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Modeling Trade in Services:
Multiple Modes, Barriers to Trade, and Data Limitations

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Abstract

We develop a model of trade in services that includes firm heterogeneity and multiple modes of delivery, including cross-border trade and foreign affiliate transactions. We then use the model to estimate the effect of a 50 percent reduction in the barriers faced by non-EU services providers in EU markets. We find that this liberalization would increase the value of cross-border imports into the EU and purchases from foreign affiliates in EU countries. This sales increase ranges from 21.7 to 27.3 percent, depending on the services category and EU country. However, the liberalization would only decrease the sales of domestic producers by 0.4 to 6.1 percent, and reduce overall prices of the services in EU countries by 0.1 to 1.2 percent.

1 Introduction

In 2015, international trade in services reached 13 percent of world GDP.[2] Although the volume of services trade has grown significantly over the last decade, it is still impeded by natural barriers such as language and distance, and by policy barriers that restrict foreign entry, the movement of

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[2] World Bank (2017).

people, competition, or regulatory transparency.[3] However, it is difficult to quantify the impact of these barriers on trade flows, or the effect that liberalization would have.

Services trade barriers are difficult to assess for a number of reasons. For one, there is very limited disaggregated information on the value of services trade flows. In addition, the international provision of services occurs through multiple and inter-connected modes of delivery, which can be complementary or competing. Finally, barriers to trade in services are complex and difficult to measure and compare across countries. Our research captures some of these complexities of international trade in services and overcomes some of these data challenges.

To this end, we develop a model of trade in services that includes firm heterogeneity and multiple modes of delivery, including cross-border exports (CBE) and foreign affiliate sales (FAS). We calibrate the model to 2014 trade data for professional services in European markets. We then use the model to estimate how trade flows and market prices would change if barriers to non-EU providers of the services were significantly reduced. The economic effects that we estimate include changes in the revenues of foreign providers, their use of different modes of delivery, market prices, and domestic sales in the European country markets included in the sample.

This analysis applies the modeling framework developed in Khachaturian and Riker (2016). That study focused on cross-border imports and foreign affiliate sales of professional services in the U.S. market. In contrast, this paper focuses on foreign supply of services in certain EU countries. Additionally, we extend the modeling framework to address two different types of foreign suppliers, those from outside the EU and those from other EU countries. This is an important distinction, because we expect that there is much less potential for further liberalization of intra-EU trade and foreign affiliate sales of services.

The analysis is based on the theoretical model of trade and foreign direct investment in Helpman, Melitz, and Yeaple (2004). Their model includes three key features that make it well-suited for analyzing trade liberalization in services industries: heterogeneity in the productivity of service providers from each country, alternative modes of supply to foreign markets, and fixed costs that are barriers to each mode of supply.[4] There is a large empirical literature that generally supports

[3] Grosso et al. (2014), 24-25.

[4] Helpman, Melitz, and Yeaple did not originally apply their model to services industries. Their empirical analysis only includes manufacturing industries. Riker (2015) applies the Helpman, Melitz, and Yeaple framework to services industries, but his data are not disaggregated by category of service.

the predictions of the Helpman, Melitz, and Yeaple model. We build upon this foundation by developing a partial equilibrium version of their model that reduces data requirements.

The rest of this paper is organized into four parts. Section 2 provides an overview of the professional services industries included in the modeling analysis. Section 3 describes the modeling framework. Section 4 uses the model to estimate the impact of EU liberalization on trade in services. Section 5 offers concluding remarks.

2 Background Information on Modes of Supply and Barriers to Trade in Professional Services

Our analysis focuses on trade in two categories of professional services: 1) architectural and engineering services and 2) legal and accounting services. These categories were chosen due to data availability in the Eurostat database. Trade in these services occurs either in the form of cross-border supply (primarily mode 1 trade) or in the form of sales by foreign-owned affiliates established in the country (mode 3 trade).[5]

At the same time, there is considerable evidence that there are discriminatory barriers to the foreign provision of architectural and engineering services and of legal and accounting services in European markets, as described below based on the OECD Services Trade Restrictiveness Index (STRI).[6] We expect that partial reduction of these barriers would have economically significant effects on both major modes of supply.

2.1 Architectural and Engineering Services

[5] The WTO's General Agreement Trade in Services (GATS) defines four modes of services delivery. Mode 1 pertains to cross-border trade, which occurs when an individual or firm in one country provides a service to a consumer in another country, often through electronic delivery (e.g., a U.S. architect emailing designs to a foreign client). Mode 2 pertains to consumption abroad, or when an individual from one country travels to another country to consume a service (e.g., a student from the United States studying at a UK. university). Mode 3 pertains to commercial presence, or when a company headquartered in one country opens a branch, office, or subsidiary in another country in order to provide services to residents of that country (e.g., a U.S. accounting firm providing auditing services to German consumers through a subsidiary located in Germany). Finally, mode 4 pertains to the movement of natural persons, or when an individual from one country travels to another country to supply services on a short term basis (e.g., a U.S. engineer traveling to France to provide services for a construction project located in that country). In general, cross-border trade in services occurs via modes 1, 2, and 4, whereas affiliate transactions occur via mode 3.

[6] The OECD STRI reflects policies in place in 2016.

Architects and engineers provide services related to the construction and design of buildings and other infrastructure, as well as the design of industrial procedures and production processes. In European markets, these services are supplied through multiple modes of delivery.[7] Due to technological advances, cross-border supply (or mode 1 supply), and specifically the digital delivery of services (for example, supplying architectural designs or engineering plans abroad via e-mail) is a growing area of trade. Mode 1 supply is often complemented by trade in the form of "movement of persons" (or mode 4 trade), when architects and engineers travel to provide services in foreign markets. For example, architectural designs provided through cross-border delivery might also warrant the architect visiting the project site to implement and manage the project. Finally, mode 3 trade, the supply of architectural and engineering services through the establishment of a commercial presence (e.g., a foreign affiliate), is an alternative and possibly complementary mode of supply, allowing companies to provide services continuously throughout various phases of projects in host countries.

