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Firm Level Analysis of Services Trade Restrictions in the Life Insurance Industry

Tamar Khachaturian and Sarah Oliver

Abstract

This paper presents a simple econometric framework to assess the impact of barriers on the profitability and the number of firms (participation) that supply life insurance services across countries. The average impact of restrictions on participation is negative and statistically significant in some specifications, lending modest support for the hypothesis that restrictions limit firm participation across countries. However, we do not find a statistically significant relationship between restrictions and average life insurance profitability, which may be due to the unique business models of life insurance firms. Depending on data availability, avenues for future research include examining profitability over a longer time horizon and differentiating the impact of restrictions on foreign versus domestic firms.

United States International Trade Commission

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Tamar Khachaturian and Sarah Oliver

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 Please direct all correspondence to Tamar Khachaturian, Office of Industries, U.S. International Trade Commission, 500 E Street, SW, Washington, DC 20436, telephone: 202-205-3299, fax: 202-205-3161, email: tamar.khachaturian@usitc.gov; or Sarah Oliver, Office of Industries, telephone: 202-205-3288, fax: 202-205-3161, email: sarah.oliver@usitc.gov

Address Correspondence To:

Office of Industries
U.S. International Trade Commission
Washington, DC 20436 USA

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This working paper was prepared by:

Tamar Khachaturian, tamar.khachaturian@usitc.gov

Sarah Oliver, sarah.oliver@usitc.gov

Administrative Support

Monica Sanders

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Introduction

U.S. companies supply insurance services in foreign markets primarily through their affiliates established abroad, rather than through cross-border exports.[1] In 2013, U.S. insurers had foreign affiliate sales of $64.8 billion, compared to $17.1 billion in cross-border exports.[2] Policies regulating the foreign provision of insurance services can vary across the three main segments of the industry (life, non-life, and reinsurance) and influence how insurance services are supplied in foreign markets. Most notably, cross-border trade in life and non-life insurance services is highly regulated, underlying the predominance of sales via foreign affiliates.[3]

This paper focuses on the effects of restrictions specific to firms providing life insurance in foreign markets. While trade via commercial presence in life insurance is relatively more open than cross border trade, there are both a myriad of discriminatory policies affecting the entry and operation of foreign-owned insurance suppliers and variation in the level of restrictiveness across countries.[4] These restrictions are aimed at limiting competition within an insurance market, and include provisions on the number of foreign firms allowed and licenses distributed to foreign entities in a given market, as well as restriction on forms of establishment, prices, and regulations affecting specific insurance products.[5]

Since official statistics on foreign affiliate sales are an aggregate of all types of insurance sales, we use company-level data in order to focus on the life insurance segment specifically. In particular, this paper seeks to assess the impact that barriers to the market entry and operation of foreign firms may have on participation (the number of firms) and profits of life insurance companies across countries. If restrictions successfully impede the entry or operation of foreign firms, we would expect fewer market participants with higher profit margins, since there is less competition in the sector. On the other hand, open economies would likely have a larger number of life insurance firms with lower average profits.

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[1] These two types of provisions roughly correspond to mode 3 (commercial presence) and modes 1, 2 and 4 (cross-border trade, consumption abroad, and the presence of natural persons) in the GATS modes of supply framework for services trade.

[2] USDOC, BEA, Interactive Data, tables 2.1 and 3.1 (accessed September 12, 2016).

[3] Rouzet et al., "Service Trade Restrictiveness Index," 2014, 10, 26 and World Bank, Services Trade Restrictions Index (accessed August 15, 2016). Cross-border trade in reinsurance, which is aimed at diversifying risk for insurance companies, is relatively less restricted and accounted for about 66 percent of U.S. cross-border exports of insurance services in 2013.

[4] Cross-border trade in life insurance has an average score of 67.5 (on a scale from 0 to 100, 100 being the most restrictive) and is completely prohibited for by approximately half the countries in the World Bank Services Trade Restrictions Index; the average life insurance mode 3 score is 22.1. World Bank, Services Trade Restrictions Index (accessed August 15, 2016).

[5] OECD, "STRI Sector Brief," 2014, 1-2.

We use a simple econometric framework, with life insurance firm-level cross-country data for the year 2011 and indicators on life insurance restrictions across countries from the World Bank's Services Trade Restrictions Index (STRI). We find that life insurance restrictions have a negative and significant impact on the number of firms across countries in some specifications, modestly supporting the hypothesis that restrictiveness limits competition in the sector. However, we do not find a significant relationship between restrictions and company profits in the industry, suggesting that there are likely drivers of profitably in the life insurance sector not captured by the model.

The rest of this paper is organized into seven sections. Section 2 presents an overview of the U.S. life insurance industry. Section 3 reviews existing firm-level empirical literature on the relationship between barriers to trade and competition/profits across countries. Section 4 provides more detail on the World Bank STRI and the firm level data. Section 5 presents the modeling framework, section 6 discusses the econometric results, and section 7 concludes.

