account for the 100% price increase in Y, which is an important input into X production. The production increases in the B sector are necessary to keep up with the likewise production increases in the Y sector, required to stay afloat with the increase in wasted resources on fixed costs. The effects of this resource waste is apparent as the number of multinational firms owned by each country in each country falls from a high of almost 60 under a costless FDI regime to 1.76 (3.5 per country) firms under the 10% inefficiency cost. At the midpoint with inefficiency costs of 5% of fixed costs the number of firms has already fallen to 8 firms from the initial 60 multinational firms that existed when there were no inefficiency costs for FDI in Y services.

### **Experiment #3**

This experiment assumes that the countries have different factor endowments. While they both have the same endowment of low skilled labor, country I has three times the

endowment of high skilled service workers, while country J has three times the endowment of routine skilled service workers. Additionally, I have low variable trade costs, low FDI costs in Y, and low Mode 1 costs for B. The experiment reduces FDI inefficiency costs in B from 10% of fixed costs to essentially zero. This set up simulates the interactions between the many bilateral trading partners who have dissimilar but not opposite factor endowments. For example, a country such as India has high skilled engineers but has a much larger endowment of what I am calling routinely skilled workers. This endowment led to some companies choosing to offshore some back-office operations. Looking to the future, a country such as this can have a growing consumer base that can be a source of welfare gains for both sides of a bilateral trade/investment relationship.

**Table 2: Summary of Results from Experiments #1, #2, and #3**

Results on wages, prices, firms and welfare	Experiment #1: Liberalize trade in Y Services	Experiment #2: No trade allowed, Increase inefficiency costs for FDI in Y Services	Experiment #3: Endowments of R and H are opposites (with Country I having more H and less R), decrease the costs to FDI in B Services from 10% to 1%	
	Both Countries	Both Countries	Home Country i	Host Country j
High Skilled Workers Wages	Increase ~10%	Decrease 60%	Increase	Increase more than i
Routine Skilled Workers Wages	Increase ~10%	Decrease 30%	Increase more than j	Increase
Low skilled Workers Wages	Increase ~10%	Decrease 40%	Increase	Increase
Price of X	Decreases	Increases 70%	Decreases 15%	Decreases 15%
Price of Y	Unchanged	Increases 100%	Decreases 20%	Decreases 20%
Price of B	Unchanged	Unchanged	Unchanged	Unchanged
Exports of Y	Increase	Zero	Unchanged	Unchanged
Production of Y	Increases	Increases	Increases	Increases
Exports of B	Unchanged	Zero	Decrease	Decrease
Production of B	Increases	Increases	Increases	Increases
Exports of X	Unchanged	Zero	Unchanged	Unchanged
Production of X	Increases	Decreases	Increases	Increases
Number of domestic Y firms	Unchanged	Zero	Unchanged	Unchanged

<b>Number of domestic B firms</b>	All domestic firms either become multinationals or exit	Zero	Decreases	Decreases
<b>Number of multinational Y firms</b>	Unchanged	Decreases from 120 to 3.5 total in each country (1.76 owned by each)	Increases	Increases
<b>Number of multinational B firms</b>	Increases	Unchanged	Increases	Increases
<b>Overall Welfare</b>	Increases 8%	Decreases	Increases	Increases more than i

The simulation results show that the number of B services multinationals increases from 13 firms to 50 firms while the price of B services remains unchanged. This increase in the providers of B services results in the prices of both Y services and therefore X goods to decrease significantly as the variety of services is expanded. The production of both X and Y also increases as there is greater demand from consumers for both goods and services at the new lower prices. Wages for all workers increase 5-7% with the scarce workers in each economy (routine workers in country i and high-skilled in country j) seeing the largest gains. Overall, country J realizes higher welfare gains due to the scarcity of high skilled workers and the cross-border immobility of labor assumed in the model (which is reflective of actual mode 4 restrictions in many countries across the globe).

#### **Experiment #4**

The final experiment examined here has the same endowments as experiment 3 where country I has 3x more high-skilled workers than country J and country J has 3x more routinely skilled workers. For this simulation however, I reduce the variable trade costs in the Y sector under two different FDI regulatory regimes. The first regime has high inefficiency costs of FDI for Y and B services while the second regime has low inefficiency costs for multinational Y and B services production.

Unsurprisingly, both scenarios see an increase in exports of Y services. The resulting country I exports however are only about half that of country J's due to the endowment differences and the workers required for Y production. In the first FDI regime, the resulting B services firms are solely domestic due to the high costs of FDI. In addition, exports of B services

from country I decrease with the decrease in Y services trade costs due to the elimination of any Y multinational production (which would be the only foreign demand for B services from abroad). In the initial scenario with high trade costs, there was still a small level of Y multinational production, taking advantage of the scale economies from horizontal activity. The major welfare effect in this simulation is from the effect on the prices of X which decrease over 15% leading to welfare gains of about 4% for country I and 10% for country J.

In the second scenario the B services firms are all multinational due to the same scale economies enjoyed through horizontal investment. Similar gains in welfare accrue from similar price reductions in the cost of good X. However, the wages in the second scenario are higher for everyone in both countries as all workers see significant increases in wages as the money allocated to wages is not being eaten up by the inefficiency fixed cost sectors associated with multinational production of Y and B services.

**Table 3: Summary of Results from Experiment #4**

Results on wages, prices, firms and welfare	Experiment #4: Endowments of R and H are opposites (with Country I having more H and less R), FDI highly restricted for all professional and business services, trade costs for Y services are reduced		Experiment #4: Endowments of R and H are opposites (with Country I having more H and less R), decrease the costs to FDI in B Services from 10% to 1%	
	Home Country i	Host Country j	Home Country i	Host Country j
High Skilled Workers Wages	Unchanged	Unchanged	Increase	Increases more than i
Routine Skilled Workers Wages	Unchanged	Unchanged	Increases more than j	Increase
Low skilled Workers Wages	Unchanged	Unchanged	Increase	Increase
Price of X	Decrease 15%	Decrease 15%	Decrease 15%	Decrease 15%
Price of Y	Decreases	Decreases	Decreases	Decreases
Price of B	Unchanged	Unchanged	Unchanged	Unchanged
Exports of Y	Increases	Increases more than i	Increases	Increases more than i
Production of Y	Increases	Increases more than i	Increases	Increases more than i
Exports of B	Decreases	Decreases	Decreases	Decreases
Production of B	Decreases	Decreases	Decreases	Decreases
Exports of X	Unchanged	Unchanged	Unchanged	Unchanged
Production of X	Unchanged	Unchanged	Unchanged	Unchanged
Number of domestic Y firms	Increase	Increase	Decreases	Decreases
Number of domestic B firms	Decrease	Decrease	Decrease to zero	Decrease to zero
Number of multinational Y	Decrease	Decrease	Increases	Increases

<b>firms</b>				
<b>Number of multinational B firms</b>	Decrease to zero	Decrease to zero	Increases	Increases
<b>Overall Welfare</b>	Increases 4%	Increases 10%	Increases 4%	Increases 10%

This fourth experiment illustrates how the model can be used to contrast and compare various trade policy regimes, and create literally thousands of endowment and regulatory scenarios.

## VII: Conclusions

The four experiments presented above show the impact that inefficiency costs in FDI have on prices, wages, levels of production and modes of supply for intermediate and final business and professional services. The simulations also allow differences in labor endowments and initial trade and investment regimes to be varied. While the model here has some limiting assumptions it can be adjusted and calibrated to use input-output, trade, and affiliate sales data in the future.

As I previously explained, this paper presents a model which is a new tool available for analyzing the effects of regulatory barriers and other restrictions to the supply of services through cross-border trade as well as through foreign affiliate sales. The simulations presented here are not claiming to be representative of a particular economy; however, the model can be calibrated or adjusted to simulate many different observed bilateral relationships.

As better bilateral data becomes available, this model be able to contribute to research that identifies and quantifies the relationships among the modes of supply and how various restrictions may impact firm's decision to supply via a particular mode. Additionally, data on regulatory barriers themselves is beginning to be collected by the OECD and the World Bank and incorporating all of these various empirical elements will allow this model to be an important tool for policy modeling as well as for determining potential gains and losses to goods sectors, services sectors, and consumers.

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## Appendix I: CGE model Code

```
SIGMADI = 5;
SIGMADJ = 5;
RHODI   = 4;
RHODJ   = 4;
SIGMAMI = 5;
SIGMAMJ = 5;
RHOMI   = 4;
RHOMJ   = 4;
ENDLI   = 1;
ENDRI   = 1;
ENDLJ   = 1;
ENDRJ   = 1;
ENDHI   = 1;
ENDHJ   = 1;
YDIFFDI = 1/(SIGMADI-1);
YDIFFDJ = 1/(SIGMADJ-1);
BDIFFDI = 1/(RHODI-1);
BDIFFDJ = 1/(RHODJ-1);
YDIFFMI = 1/(SIGMAMI-1);
YDIFFMJ = 1/(SIGMAMJ-1);
BDIFFMI = 1/(RHOMI-1);
BDIFFMJ = 1/(RHOMJ-1);
SCYMI   = 6/10;
SCYMJ   = 6/10;
SCBMI   = 7/10;
SCBMJ   = 7/10;
YDIQ0   = 64/(4**(SIGMADI/(SIGMADI-1)));
YDJQ0   = 64/(4**(SIGMADJ/(SIGMADJ-1)));
YDIP0   = 80/(YDIQ0*4);
YDJP0   = 80/(YDJQ0*4);
YCIQ0   = 96/(4**(SIGMADI/(SIGMADI-1)));
YCJQ0   = 96/(4**(SIGMADJ/(SIGMADJ-1)));
YCIP0   = 120/(YCIQ0*4);
YCJP0   = 120/(YCJQ0*4);
BDIQ0   = 60/(2**(RHODI/(RHODI-1)));
BDJQ0   = 60/(2**(RHODJ/(RHODJ-1)));
BDIP0   = 80/(2*BDIQ0);
BDJP0   = 80/(2*BDJQ0);
YMIQ0   = 64/(4**(SIGMAMI/(SIGMAMI-1)));
YMJQ0   = 64/(4**(SIGMAMJ/(SIGMAMJ-1)));
YMIP0   = 80/(YMIQ0*4);
YMJP0   = 80/(YMJQ0*4);
BMIQ0   = 60/(2**(RHOMI/(RHOMI-1)));
BMJQ0   = 60/(2**(RHOMJ/(RHOMJ-1)));
BMIP0   = 80/(2*BMIQ0);
BMJP0   = 80/(2*BMJQ0);

MKYDI   = 1/(SIGMADI-1);
MKYDJ   = 1/(SIGMADJ-1);
MKBDI   = 1/(RHODI-1);
MKBDJ   = 1/(RHODJ-1);
MKYMI   = 1/(SIGMAMI-1);
MKYMJ   = 1/(SIGMAMJ-1);
```

```

MKBMI   = 1/(RHOMI-1);
MKBMJ   = 1/(RHOMJ-1);
FDIYI   = 10.0001;
FDIYJ   = 10.0001;
FDIBI   = 5.0001;
FDIBJ   = 5.0001;
MODE1I  = .0001;
MODE1J  = .0001;
SUMI    = FDIYI+FDIBI+MODE1I;
SUMJ    = FDIYJ+FDIBJ+MODE1J;
DISPLAY YMIQ0, YMJQ0, YMIP0, YMJP0, BMIQ0, BMJQ0, BMIP0, BMJP0,
        YDIQ0, YDJQ0, YDIP0, YDJP0, BDIQ0, BDJQ0, BDIP0, BDJP0;
SETS J   /1*10/
      C   /1*10/
      N   /1*30/;
PARAMETERS
REPORTN(*,C)
REPORTC(*,C)
$ONTEXT
$MODEL:COMP_NEW
$SECTORS:
  XI  XJ
  YDI YDJ
  YMII YMIJ
  YMJJ YMJI
  BDI  BDJ
  BMII BMIJ
  BMJJ BMJI
  EYDI EYDJ
  EBDI EBDJ
  EXI  EXJ
  DYI  DYJ
  MYI  MYJ
  DBI  DBJ
  MBI  MBJ
  UI   UJ

$COMMODITIES:
  PXI  PXJ
  PYDI PYDJ
  PYMII PYMIJ
  PYMJJ PYMJI
  PEYDI PEYDJ
  PBDI  PBDJ
  PBMI  PBMIJ
  PBMJJ PBMJI
  PEBDI PEBDJ
  FCYDI FCYDJ
  FCYMI FCYMJ
  FCBDI FCBDJ
  FCBMI FCBMJ
  PRI   PRJ
  PLI   PLJ
  PHI   PHJ
  PUI   PUJ
  PINEFFYI
  PINEFFYJ

```

LOSSYI  
 LOSSYJ  
 PINEFFBI  
 PINEFFBJ  
 LOSSBI  
 LOSSBJ  
 PTCBI  
 PTCBJ  
 BLOSSI  
 BLOSSJ

\$CONSUMERS:

CONSI CONSJ  
 ENTDI ENTDJ  
 ENTMI ENTMJ  
 BUSDI BUSDJ  
 BUSMI BUSMJ  
 BCATI BCATJ  
 WASTEI  
 WASTEJ  
 BCOSTI  
 BCOSTJ

\$AUXILIARY:

REGYI  
 REGYJ  
 REGBI  
 REGBJ  
 TRADEI  
 TRADEJ

\$PROD:XI s:1.0 a:5  
 O:PXI Q:180  
 I:PLI Q:100  
 I:PYMII Q:YMIQ0 P:YMIP0 a:  
 I:PYMJI Q:YMIQ0 P:YMIP0 a:  
 I:PYDI Q:YDIQ0 P:YDIP0 a:  
 I:PEYDJ Q:YDIQ0 P:YDIP0 a:

\$PROD:XJ s:1.0 a:5  
 O:PXJ Q:180  
 I:PLJ Q:100  
 I:PYMIJ Q:YMJQ0 P:YMJP0 a:  
 I:PYMJJ Q:YMJQ0 P:YMJP0 a:  
 I:PEYDI Q:YDJQ0 P:YDJP0 a:  
 I:PYDJ Q:YDJQ0 P:YDJP0 a:

\$PROD:YDI s:0.5 a:4  
 O:PYDI Q:(160\*NYDI\*\*YDIFFDI)  
 I:PRI Q:80 A:ENTDI T:MKYDI  
 I:PBDI Q:BDIQ0 P:BDIP0 a: A:ENTDI T:MKYDI  
 I:PBMII Q:BMIQ0 P:BMIP0 a: A:ENTDI T:MKYDI

\$PROD:YDJ s:0.5 a:4  
 O:PYDJ Q:(160\*NYDJ\*\*YDIFFDJ)  
 I:PRJ Q:80 A:ENTDJ T:MKYDJ  
 I:PBDJ Q:BDJQ0 P:BDJP0 a: A:ENTDJ T:MKYDJ  
 I:PBMJJ Q:BMJQ0 P:BMJP0 a: A:ENTDJ T:MKYDJ

	\$PROD:YMII	s:0.5	a:4			
	O:PYMII	Q:(80*NYMI**YDIFFMI)				
	I:PRI	Q:40		A:ENTMI	T:MKYMI	
	I:PBDI	Q:BDIQ0	P:BDIP0	a:A:ENTMI	T:MKYMI	
	I:PBMII	Q:BMIQ0	P:BMIP0	a:A:ENTMI	T:MKYMI	
	\$PROD:YMIJ	s:0.5	a:4			
	O:PYMIJ	Q:(80*NYMI**YDIFFMI)		A:ENTMI	N:REGYI	
	I:PRJ	Q:40		A:ENTMI	T:MKYMI	
	I:PEBDI	Q:BDIQ0	P:BDIP0	a:A:ENTMI	T:MKYMI	
	I:PBMIJ	Q:BMIQ0	P:BMIP0	a:A:ENTMI	T:MKYMI	
	\$PROD:YMJI	s:0.5	a:4			
	O:PYMJI	Q:(80*NYMJ**YDIFFMJ)		A:ENTMJ	N:REGYJ	
	I:PRI	Q:40		A:ENTMJ	T:MKYMJ	
	I:PEBDJ	Q:BDJQ0	P:BDJP0	a:A:ENTMJ	T:MKYMJ	
	I:PBMJI	Q:BMJQ0	P:BMJP0	a:A:ENTMJ	T:MKYMJ	
	\$PROD:YMJJ	s:0.5	a:4			
	O:PYMJJ	Q:(80*NYMJ**YDIFFMJ)				
	I:PRJ	Q:40		A:ENTMJ	T:MKYMJ	
	I:PBDJ	Q:BDJQ0	P:BDJP0	a:A:ENTMJ	T:MKYMJ	
	I:PBMJJ	Q:BMJQ0	P:BMJP0	a:A:ENTMJ	T:MKYMJ	
	\$PROD:BDI	s:0.5				
	O:PBDI	Q:(60*NBDI**BDIFFDI)		A:BUSDI	N:TRADEI	
M:.01\$EBDI.L						
	I:PRI	Q:40		A:BUSDI	T:MKBDI	
	I:PHI	Q:20		A:BUSDI	T:MKBDI	
	\$PROD:BDJ	s:0.5				
	O:PBDJ	Q:(60*NBDJ**BDIFFDJ)		A:BUSDI	N:TRADEJ	
M:.01\$EBDJ.L						
	I:PRJ	Q:40		A:BUSDJ	T:MKBDJ	
	I:PHJ	Q:20		A:BUSDJ	T:MKBDJ	
	\$PROD:BMII	s:0.5				
	O:PBMII	Q:(30*NBMI**BDIFFMI)				
	I:PRI	Q:20		A:BUSMI	T:MKBMI	
	I:PHI	Q:10		A:BUSMI	T:MKBMI	
	\$PROD:BMIJ	s:0.5				
	O:PBMIJ	Q:(30*NBMI**BDIFFMI)		A:BUSMI	N:REGBI	
	I:PRJ	Q:20		A:BUSMI	T:MKBMI	
	I:PHJ	Q:10		A:BUSMI	T:MKBMI	
	\$PROD:BMJJ	s:0.5				
	O:PBMJJ	Q:(30*NBMJ**BDIFFMJ)				
	I:PRJ	Q:20		A:BUSMJ	T:MKBMJ	
	I:PHJ	Q:10		A:BUSMJ	T:MKBMJ	
	\$PROD:BMJI	s:0.5				
	O:PBMJI	Q:(30*NBMJ**BDIFFMJ)		A:BUSMJ	N:REGBJ	
	I:PRI	Q:20		A:BUSMJ	T:MKBMJ	
	I:PHI	Q:10		A:BUSMJ	T:MKBMJ	
	\$PROD:DYI	s:0.25				

O:FCYDI	Q:40		
I:PRI	Q:10		
I:PLI	Q:10		
I:PHI	Q:20		
\$PROD:DYJ	s:0.25		
O:FCYDJ	Q:40		
I:PRJ	Q:10		
I:PLJ	Q:10		
I:PHJ	Q:20		
\$PROD:MYI	s:0.25		
O:FCYMI	Q:(40*SCYMI+FDIYI)		
I:PRI	Q:(5*SCYMI)		
I:PLI	Q:(5*SCYMI)		
I:PHI	Q:(10*SCYMI)		
I:PRJ	Q:(5*SCYMI)		
I:PLJ	Q:(5*SCYMI)		
I:PHJ	Q:(10*SCYMI)		
I:PINEFFYI	Q:FDIYI	A:BCATI	T:1
\$PROD:MYJ	s:0.25		
O:FCYMJ	Q:(40*SCYMJ+FDIYJ)		
I:PRI	Q:(5*SCYMJ)		
I:PLI	Q:(5*SCYMJ)		
I:PHI	Q:(10*SCYMJ)		
I:PRJ	Q:(5*SCYMJ)		
I:PLJ	Q:(5*SCYMJ)		
I:PHJ	Q:(10*SCYMJ)		
I:PINEFFYJ	Q:FDIYJ	A:BCATJ	T:1
\$PROD:DBI			
O:FCBDI	Q:(20+MODE1I)		
I:PHI	Q:20		
I:PTCBI	Q:MODE1I	A:BCOSTI	T:1
\$PROD:DBJ			
O:FCBDJ	Q:(20+MODE1J)		
I:PHJ	Q:20		
I:PTCBJ	Q:MODE1J	A:BCOSTJ	T:1
\$PROD:MBI	s:0.25		
O:FCBMI	Q:(20*SCBMI+FDIBI)		
I:PHI	Q:(10*SCBMI)		
I:PHJ	Q:(10*SCBMI)		
I:PINEFFBI	Q:FDIBI	A:WASTEI	T:1
\$PROD:MBJ	s:0.25		
O:FCBMJ	Q:(20*SCBMJ+FDIBJ)		
I:PHI	Q:(10*SCBMJ)		
I:PHJ	Q:(10*SCBMJ)		
I:PINEFFBJ	Q:FDIBJ	A:WASTEJ	T:1
\$PROD:EYDI			
O:PEYDI	Q:(80*NYDI**YDIFFDI)		
I:PYDI	Q:(80*NYDI**YDIFFDI*TCYI)		
\$PROD:EYDJ			
O:PEYDJ	Q:(80*NYDJ**YDIFFDJ)		

I:PYDJ Q:(80\*NYDJ\*\*YDIFFDJ\*TCYJ)  
\$PROD:EBDI  
O:PEBDI Q:(30\*NBDI\*\*BDIFFDI)  
I:PBDI Q:(30\*NBDI\*\*BDIFFDI\*TCBI)

\$PROD:EBDJ  
O:PEBDJ Q:(30\*NBDJ\*\*BDIFFDJ)  
I:PBDJ Q:(30\*NBDJ\*\*BDIFFDJ\*TCBJ)

\$PROD:EXI  
O:PXJ Q:180.  
I:PXI Q:180.1

\$PROD:EXJ  
O:PXI Q:180.  
I:PXJ Q:180.1

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I:PYDI Q:YCIQ0 P:YCIP0 a:  
I:PYMII Q:YCIQ0 P:YCIP0 a:  
I:PEYDJ Q:YCJQ0 P:YCJP0 a:  
I:PYMJI Q:YCJQ0 P:YCJP0 a:

\$PROD:UJ s:1.0 a:5.0  
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I:PXJ Q:180  
I:PYDJ Q:YCJQ0 P:YCJP0 a:  
I:PYMIJ Q:YCJQ0 P:YCIP0 a:  
I:PEYDI Q:YCIQ0 P:YCIP0 a:  
I:PYMJJ Q:YCIQ0 P:YCJP0 a:

\$DEMAND:CONSI  
D:PUI Q:(300+SUMI)  
E:PRI Q:(130\*ENDRI)  
E:PLI Q:(110\*ENDLI)  
E:PHI Q:(60\*ENDHI)  
E:LOSSYI Q:FDIYI  
E:LOSSBI Q:FDIBI  
E:BLOSSI Q:MODE1I

\$DEMAND:CONSJ  
D:PUJ Q:(300+SUMJ)  
E:PRJ Q:(130\*ENDRJ)  
E:PLJ Q:(110\*ENDLJ)  
E:PHJ Q:(60\*ENDHJ)  
E:LOSSYJ Q:FDIYJ  
E:LOSSBJ Q:FDIBJ  
E:BLOSSJ Q:MODE1J

\$DEMAND:ENTDI  
D:FCYDI

\$DEMAND:ENTDJ  
D:FCYDJ



\$DEMAND:ENTMI  
 D:FCYMI

\$DEMAND:ENTMJ  
 D:FCYMJ

\$DEMAND:BUSDI  
 D:FCBDI

\$DEMAND:BUSDJ  
 D:FCBDJ

\$DEMAND:BUSMI  
 D:FCBMI

\$DEMAND:BUSMJ  
 D:FCBMJ

\$DEMAND:BCATI  
 D:LOSSYI  
 E:PINEFFYI

\$DEMAND:BCATJ  
 D:LOSSYJ  
 E:PINEFFYJ

\$DEMAND:WASTEI  
 D:LOSSBI  
 E:PINEFFBI

\$DEMAND:WASTEJ  
 D:LOSSBJ  
 E:PINEFFBJ

\$DEMAND:BCOSTI  
 D:BLOSSI  
 E:PTCBI

\$DEMAND:BCOSTJ  
 D:BLOSSJ  
 E:PTCBJ

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\$CONSTRAINT:REGYJ  
 PINEFFYJ =E= LOSSYJ;

\$CONSTRAINT:REGBI  
 PINEFFBI =E= LOSSBI;

\$CONSTRAINT:REGBJ  
 PINEFFBJ =E= LOSSBJ;