Table A1 provides summary statistics on cross-border trade and foreign affiliate transactions in architectural and engineering services. In 2014, the value of cross-border trade in architectural and engineering services, which includes services supplied through modes 1 and 4, varied widely by country. Imports of architectural and engineering services from outside the EU showed a similar trend, with imports surging in France (102.7 percent) and the Czech Republic (68.9 percent), while declining slightly in Austria (-10.0 percent) and Hungary (-3.8 percent).[8] Architectural and engineering services supplied by foreign affiliates from outside the EU operating in the European countries presented here (so-called "inbound foreign affiliate sales") declined in several countries, including in Germany (-31.2 percent) and Austria (-16.2 percent) but experienced modest growth in others, such as France (9.7 percent) and the Netherlands (6.0 percent).[9] In 2014, the year of the data used in the model calibration, inbound foreign affiliate sales were the dominant mode of

[7] Unless otherwise noted, this paragraph is based on Grosso et al., (2014), 10-12.
[8] Eurostat, International Trade in Services Database (accessed April 12, 2017). Data for 2013 and 2014 are the most widely available years for the countries presented here. Eurostat data on cross-border trade roughly corresponds to modes 1, 2 and 4 (cross-border supply, consumption abroad, and the presence of natural persons) while Eurostat data on foreign affiliate transactions roughly corresponds to mode 3 (commercial presence) in the GATS modes of supply framework for services trade. See Koncz et al., (2006), 39-40.
[9] Eurostat, Foreign Control of Enterprises by Economic Activity and a Selection of Controlling Countries (accessed April 12, 2017).

supply in 6 of the 9 countries examined here (Czech Republic, Hungary, Italy, Netherlands, Poland, and Sweden).[10]

Although policies related to the foreign provision of architectural and engineering services tend to be less restrictive than those related to other professional services, countries nevertheless maintain regulations related to the entry or operation of foreign or foreign-owned service providers that likely impede trade, including, most notably, discriminatory qualification and licensing requirements. The OECD STRI for architectural and engineering services categorizes trade restrictions into five groups: restrictions on foreign entry, restrictions to movement of people, barriers to competition, other discriminatory measures, and regulatory transparency.[11] In architectural and engineering services, the most prevalent barriers are restrictions to movement of people (this category affects either all modes of trade or specifically mode 4 trade) and restrictions on foreign entry (this category affects mode 3 trade). In the former category, quotas and labor market tests — for example, work permits that require proof that the vacancy could not be filled by a local employee or that the work by the foreign employee will benefit the local economy — are common and restrict or limit foreign architects and engineers from traveling to host countries on a temporary basis. Also in this category, restrictions on recognition of foreign qualifications (for example, local practice or examination requirements) and licensing (residency and in a few cases, nationality requirements) are prevalent and affect all modes of trade.[12] Restrictions that affect the entry of foreign firms include specific requirements on the composition of boards of directors or the management of engineering and architecture firms (such as residency), restrictions on acquiring land (which affects construction services directly and the architectural and engineering services indirectly), and in some cases foreign equity restrictions for non-locally licensed architects. The remaining restrictions affect the use of professional titles (e.g., titles of "architect" or "engineer"), prices, and advertising architectural services.

Table A2 presents the STRI scores for each country examined here, along with a brief summary of their most restrictive measures applied to the architectural and engineering services sectors. For example, Poland restricts the acquisition and use of land and real estate by foreigners, conditions employment and residency permits on either proving positive local impacts or that the vacancy

[10] Eurostat, Foreign Control of Enterprises by Economic Activity and a Selection of Controlling Countries (accessed April 12, 2017).
[11] The following paragraph is based on Grosso et al. (2014), 24-25.
[12] Temporary licensing systems are often available and some countries recognize foreign degrees with some additional local criteria.

could not be filled locally, and maintains that providers of architectural and engineering services must be members of national associations that, in turn, require EU citizenship. The STRI scores for both architecture and engineering services range from less than 0.2 (France, Germany, Netherlands, and Sweden) to above 0.4 (Poland), which suggests fewer or less intense restrictions on trade in these services among countries with larger architecture and engineering services markets.[13]

2.2 Legal and Accounting Services

International trade in legal services typically involves foreign lawyers providing legal services in their home country law, international law, or third country law while trade in accounting services typically involves foreign accountants or auditors providing accounting and auditing services (though many large accounting firms also provide consulting services). It is reported that supplying services via the establishment of a commercial presence (mode 3) and via the movement of people (mode 4) are the preferred modes of delivery in foreign markets.[14]

Again, table A1 provides summary statistics on cross-border trade and foreign affiliate transactions in legal and accounting services. In 2014, cross-border imports of legal and accounting services combined exceeded inbound foreign affiliate sales in 4 of the 6 countries examined (Austria, France, Greece, and Netherlands). However, inbound foreign affiliate sales grew quickly in several smaller economies in 2013–14, with FAS growth in Austria (50.0 percent), Czech Republic (33.2 percent), and Poland (105.8 percent) all exceeding growth in cross-border imports by a large margin.[15] The trend is not uniform though, as France, Germany and Greece all saw large declines in inbound foreign affiliate sales while their cross-border imports of legal and accounting services grew.[16]

Policies related to the foreign provision of legal services tend to be the most restrictive among professional services, while the provision of accounting services tends to be less heavily restricted.[17] The STRI scores for legal services and accounting services are categorized into the same five groups as architectural and engineering services. Also like architectural and engineering services, the most prevalent are restrictions to movement of people and restrictions on foreign entry. Notably, in the former category, nationality and/or residency requirements to practice law or

[13] OECD, Services Trade Restrictiveness Index, 2016.
[14] As indicated above, part of mode 4 is captured in the data on cross-border trade.
[15] Eurostat, International Trade in Services Database (accessed April 12, 2017).
[16] Eurostat, Foreign Control of Enterprises by Economic Activity and a Selection of Controlling Countries (accessed April 12, 2017).
[17] The following paragraph is based on Grosso et al. (2014), 9-10 and OECD (2016), 2.

provide accounting services, along with lack of recognition of foreign qualifications, are significant impediments and affect all modes of trade.[18] In this same category, quotas and labor market tests are also prevalent and restrict or limit foreign attorneys or accountants from traveling to host countries on a temporary basis. Other prevalent restrictions in this category include local qualifications for a majority of the board of directors/equity partners/managers and limits on commercial association between locally and non-locally licensed attorneys.[19] Restrictions in other categories relate to the fee structure services providers are allowed to charge and minimum capital requirements for the establishment of an affiliate.