Life Insurance Industry Overview

The insurance industry is a substantial contributor to the global economy, and life insurance accounts for more than half of the world insurance market. In total, premiums written in the global insurance sector accounted for 6.2 percent of world GDP in 2015, with a value of $4.5 trillion. Of this total, the life sector accounted for $2.5 trillion. The United States is the world's largest market for life insurance, accounting for over 20 percent of the global market.[6] China is the fastest growing country market for life insurance, with Chinese life insurers Ping An Insurance and China Life Insurance ranked among the top five global life insurance providers in 2015.[7]

The life insurance industry provides financial protection for individuals and families throughout the course of their lifetimes and following the death of a family member. Unlike automobile insurance which tends to be required by law, demand for life insurance varies, and is more likely to be purchased by individuals with higher incomes and education levels and higher numbers of dependents.[8] To address the different needs of policy holders at different income levels, there are several types of policies offered by life insurance companies worldwide, including:

- Term Policies, which offer simple coverage in the case of death of an individual

[6] USITC staff calculation using data on premium volume from Swiss Re, "World Insurance in 2015," 2016, 38.
[7] USITC, *Recent Trends in U.S. Services Trade*, 2016, 97; Insurance Information Institute, "Top 10 Countries" (accessed August 10, 2016).
[8] See Beck and Webb "Economic, Demographic, and Institutional Determinants of Life Insurance Consumption Across Countries," 2003 and Li et al., "The Demand for Life Insurance in OECD Countries," 2007.

- Universal (whole) life policies, which offer coverage in case of death of an individual but are also a savings vehicle where the policyholder is paid accrued interest during the life of the policy, or a cash lump sum upon termination or maturity of the policy and
- Annuity policies which, in return for earlier payments, pay a regular fixed sum to the insured for the rest of their life.[9]

Although a majority of life insurance firms in the United States are classified as small and medium-sized enterprises (SMEs), the largest life insurance firms dominate the industry given their role as risk aggregators. Specifically, while 84 percent of life insurance firms in the United States had fewer than 500 employees in 2013, these firms represented only 4 percent of all employment in the sector (table 1). Further, the largest 30 life insurance companies held 60 percent of assets in the industry in 2012.[10]

Table 1: US Direct Life Insurance Carriers, 2013

Firm size	Number of firms	Total employees	Share of total employment (percent)
0-500 employees	544	13,176	3.8
500+ employees:	106	330,929	96.2
Of which 5000+ employees	43	270,322	78.6
Total	650	344,105	

Source: U.S. Census Bureau, 2013 SUSB Annual Datasets by Establishment Industry, 2016 (accessed August 15, 2016).
Note: Direct life insurance includes companies in NAICS code 524113.

Empirical Literature Assessing the Impact of Barriers to Trade on Firm Profitability

Previous literature on the relationship between barriers to trade in the services sector and firm profitability typically uses a two-stage regression model. The first regression in these two-stage models creates an "adjusted" profit margin by controlling for differences in firm characteristics, while the second regression relates the country-level profit margin (conditioned on firm characteristics) to the economic characteristics of the countries.[11] The aim of this approach is to control for determinates of profit margins separately at the firm level and country level, in order to correct for problems of misspecification when combining micro and aggregate data

[9] Beck and Webb, "Economic, Demographic, and Institutional Determinants of Life Insurance Consumption Across Countries," 2003, 53.
[10] Obersteadt et al., "State of the Life Insurance Industry," 2013, 104.
[11] Dihel and Shepherd, "Modal Estimates of Services Barriers," 2007, 48.

outlined in Moulton (1990).[12] One of the assumptions of this approach is that firm controls such as sales or labor productivity are not jointly determined with profit margins.

Using this methodology, Kalirajan et al. (2000) find that increased trade restrictiveness has a positive and significant impact on profit margins in the banking sector, while Kalirajan (2000) finds a negative and significant relationship between trade restrictions and profit margins in the food distribution industry.[13] Similarly, using a sample of 20 emerging market countries, Dihel and Shepard (2007) apply this methodology to a variety of service sectors, including the insurance sector as a whole. In their analysis of restrictions on foreign affiliates, the authors find a positive association between trade barriers and profit margins in the insurance industry, consistent with the idea that higher barriers to entry lead to less competition in the sector. However, their results are not statistically significant.

More recently, USITC (2009) used this two-stage estimation method to assess the effects of restrictions in the property and casualty insurance industry. USITC (2009) created an Insurance Trade Restrictiveness Index specific to the property and casualty insurance industry and tested the relationship between restrictions and competitive conditions in country markets.[14] After estimating the adjusted profit margin in the first stage, the report found that at the country level, an increase in insurance trade restrictiveness was associated with a positive and significant increase in adjusted profit margins, implying that increased trade restrictions lead to less competition in property and casualty insurance markets.[15]

An alternative to the two-stage estimation was applied in Fontagné and Mitaritonna (2012). This approach combines firm and country level variables into one regression, but clusters the errors at the country level to avoid potential bias in the standard errors from misspecification discussed above, following Wooldridge (2003).[16] With this specification, Fontagné and Mitaritonna focus on the telecommunications and distribution sectors and find that an increase in restrictiveness has a negative and significant impact on profitability, after controlling for other trade policy measures (such as the presence of a trade agreement).[17]