\$CONSTRAINT:TRADEI  
 PTCBI =E= BLOSSI;

```

$CONSTRAINT:TRADEJ
  PTCBJ =E= BLOSSJ;

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OPTION MCP = PATH;
OPTION SOLPRINT = ON;
*PUI.FX = 1;
YDIQ0=YDIQ0/0.9999;
YDJQ0=YDJQ0/0.9999;
BMIQ0=BMIQ0/0.9999;
BMJQ0=BMJQ0/0.9999;
YMIQ0=YMIQ0/0.9999;
YMJQ0=YMJQ0/0.9999;
BDIQ0=BDIQ0/0.9999;
BDJQ0=BDJQ0/0.9999;

ENDHI = 1.5;
ENDHJ = .5;
ENDRI = .5;
ENDRJ = 1.5;
ENDLI = 1;
ENDLJ = 1;
TCBI = 1.01;
TCBJ = 1.01 ;
TCYI = 1.01;
TCYJ = 1.01;

LOOP(C,
TCYI = 2-.1*ORD(C);
TCYJ = 2-.1*ORD(C);

LOOP(N,
NYDI = MAX(DYI.L, 0.0001);
NYDJ = MAX(DYJ.L, 0.0001);
NYMI = MAX(MYI.L, 0.0001);
NYMJ = MAX(MYJ.L, 0.0001);
NBDI = MAX(DBI.L, 0.0001);
NBDJ = MAX(DBJ.L, 0.0001);
NBMI = MAX(MBI.L, 0.0001);
NBMJ = MAX(MBJ.L, 0.0001) ;
IF (ORD(N) EQ CARD(N), OPTION SOLPRINT =ON;
ELSE OPTION SOLPRINT = OFF; );
$INCLUDE COMP_NEW.GEN
SOLVE COMP_NEW USING MCP;
);
DISPLAY YDIFFDI, YDIFFDJ, BDIFFDI, BDIFFDJ, YDIFFMI, YDIFFMJ,
BDIFFMI, BDIFFMJ;
REPORTN("DYI",C) = DYI.L;
REPORTN("DYJ",C) = DYJ.L;
REPORTN("MYI",C) = MYI.L;
REPORTN("MYJ",C) = MYJ.L;
REPORTN("DBI",C) = DBI.L;
REPORTN("DBJ",C) = DBJ.L;

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REPORTN ("MBI", C) = MBI.L;
REPORTN ("MBJ", C) = MBJ.L;
REPORTN ("YMI", C) = YMII.L+YMIJ.L;
REPORTN ("YMJ", C) = YMJJ.L+YMJI.L;
REPORTN ("BDI", C) = BDI.L;
REPORTN ("BDJ", C) = BDJ.L;
REPORTN ("YDI", C) = YDI.L;
REPORTN ("YDJ", C) = YDJ.L;
REPORTN ("BMI", C) = BMII.L+BMIJ.L;
REPORTN ("BMJ", C) = BMJJ.L+BMJI.L;
REPORTN ("EYDI", C) = MAX(EYDI.L, .0001);
REPORTN ("EYDJ", C) = MAX(EYDJ.L, .0001);
REPORTN ("EBDI", C) = MAX(EBDI.L, .0001);
REPORTN ("EBDJ", C) = MAX(EBDJ.L, .0001);
REPORTN ("PHI", C) = PHI.L/PUI.L;
REPORTN ("PHJ", C) = PHJ.L/PUJ.L;
REPORTN ("PRI", C) = PRI.L/PUI.L;
REPORTN ("PRJ", C) = PRJ.L/PUJ.L;
REPORTN ("PLI", C) = PLI.L/PUI.L;
REPORTN ("PLJ", C) = PLJ.L/PUJ.L;
REPORTN ("WELI", C) = UI.L;
REPORTN ("WELJ", C) = UJ.L;
REPORTN ("NYDI", C) = NYDI;
REPORTN ("NYDJ", C) = NYDJ;
REPORTN ("NYMI", C) = NYMI;
REPORTN ("NYMJ", C) = NYMJ;
REPORTN ("NBDI", C) = NBDI;
REPORTN ("NBDJ", C) = NBDJ;
REPORTN ("NBMI", C) = NBMI;
REPORTN ("NBMJ", C) = NBMJ;
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REPORTN ("PTCBJ", C) = PTCBJ.L;
REPORTN ("XI", C) = XI.L;
REPORTN ("XJ", C) = XJ.L;
REPORTN ("TRADEI", C) = TRADEI.L;
REPORTN ("TRADEJ", C) = TRADEJ.L;
REPORTN ("LOSSBI", C) = LOSSBI.L;
REPORTN ("LOSSBJ", C) = LOSSBJ.L;
REPORTN ("LOSSYI", C) = LOSSYI.L;
REPORTN ("LOSSYJ", C) = LOSSYJ.L;
REPORTN ("BLOSSI", C) = BLOSSI.L;
REPORTN ("BLOSSJ", C) = BLOSSJ.L;
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REPORTN ("REGYJ", C) = REGYJ.L;
REPORTN ("REGBI", C) = REGBI.L;
REPORTN ("REGBJ", C) = REGBJ.L;
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REPORTN ("PYDI", C) = PYDI.L;
REPORTN ("PYDJ", C) = PYDJ.L;
REPORTN ("PYMII", C) = PYMII.L;
REPORTN ("PYMJI", C) = PYMJI.L;
REPORTN ("PYMIJ", C) = PYMIJ.L;
REPORTN ("PYMJJ", C) = PYMJJ.L;
REPORTN ("PBDI", C) = PBDI.L;
REPORTN ("PBDJ", C) = PBDJ.L;
REPORTN ("PBMII", C) = PBMII.L;

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REPORTN ("PBMIJ", C) = PBMIJ.L;  
REPORTN ("PBMJJ", C) = PBMJJ.L;  
REPORTN ("FCYDI", C) = FCYDI.L;  
REPORTN ("FCYDJ", C) = FCYDJ.L;  
REPORTN ("FCYMI", C) = FCYMI.L;  
REPORTN ("FCYMJ", C) = FCYMJ.L;  
REPORTN ("FCBDI", C) = FCBDI.L;  
REPORTN ("FCBDJ", C) = FCBDJ.L;  
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REPORTN ("FCBMJ", C) = FCBMJ.L;  
);  
DISPLAY REPORTN;
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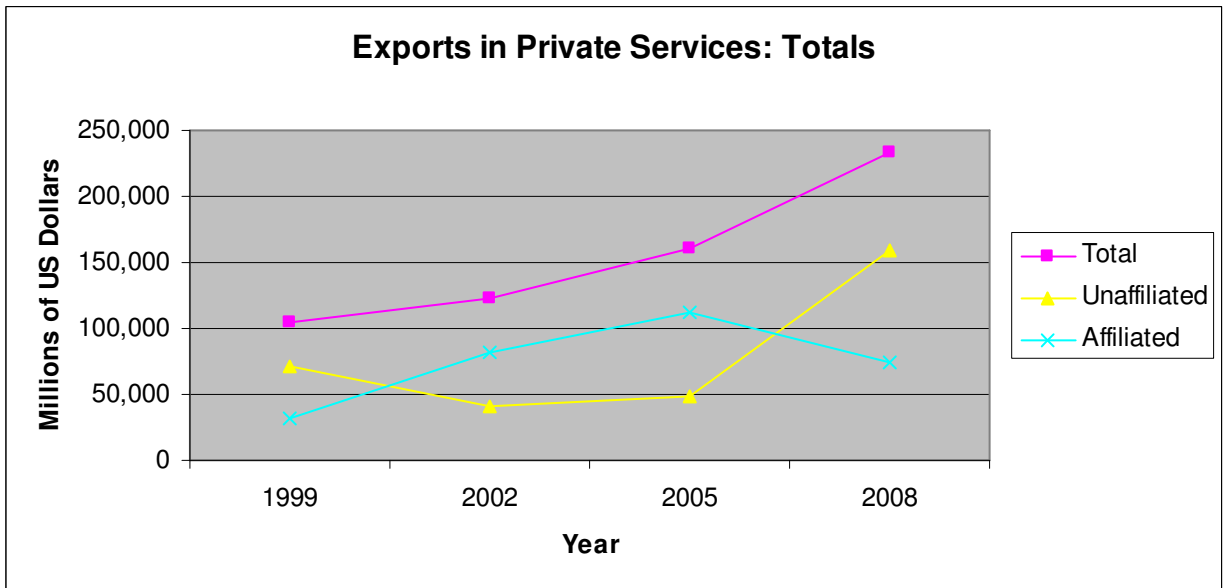
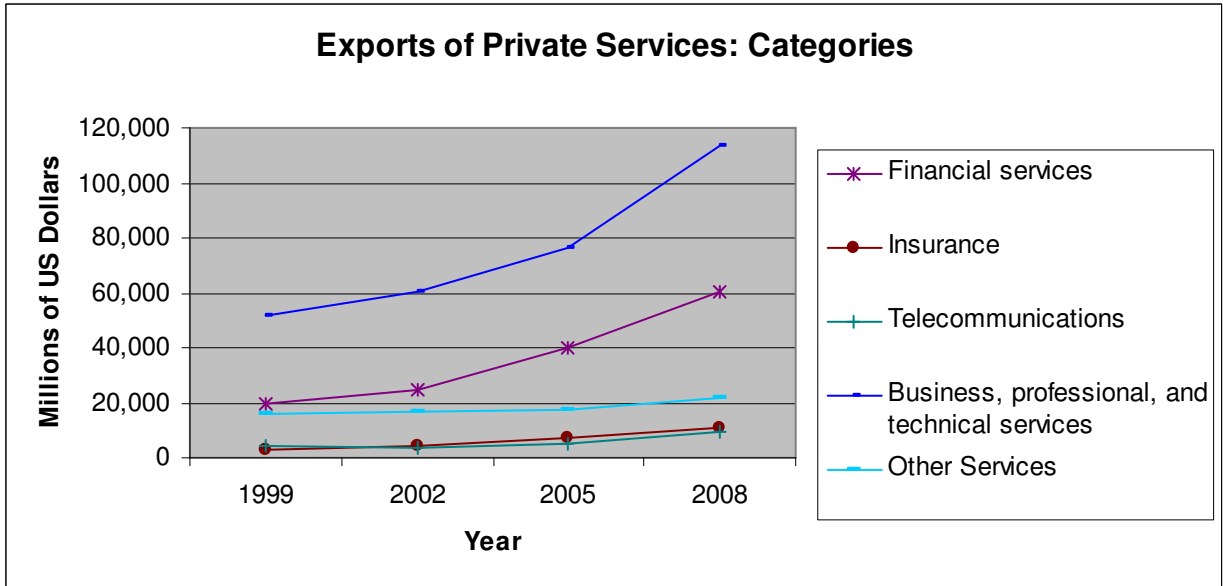
## **Chapter 5: Relationships and Regulations: Interactions with Exports and Foreign Affiliate Sales of Business and Professional Services**

The rapid growth of trade and foreign affiliate sales in services has led to increased analysis and an increased interest in modeling the interactions between the different modes of supplying services abroad. Services have gone from being modeled as non-tradables to being modeled as intermediate inputs (producer services) and finally are now being considered as both a final service and an intermediate input into the production of goods as well as other services. This new treatment of services reflects what the data shows about sales of services and trade in services. Services made up 74% of OECD countries' economies in 2007. For the United States, Exports of Private Services<sup>1</sup> increased from \$150,000 million in 2004 to \$233,500 million in 2008. Business, Professional and Technical Services make up close to 50% of these traded services and financial services make up around 25%. Tables 1 and 2 contain the trade data over time along with the foreign affiliate sales of services data for a similar time period. Even more dramatically, sales of US Majority Owned Foreign Affiliates increased from \$483,000 million in 2004 to \$1,026,000 million (\$1.02 billion) in 2007 (see Figures 1 and 2 below). Clearly US foreign affiliate sales of services are outpacing exports in both absolute value and growth but exports are an important method of supplying services abroad.

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<sup>1</sup> Private Services as defined by the BEA are: Education, Finance, Insurance, Telecommunications and Business and Professional Services (BPT). BPT Services include: Computer and Information Services; Management, Consulting and Public Relations Services; R&D and Testing Services; Construction, architecture and engineering services; Industrial Engineering Services; Advertising; Operational Leasing Services; Legal Services and other business services.

Figures 1 and 2



While it is most definitely the case that countries which have relatively more trade with each other, also are more likely to have more foreign affiliates and engage in FDI in one another. Taking this to be true, do restrictions on one mode of service provision results in substituting with the other or restricting those services altogether? What regulations or institutions encourage both trade and affiliate sales? Does a liberalization of restrictions in one type of service lead to increases in both types of services provision? Providing answers to the preceeding questions is not a straightforward exercise, yet this paper will begin to try to answer them, at least in terms of US firms. The contribution of this paper is an initial empirical analysis of how barriers to cross-border trade and FDI in professional services affect the complementarity or substitutability of these types of service provision to affiliated firms, unaffiliated firms and end users.

In this paper I will be examining the data on foreign affiliate sales in services, which is the true measure of what GATS terms MODE 3. Most analysis using FDI stocks/flows as the measure of this, which has been proven to be a huge overstatement (Brainerd, 2006). I will also look at US unaffiliated and affiliated trade in services between the same set of countries and attempt to determine where the data shows relationships between the types of services supply abroad. This requires various statistical and theoretical challenges as causality between trade and FDI exists, as well as causality among different restrictions (i.e. a country with monopolies in certain industries will also have entry restrictions and is more likely to have cartel behavior in other industries). I will explore the intuition behind different techniques, including simultaneous probit equations, SEM modeling and the benefits of 3SLS over 2SLS in the analysis of the relationships between foreign affiliate sales and cross border trade in services.

I will also try to reveal which types of barriers to trade and foreign affiliate sales are impacting how US services firm choose to supply the services abroad. In order to do this I will use panel regression techniques to separate the impacts of country level and sector level barriers, restrictions, and regulations; the existence of supplies of service by the opposite mode, as well as correct for gravity variables and other fixed effects.

Section II discusses the recent literature on trade and FDI as substitutes or complements, Section III presents the data and the estimation strategy, Section IV provides an overview of the estimation results and Section V concludes.

<b>Exports</b>									
Year	Total	Unaffiliated	Affiliated	Education	Financial services	Insurance	Telecommunications	Business, professional, and technical services	Other Services
1999	103,934	71,684	32,250	9,616	19,433	3,053	4,549	51,494	15,790
2002	122,207	40,513	81,694	12,626	24,496	4,415	3,890	60,177	16,602
2005	160,051	48,001	112,050	14,021	39,878	7,566	4,748	76,487	17,351
2008	233,529	158,978	74,551	17,796	60,190	10,756	9,163	113,525	22,099
<b>Percentage Change 1999-2008</b>	124.69%	121.78%	131.17%	85.07%	209.73%	252.34%	101.43%	120.46%	39.96%

Year	Total	Unaffiliated	Affiliated	Education	Financial services	Insurance	Telecommunications	Business, professional, and technical services	Other Services
1999	55,510	30,387	25,123	1,807	8,280	9,389	6,601	28,773	659
2002	72,604	29,443	43,161	2,702	8,963	21,926	4,233	34,185	596
2005	97,818	37,826	59,992	3,992	12,126	28,710	4,519	46,924	1,547
2008	153,267	92,505	60,762	5,204	19,143	42,939	7,193	76,284	2,505
<b>Percentage Change 1999-2008</b>	176.11%	204.42%	141.86%	188.04%	131.20%	357.32%	8.97%	165.12%	280.12%

Industry of Affiliate	Year	All countries	Canada	Europe	Latin America/ Caribbean	Australia	Japan	Other countries
<b>All industries</b>	<b>1999</b>	<b>353,207</b>	<b>34,741</b>	<b>198,673</b>	<b>41,551</b>	<b>14,699</b>	<b>26,425</b>	<b>37,118</b>
<b>All industries</b>	<b>2007</b>	<b>1,025,841</b>	<b>100,498</b>	<b>564,796</b>	<b>118,772</b>	<b>36,566</b>	<b>60,026</b>	<b>145,183</b>
Percentage Change	1999-2007	190.44%	189.28%	184.28%	185.85%	148.77%	127.16%	291.14%
<b>Finance and insurance</b>	<b>1999</b>	<b>84,496</b>	<b>7,794</b>	<b>37,314</b>	<b>12,620</b>	<b>26,768</b>	<b>2,047</b>	<b>13,646</b>
<b>Finance and insurance</b>	<b>2007</b>	<b>230,186</b>	<b>12,195</b>	<b>115,323</b>	<b>37,556</b>	<b>65,112</b>	<b>8,661</b>	<b>18,373</b>
Percentage Change	1999-2007	172.42%	56.47%	209.06%	197.59%	143.25%	323.11%	34.64%



## **Section II: Recent Literature on Services Trade and Foreign Affiliate Sales**

The decision whether to export or to establish a foreign affiliate to supply services to a foreign market has been discussed in the literature in terms of the firms' productivity, (Melitz, Helpman and Yeaple, 2003) within the knowledge capital model of trade theory (Maskusen 2005), as well as in CGE analyses, both simulated and numerical (Maskus and Konan, Balistreri et al., among others). There have been only a few papers (Christen and Francois, 2010; Fillat-Castejon, Francois and Woerz, 2008) that look at the data and how the prevalence of service trade and foreign affiliate production are more complex and intertwined than previously thought and the decision to trade or sell through an affiliate may be determined by the regulatory system in the host country and restrictions imposed on services providers that limit market access and/or create barriers to establish a commercial presence.

Balistreri, Rutherford and Tarr (2009) find that when the regulatory barriers to foreign and domestic business services providers in Kenya are relaxed or eliminated, the gains are quite substantial. They model the barriers in terms of ad valorem equivalents as well as productivity effects on the business services sectors as well as all up and downstream sectors. The gains found from eliminating the restrictions to foreign and domestic production in business services derive from over 55 sectors and increase up to 50% of consumption in their long term solution. In this particular analysis, where the regulatory barriers are also very restrictive to domestic providers, the gains were even greater due to where the Kenyan economy is starting from. However, this model is one of the few to look at the impact of both non-discriminatory and discriminatory barriers to production in business services and the model's calibration is quite sophisticated in the including of capital productivity effects and 55 different sectors.

For comprehensive overviews of the literature around trade and foreign direct investment in services, Fontana and Picot (1999) provide an excellent resource. They make the good point that the level of analysis is important in determining this relationship as well as determining the assumptions about what the theory tells us. Trade theory surrounding multinational firms would contend that trade and foreign affiliate production are substitutes at the firm level however; they may be complements at a more macro-economy level. This aspect is discussed in Egger and