Table A3 presents the STRI scores for each country examined here, along with a brief summary of their most restrictive measures as applied to the legal and accounting services sectors. In one case (Poland) where trade in legal services is classified as completely restricted, ownership is restricted to locally-licensed attorneys for both domestic and international law, and boards of directors and managers must also be locally licensed attorneys. Additionally, foreign providers must completely re-do their university degree, practice requirement and exam in Poland to qualify if their home country does not have a reciprocity agreement with Poland. Less restrictive countries, like Netherlands, may still have other restrictions such as limits on foreign equity or require managers and boards of directors to be licensed to practice law. The practice of host country law is usually regulated more heavily than international law. In the countries covered here, accounting services tends to have lower STRI scores (indicative of being less heavily regulated) than legal services, with fewer restrictions on foreign equity or licensing (though auditing services typically has more stringent requirements).

[18] Some countries have implemented limited-licensing schemes which circumvent the necessity to be licensed in the host country and allow foreign attorneys to practice in their qualified areas of law (typically known as foreign legal consultants). Temporary practice rules adopted by some jurisdictions are considered an additional avenue for foreign attorneys to be able to practice law. Similar schemes also exist in certain countries for accounts and auditors, usually requiring reciprocal recognition of qualifications. See European Commission, "Regulation of Professional Services," November 15, 2016, 8, for information on various EU countries' recognition rates of professional qualifications.

[19] Restrictions on commercial association can impede the ability of foreign firms to partner with or employ local lawyers or accountants as an avenue to provide certain services (such as host country law or auditing services) to their clients, without the need to requalify in local markets.

3 Modeling Framework

In this section, we derive an economic model of foreign affiliate sales and cross-border exports of services, based on a partial equilibrium version of the Helpman, Melitz, and Yeaple (2004) framework.[20] Then we derive formulas for calculating the impact of reducing the fixed costs of the different modes of trade in these services.

The model focuses on a single national market, the destination country, and a single category of services. Firms provide services that are differentiated from the services provided by other firms within their category, and they engage in monopolistic competition. The parameter ε is the constant elasticity of substitution among different varieties of services within the category.

3.1 Firm Costs

Labor is the only factor of production, following Helpman, Melitz, and Yeaple (2004). The wage in the destination market is w, and the wage in exporting country c is w_c. Providers of the services vary in their productivity. The unit labor requirement of each firm, a, is drawn from a distribution with cumulative distribution function $G(a)$. As in Helpman, Melitz, and Yeaple (2004), we assume that the productivity of individual firms has a Pareto distribution with shape parameter $k > \varepsilon - 1 > 0$. There are n firms headquartered in the destination country, and n_c firms headquartered in country c

Beyond the unit labor requirement, the model includes three additional costs of serving a national market. The first is a variable cost of cross-border exports from country c to the destination country, τ_c, that has an iceberg form. (It is an ad valorem trade cost that increases the marginal cost of supplying the destination country from country c by $(\tau_c - 1) \times 100$ percent.) The second is a fixed cost of exporting from country c to the destination country, equal to f_{Xc}. The third is a fixed cost incurred when a firm from country c establishes a foreign affiliate in the destination country. Following Helpman, Melitz, and Yeaple (2004), we represent this third cost in terms of the *incremental* fixed cost of foreign affiliate sales relative to cross-border exports, equal to f_{Ac}.[21] The model also includes fixed costs of producing in the destination country to supply the domestic market, equal to f_D.

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[20] For the purposes of the model, cross-border exports refer to all trade that does not involve setting up a foreign affiliate.

[21] This is the cost of establishing foreign affiliate production, in excess of the cost of gaining market access.

3.2 Firm Profits

The next step in the derivation of the model is to examine the firm's profitability from alternative modes of supplying the services to the destination country. Profits are the difference between revenue and costs of supply. For example, equation (1) represents the revenue from a domestic firm with unit labor requirement a serving the destination country.

$$R_D(a) = \beta\, E P^{\varepsilon-1} p(a)^{1-\varepsilon} \quad (1)$$

Following the notation in Helpman, Melitz, and Yeaple (2004), E represents aggregate expenditures on all commodities in the destination country, β is the constant expenditure share on the services category out of aggregate expenditures, P is a CES price index for the services category in the destination country, and $p(a)$ is the producer price of a firm with unit labor requirement a.[22] Equation (2) is the marginal cost of supplying the service in the destination country.

$$mc(a) = wa \quad (2)$$

The assumptions of CES demand and monopolistic competition in the model imply that the producer price is set as a constant mark-up over marginal costs.

$$p(a) = \left(\frac{\varepsilon}{\varepsilon-1}\right) wa \quad (3)$$

Combining these elements, equation (4) represents the profits of the firm from serving its domestic market.

$$\pi_D(a) = \frac{1}{\varepsilon}\, \beta\, E P^{\varepsilon-1} \left[\left(\frac{\varepsilon}{\varepsilon-1}\right) a\, w\right]^{1-\varepsilon} - f_D \quad (4)$$

By a similar derivation, equation (5) is the profits of a country c firm that exports its service across the border into the destination country.

$$\pi_{Xc}(a) = \frac{1}{\varepsilon}\, \beta\, E\, P^{\,\varepsilon-1} \left[\left(\frac{\varepsilon}{\varepsilon-1}\right) a\, w_c\, \tau_c\right]^{1-\varepsilon} - f_{Xc} \quad (5)$$

Equation (6) is the incremental profits of a country c firm that serves the market in the destination country through foreign affiliate sales rather than cross-border exports.