[12] As discussed in Moulton, the misspecification may lead to a downward bias in standard errors that occurs when the errors of micro variables are potentially correlated within a group when regressing micro data on aggregate data, Moulton, "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units," 1990.
[13] Kalirajan et al., "The Price Impact of Restrictions on Banking Services," 2000 and Kalirajan, "Restrictions on Trade in Distribution Services," 2000.
[14] USITC, *Property and Casualty Insurance Services*, 2009, 4-10.
[15] Ibid, F-10.
[16] Wooldridge, "Cluster-Sample Methods in Applied Econometrics," 2003.
[17] Fontagné and Mitaritonna, "Assessing Barriers to Trade in the Distribution and Telecom Sectors," 2012, 16–17.

Focusing on the telecommunications industry, Khachaturian (2015) uses various approaches, including the two-stage and one-stage estimation frameworks described above, as well as an approach which simply calculates an unconditional average profit margin by country. While the two-stage approach follows the literature and conditions profit margins on firm characteristics, neither the one-stage nor the unconditional average approach includes firm controls. Interestingly, Khachaturian (2015) finds that increased restrictiveness has a positive and significant effect on profitability in the one-stage and unconditional average approaches.[18]

This paper follows Khachaturian (2015) by adopting an unconditional average profit margin estimation approach. Before moving on to the estimation framework, the next section provides more detail on the main policy variable—the World Bank Services Trade Restrictions Index (STRI)—as well as the firm level data from Bureau van Dijk.

Services Trade Restrictions Index and Life Insurance Company Data

World Bank Services Trade Restrictions Index

The World Bank Services Trade Restrictions Index (STRI) is a snapshot of the restrictions in place (typically as of 2008) for 103 countries across a number of services sectors, including the life insurance sector.[19] Restrictiveness is measured on a scale of 0-100, where 0 is completely open to trade and 100 is completely closed. For life insurance, restrictions are measured both for cross-border trade (mode 1) and the provision of services through foreign affiliates (mode 3). Since this analysis focuses on the level of competition within countries, it only uses mode 3 scores to assess the restrictiveness of trade barriers. The types of restrictions accounted for in the STRI scores for life insurance services provided through mode 3 are as follows:

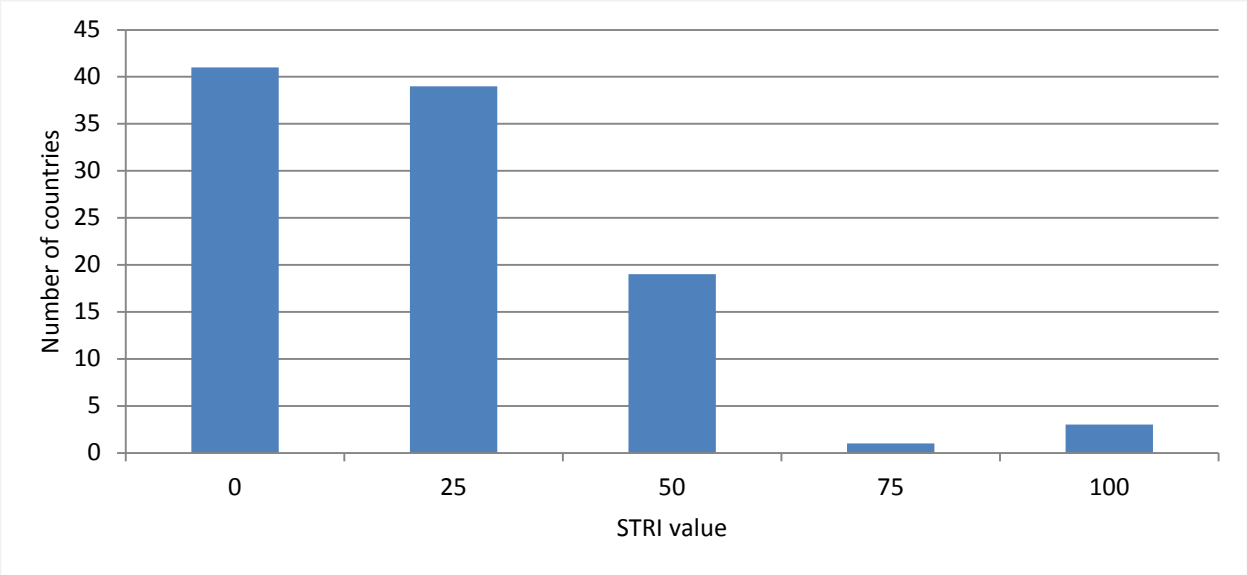
- Restrictions on foreign ownership and foreign direct investment (FDI)
- Restrictions on establishment of a subsidiary and acquiring private local companies
- Restrictions on licensing of foreign firms, including limits on the number of licenses and higher barriers for obtaining a license for foreign firms
- Restrictions on establishing branches in a foreign market, including limits on the number of branches, and

[18] Khachaturian, "Services Trade Restrictions and Company Profits," 2015.
[19] World Bank, Services Trade Restrictions database (accessed August 15, 2016).The STRI also includes an aggregate score for the EU-20 countries. Although STRI scores largely reflect the regulatory environment in 2008, some may refer to later years.