Pfaffermayr (2005) as they examine a three factors New Trade Theory model which assumes distance affects both trade and FDI through transportation costs and plant set up costs respectively. They find that trade and FDI are complementary with respect to distance as well as additional exogenous determinants. Fontagné and Pajot (1999) have attributed the apparent complementarity and substitutability of trade and foreign affiliate sales to the different level of analysis (firm, industry/sector, economy) as well as to the lack of clarification between vertical and horizontal FDI. The latter point, in the analysis sections to follow, is related to whether the services are final or intermediate in nature and further what is the trade or affiliate sales relationship (ex: trade from parent to affiliate is intra-firm and vertical whereas affiliate sales to unaffiliated local parties is likely horizontal).

The discussion of vertical vs. horizontal FDI is not a new area of discussion or research and is discussed in Zarotiadis and Mylonidis (2005) and Egger and Pfaffermayr (2005) as it relates to services and many others as it related to manufacturing. It may be the case that complementarity between trade and FDI is stronger, which is associated with vertical FDI and rather low trade costs. This is intuitively compelling given that the majority of FDI takes place between high developed countries, where vertical FDI is expected to play a greater role than between partners at different levels of economic development. I believe that there is a great deal of horizontal and vertical FDI among high income countries as vertical FDI in services may also serve downstream manufacturing firms already established.

There are countless ways that foreign affiliate sales and exports may be combined, such as the two hypothetical situations below and presented in Figure 3 in the appendix.

1. Home Country Firm which has an affiliate established can sell services produced at the affiliate to both consumers and firms in the host country,

AND can import additional services from the US,

AND can also export those services directly to consumers and firms in the host country using the knowledge/relationships that have been made through the established affiliate.

2. Home Country Firm may *want* to establish an affiliate but the regulatory barriers are too costly and so the firm supplies firms, consumers and other affiliates by exporting services

to those firms abroad. If the regulations are lifted the firm may establish an affiliate to sell services abroad *and/or* continue to export the services.

Professional and Business Services are some of the most differentiated industries in that some services within these industries are similar and related while others are completely unrelated and are used in vastly different ways and by different types of end users. This results a firm to have the ability to supply differentiated services to both affiliated and unaffiliated firms as well as end consumers. For example: an insurance company can offer various types of insurance which are an input into an insurance package for a firm and are a final service demanded by individuals and families. The same applies for financial services, legal services, and engineering services to name a few examples. The complexity from this differentiation also implies a more complex decision process for firms choosing to supply services abroad.

I will assume that service suppliers of BPT services which engage in trade or establish foreign affiliates can do either at any time. This paper is not about the actual choice to invest or to export which is modeled nicely in an oligopoly context by Christen and Francois (2010). Professional and Business services (including finance, insurance, and information services) industries often have a small number of firms that are responsible for a very high percentage of the sales. Services are most often modeled using monopolistic competition due to the differentiated nature of the services and the fact that there are numerous different firms providing the services. This also allows for theory determining productivity levels required for a firm to be able to export, and an even high productivity level for firms to be able to establish a commercial presence abroad and have a foreign affiliate sell the services.

There have been a few studies using extensive firm level data shared by the country being analyzed (Eby Konan and Van Assche 2007, Balistreri et al. 2009). The literature is lacking an acknowledged method of modeling the impacts on trade and foreign affiliate sales in professional services of the various regulatory barriers. More importantly for this paper, the literature is largely lacking in answering the question: what is the current relationship between unaffiliated trade, affiliated trade and FDI in the business and professional services sectors and industries and how are these relationships affected by the various barriers? If we know that entry

barriers to services also result in decreases in both unaffiliated and affiliated cross border trade this means that liberalization of the fixed cost increasing barriers will have even larger benefits as trade in services would increase for both intra-firm, inter-firm, and end user servicing trade.

At a true macro level, there are three elements of services supply that are related to the analysis in the following sections: United States (parent country) supply and consumption of services; United States (or other home country) supply of services abroad in a chosen foreign economy (host country); host country's supply and consumption of services. I am most concerned with the first two, although an analysis of all three is desirable for future work. These are easily theoretically with both countries having domestic and multinational service providers which can supply the domestic economy, can export abroad, or in the case of MNEs can also supply services in a foreign economy by establishing an affiliate. When looking at the data, these different sources of consumption and supply and important to keep in mind as variables such as a host countries imports or exports of services to the US may have an impact of the level of US owned affiliate sales of services in that country. Likewise, US exports of services to a host country may act as substitutes for affiliate sales in some cases and as complements in others. It is also entirely likely that some of these relationships are not consistent enough to show up in the data available for analysis.

The General Agreement on Trade in Services (GATS) identifies four modes to trade in services. These are:

Mode 1: Cross-border supply: when a service crosses a national border. An example is the purchase of insurance by a consumer from a producer abroad.

Mode 2: Consumption abroad: when a consumer travels abroad to consume from the service supplier, such as in tourism, education, or health services.

Mode 3: Commercial presence: when a foreign owned company sells services (e.g. foreign branches of banks).

Mode 4: Temporary movement of natural persons: when independent service providers or employees of a multinational firm temporarily move to another country.

Countries have made commitments through the WTO rounds of negotiations that apply to specific modes of supply and further, apply to national treatment and/or market access for foreign suppliers. National treatment implies that foreign providers of services will not be treated any differently than domestic providers. This includes quotas or licenses which may be restrictive as these barriers fall into the market access article within GATS. National treatment is a critical area of liberalization for many services industries as the discrimination foreign service providers encounter prevents entry and/or access to the consumers and firms within the country.

Market Access is the other GATS article under which countries are supposed to guarantee rights for foreign service suppliers. Market Access entails guaranteeing unrestricted access to consumers and firms within the country for foreign service suppliers which meet the domestic standards for supplying each service. Often, national treatment restrictions are used to restrict market access and therefore commitments in one but not the other are still very harmful. Data on who has commitments in GATS is not useful as the list of commitments is a positive list, not a negative list. This means that countries list who they promise to guarantee market access and/or national treatment but not those which they will not guarantee these rights, whereas the latter is important for any analysis to be meaningful. The GATS data also has the problem in that it is difficult to determine whether the pledged commitments are a change from the status quo and if they are a change there is no mention of what the differences?

Christen and Francois (2010) provide a comprehensive look at the modes of delivery of services using a new theoretical framework using oligopoly to model the production of services both at home and abroad. While there may be a high number of firms in each industry the authors point out that in many of these industries the top 8 firms account for 45-80% of all sales. Therefore, oligopoly firm theory has been used for more recent work in the area.

They find that the interdependence among the various modes of supply will allow liberalization in one mode to have significant spillover effects onto other modes of supply and therefore increases the gains from such liberalization. They also use manufacturing affiliate sales as a determinant of services affiliate production and find it to be significant. In my analysis, I will not include this data in order to eliminate interactions between the manufacturing data and

various services trade and affiliate sales values in the analysis. I believe that the existence of prior manufacturing FDI is a determinant and will be picked up in the country effects.

The analysis in the sections that follow in this paper focuses on Mode 1 and Mode 3 in GATS terminology; however, Mode 4 is also important yet will not be explicitly modeled due to a lack of data that is specific to Mode 4. In many cases, the temporary movement of persons is needed to provide services under Mode 3 when the foreign affiliate needs to fly over workers from the home country to either be employed at the affiliate temporarily or to work to provide a service for a given contract/project. Additionally, prior Mode 4 services provision may provide needed information for setting up an affiliate and working with the foreign government and foreign companies. While this paper will not look at any restrictions to Mode 4 specifically (or measure Mode 4 sales), previous work has found “that a 10 per cent increase in the temporary movement of people increases services imports (exports) under Mode 1 by 4.7 (2.9) per cent, and it is correlated to a 8.0 (approximately 7) per cent higher inflows (outflows) of foreign direct investment (a proxy for trade in services under Mode 3).” (Jansen and Piermartini, 2004)

Due to extensive data limitations relating to the expense of collecting, aggregating, measuring and publishing data on barriers as they relate to the Modes of supply the questions whether the relationships between modes complementary or substitutable is addressed sparingly with in the literature. Brandstetter et al. cover the current state of data available for the analysis of services trade and FDI in their August 2010 NBER working paper which illustrates the need for continued cooperation among organizations to create a true dataset of services trade and affiliate production sales as well as measures of the barriers encountered at the border as well as the various behind the border types of restrictions. As mentioned previously, Fortagné (1999) and Magalães and Africano (2007) are resources at the macro level while Hejazi and Safarian (2001) and Bos and van de Laar (2004) are good sources on the complementarity in services trade and foreign direct investment. Sector specific studies are numerous and include Buch and Lipponer (2007) for German banks and financial services trade/affiliate sales, Moshirian (2001) and Moshirian et al (2005) for intra-industry trade in banking and Fink, Mattoo and Rathindran (2003) for telecommunications among others.

### **Section III: Data and Analysis Specification**

I am using United States trade and foreign affiliate sales data from the Bureau of Economic Analysis (BEA) for the years 1999-2008 (2007 for foreign affiliate sales data). I will utilize both import and export data in all the sub-categories within the BEA's "Other Private Services" classification which includes and Business, Professional and Technical Services. The other categories within Other Private Services as defined by the BEA are: Education, Finance, Insurance, Telecommunications and Business and Professional Services (BPT). BPT Services include: Computer and Information Services; Management, Consulting and Public Relations Services; R&D and Testing Services; Construction, architecture and engineering services; Industrial Engineering Services; Advertising; Operational Leasing Services; Legal Services and other business services.