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[22] The HMY framework assumes that there are constant expenditure shares, corresponding to Cobb-Douglas preferences across categories of services.

$$\pi_{Ac}(a) = \frac{1}{\varepsilon}\,\beta\,E\,P^{\,\varepsilon-1}\left[\left(\frac{\varepsilon}{\varepsilon-1}\right)a\,w\right]^{1-\varepsilon} - (\,f_{Xc} + f_{Ac}\,) \quad (6)$$

3.3 Productivity Cutoffs for Different Modes of Supply

A firm's most profitable mode of supply depends on the firm's unit labor requirement. All domestic firms with unit labor requirements below a_D sell in the destination country. The cutoff level for domestic sales is implicitly defined in equation (7).

$$\pi_D(a_D) = 0 \quad (7)$$

In addition, country c firms with unit labor requirements below a cutoff level a_{Xc} also supply the destination market, either through cross-border exports or through foreign affiliate sales. Firms from country c with unit labor requirements below the even lower cutoff a_{Ac} serve the market by establishing a foreign affiliate in the destination country. Firms from country c with unit labor requirements below a cutoff level a_{Xc} but above a_{Ac} serve the destination country through cross-border exports. These cutoff levels are implicitly defined by the condition for zero profits in cross-border exports (in equation (8)) and for zero incremental profits for foreign affiliate sales relative to cross-border exports (in equation (9)).

$$\pi_{Xc}(a_{Xc}) = 0 \quad (8)$$

$$\pi_{Ac}(a_{Ac}) - \pi_{Xc}(a_{Xc}) = 0 \quad (9)$$

Following Helpman, Melitz, and Yeaple (2004) and the related literature, we assume that a_{Xc} is greater than a_{Ac}. The most productive firms establish foreign affiliates, while the least productive country c firms do not serve the destination country at all.

Equations (4) through (9) imply that the relative cutoff levels depend on the relative magnitude of the different types of costs.

$$h_{Xc} \equiv \frac{a_{Xc}}{a_D} = \left(\frac{f_{Xc}}{f_D}\right)^{\frac{1}{1-\varepsilon}} \frac{w}{w_c\,\tau_c} \quad (10)$$

$$h_{Ac} \equiv \frac{a_{Ac}}{a_D} = \left(\frac{f_{Ac}}{f_D}\right)^{\frac{1}{1-\varepsilon}} w\,(w^{1-\varepsilon} - (w_c\,\tau_c)^{1-\varepsilon})^{\frac{1}{\varepsilon-1}} \quad (11)$$

3.4 Supply by Mode and the Price Index

Equation (12) represents the equilibrium quantity of foreign affiliate sales of country c firms (q_{Ac}) associated with the cutoff unit labor requirements implicitly defined by equations (7), and equation (13) represents the equilibrium *value* of these foreign affiliate sales (v_{Ac}).

$$q_{Ac} = n_c\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w\right)^{-\varepsilon} \int_0^{a_{Ac}} a^{-\varepsilon}\, dG(a) \quad (12)$$

$$v_{Ac} = n_c\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w\right)^{1-\varepsilon} \int_0^{a_{Ac}} a^{1-\varepsilon}\, dG(a) \quad (13)$$

Similarly, equations (14) and (15) represent the equilibrium values of cross-border exports of country c (v_{Xc}) and domestic shipments in the destination country (v_D).

$$v_{Xc} = n_c\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w_c\, \tau_c\right)^{1-\varepsilon} \int_{a_{Ac}}^{a_{Xc}} a^{1-\varepsilon}\, dG(a) \quad (14)$$

$$v_D = n\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w\right)^{1-\varepsilon} \int_0^{a_D} a^{1-\varepsilon}\, dG(a) \quad (15)$$

Equation (16) is the CES price index for the category of services in the destination country.

$$P = \left(\frac{\varepsilon}{\varepsilon-1}\right) \Big[n\, (w)^{1-\varepsilon} \int_0^{a_D} a^{1-\varepsilon}\, dG(a) + \sum_c \left(n_c (w_c\, \tau_c)^{1-\varepsilon} \int_{a_{Ac}}^{a_{Xc}} a^{1-\varepsilon}\, dG(a)\right) + \sum_c \left(n_c (w)^{1-\varepsilon} \int_0^{a_{Ac}} a^{1-\varepsilon}\, dG(a)\right)\Big]^{\frac{1}{1-\varepsilon}} \quad (16)$$

Our assumption that the productivity of individual firms has a Pareto distribution with shape parameter k allows us to rewrite equations (13) through (16) in terms of the cutoff levels a_D, a_{Xc}, and a_{Ac}.

$$v_{Ac} = n_c\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w\right)^{1-\varepsilon} \left(\frac{k}{k-(\varepsilon-1)}\right) (a_{Ac})^{k-(\varepsilon-1)} \quad (17)$$

$$v_{Xc} = n_c\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w_c\, \tau_c\right)^{1-\varepsilon} \left(\frac{k}{k-(\varepsilon-1)}\right) \left[(a_{Xc})^{k-(\varepsilon-1)} - (a_{Ac})^{k-(\varepsilon-1)}\right] \quad (18)$$

$$v_D = n\, \beta\, E\, P^{\varepsilon-1} \left(\left(\frac{\varepsilon}{\varepsilon-1}\right) w\right)^{1-\varepsilon} \left(\frac{k}{k-(\varepsilon-1)}\right) (a_D)^{k-(\varepsilon-1)} \quad (19)$$

$$P = \left(\frac{\varepsilon}{\varepsilon-1}\right)\left(\frac{k}{k-(\varepsilon-1)}\right)^{\frac{1}{1-\varepsilon}}\left[n\,(w)^{1-\varepsilon}(a_D)^{k-(\varepsilon-1)} + \sum_c\left(n_c(w_c\,\tau_c)^{1-\varepsilon}\left((a_{Xc})^{k-(\varepsilon-1)} - (a_{Ac})^{k-(\varepsilon-1)}\right)\right) + \sum_c\left(n_c(w)^{1-\varepsilon}(a_{Ac})^{k-(\varepsilon-1)}\right)\right]^{\frac{1}{1-\varepsilon}} \quad (20)$$