- Nationality requirements for board members and employees, and restrictions on repatriation of profits.[20]

On average, countries in the World Bank sample have a score of 22.5 for mode 3 life insurance services. Figure 1 shows the distribution of mode 3 life insurance STRI scores within the countries in the World Bank sample. The largest share of firms have either no restrictions (as reflected in a score of 0) or maintain some level of restrictions (as reflected in a score of 25); few countries have scores above 50, and only three countries ban foreign entry into the life insurance sector completely (as reflected in a score of 100). [21]

Figure 1: Distribution of Countries by World Bank Mode 3 STRI Score, Life Insurance



Source: World Bank Services Trade Restrictions Index

For countries where foreign entry is not banned completely, the primary drivers of higher mode 3 STRI scores tend to be limits on the share of foreign ownership. For example, in Malaysia, a restriction limiting foreign ownership of life insurance firms to 49 percent is the driving force behind the country's STRI score of 50 in mode 3 life insurance trade.

Bureau van Dijk Orbis Insurance Focus Database

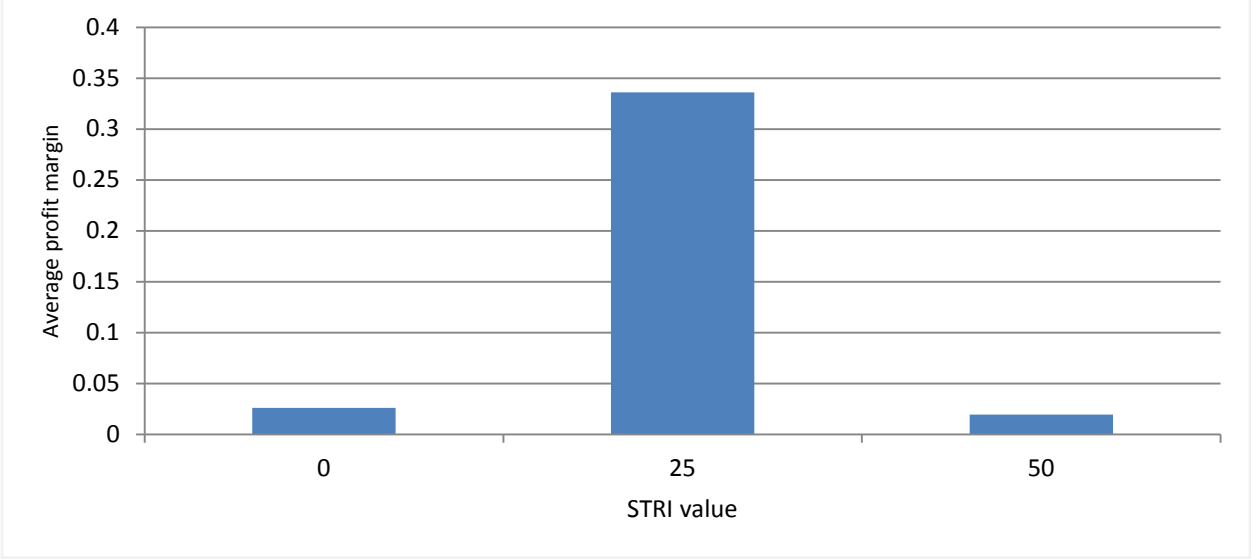
Data specific to life insurance companies was obtained from Bureau van Dijk's Orbis Insurance Focus Database (see the appendix for more information). The data is a cross section of life insurance firms' balance sheet information for the year 2011. USITC analysts isolated the part of

[20] See Borchert, et al., "Guide to the Services Trade Restrictions Database," 2012 for a detailed explanation of scoring criteria.
[21] Ethiopia, Iran and Congo (DRC).

each firm's business that was derived from sales of life insurance, and categorized firms into three types: 100 percent life firms, composite firms, and other (firms that cannot be definitively categorized as either). This process of categorization produced a dataset of 2,343 discrete company observations. For companies with available data, profit margins were calculated as profit before taxes over net premiums in the life insurance segment,[22] a metric which is commonly used to compare profitability of life insurance companies.[23] Data availability on profit margins, a size cut off, and availability of the STRI further reduced the actual sample of firms used in the estimation (see appendix for details).

The final sample of firms used in the analysis includes insurance companies across 74 countries. For each country in the analysis, the total number of firms and the average profit margins were calculated. Companies in the dataset were also classified as either small and medium-sized (SME), or large based on the U.S. Small Business Administration's criteria defining a cut-off for SMEs as those with up to $38,500,000 in net premiums written. On average, in the sample, the countries represented have 27 firms, with an average $670 million in net premiums written, and an STRI score of 20. Figure 2 shows the distribution of average profits by the level of restrictiveness for the countries included in our data. Based on this distribution, the relationship between restrictions and firm profitability does not appear to be linear.