Export data is separated for Affiliated and Unaffiliated and is then also broken down by country. Data by country and industry for 1999-2005 is limited to unaffiliated trade only so I will also keep this data separate for the whole time series within the panel data analysis. US majority owned foreign affiliate import data for intermediate services is also available and so these will proxy the affiliated exports from the US. The foreign affiliate sales data I am using is the total sales of US Majority Owned Foreign Affiliates in the following industries: financial services; insurance services; information services; and professional, scientific and technical services (PST). PST services include architectural and engineering services; computer system design and related services; management, scientific and technical consulting services; legal services; accounting services; research and development services; advertising services, and other professional, scientific and technical services not contained in the prior categories.

The analysis will include a set of sector-year indicators related to the dependent variables (ex: foreign ownership restrictions if the dependent variable is foreign affiliate sales), country-year indicators (ex: corporate tax rate and GDP), country time-invariant indicators (distance, language). In addition, a set of "other-mode of supply" variables will be included in order to

determine what the impacts of the other supply (one year lagged) and the barriers that are particular to that mode of supply. Data definitions and sources are available in Appendix I and the variables are contained in Table 3.

We would expect to see that trade has a positive effect on foreign affiliate sales as the existence of trade in a particular service means that there is entry into the market and there is demand in the foreign market. This where the simultaneous probit analysis may lend additional insight if properly specific as we can try to determine when foreign affiliates are established given the trade level that exists in a particular service industry.

The addition of intra-firm trade data and US multinational trade data in all professional and business services adds additional questions to the theory. It may be the case that US multinational exports have a negative effect on the establishment of foreign affiliates in those same services. In addition, US multinationals' intra-firm trade in services is likely a substitute for those services being provided outwardly as the firms are using the services in other affiliates at home, in the host country, or even in a third country.

The estimation techniques used here are rather straightforward as this is demonstrating an initial analysis of the relationships among the data and the impact of various regulatory barriers on these relationships. However, examining methods for finding accurate instruments and estimating these relationships again with bilateral data in a structural equation model is desirable. I will explain this in the following paragraph while admitting that the lack of bilateral trade and foreign affiliate sales data for the panel makes a meaningful (in terms of coefficient translation into actual dollars) approach to simultaneous models difficult and therefore I leave much of it for future research.

The equations for analysis are as follows:

$$FA_{ijnt} = B_0 + B_1 + X1_{ijt} + X2_{jnt} + X3_{ij} + IM_{ijnt-1} + EX_{ijnt-1} + CD + YD + \square_{ijnt}$$

$$IM_{ijnt} = B_0 + B_1 + X1_{ijt} + X2_{jnt} + X3_{ij} + FA/OT_{ijnt-1} + CD + YD + \square_{ijnt}$$

$$EX_{ijnt} = B_0 + B_1 + X1_{ijt} + X2_{jnt} + X3_{ij} + FA/OT_{ijnt-1} + CD + YD + \square_{ijnt}$$

$$FA_{ijnt} = B_0 + B_1 + X1_{ijt} + X2_{jnt} + X3_{ij} + IM_{ijnt-1} + EX_{ijnt-1} + CD + YD + \square_{ijnt}$$



Where the vectors are defined as:

**FA:** Logged foreign affiliate sales in the sector  $n$  of analysis from country  $i$  (US) to country  $j$  (host country) in year  $t$ .

**X1:** Vector of country pair time variant indicators (GDP difference, skill difference, tax rate differences). Also includes macro regulatory indicators which are time variant

**X2:** Vector of sector specific variables which are time variant (for the regulatory analysis in Section IV.B)

**X3:** Vector of country specific variables which are time invariant (distance, language, etc.)

**FA/OT:** Vector of other modes of supply (foreign affiliate sales, other trade in services, etc) which is lagged one year to prevent collinearity.

**CD:** Country dummy variables used in most specification. When not used, a basic country variable with additional NAFTA and OECD variables used to pick up fixed effects.

**YD:** Year dummy variable used in most specifications. In short samples, simple year variable used to pick up all year fixed effects.

$\epsilon$ : Error term which is clustered at the country or country year level

As we will see later in this section the dependent variables are highly correlated with one another in some cases, the error terms are also correlated in these cases. This means I need to explore the use of simultaneous equations in determining the relationship between trade and foreign affiliate sales in services. I will explain the future benefits of using simultaneous probit models with one continuous and one dichotomous variable, simultaneous equations within a structural equation model, and 3SLS using panel regressions. Initial regressions with traditional gravity variables and lagged opposite mode are done as well where they make sense with the theory. By utilizing the lagged on the right side for such cases, I will be able to use panel regression techniques rather than a 2SLS or other SEM model for these initial determinants. The analysis includes the logged values for exports, imports, affiliate sales, GDP, etc. as there are a number of different scales within the explanatory variables and in my initial analysis I found that

the coefficients did not make sense in due to the scaling issue. Zero-one dummy variable will not be transformed and neither are percentage variables (ex: trade as a % of GDP, labor force percentage with tertiary education). Also, I will employ lagged variables wherever collinearity or endogeneity present a bias if current year is utilized in the specification.

The data analysis is separated into two exercises. The first focuses on the relationships among the various modes of supply without the sector level regulatory variables included. This will allow for some initial inferences about the supply and the consumption of financial, information, and professional services within a traditional gravity model framework.

The second part of the analysis focuses on how the barriers to each mode of supply affect the sales by affiliates and/or the exports. What does theory tell us about which types of restrictions affect fixed variable or entry costs and therefore affect the various modes of supply for services? The initial analysis allows these comparisons to be made more easily as it provides a baseline where the regulatory impacts are captured in the country and year fixed effects.

The outcomes of the analysis, rather than aim at policy recommendations or confirmations of new theoretical models serve instead to guide the next steps in the process of redefining how trade and investment in professional and business services (particularly focused on the various modes of supplying services abroad) interact with regulatory barriers, restrictive policies, institutions, and also prudent regulatory policies (having an independent regulatory body, requiring a professional exam, etc.) in these sectors. This type of analysis can be done using simulations but would be best done in a calibrated CGE model with selected country pairs. The relationships described in the analysis below provide a challenge in adapting the theory to incorporate the intermediate and final good nature of business and professional services as well as the determinants of a firm's choice of supplying these services abroad.

#### **Section IV.A Relationship Analysis and Discussion of Simultaneous Modeling Approaches**

In order to handle the causality between the existence of trade and the increased probability of foreign affiliates established in the country of question there are a few different techniques that can be established.

The relationships in question can be analyzed for the three individual sectors using the following variables of interest: MOFA sales (foreign affiliate sales), unaffiliated exports/imports (exports are the other mode of supply and we use unaffiliated US exports/imports to reduce the effects from endogeneity), exports of other private services by US parent companies (not restricted to intra firm trade) and exports of services to their affiliates (purely intra-firm trade).

It is obvious that the data analysis would be more robust under a simultaneous equation setup due to the correlation between exports and foreign affiliate sales of services and the fact that the exogenous or pre-determined variables impact both modes of supply as well. This is why I do not include exports of services as a dependent variable in the analysis. There are some available methods of modeling these relationships within the statistical software packages, however, they are limited when using panel data. One method would be to assume that one variable (exports) is continuous and the other (foreign affiliate sales) is dichotomous and therefore taking a zero or one value only. This analysis would be answering a different question however and would not be the ideal method for determining how various barriers impact trade and foreign affiliate sales simultaneously. A more conventional approach would utilize a 3SLS approach (such as Hausman-Taylor) which requires the model to incorporate instrument variables. This is an approach that definitely merits further research into valid instruments.

The best candidate for modeling these relationships is using a the non-IV fixed effects approach taken by Plumper and Troger (2007). This model allows for time-invariant as well as time-variant effects and does not run the risk of weak instrumentation. This approach also would benefit from a larger panel and more complete panel. There are both true zeros as well as non-disclosure zero in the trade and foreign affiliate sales data and these are problematic. Having a complete dataset will allow this structural model to be applied and for the interactions of the barriers introduced in this paper to be estimated.

For this initial analysis, looking foreign affiliate sales as the dependent variable, the regressions are performed with data separated into country-sector-year panels (35 countries, 10 years, 4 sectors). The analysis is done on the Finance, Information and Professional Services

sectors separately and then the fourth sector is really All Private Services which includes the other the three sectors.

Table 3 includes the variable names and their descriptive statistics across the entire panel. Some of the variables are only included for OECD countries (as the source is the OECD) and other variables are only included for the All Private Services category (as this is the level that the BEA provides this data publicly).

**Table 3: Summary Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max	Variable	Obs	Mean	Std. Dev.	Min	Max
English	1560	0.282051	0.450143	0	1	Total US Parent Sales from Affiliates	311	717.2683	1540.563	0	10956
Distance	1560	8393.4	3749.158	548.3946	16180.3	Total US Unaffiliated Sales from Affiliates	291	291.4421	678.8832	0	4061.06
Regulatory Impact	882	0.206467	0.097512	0.029	0.44	Sales to Local Affiliates from US Affiliates	380	86.19202	78.06559	0.832033	488.444
Tax	1552	30.67502	7.173443	12.5	52.3	Sales to Local Unaffiliated Persons from US Affiliates	380	163.0782	135.6815	0.723252	1090.04
% of Labor Force with Secondary Education	1056	28.93392	13.82379	3.3	84	Sales to unaffiliated third country persons by US Affiliates	380	106.4236	82.1654	1.103085	313.623
School Enrollment in Tertiary	1296	53.06164	21.66635	6.566264	98.0917	GDP	1560	9.95E+11	2.00E+12	2.00E+10	1.32E+13
% of Labor Force with Tertiary Education	1036	41.99846	15.97839	7.2	79.1	GDP per capita	1560	21244.56	16362.22	542.5287	88414.1
OECD Market Share in Service Sector	847	3.667425	5.455678	0	29.4118	GDP difference	1560	1.14E+13	3.29E+12	0	4.74E+13
Skilled Labor	1600	37161.68	99610.67	153.9	774160	GDP Difference Squared	1560	1.40E+26	1.27E+26	0	2.25E+27
MOFA Sales	1472	8718.772	38003	0	556276	Unaffiliated Exports	553	333.93	294.6323	-29.57574	1728.62
Parent Exports: Intra-firm	1254	1612.994	6993.766	0	73713.1	Exports of Other Private Services	966	237.9572	615.7378	0	4991
Parent Imports: Intra-firm	1277	1774.288	9017.253	0	101212	Imports of other private Services	884	162.7831	546.79	0	6393.97