We can further rewrite equations (17) through (20) in terms of the relative cutoff levels, h_{Xc} and h_{Ac}, and a common term Z.

$$v_{Ac} = n_c\,Z\,(h_{Ac})^{k-(\varepsilon-1)} \quad (21)$$

$$v_{Xc} = n_c\,Z\left(\frac{w_c\,\tau_c}{w}\right)^{1-\varepsilon}\left((h_{Xc})^{k-(\varepsilon-1)} - (h_{Ac})^{k-(\varepsilon-1)}\right) \quad (22)$$

$$v_D = n\,Z \quad (23)$$

$$Z \equiv\ \beta\,E\left[n\ + \sum_c\left(n_c\left(\frac{w_c\,\tau_c}{w}\right)^{1-\varepsilon}\left((h_{Xc})^{k-(\varepsilon-1)} - (h_{Ac})^{k-(\varepsilon-1)}\right)\right) + \sum_c\left(n_c(h_{Ac})^{k-(\varepsilon-1)}\right)\right]^{-1} \quad (24)$$

3.5 Effect of Changes in Fixed Costs on Each Mode of Supply

Next, we calculate the impact of reducing the two types of fixed costs of trade on foreign affiliate sales, cross-border exports, and domestic sales in the destination country by totally differentiating equations (10), (11), (21), (22), (23), and (24), while holding aggregate expenditure levels, wages, variable trade costs, and the number of potential firm in each country fixed.[23] Equations (25) through (30) are the resulting equations in percentage changes. The notation $\hat{v} \equiv \frac{dv}{v}$ represents the proportional, or percentage, change in variable v.

$$\hat{v}_{Ac} = \hat{Z} + \left(k - (\varepsilon-1)\right)\hat{h}_{Ac} \quad (25)$$

$$\hat{v}_{Xc} = \hat{Z} + \left(1 + \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\left(k - (\varepsilon-1)\right)\hat{h}_{Xc} - \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\left(k - (\varepsilon-1)\right)\hat{h}_{Ac} \quad (26)$$

$$\hat{v}_D = \hat{Z} \quad (27)$$

$$\hat{Z} = \left(k - (\varepsilon-1)\right)\left(-\sum_c m_{Ac}\,\hat{h}_{Ac} - \sum_c m_{Xc}\left(1 + \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\hat{h}_{Xc} + \sum_c m_{Xc}\left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\hat{h}_{Ac}\right) \quad (28)$$

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[23] The following equations for the changes in the economic variables do not show all of the steps of the derivation. The technical appendix provides more details of the derivation.

$$\hat{h}_{Ac} = \left(\frac{1}{1-\varepsilon}\right)\hat{f}_{Ac} \quad (29)$$

$$\hat{h}_{Xc} = \left(\frac{1}{1-\varepsilon}\right)\hat{f}_{Xc} \quad (30)$$

The variables m_{Ac} and m_{Xc} are the shares of sales by affiliates of companies from country c in the destination country and cross-border exports from country c in the destination country, respectively, as a fraction of total consumption of the service in the destination country.

Equations (31) through (34) reduce the number of equations by substitution for $\hat{h}_{Ac}$ and $\hat{h}_{Xc}$.

$$\hat{v}_{Ac} = \hat{Z} + \left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\hat{f}_{Ac} \quad (31)$$

$$\hat{v}_{Xc} = \hat{Z} + \left(1 + \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\hat{f}_{Xc} - \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\hat{f}_{Ac} \quad (32)$$

$$\hat{v}_D = \hat{Z} \quad (33)$$

$$\hat{Z} = \left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\left(-\sum_c m_{Ac}\,\hat{f}_{Ac} - \sum_c m_{Xc}\left(1 + \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\hat{f}_{Xc} + \sum_c m_{Xc}\left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\hat{f}_{Ac}\right)$$
(34)

3.6 Effect of Changes in Fixed Costs on the Price Index

Next, we calculate the percentage change in the price index in the destination country. We totally differentiate equations (7), (8), (9), and (20), while holding aggregate expenditure levels, wages, variable trade costs, and the number of potential firm in each country fixed. Equations (35) through (38) are the resulting equations in percentage changes.

$$\hat{a}_D = \hat{P} + \left(\frac{1}{1-\varepsilon}\right)\hat{f}_D \quad (35)$$

$$\hat{a}_{Xc} = \hat{P} + \left(\frac{1}{1-\varepsilon}\right)\hat{f}_{Xc} \quad (36)$$

$$\hat{a}_{Ac} = \hat{P} + \left(\frac{1}{1-\varepsilon}\right)\hat{f}_{Ac} \quad (37)$$

$$\hat{P} = \left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\left((1 - \sum_c m_{Xc} - \sum_c m_{Ac})\hat{a}_D + \sum_c m_{Ac}\,\hat{a}_{Ac} + \sum_c m_{Xc}\left(1 + \left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\hat{a}_{Xc} -$$

$$\sum_c m_{Xc}\left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\hat{a}_{Ac}\right) \quad (38)$$

Finally, we use equations (35) through (38) to solve for the percentage change in the price index in the destination market resulting from the reductions in f_{Ac} and f_{Xc}. Equation (39) is the reduced-form expression for the price change.