Figure 2: Distribution of Average Life Insurance Company Profit Margins by World Bank Mode 3 Life Insurance STRI Score



Source: World Bank Services Trade Restrictions Index; Bureau van Dijk, Orbis Insurance Focus Database.

[22] Profit before taxes is defined by Bureau van Dijk as "net income before taxation."
[23] Kirova and Steinmann, "Understanding Profitability in Life Insurance," 2012, 10. This metric is also consistent with USITC (2009) calculations for profit margins in property and casualty insurance (see appendix F).

Estimation Framework

The focus of this analysis is the effect of life insurance trade restrictions on market participation, as measured by the number of firms in each country, and on profit margins. The number of firms and average profit margins are calculated using the firm-level data described in section 4 and in the appendix. The main policy variable is the World Bank's STRI for mode 3 life insurance. The index reflects licensing restrictions, foreign equity limits and other policies affecting the commercial establishment and operation of foreign life insurance firms.

First, a simple cross-sectional regression estimates the impact of the STRI level on the number of firms in each country. Equation (1) is the basic form of the model:

$$(1)\ \boldsymbol{lnNumber\ of\ firms}_{i2011} = \beta_1 + \beta_2 \boldsymbol{STRI}_{i2008} + \varepsilon_{i2011}$$

The dependent variable is the number of firms in country *i* in 2011. Additional controls are added in model 2: level of development, proxied by whether the country is categorized as a high-income country, and the log of population.[24] While the STRI is expected to have a negative impact on the number of firms, level of development and country size are expected to have positive impacts:

$$(2)\ \boldsymbol{lnNumber\ of\ firms}_{i2011} = \beta_1 + \beta_2 \boldsymbol{STRI}_{i2008} + \beta_3 \boldsymbol{High\ Income}_{i2011} + \beta_4 \boldsymbol{lnPopulation}_{i2011} + \varepsilon_{i2011}$$

The above models are estimated using both a linear regression and a non-linear Poisson model where the dependent variable is in levels rather than logs. In addition to the analysis of the total number of firms in a country market, these models are estimated separately for SMEs and large firms as well as for the ratio of SMEs to all firms in the country as the dependent variables.

Second, models estimate the impact of the STRI level on the average profitability of firms in a given market, measured as profit before taxes over net premiums written:[25]

$$(3)\ \boldsymbol{Average\ Profit\ Margin}_{i2011} = \gamma_1 + \gamma_2 \boldsymbol{STRI}_{i2008} + \omega_{i2011}$$

[24] Population data are from the World Bank, World Development Indicators (accessed June 30, 2015) http://data.worldbank.org/data-catalog/world-development-indicators.The dummy variable for level of development is from the World Bank's categorization of income categories and equals 1 if the country is included in the high-income category; data are from the historical classification by income, available at World Bank, World Bank Country and Lending Groups (accessed September 1, 2016) https://datahelpdesk.worldbank.org/knowledgebase/articles/906519.

[25] This approach follows the unconditional average approach in Khachaturian (2015), with a simpler framework that excludes industry-specific and other controls.

and

$$(4)\ \textbf{Average Profit Margin}_{i2011} = \gamma_1 + \gamma_2 \textbf{STRI}_{i2008} + \gamma_3 \textbf{High Income}_{i2011} + \gamma_4 \textbf{lnPopulation}_{i2011} + \omega_{i2011}$$

Econometric Estimates

Regression results show modest support for the hypothesis that higher levels of restrictions have a negative (limiting) impact on the number of firms. However, the size and development level of the country appear to explain most of the variation in market participation by life insurance firms. Additionally, the effect of the STRI on market participation appears to be driven by large firms, which make up the majority of the sample. Finally, barriers to entry do not appear to have a significant effect on the profits of insurance firms. Results are presented in appendix tables A.2–A.5, and are described in more detail below.

Table A.2, which includes the full sample of firms, shows that the STRI has a negative effect on the number of firms, though the effect is only statistically significant in the linear model. The high income dummy and population appear to have positive and significant impacts, and in specifications where those controls are included, these covariates help explain at least half of the variation in the number of firms across countries. These results are in line with an analysis of the relationship between life insurance penetration and the alternative services trade restriction indices published by the OECD, which indicates that higher barriers are associated with lower life insurance penetration.[26]

Tables A.3 and A.4 split the sample into large firms and SMEs. These regression results indicate the effects of trade restrictions on market participation are driven by large firms, i.e. the models explain a greater share of variation in large firms versus SME participation, and results for large firms are very similar to the results for the full sample of firms. These results could be driven by biases in the data (generally larger firms have more complete financial data) or indicate that participation by SMEs may depend on additional factors beyond those included in the analysis.[27]

Finally, the STRI does not appear to have a significant impact on profit margins on life insurance firms, as shown in table A.5. These results are in line with Dihel and Shepard's broader analysis of the insurance sector, which found positive but insignificant effects of mode 3 barriers on

[26] OECD, "STRI Sector Brief," 2014, 2.
[27] Barriers to entry do not appear to have a significant impact on the ratio of SMEs relative to all firms. Results are not shown in the appendix.