**IV.A.i Information Services**

Information services have become an absolute necessity for consumers and producers alike. Information services include information and data processing, publishing (including software) as well as broadcast and telecommunications services. The distribution of sales among these industries shows that Publishing has the largest amount of total sales, with data processing

and information services close behind, when it is available, however, due to the disclosure rules preventing the identification of individual firms, much of the information services and data processing industry data is not available at the industry level.

Table 4 shows the correlation coefficients for the various types of supply of information services by the US abroad as well as the importation of these services. It can be seen here that the endogeneity discussed above is apparent between unaffiliated services exports and affiliate sales. This correlation is not surprising, however the highly positive nature is a first sign of what may arise later in the analysis. The question remains whether this positive correlation is due to a complementary relationship, is driven by larger markets where demand for all services is great, or is defined by a combination of trade being a substitute mode of supply at some times and a complement at others (which is becoming the predominant opinion in the literature). Interestingly, unaffiliated exports are also highly correlated with intra-firm trade, but specifically, US parent company imports from their foreign affiliates. This may be the results of a parent company establishing an affiliate for intermediate services production abroad where the market for final services is largely services by exports. In the case of information services, the regulation and monopoly power within broadcasting, internet services and publishing (including software) also has an impact on this correlation.

In terms of the impacts of the gravity model variables I find that the availability of skilled labor has a positive effect on affiliate sales and the GDP per capita of the host country does as well in most of the regressions. The variable for the difference in GDP is not significant in most of the regressions and when it is it is negative which implies affiliates are more prevalent in countries that are similar in economic size to the United States, while GDP per capita (normalized and corrected for PPP) is significant and positive in the analysis furthering that contention. English speaking country dummies were significant and positive and distance was usually significant unless country dummies were excluded. Imports of goods and services as a % of GDP (and exports) are used in many of the regressions as country level variables and the higher the % of imports of goods and services for a host country, the higher the value of total affiliate sales in information services. This can be thought of as a proxy for excess demand in the economy

(excess in that it cannot be served by domestic producers). I also use trade as a % of GDP in some of the analysis as it does not decrease the panel dimensions as the data is more complete across the panel. It is interesting as we might interpret this as a signal that imports are the preferred mode of supply for services in the host country but the model's results are saying otherwise.

**Table 4: Correlation Coefficients for Information Services**

	Intra Firm Exports	Intra Firm Imports	Unaffiliated Exports	Unaffiliated Imports	Exports Other Services	Imports Other Services
Intra Firm Exports	1					
Intra Firm Imports	0.6265	1				
Unaffiliated Exports	0.5967	0.8585	1			
Unaffiliated Imports	-0.0325	0.0425	0.4498	1		
Exports Other Services	0.4956	0.3926	0.544	0.2716	1	
Imports Other Services	-0.1707	-	0.1496	0.565	-0.0288	1

	MOFA Sales	Intra Firm Exports	Intra Firm Imports	Unaffiliated Exports	Exports Other Services	Imports Other Services
MOFA Sales	1					
Intra Firm Exports	0.3649	1				
Intra Firm Imports	0.4983	0.6282	1			
Unaffiliated Exports	0.8706	0.5629	0.8163	1		
Exports Other Services	0.6604	0.4826	0.3813	0.5814	1	
Imports Other Services	0.406	-0.1823	0.1115	0.1933	0.0256	1

The first set of regressions in Table 5 I include lagged US Unaffiliated Exports as an independent variable and these demonstrate the findings above but also demonstrate the positive and significant effect of unaffiliated trade in information services. Parent exports of other private services are also found to have a positive effect on affiliate sales (second panel in Table 5) which lends credit to the idea that trade and affiliate sales in business and professional services is complementary. This is not new information as Brainard (1997), Graham (1999), Clausing (2000),

Egger & Pfaffermayr (2004) as well as Fontagne & Pajot (1997) have all found results in line with this complementary view of trade and FDI, however, most studies use FDI Stocks and/or Flows rather than foreign affiliate sales which is the truer measure of the supply of services through a foreign affiliate.

**Table 5: Information Services Regressions**

Dependent Variable: MOFA sales in Information Services				Dependent Variable: MOFA sales in Information Services			
R-squared	0.9706			R-squared	0.9391		
Variable	Coef.	T-Stat	P> t	Variable	Coef.	T-Stat	P> t
Lagged Unaffiliated Exports	0.5475673	3.27	0.003	Lagged Parent Exports of Other Services	0.4457249	2.85	0.013
GDPDiff	-2.427392	-1.32	0.197	Lagged Parent Imports of Other Services	-0.0071931	-0.07	0.947
Skill Diff	7.464261	3	0.006	Tertiary Share of Labor Force	0.0168684	2.23	0.043
GDP per Capita	1.34587	2.77	0.01	Trade% of GDP	-0.0038589	-0.87	0.399
Distance	-1.31148	-2.29	0.031	GDPDiff	0.7825723	0.31	0.76
English	0.804788	0.68	0.503	Skill Diff	-1.70925	-0.53	0.605
Trade% of GDP	0.0098455	1.76	0.09	GDP per Capita	1.100223	2.29	0.038
Constant	-15.24115	-0.53	0.604	Distance	0.3652441	-2.4	0.031
				English	0.4315286	1.43	0.176
				Constant	-45.44962	-0.33	0.747



#### **IV.A.ii Financial Services**

Financial services have been more thoroughly analyzed in the last decade than any other business services. They have also experienced more liberalization than the others, which will make the second part of the analysis more difficult for these services. The economic crisis of 2008-2009 put financial services in the limelight and there are already quite a few published papers on the impact of the crisis on trade and FDI in both services and manufacturing. Borchert and Mattoo (2009) show that services trade weathered the crisis much better than expected or than thought initially, however, the resulting regulatory onslaught on financial sectors at both national and global levels will likely need another couple years until to determine any resulting impacts (good or bad).

The correlation coefficients are shown in Table 6 and do differ from the information services sector. Firstly, unaffiliated exports are not correlated with affiliate sales which illustrates the very different nature of the financial services industry and points also to the high level of services differentiation. Second, parent exports to affiliates (intra-firm) are not significantly correlated with affiliate sales either, which may demonstrate MNE motives as purely horizontal or vertical when they establish a financial services affiliate abroad. Parent exports of private services (other private services in BEA's classification are a sub-category of Private Services and do not include Travel, Tourism and Trade related services) are highly correlated with affiliate sales which makes sense in terms of the evidence that Banks and other Financial Services firms which establish affiliates abroad also export additional services to the same country.

**Table 6: Correlation Coefficients for Financial Services (including Insurance)**

	MOFA Sales	Intra Firm Exports	Unaffiliated Exports	Exports Other Services	Imports Other Services
MOFA Sales	1				
Intra Firm Exports	0.1125	1			
Unaffiliated Exports	0.4172	0.0602	1		
Exports Other Services	0.7967	0.1577	0.2586	1	
Imports Other Services	-0.1745	-0.0729	-0.2456	-0.217	1

	MOFA Sales	Intra Firm Exports	Intra Firm Imports	Exports Other Services	Imports Other Services
MOFA Sales	1				
Intra Firm Exports	0.0437	1			
Intra Firm Imports	0.1687	0.8437	1		
Exports Other Services	0.9548	0.1706	0.2762	1	
Imports Other Services	-0.1355	0.0394	0.0202	-0.1266	1

Table 7 shows the results of the regression analysis and the shows that parent exports of other private services have a significant and positive impact on affiliate sales in financial services. GDP and skilled labor differences have negative signs while GDP per capita has a positive sign and all are significant in line with the gravity model theory. It is likely that almost all financial services firms which export services from the US are MNEs so this will also include the unaffiliated exports of financial services (and therefore I do not include this in the specification). Of note, for most the financial services regressions is English as an official language is negative for the regressions with affiliate sales while English as a commonly spoken language (from the

CEPII gravity dataset) is positive and significant. The openness proxy of trade as a percentage of GDP has a positive and significant sign and a variable indicating if countries have a lower marginal tax rate than the US shows a positive sign for this indicating that this is something companies find attractive when setting up an affiliate and financial services firms may even be more responsive to differences, all other things equal.

**Table 7: Financial Regressions with Foreign Affiliate sales in Financial and Insurance Services as the Dependent Variable**

Dependent variable: MOFA Sales				Dependent variable: MOFA Sales			
R-squared	0.82			R-squared	0.89		
Variable	Coef.	T-Stat	P> t	Variable	Coef.	T-Stat	P> t
GDP Diff	-1.86	-2.19	0.04	GDP Diff	1.04	0.82	0.42
GDP per Capita	0.19	1.83	0.08	GDP per Capita	0.79	1.42	0.17
Distance	0.09	0.71	0.48	Distance	0.24	2.05	0.05
Lagged Exports Private Services	0.58	7.79	0.00	Lagged Exports Private Services	0.44	5.63	0.00
English	-0.16	-0.54	0.59	English	0.25	1.12	0.28
Trade % of GDP	0.00	0.29	0.77	Trade % of GDP	0.06	1.79	0.09
Skill Diff	-0.79	-1.84	0.08	Skill Diff	-3.63	-2.53	0.02
country	0.01	0.58	0.57	Imports % of GDP	-0.09	-1.40	0.18
year	0.06	2.19	0.04	year	-0.05	-0.51	0.62
Constant	61.70	-1.37	0.18	Lower Tax	0.45	2.00	0.06
				Country	0.00	0.35	0.73
				OECD Market Share	0.03	1.80	0.09
				Constant	125.51	0.74	0.47

#### **IV.A.iii Professional Services**

Professional services are fully labeled as Professional, Scientific and Technical services by the BEA as I mentioned above. These services represent those which are the most highly regulated, both out of need and out of tradition. Trade in these services usually requires a face to face interaction but more and more is facilitated by ICT networks to be able to be completed across borders as well. Thinking about the various modes of supply professional services can be supplied by a US to a foreign firm and consumer with or without having someone travel to the foreign country, however, in the case that this is required it is not clear how the service is accounted for as Mode 4 is really a description of a method used in conjunction with another mode of supply.

A firm may establish an affiliate and yet may still fly professionals from the US to service firms or countries or the firm may have workers from the host country working at the affiliate

company for short terms (due to visa requirements this is often the case) and this may still be categorized as a Mode 4 supply of services. In the other case we are concerned with, a firm in the US which does not have a service affiliate may provide the services from the US utilizing all the various modes of communication available today. The firm may also then send an employee for a final check or to do the actual service once the terms and contracts have been agreed upon.

Professional services are rapidly growing sections of trade and like Financial services have many opportunities for complex trade and FDI relationships with the broad range of services supplied and types of consumers which require them. In the next section, regulatory barriers for professional services will be discussed and their positive or negative effects on trade and affiliate sales will be estimated.

In Table 9 the correlation coefficients for the professional services dataset are shown. We see that like financial services, unaffiliated exports are not highly correlated with affiliate sales (.10) and lagged unaffiliated exports are even less correlated (-0.01). Parent exports to their affiliates and over US MNE exports of private services are mildly correlated with affiliate sales but not correlated with each other.

**Table 9: Correlation Coefficients for Professional Services**

	Intra Firm Exports	Intra Firm Imports	Unaffiliated Exports	Unaffiliated Imports	Exports Other Services	Imports Other Services