$$\hat{P} = \left(\frac{k-(\varepsilon-1)}{k\,(1-\varepsilon)}\right)\left(\sum_c m_{Ac}\,\hat{f}_{Ac} + \sum_c m_{Xc}\left(1+\left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\right)\hat{f}_{Xc} - \sum_c m_{Xc}\left(\frac{m_{Ac}}{m_{Xc}}\right)\left(\frac{w_c\,\tau}{w}\right)^{\varepsilon-1}\hat{f}_{Ac}\right) \quad (39)$$

4 Application of the Model: Estimating the Effects of EU Trade Liberalization

4.1 Description of the Liberalization

As an application of this modeling framework, we estimate the impacts of a hypothetical liberalization of EU policy that reduces barriers to the two modes of trade in services. In this policy experiment, we reduce the fixed costs of supplying the EU countries from a non-EU country by 50 percent, for both cross-border exports and foreign affiliate sales.[24] On the other hand, we assume that there is no change in the fixed costs of supplying the EU destination country from other EU countries, since intra-EU trade flows are already liberalized. Specifically, we assume that $\hat{f}_{Xc} = \hat{f}_{Ac} = -0.50$ if source country c is outside of the EU and $\hat{f}_{Xc} = \hat{f}_{Ac} = 0$ if c is within the EU.

In this policy scenario, the percentage changes in cross-border exports and foreign affiliates reduce to equation (40) for non-EU countries, equation (41) for other EU countries, and equation (42) for domestic supply in the EU destination countries.

For non-EU countries: $\hat{v}_{Ac} = \hat{v}_{Xc} = k\,\hat{P} + \left(\frac{k-(\varepsilon-1)}{1-\varepsilon}\right)\hat{f}_{Ac}$ (40)

For other EU countries: $\hat{v}_{Ac} = \hat{v}_{Xc} = k\,\hat{P}$ (41)

For domestic suppliers: $\hat{v}_D = k\,\hat{P}$ (42)

4.2 Data Sources and Challenges

The data used in this model consist of inbound foreign affiliate sales, cross-border imports and exports, and total revenue for two industries (accounting/legal services and

[24] Since the fixed costs of trade include natural barriers as well as policy barriers, a 50 percent reduction in the fixed costs of trade would require a more than 50 percent reduction in the costs associated with policy barriers.

architecture/engineering services) for a sample of European countries, sourced from two Eurostat databases.[25] Cross-border trade and total revenue data are available separately for accounting services, legal services, architecture services, and engineering services; however, data on inbound foreign affiliate sales is only available as two combined categories: legal/accounting services and architecture/engineering services. Therefore it is necessary to aggregate cross-border trade and revenue data to make the industry groupings comparable across data sources. Data on inbound foreign affiliate sales is available only as recently as 2014, which necessitates using that year for other data sources as well. Cross-border trade and foreign affiliate sales are calculated as the value of trade between the country represented in the model (France, Hungary, etc.) and all countries outside the EU, because the policy scenario assumes the same reduction in fixed costs for all non-EU sources.

Despite the modest data requirements of this model, the Eurostat database was missing key pieces of data for architectural/engineering and legal/accounting services for several large European economies (such as the UK), and for this reason they are not include in our analysis. We attempted to supplement the Eurostat data with official data from various national statistical offices; however, the requirement to subtract intra-EU trade proved difficult as bilateral services trade data were not available in sufficient detail at the sectoral level from these sources. If more detailed data sources can be found, particularly for foreign affiliate sales, this model can be applied to more sectors and countries. Since it is not a general equilibrium model, missing data for one country or sector also does not preclude the model from being applied to other destination countries or sectors.

4.3 Effects of the Liberalization

The liberalization reduces the fixed costs of exporting to the EU destination country from non-EU source countries, while keeping domestic and intra-EU trade costs unchanged. As a result, it lowers average prices in the destination country. In terms of sources of supply, the liberalization increases the cross-border exports (CBE) and foreign affiliate sales (FAS) of non-EU countries into the EU, at

[25] Cross-border trade data is sourced from Eurostat, "International Trade in Services Database (since 2010) (BPM6)," while data on inbound foreign affiliate sales and total revenue comes from Eurostat, "Foreign Control of Enterprises by Economic Activity and a Selection of Controlling Countries (from 2008 onwards)." Total revenue is obtained by setting the controlling country parameter to "all countries" for each industry, while inbound foreign affiliate sales data is obtained by setting the controlling country parameter for each industry to "Extra-EU-28." Data on cross-border exports and imports also exclude intra-EU trade by setting the partner country parameter to "Extra-EU-28."

the expense of domestic and intra-EU supply. However, the reduction in EU-sourced sales is small, due to the small initial shares of the markets supplied by non-EU sources.

4.3.1 Effects on Prices and Sales

Table 1 presents the estimated effects of the liberalization on the overall price index for legal and accounting services in each destination country ($\widehat{P}$). The table also shows the effect of the liberalization on the values of supply, by each mode, in each destination country ($\hat{v}_{Ac}$, $\hat{v}_{Xc}$, and $\hat{v}_{D}$). Table 2 does the same for architecture and engineering services.

These tables illustrate four main themes. First, the impact of liberalization on the destination country's price index is small. Second, several types of supply change by the same percentage. Third, sales from EU-sources fall by relatively small percentages. Fourth, sales from non-EU sources increase consistently across modes, destination countries, and services categories, by around 25 percent.