profitability (2007).[28] Market size and level of economic development are also not significant determinants of average profit margins in this model, suggesting these country level measures are not good predictors of variation in profits at the firm level. This is not surprising given the nature of the life insurance business. Life insurance policies are long term risks, and it is difficult to predict when they will become liabilities. As a result, to maintain profitability in a given year, life insurance providers rely on both short and long-term investments to cover potential losses. While investment returns depend on overall market conditions, policy payouts are a fixed rate. The mismatch between assets and liabilities would likely contribute to volatility in profits over time. Consequently, though we use a standard measure of profitability,[29] it is likely sensitive to short term fluctuations on returns in financial markets, which would likely impact the profitability of all firms in the same market. In order to mitigate this problem and isolate the effect of the STRI on company profits in future research, it would be useful to look at multiple years of data on firm profitability and control for the effect of market fluctuations across years on life insurance profits.

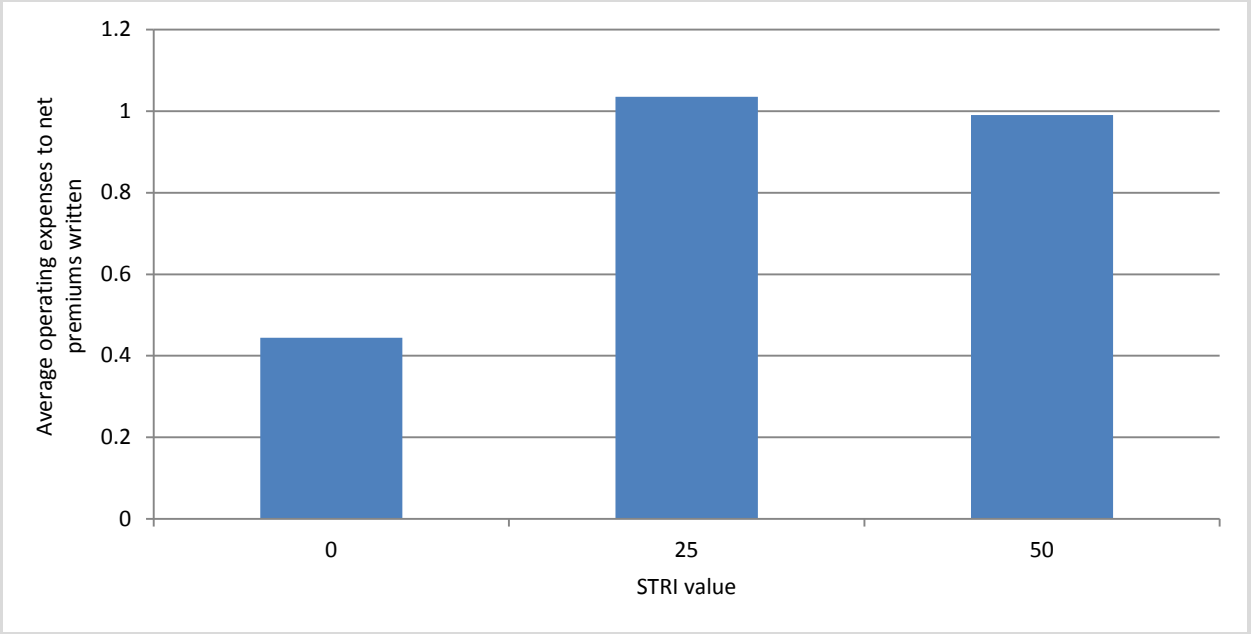
As a preliminary extension to the profit analysis, we also examined the effect of barriers to trade on the efficiency of companies. Our data show more efficient firms operate in countries with fewer barriers (figure 3 shows the average ratio of operating expenses to net premiums written for countries in our sample by STRI score). On average, countries with no mode 3 barriers have lower ratios of costs to premiums, implying that firms in these countries are more efficient than firms in countries with restrictions. This relationship is similar to the one in OECD (2014), which also shows that countries with fewer barriers tend to have more efficient life insurance markets.[30] While this distribution shows a more linear relationship than restrictions and profitability, like average profit margins, this relationship is not statistically significant in any specification of the model.

[28] We also conducted two robustness checks. First, we restricted the sample to only firms that were 100 percent life insurance firms, and found no significant relationship between firm size and profits. This is not surprising since this specification reduced the sample size from 74 countries to 23, which makes finding significant results less likely (though population and income controls had similar predictive power). Second, we lowered the inclusion cut-off of $50,000 in net premiums written to include all firms with net premiums written above zero in 2011. This increase in sample size produced results consistent with the higher cutoff in our main analysis.

[29] Kirova and Steinmann, "Understanding Profitability in Life Insurance," 2012, 2, 10.

[30] OECD, "STRI Sector Brief," 2014, 2. The efficiency of the insurance sector is measured as operating expenses relative to gross premiums.

Figure 3: Distribution of Average Operating Expenses to Net Premiums Written by World Bank Mode 3 Life Insurance STRI Score



Source: World Bank Services Trade Restrictions Index; Bureau van Dijk, Orbis Insurance Focus Database.