Intra Firm Exports	1					
Intra Firm Imports	0.3896	1				
Unaffiliated Exports	-0.0265	0.021				
Unaffiliated Imports	0.1669	0.0301	0.6407	1		
Exports Other Services	0.197	0.124	0.2568	0.5105	1	
Imports Other Services	-0.0452	-	0.2465	-0.0786	-0.0687	1
					1.0000	

	MOFA Sales	Exports Other Services	Imports Other Services	Unaffiliated Exports	Unaffiliated Imports
MOFA Sales	1				
Exports Other Services	0.5672	1			
Imports Other Services	-0.1218	-0.047	1		
Unaffiliated Exports	0.1088	0.1891	0.1892	1	
Unaffiliated Imports	0.2005	0.2497	0.2558	0.43	1

In Table 10 the regression with foreign affiliate sales as the dependent variable finds lagged unaffiliated exports of professional services which are positive and significant. This may be evidence of trade and affiliate sales being complementary but this complementarity could be the outcome of various situations. One that this paper is interested in is if this is evidence that countries which allow affiliate sales in professional services also import other business and professional services which they restrict from being produced within the borders. Both GDP per capita and GDP differences are found to be positive and significant as is trade as a percentage of GDP.

Table 10: Professional Relationship Regression Results

<b>Dependent Variable: Foreign Affiliate Sales in Services</b>			
<b>R-Squared</b>	<b>0.95</b>		
<b>Variable</b>	<b>Coef.</b>	<b>T-Stat</b>	<b>P&gt; t</b>
GDP Diff	1.354213	2	0.064
GDP Per Capita	1.254946	2.68	0.017
Distance	0.7631882	1.26	0.225
Lagged Unaffiliated Exports	0.1300269	2.15	0.048
English	-2.002359	-1.08	0.299
Trade % of GDP	0.0898036	1.75	0.1
Antireform exports	0.1867325	1.68	0.113
Skill Diff	-0.3268758	-0.7	0.496
Imports % of GDP	-0.1469935	-1.4	0.182
Year	0.0632749	1.3	0.214
School Enrollment in Tertiary	-0.5980769	-1.31	0.209
Higher Tax	-0.5104222	-1.25	0.23
Constant	-209.5111	-2.08	0.055

#### IV.A.iv All Services

This section uses data from all sales of services by US majority owned affiliates as the values for total sales. It does not include any values for intra firm trade but does have the ability for descriptive purposes to break down the sales of services into the type (affiliated/not affiliated) and the location (US, local market, and third country market) which are illustrated in Figure 3 and Table 11.

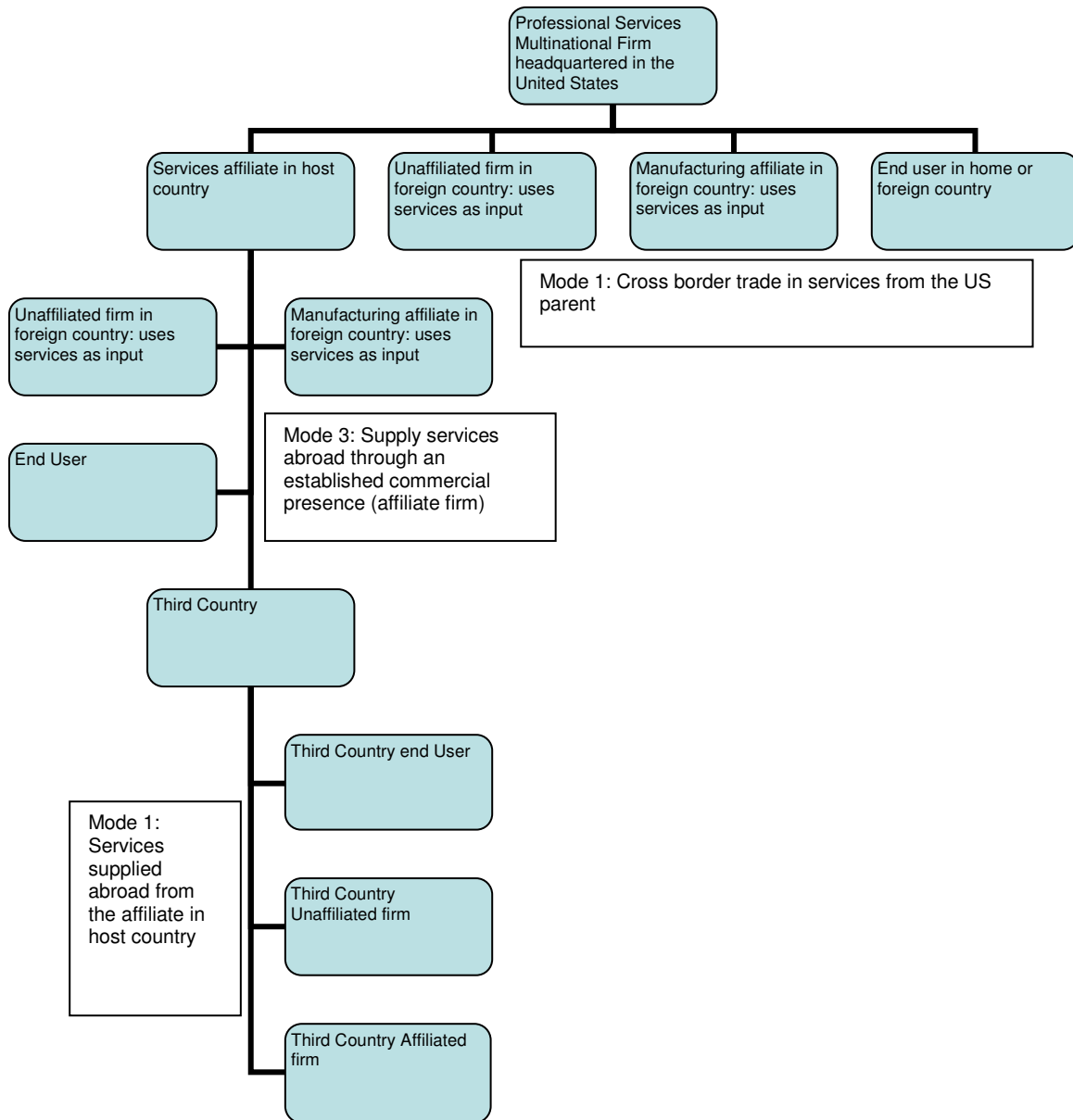
**Table 11: Sales of Services by Foreign Affiliates by Destination**

Sales in Millions of US Dollars	All Sales	Sales to Affiliated Persons	Sales to Unaffiliated Persons	Percentage of Total Sales To Local Market	Local Total Sales	Local Affiliate Sales	Local Unaffiliated Sales	
1999	\$372,853	\$38,435	\$334,418	86.01%	\$320,686	\$9,790	\$310,896	
2003	\$840,795	\$147,138	\$693,657	73.76%	\$620,167	\$30,742	\$589,425	
% Change from 1999-2008	125.50%	282.82%	107.42%	-14.24%	93.39%	214.01%	89.59%	
Sales in Millions of US Dollars	Percentage of Total Sales to US Market	Total US Sales	Sales to US Parents	Sales to Unaffiliated US Persons	Percentage of Total Sales to Third Countries	Total Third Country Sales	Third Country Affiliated Sales	Third Country Unaffiliated Sales
1999	5.27%	\$19,646	\$14,779	\$4,867	8.72%	\$32,520	\$13,866	\$18,654
2003	7.85%	\$65,990	\$41,534	\$24,456	18.39%	\$154,638	\$74,862	\$79,776
% Change from 1999-2008	48.95%	235.90%	181.03%	402.49%	110.87%	375.52%	439.90%	327.66%

I've included the data on US MNEs' imports and exports of other private services and included unaffiliated exports and imports of other private services as well. This means that the services included in the dependent variable are all potential services and this analysis looks at the relationship of business and professional services (including information, finance and insurance, and all the professional, scientific and technical services) have with affiliate sales of all services.

Therefore the results are not to be compared with those of the prior three sections as they are not showing the same types of relationships. The added destination breakdown of this data is why I've included it here as it lends to illustrating the current interactions between trade and affiliate sales as well as the magnitude of affiliate sales abroad, sold back to the US and sold to third countries (often referred to as export platform FDI).

**Figure 3**





The results of the relationship analysis are contained in Table 12. The table shows that the lagged level of parent exports of other private services and finds that those exports are positive and significant in determining the sales of other private services by foreign affiliates. This shows a true complementary relationship at the aggregated business and professional services level. GDP, English as an official language and GDP per capita all have positive effects on affiliate sales in other private services.

**Table 12: All Services Relationship Results**

<b>Dependent: MOFA Sales</b>			
<b>R-squared</b>	<b>0.9123</b>		
<b>Variable</b>	<b>Coef.</b>	<b>T-Stat</b>	<b>P&gt; t</b>
Lagged Exports Other Services	0.6671943	8.12	0
GDP	0.3208533	2.52	0.02
Skill Diff	-0.031793	-0.08	0.94
GDP Per Capita	0.1383868	1.61	0.12
Trade % of GDP	-0.001085	-1.32	0.2
Distance	-3.32E-05	-0.91	0.37
English	0.6155592	1.99	0.06
year	0.0265773	1.99	0.05
country	-0.01405	-2.11	0.04
Constant	-57.28412	-2.28	0.03

#### **Section IV.B. Regulatory Indicators Analysis**

As previously discussed, the various barriers encountered by services suppliers abroad are often difficult to quantify and this author has tried numerous methods, none of which achieved satisfactory conclusions. Therefore, in this paper I will use available data from extensive surveys performed by the OECD over the past 15 years which focuses on the restrictiveness of policies and regulations as they pertained to specific industries. In addition, country level and aggregate services level data is included from sources such as the UN, the World Governance Report published by the World Economic Forum and CEPII.

The measurement of barriers to services trade and the related literature is summarized by Hoekman in his 2006 literature review and I will not revisit this discussion here as I am not advocating any new method of measuring and quantifying barriers to trade and affiliate establishment in the business and professional services industries

The first caveat with the data for this analysis is that it is not available annually for all sectors. This is common in survey datasets due to the amount of time it takes to refine and aggregate the survey data received but adds gaps to the dataset which then greatly reduces the number of observations. In addition, the data is only available for OECD countries which restricts the analysis to those countries which both the BEA and the OECD have data for during the period of 1999-2008. There were countries from both sources which did not overlap and there was a decrease from 35 to 29 countries in the dataset for the analysis below. The regulatory indicators are described in Appendix II and the methodology is thoroughly explained in OECD Working papers 419 and 530 for the overall and professional indicators respectively.

In addition to the indicators from the various surveys described below, there is a sector specific variable called Regulatory Impact which is a variable that measures the “knock on” effects of regulatory barriers in sectors that are inputs into the sector in question. The variable captures the impact of anti-competitive regulation in sectors which are inputs into the production of the service in question. The variable is constructed using data from the OECD input-output

matrices in order to factor in the importance of the input sector in the production of the final good or service (OECD Economics Working Paper 530).

The variable therefore defined as  $RI_{kt} = \sum_j R_{jt} * w_{jk}$  where  $w_{jk}$  = the total input requirement of sector n for intermediate inputs from sector k, and R is the anti-competitive regulation in sector k measured by OECD surveys and additional sources. This variable captures an important missing piece in the current theory surrounding barriers to supplying services abroad through foreign affiliates. It's expected that the regulatory impact variable will have a negative impact on the level of foreign affiliate sales as it introduces added costs for sourcing necessary inputs. It may also be the case that a firm will choose to export rather than establish a foreign affiliate due to the intermediate effects of anti-competitive policies in those sectors.

The variables for professional services include indicators on entry regulation (licensing, education requirements and quotas and economic needs tests) as well as what the OECD terms conduct regulation (prices and fees, advertising, form of business and inter-professional cooperation). In terms of where these impact the decision of a firm to supply services abroad through an affiliate as well as the costs for that firm each indicator can be treated separately as well as the aggregates. Form of business restrictions as well as quotas would be taken as significant barriers for entry for firms unwilling to abide by the allowed business forms. Education requirements and licensing are more likely expected costs for firms establishing foreign presence in professional services and therefore, may impact the fixed costs of entry but would not be seen as an ongoing barrier. Due to this, it is more likely that overall regulation on entry may limit the firms able to enter the market due to increased fixed costs but does not constitute a market access barrier (except in the case of quotas) while form of business restrictions may constitute a complete barrier to entry for many firms. In addition, governmental regulation of prices and fees would be an on-going operating concern and would need to be considered on a country-sector level basis by the firm to determine if the pricing regulation was prohibitive.

The set of regulatory indicators from the PMR, STRI, and NMR surveys include low-level indicators which are at the question level, mid-level indicators, and then an aggregate indicator. There may be different impact of low-level indicators on foreign firms' decision to supply services

through trade or through an affiliate due to the impacts on different costs as well as on risk. These indicators include the following 26 different variables (in addition to the professional services specific indicators discussed above):

1. Administrative burdens for corporations
2. Administrative burdens for sole proprietor firms
3. Administrative burdens on startups
4. Antitrust exemptions
5. Barriers to competition
6. Barriers to entrepreneurship
7. Barriers to entry in services
8. Barriers to FDI
9. Barriers to trade and investment
10. Communication and simplification of rules and procedures
11. Discriminatory procedures
12. Explicit barriers
13. Government involvement in network sectors
14. Involvement in business operations
15. Legal barriers
16. Licenses and permits system
17. Other barriers
18. Price controls
19. Product market regulation
20. Public ownership
21. Regulatory and administrative opacity
22. Regulatory barriers
23. Scope of public enterprise sector
24. Sector specific administrative burdens
25. State control
26. Tariffs

While all the information collected is useful, not all these indicators are truly relevant at their specific level and are better as inputs into an aggregated variable. In terms of barriers that impact the decision to export or establish foreign presence, variables which measure barriers and burdens are more indicative of increased costs (administrative burdens, regulatory barriers) while other variables are more institution based (product market regulation, licenses and permits system). In the table below I've separated the barriers into three different categories. The barriers which have the largest potential impact on the decision of a firm to export or to supply services through an affiliate are those that impact the costs of operation or establishment. Regulatory institutions may be a signal of a more efficient marketplace or one that protects consumers. Barriers to competition will likely have impacts across the board and therefore need more disaggregated data with bilateral country data.

Therefore I focus on the Cost Increasing Policies/Barriers in the analyses below, which again is a preliminary analysis which would benefit from a simultaneous equation analysis described above, which will be the next step in this research.

<b>Cost increasing Policies/Barriers</b>	<b>Regulatory Institutions</b>	<b>Anti-Competitive</b>
Administrative burdens for corporations	Licenses and permits system	Barriers to competition
Barriers to trade and investment	Communication and simplification of rules and procedures	Barriers to entrepreneurship
Discriminatory procedures	Product market regulation	Antitrust exemptions
Administrative burdens for sole proprietor firms	Legal barriers	Government involvement in network sectors