Table 1: Effect of the Liberalization on the Price and Sales of Legal and Accounting Services

	Percentage Change in		
Destination Country	Price Index	Domestic Sales or CBE or FAS from EU	CBE or FAS from non-EU
Czech Republic	-0.3	-1.7	26.0
Greece	-0.1	-0.4	27.3
France	-0.1	-0.6	27.1
Hungary	-0.7	-3.7	24.1
Austria	-0.1	-0.5	27.3
Poland	-0.3	-1.4	26.4
Netherlands	-0.5	-2.6	25.1

Table 2: Effect of the Liberalization on the Price and Sales of Architecture and Engineering Services

	Percentage Change in		
Destination Country	Price Index	Domestic Sales or CBE or FAS from EU	CBE or FAS from non-EU
Czech Republic	-0.5	-2.6	25.2
Germany	-0.5	-2.8	24.9
France	-0.8	-4.2	23.6
Italy	-0.5	-2.6	25.2
Hungary	-0.5	-2.3	25.4
Netherlands	-1.2	-6.1	21.7
Austria	-0.5	-2.5	25.2
Poland	-0.4	-2.2	25.6
Sweden	-0.5	-2.6	25.1

The small drop in price indices can be understood by examining equation (39). The overall price index can be thought of as a weighted average of the costs of supply of each mode from each source country. So the impact of the liberalization on a country's overall price index depends on the market shares of the suppliers who are receiving reductions in their trade costs. The larger the market share of non-EU sources in a destination country, the more the destination price falls after the liberalization. However, the market share of non-EU sources is relatively small in all destination countries and services categories (see Tables 3 to 6). As a result, the liberalization only reduces the destination country price indices by 0.1 to 1.2 percent.

The sales of several modes of supply all change by the same percentage. This occurs because, for each mode of supply, all that matters for the sales of that mode is its price relative to the overall price index (see equations 41 and 42). Within each destination country, domestic sales and EU-sourced CBE and FAS each have the same change in costs (zero) and also face the same drop in the price index. As a result, they all have the same percentage change in sales. Similarly, non-EU sourced CBE and FAS face the same reduction in costs (50 percent) and the same change in the price index. As a result, equation (40) shows that both of these modes display the same percentage increase in sales.

The drop in sales from other EU sources in Tables 1 and 2 can be understood by examining equation (41). As was previously discussed, the change in sales of each mode depends on the change in the price index and the change in that mode's costs. But costs do not change for other EU sources. As result, the percentage change in EU-sourced CBE and FAS is also equal to k times the percentage change in the price index. As the drop in EU-sourced sales is driven by the drop in the price index, the largest drops in EU-sourced sales occur in countries and services categories with the largest drops in prices. And these are the countries and categories where non-EU sourced suppliers have larger market shares. Likewise for domestic sales in equation (42), the percentage change in domestic sales is equal to k times the fall in prices.[26]

The story behind the change in CBE and FAS from non-EU sources is more complex. Their percentage increase in sales is defined by equation (40). The right hand side of these equations has two terms. The first is a price term that is the same as the percentage changes in sales of the other

[26] It may seem counter-intuitive that domestic sales fall whenever the price index falls. However, note that the change in the price index is not the exogenous shock or root cause. $\hat{P}$ is not an exogenous change in price, it is a change in the price index caused by a change in the fixed costs of CBE and FAS, modes that are substitutes for domestic sales in the model.

modes. It is determined by the market share of non-EU sources in the destination country, and is relatively small. The second term is determined by the change in the fixed costs of trade for the particular mode of supply. The second term is large relative to the change in the overall price index. For the particular parameter values used in the model, the second term is equal to 27.8 percent, for all of the non-EU sources, so the second term dominates the first. As a result, all countries show similar percentage increases in the value of non-EU sourced FAS and CBE, ranging from 21.7 to 27.3.

4.3.2 Effects on the Market Share of Different Modes of Supply

The following tables present the market share of each mode of supply in each destination country, before and after the liberalization. Table 3 and Table 4 are for legal and accounting services before and after, while Table 5 and Table 6 are for architecture and engineering services before and after.

The most striking result is how little the market shares change in response to the liberalization. This occurs because, according to tables 1 and 2, there is only a small percentage change in the shares of modes with the largest initial market shares (those from EU-sources). However, the modes with large percentage changes (those from non-EU sources) have small initial market shares. As a result, the market shares of the different modes of supply look very similar both before and after the liberalization.

Table 3: Market Share of each Mode of Supply in Legal and Accounting Services, before the Liberalization

	Market Share (percent)				
Destination Country	Cross Border from non-EU	Cross Border from EU	FAS from non-EU	FAS from EU	Domestic Sales
Czech Republic	2.1	7.2	4.2	8.4	78.2
Greece	1.5	8.1	0.0	3.7	86.8
France	2.1	4.6	0.1	1.5	91.7
Hungary	1.3	5.0	12.0	23.6	58.1
Austria	1.6	6.5	0.0	2.5	89.4
Poland	1.3	5.3	3.6	11.8	78.1
Netherlands	7.6	7.9	1.8	2.9	79.8

Table 4: Market Share of each Mode of Supply in Legal and Accounting Services, after the Liberalization

	Market Share (percent)				
Destination Country	Cross Border from non-EU	Cross Border from EU	FAS from non-EU	FAS from EU	Domestic Sales
Czech Republic	2.6	7.0	5.3	8.2	76.8
Greece	1.8	8.0	0.0	3.7	86.4
France	2.7	4.6	0.1	1.4	91.2
Hungary	1.6	4.8	14.9	22.8	55.9
Austria	2.1	6.5	0.0	2.5	88.9
Poland	1.6	5.2	4.6	11.6	77.0
Netherlands	9.5	7.7	2.2	2.8	77.8

Table 5: Market Share of each Mode of Supply in Architecture and Engineering Services, before the Liberalization

	Market Share (percent)				
Destination Country	Cross Border from non-EU	Cross Border from EU	FAS from non-EU	FAS from EU	Domestic Sales
Czech Republic	2.6	6.8	6.7	13.1	70.8
Germany	5.3	9.3	4.9	9.3	71.3
France	10.2	9.2	4.8	7.0	68.8
Italy	4.4	7.9	4.8	11.7	71.2
Hungary	2.0	11.7	6.4	10.9	69.0
Netherlands	8.3	6.2	13.6	11.1	60.8
Austria	7.2	18.8	1.9	5.0	67.2
Poland	3.4	11.3	4.4	9.2	71.7
Sweden	1.4	3.1	8.1	13.8	73.7