Conclusion

The econometric analysis in this paper suggests that services trade restrictions may have a negative impact on life insurance firm participation across countries. However, the analysis does not find a relationship between restrictions and life insurance profitability. Avenues for future research include more detailed analysis of the determinants of life insurance companies' profits (for example, examination over a longer time horizon) and participation by SMEs across markets. Additionally, since this paper does not separate firms into domestic firms and foreign affiliates, the specific impact of STRI restrictions is unclear, since purely domestic firms do not face the same barriers to entry as foreign firms. As such, this research could also be extended to focus only on foreign affiliates, rather than the entire life insurance market in each country. Preliminary research using a sample of life insurance firms that includes data on the location of parent companies suggest that there is a higher share of foreign affiliates in countries with lower restrictions, but is inconclusive as far as the impact of restrictiveness on foreign subsidiary profits.[31]

Relatedly, this paper's simple econometric framework can be extended to other industries, which could shed light on the drivers of profit and participation across various services industries and help determine the applicability of the approach.

[31] These findings are based on a cross section of life insurance firms in 2011 (NAICS code 524113), downloaded from Bureau van Dijk's main Orbis database, which provides less detailed information on insurance firms than Orbis Insurance Focus.

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Appendix A
Data on Companies in the Life Insurance Industry and Regression Results

Data on Companies in the Life Insurance Industry

Data specific to life insurance companies was obtained from Bureau van Dijk.[32] The data is a cross section of life insurance firms' balance sheet information in the year 2011. In the original download of the data, each company had multiple rows of information identifying firm type (by business activity - life, non-life, and composite) with financial data by product segment. As the classification of entity type and financials did not appear to be consistent, USITC analysts converted the exported data into a form that could be used for statistical analysis (so that there was one line of data for each company properly categorized by type).

Despite the original firm classification, for multiple-line insurers, analysts isolated the part of the firm's business that was derived from sales of life insurance, and categorized firms into three types: 100% life firms, composite firms, and other (firms that cannot be definitively categorized as either).[33] Firm classifications are based on the size of their life business segment as captured by the value of net premiums written.[34] For firms categorized as 100 percent life insurance, net life premiums are equal to total written premiums. For firms categorized as composite firms, net premiums written for life insurance accounts for only a portion of their total written premiums.[35] Due to discrepancy in the data which did not allow for their categorization, the third category of firms is not classified as either 100 percent life or composite.[36]

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[32] "Orbis Insurance Focus" is the name of the insurance database, which supersedes the previous insurance database, "Isis." Data from the Isis database is used in this analysis. Analysts from the USITC's Services division downloaded the data in 2014 and refined the data for use in statistical analyses. The description here refers the work done by these analysts. For a general description of the insurance database, see http://www.bvdinfo.com/en-gb/our-products/company-information/international-products/orbis-insurance-focus.

[33] Companies classified as composite firms originally maintained that classification. Companies originally classified as life firms were at times reclassified where business segment data indicated non-life insurance activities. Firms with multiple classifications in the original data were categorized into either life, composite or other based on business segment data. This latter reclassification was not consistent across firms; 100 firms that showed multiple business segments were nevertheless reclassified as life. This misclassification affects less than 5 percent of the over 2000 firms, and since our analysis focuses on life insurance premiums, only impacts the SME analysis, which uses total net premiums written to categorize firms size. In this analysis all incorrectly classified firms will appear to be smaller than they actually are.

[34] Isis data includes data for size different net premium variables: net premiums written for life insurance, non-life insurance, premiums for other types of products, and total premiums. For each company, the share of total premiums accounted for by various business line is reported. Categories of insurance business line other than life include marine, aviation, and transport; third party motor liability; fire and other property damage; accident and health; and reinsurance.

[35] Although life insurance premiums are reported for composite firms in the original data, for our analysis the total dollar amount of life insurance premiums is recalculated by multiplying the share of total premiums accounted for life insurance by total net premiums.

[36] For this group of companies, life insurance net premiums written may refer to different product segments in the original data. In some cases, firms conduct almost all of their business in life (for example, 99 percent of business is considered life, while 1 percent is devoted to reinsurance, unlike other composite firms whose premiums indicate sales of different types of insurance products), while others appear to have missing business segment data.

The original file included 59,853 lines of data, and through this process, was reduced to 2,343 discrete company observations, classified as shown below in table A1. Profit margins were calculated as profit before taxes over net premiums in the life insurance sector.

Table A.1: Classifications of Firms Based on Net Premiums Written in Life Insurance

Firm type	Number	Share of total firms (percent)
100% Life	1,727	73.7
Composite	208	8.9
Other	408	17.4
Total	2,343	

Source: Compiled by USITC staff.

From this baseline dataset of 2,343 firms, the sample was reduced based on availability of data. Firms without data on net premiums written (used for determining firm size and calculating profit margins) or profit before taxes (used to calculate profit margins) were eliminated. The minimum size cutoff for inclusion of firms is $50,000 net premiums written. Finally, firms in countries not covered by the World Bank STRI were eliminated from the sample.