Regulatory and administrative opacity	Tariffs	Price controls
Regulatory barriers	Explicit barriers	Public ownership
Sector specific administrative burdens		Scope of public enterprise sector
Administrative burdens on startups		Involvement in business operations
Barriers to entry in services		
Barriers to FDI		

In the sections below, the impacts of the various regulatory institutions, policies and barriers are added to the model specifications and refined to determine which are significant for the US trade and affiliate sales variables discussed above for each sector and relevant results are presented in Table 13 below.

#### **IV.B.i Information Services**

The analysis done in part A is redone with the addition of the variables that measure regulatory restrictiveness as well as regulatory policies. The model specification was completed by testing each restriction, then including all restrictions and removing those which were insignificant. Errors are clustered by country-year and the regression analysis includes fixed effects for countries and years. Due to the fact that there is only data for 4 different years, which are not consecutive (1999, 2003, 2005, 2008) I do not included lagged variables. Also, for

unaffiliated trade regressions there is no data for 2008 as the BEA does not separate unaffiliated and affiliated data for 2006-2008.

The gravity model variables are similar as before with GDP difference and distance being negative and significant while common language and GDP are positive and significant. Regulatory barriers and restrictions categorized as administrative burdens on corporations and start-ups are found to have a significant negative impact on affiliate sales in information services. The overall regulatory impact variable is also found to be negative and significant so countries with policies that have a greater impact on economic activity, especially trade, will deter foreign affiliate production of information services. The other regulatory variables range from 1-6 with 6 being the most restrictive.

Table 13 includes the various regressions for information, financial, and professional services with the former having the results above. The second specification has unaffiliated exports of services as the dependent variable and here only the overall regulatory barriers to services indicator was significant which is an aggregate of entry barriers, administrative barriers, government control/ownership, competition/entrepreneurship barriers and regulatory/legal barriers. This is logical as exporting to a country is less impacted by the regulatory regime in place (other than trade licensing/fees, etc.) than is the action of establishing a foreign affiliate.

#### **IV.B.ii Financial Services**

The analysis on financial services finds that administrative burdens on sole proprietorships and corporations have significant negative impacts as they did for information services. In addition, barriers to trade and investment, FDI, and restriction on entry in the services industries are all found to have a negative impact on affiliate sales in financial services. Explicit barriers to trade and investment such as legal barriers which are clearly specific are found to be positive and significant perhaps due to the transparency in these restrictions.

#### **IV.B.iii Professional Services**

Professional services have additional measures of regulation that are specific to the industries within the category (sector is a bit misleading of a terminology since it really is a BEA

classification based on sector breakdowns but not exact). These indicators are also included in Appendix 2. In this analysis I first looked at only the professional indicators and then also included the services and whole economy regulatory indicators. Table 13 includes this model as well as an additional specification with unaffiliated exports of professional services as the dependent variable. The first specification in Table 13 shows that GDP per capita, English as an official language and host country GDP all have positive and significant effects while differences in skilled labor and distance have negative signs and are also significant in their effect on the level of affiliate sales in professional services.

In terms of professional services restrictions there were two aggregate indicators and they are both significant; overall regulatory barriers to economic activity in professional services industries has a negative sign while the overall entry regulations variable is positive and significant. Entry regulations in professional services are not necessarily discriminatory and are also present in almost every country as these are professions where certifications, certain levels of education and independent regulatory bodies often exist to protect the country's citizens. As was found for financial services above, explicit regulatory restrictions also do not seem to impede professional services produced by US foreign affiliates. This specification also finds that regulatory opacity and administrative burdens on corporations negatively impact affiliate sales in professional services which are two areas of barriers that tend to be very problematic in any sector for foreign firms trying to enter the market, and even more so for firms attempting to establish an affiliate within the borders. The results of this estimation reveal that a reduction in the Overall Regulatory Restrictions in Professional Services (the point values are explained in Appendix 2 as the answers to the questions on the survey determine which value the country has for that indicator) would result in 43% increase in foreign affiliate sales in professional services.

**Table 13: Regulatory Results**

<b>Dependent Variable: Affiliate Sales in Information Services</b>				<b>Dependent Variable: Affiliate Sales in Financial and Insurance Services</b>			
<b>R-squared</b>	<b>0.8415</b>			<b>R-squared</b>	<b>0.9049</b>		
<b>Variable</b>	<b>Coef.</b>	<b>T-Stat</b>	<b>P&gt; t</b>	<b>Variable</b>	<b>Coef.</b>	<b>T-Stat</b>	<b>P&gt; t</b>
Skill Diff	0.7858664	1.06	0.3	GDP Per Capita	0.3801868	1.57	0.13
GDP Diff	-0.333425	-1.74	0.1	Skill Diff	-0.288978	-1.87	0.07
Distance	-0.621736	-2.27	0.03	Distance	-0.517601	-2.09	0.05
GDP	1.078421	4.27	0	GDP	1.12139	13	0
English	1.648569	2.82	0.01	English	1.992708	8.04	0
Regulation Impact	-12.48201	-2.56	0.02	Overall Entry Barriers	0.1171386	1	0.33
State Control	-0.271937	-0.72	0.48	Admin Burdens Corp	1.290462	6.67	0
Admin Burdens Star-ups	1.122781	2.04	0.05	Admin Burdens Sole	-0.564653	-4.59	0
Admin Burdens Corps	-1.08273	-1.74	0.1	Barriers to Trade and Investment	-1.021182	-3.03	0.01
Year	-0.067726	-0.92	0.37	Barriers to Services Entry	-0.256871	-3.15	0
Country	-0.009174	-0.68	0.5	Explicit Barriers	0.6608681	2.55	0.02
Constant	121.9791	0.96	0.35	Barriers to FDI	-0.629445	-3.7	0
				State Control	-0.158169	-0.94	0.36
				Year	-0.073149	-2.84	0.01
				Country	-0.011122	-1.14	0.27
				Constant	131.5161	2.73	0.01
<b>Dependent Variable: Affiliate Sales in Professional Services</b>							
<b>R-squared</b>	<b>0.9137</b>						
<b>Variable</b>	<b>Coef.</b>	<b>T-Stat</b>	<b>P&gt; t</b>				
GDP per Capita	0.9344351	5.8	0				
Skill Diff	-1.244472	-2.32	0.03				
Distance	-0.594911	-2.99	0.01				
GDP	0.8549387	7.58	0				
Regulatory Opacity	-0.941481	-3.87	0				
Overall Entry Barriers	0.2831074	2.21	0.04				
Admin Burdens Corp	-4.627728	-5.37	0				
Admin Burdens Sole	5.138404	5.37	0				
English	1.280352	6.78	0				
Overall Regulatory Restrictions in Professional Services	-0.502114	-1.94	0.07				
Explicit Barriers	0.4528645	2.55	0.02				
Form Of Business	-0.085853	-1.07	0.3				
Gov't Involvement	0.1830943	1.69	0.1				
Year	0.0132842	0.56	0.58				
Country	-0.010829	-1.19	0.25				
Constant	-31.6834	-0.64	0.53				



## **Section V: Conclusions and Next Steps**

The preceding discussion and analysis focused on the relationships between affiliate sales, unaffiliated US trade, intra-firm trade and US multinational trade (both affiliated and unaffiliated) in professional, financial, information and other private services. The relationship analysis shows that US unaffiliated trade in services and US foreign affiliate sales in the same services are complementary. US multinational exports of other private services are also found to be positively related with foreign affiliate sales. The analysis looking into the reverse effect was also consistent which shows that for countries where the US has foreign affiliate sales in business and professional services there is also unaffiliated trade in services and US multinationals trade other private services

The regulatory analysis finds that administrative burdens, entry barriers, and aggregate barriers to services most impact foreign affiliate sales while barriers that are explicit in nature and transparent do not seem to have an impact on affiliate sales or trade as they are expected and are known. The next steps are using this information to calibrate models of affiliate sales and trade in services using what we have learned about the interdependencies of the different types of data. In addition, exploring the theoretical foundations of firms' choices to export and establish affiliates to supply services abroad is an area that needs additional research. For now, it is no longer a question whether trade and affiliate sales are complements because in any opportunity where both trade and affiliate production is possible, we see complementary relationships. Utilizing the improvements to data that are expected, these relationships will be able to be explored more clearly at the firm and industry level where the true relationships and regulatory impacts will be able to be explored.

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## Appendix 1: Data Descriptions

**MOFA Sales:** Majority Owned Foreign Affiliate sales in the services sector specified from the Bureau of Economic Analysis website for years 1999-2008 and all available countries.

**Parent Exports/Imports of Other Private Services:** Exports by US Parent companies abroad to both affiliated and unaffiliated recipients (or Parent imports of other private services from any party abroad). Downloaded from the BEA website for 1999-2008 for all available countries and for the selected services sectors.

**Parent Imports/Exports From/To Affiliates:** Intra-firm exports and imports between the US Parent and their majority owned foreign affiliate in the sector being analyzed.

**Sales of Services to US/Local/Third Country Affiliated and Unaffiliated Persons:** Total sales of services by majority owned foreign affiliates to the specified type of destination. BEA data for all the years in the sample and for most of the countries.

**GDP and GDP per capita:** Data is from the World Bank online indicators and is available for all years and countries in the dataset. Data is in US dollars, both current and constant 2005 dollars. I use current dollars and adjust the data to be in 2005 dollars using the appropriate CPI index for each country before the data is used in the analysis.

**Trade of GDP:** Total goods and services trade as a percentage of GDP. World Bank online database.

**Imports of GDP / Exports of GDP:** Total imports or exports of goods and services as a percentage of GDP. World Bank online database.

**English:** English as an official language. This is taken from the CEPII gravity variable database available at: <http://www.cepii.fr/anglaisgraph/bdd/distances.htm> and I use two separate variables for this. Common language: Official and Common Language: Ethno, the latter is from the ethnologue database that CEPII uses and is an indicator for if 20% or more of the population speak the language.

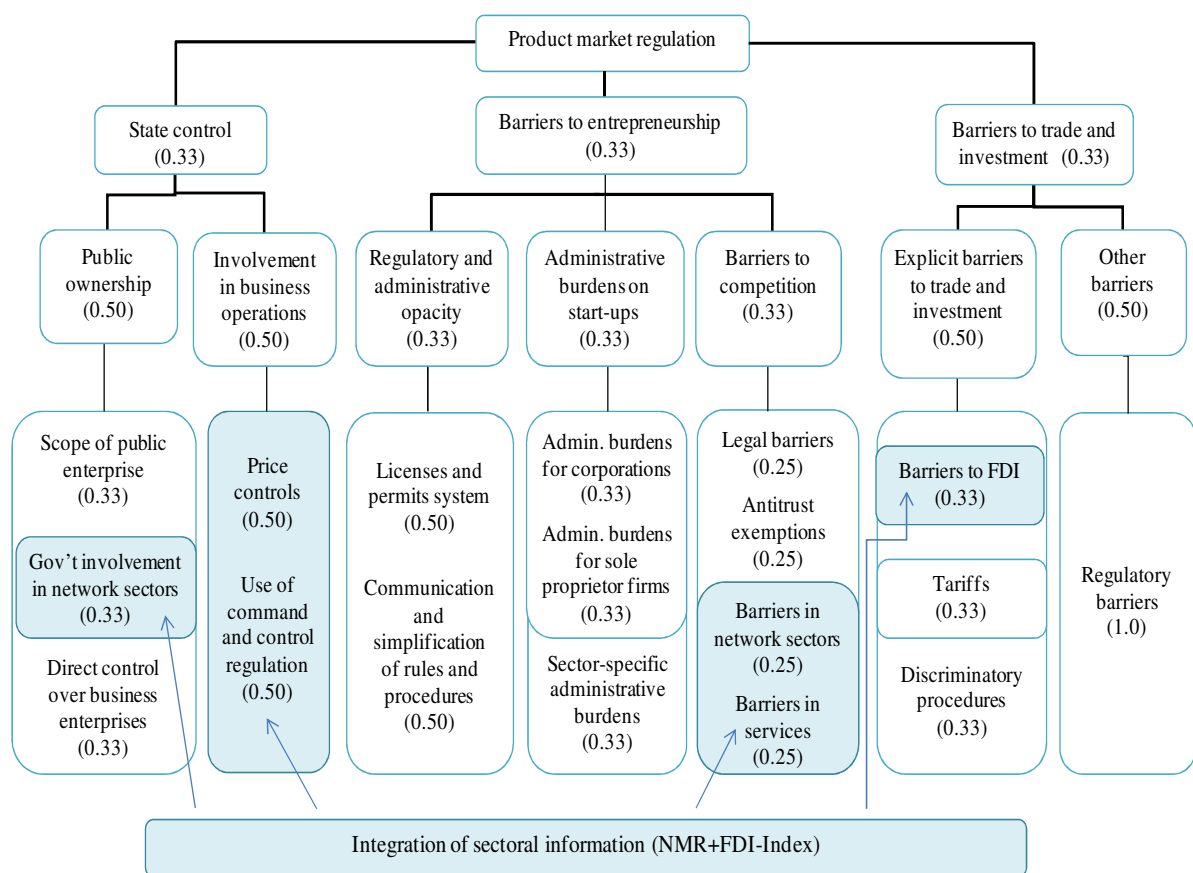
**Skilled Labor:** The skilldiff variables are the difference in the highskilled labor available between the US and the host country. The data is from the International Labor Organization and is the sum of professional categories 1-9 for each country.

**Additional Skilled Labor Variables:** Labor Force percentage with Secondary Education, Labor Force percentage with Tertiary Education, and Gross school enrollment in tertiary education were all downloaded from the World Bank database.

**Tax:** The highest marginal corporate tax rate for that year. World Bank Database

## Appendix 2: Regulatory Barriers

The regulatory indicators used came from the OECDs PMR indicators. The overall "integrated PMR indicator" integrates the indicators of regulation in non-manufacturing sectors (NMR) and the FDI regulatory restrictiveness index and covers thus to a larger extent than was done in the past information on sector-specific regulation.<sup>1)</sup> It replaces the "old" economy-wide PMR indicator. The individual low-level indicators and the places where the sector-specific information has been integrated are as described in the tree structure below.



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