This process produced a dataset that includes insurance companies in 74 countries. For each country in the analysis, the total number of firms, and the average profit margins were calculated. On average, the countries represented have 27 firms in the sample, with an average $670 million of net premiums written and an STRI score of 20.

Companies in the dataset were also classified as either a small and medium-sized company (SME) or large or based of the U.S. Small Business Administration's criteria for life insurance firms with $38,500,000 in net premiums written.[37] In the final dataset, 72 percent of the firms are considered “large firms” based on this cutoff. The majority of countries in our dataset have a mix of SMEs and large firms. While thirteen countries have only small and medium sized life insurance firms, life insurance markets in individual countries are split, on average, into 40 percent SMEs and 60 percent large firms.[38]

[37] See SBA website https://www.sba.gov/contracting/getting-started-contractor/make-sure-you-meet-sba-size-standards/summary-size-standards-industry-sector. The size criteria were applied to total net premiums written irrespective of the classification of the firm.

[38] The countries without large firms represent small markets overall and include Albania, Bolivia, Bulgaria, Ecuador, Honduras, Jordan, Namibia, Nepal, Oman, Tunisia, Ukraine, Uruguay, and Uganda. There are also 11 countries with only large firms represented, but this likely indicates a lack of data rather than a lack of SME life insurance firms.

Regression Results

Table A.2: STRIs and Market Participation for All Firms, Life Insurance

Dependent Variable:	Number of firms (logged)	Number of firms (logged)	Number of firms	Number of firms
World Bank STRI, Life Insurance	-0.015*	-0.014**	-0.013	-0.009
	(0.008)	(0.007)	(0.011)	(0.008)
World Bank High Income Country Indicator		1.518***		2.116***
		(0.262)		(0.461)
Population (in logs)		0.486***		0.744***
		(0.073)		(0.131)
Constant	2.504***	-6.314***	3.522***	-10.847***
	(0.244)	(1.261)	(0.276)	(2.542)
R-Square or Pseudo R-Square	0.04	0.50	0.02	0.66
Number of Observations	74	74	74	74
* p<0.05, ** p<0.01, *** p<0.001				

Source: Authors estimates.
Note: Robust standard errors in parentheses. The first two columns are estimated using OLS and the third and fourth columns are estimated using a Poisson estimator. Companies with NPW below $50,000 are omitted.

Table A.3: STRIs and Market Participation for Large Firms, Life Insurance

Dependent Variable:	Number of large firms (logged)	Number of large firms (logged)	Number of large firms	Number of large firms
World Bank STRI, Life Insurance	-0.020**	-0.015**	-0.010	-0.004
	(0.009)	(0.007)	(0.011)	(0.007)
World Bank High Income Country Indicator		1.681***		2.665***
		(0.268)		(0.364)
Population (in logs)		0.562***		0.838***
		(0.085)		(0.110)
Constant	2.467***	-7.994***	3.144***	-13.396***
	(0.260)	(1.524)	(0.290)	(2.119)
R-Square or Pseudo R-Square	0.07	0.58	0.01	0.74
Number of Observations	61	61	74	74
* p<0.05, ** p<0.01, *** p<0.001				

Source: Authors estimates.
Note: Robust standard errors in parentheses. The first two columns are estimated using OLS and the third and fourth columns are estimated using a Poisson estimator. Companies with NPW below $50,000 are omitted. Large firms are defined as NPW greater than or equal to $38,500,000.

Table A.4: STRIs and Market Participation for SMEs, Life Insurance

Dependent Variable:	Number of SMEs (logged)	Number of SMEs (logged)	Number of SMEs	Number SMEs
World Bank STRI, Life Insurance	-0.010	-0.011	-0.021*	-0.023*
	(0.007)	(0.007)	(0.012)	(0.013)
World Bank High Income Country Indicator		0.522		1.037*
		(0.319)		(0.628)
Population (in logs)		0.261**		0.551***
		(0.102)		(0.169)
Constant	1.532***	-3.044*	2.369***	-7.682**
	(0.218)	(1.726)	(0.289)	(3.193)
R-Square or Pseudo R-Square	0.03	0.17	0.05	0.33
Number of Observations	63	63	74	74
* p<0.05, ** p<0.01, *** p<0.001				

Source: Authors estimates.
Note: Robust standard errors in parentheses. The first two columns are estimated using OLS and the third and fourth columns are estimated using a Poisson estimator. Companies with NPW below $5,000 are omitted. Small firms are defined as NPW less than $38,500,000.

Table A.5: STRIs and Average Profit Margins, Life Insurance

Dependent Variable:	Average Margin	Average Margin
World Bank STRI, Life Insurance	0.001	0.000
	(0.004)	(0.004)
World Bank High Income Country Indicator		0.008
		(0.212)
Population (in logs)		0.058
		(0.070)
Constant	0.113	-0.853
	(0.140)	(1.276)
R-Square	0.00	0.02
Number of Observations	74	74
* p<0.05, ** p<0.01, *** p<0.001		

Source: Authors estimates.
Note: Robust standard errors in parentheses. Companies with NPW below $50,000 are omitted.