Table 6: Market Share of each Mode of Supply in Architecture and Engineering Services, after the Liberalization

	Market Share (percent)				
Destination Country	Cross Border from non-EU	Cross Border from EU	FAS from non-EU	FAS from EU	Domestic Sales
Czech Republic	3.2	6.6	8.4	12.8	69.0
Germany	6.6	9.0	6.1	9.0	69.3
France	12.6	8.9	5.9	6.7	65.9
Italy	5.5	7.7	6.1	11.4	69.4
Hungary	2.5	11.4	8.1	10.6	67.4
Netherlands	10.1	5.8	16.6	10.4	57.1
Austria	9.0	18.3	2.4	4.9	65.5
Poland	4.2	11.1	5.6	9.0	70.2
Sweden	3.2	6.6	8.4	12.8	69.0

5 Conclusions

The model provides a practical tool for trade policy analysis for services industries where data are limited and the economics of multi-mode supply can be complex. The estimates indicate that 50 percent reductions in the fixed costs of the two modes of trade in these professional services would have large effects on the value of cross-border exports into the EU countries and on foreign affiliate purchases in these countries, but would have only small effects on the sales of domestic producers and on overall prices of the services in the EU markets.

This model quantifies the economic impact of hypothetical reductions in the fixed costs of trade, but the model does not provide a method for estimating the magnitude of cost reductions associated with specific policy changes. To provide an illustration of how the model works, we have assumed 50 percent reductions in one or both of the types of fixed costs. The relevant magnitudes of the cost reductions associated with policy changes are critical inputs into the analysis and therefore a very important area for future research.

Finally, there may be even larger potential gains from liberalizing markets for services in developing countries, so the challenge for future research will be collecting reliable data on markets shares in these markets in order to extend the analysis.

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Appendix

Table A1: Trade in Certain Professional Services by Country in 2014 (million euros)

Country	Category of Services	Cross-Border Exports	Cross-Border Imports	Inbound FAS	Revenue
Austria	Architectural and Engineering	1,311.0	457.0	122.2	7,227.2
Austria	Legal and Accounting	130	89	1.8	5,502.3
Czech Republic	Architectural and Engineering	337.4	120.1	317.8	4,932.9
Czech Republic	Legal and Accounting	100.1	55.1	110.8	2,691.5
France	Architectural and Engineering	8,759.0	5,097.0	2,378.8	53,502.3
France	Legal and Accounting	731	814	17.8	38,253.1
Germany	Architectural and Engineering	5,945.0	3,660.0	3,359.4	71,401.8
Greece	Legal and Accounting	24.3	25.2	0.1	1,741.9
Hungary	Architectural and Engineering	72.0	45.0	143.1	2,252.9
Hungary	Legal and Accounting	91.5	25.1	228.2	1,972.4
Italy	Architectural and Engineering	1,046.0	860.2	948.4	19,782.2
Netherlands	Architectural and Engineering	2,623.8	1,170.0	1,927.7	15,603.4
Netherlands	Legal and Accounting	1699.3	1118.6	262.3	15,327.7
Poland	Architectural and Engineering	398.2	171.4	223.8	5,246.8
Poland	Legal and Accounting	356.1	62.2	179.7	5,294.5
Sweden	Architectural and Engineering	1,004.5	180.8	1,072.7	14,069.0

Note: Cross-border exports, cross-border imports, and inbound foreign affiliate sales exclude all intra-EU trade.
Source: Eurostat, International Trade in Services Database (accessed April 12, 2017); Eurostat, Foreign Control of Enterprises by Economic Activity and a Selection of Controlling Countries (accessed April 12, 2017).

Table A2: Architecture and Engineering Services Restrictions by Country

Country and Score	Restrictions on Foreign Entry	Restrictions on Movement of People	Other
Austria Architecture (0.301) Engineering (0.304)	Acquisition and use of land and real estate by foreigners ; equity restrictions applying to non-locally licensed individuals or firms	Labor market tests; limitations on stay	Minimum capital requirements
Czech Republic Architecture (0.273) Engineering (0.258)	Equity restrictions applying to non-locally licensed individuals or firms	Residency requirements for board of directors; licensing requirements for board of directors; labor market tests; limitations on stay; local exam and practice requirements	Minimum capital requirements
France Architecture (0.197) Engineering (0.144)	Equity restrictions applying to non-locally licensed individuals or firms	Licensing requirements for board of directors; labor market tests; limitations on stay;	Minimum capital requirements
Germany Architecture (0.197) Engineering (0.204)	Equity restrictions applying to non-locally licensed individuals or firms; foreign investment screening	Licensing requirements for managers; labor market tests; limitations on stay	Minimum capital requirements; fee setting
Hungary Architecture (0.271) Engineering (0.269)	Acquisition and use of land and real estate by foreigners	Labor market tests; (intra-company transfers, contractual/independent service suppliers); limitations on stay; nationality or citizenship requirements for license to practice	Minimum capital requirements
Italy Architecture (0.236) Engineering (0.160)	Equity restrictions applying to non-locally licensed individuals or firms; acquisition and use of land and real estate by foreigners; licensing requirement for managers;	Labor market tests; quotas (independent suppliers); limits on stay; permanent residency/domicile required for practice; local exam requirements	
Netherlands Architecture (0.170) Engineering (0.171)		Labor market tests; limitations on stay	
Poland Architecture (0.439) Engineering (0.432)	Acquisition and use of land and real estate by foreigners	Labor market tests for contractual/independent services suppliers; limitations on stay; nationality or citizenship requirements for license to practice	Minimum capital requirements

Sweden Architecture (0.197) Engineering (0.198)	Residency for management/board of directors/key foreign personnel	Labor market tests; limitations on stay	Minimum capital requirements

Source: OECD Services Trade Restrictiveness Index Simulator (accessed April 12, 2017). http://sim.oecd.org/default.ashx.

Note: Most restrictive policies in the "Foreign Entry" and "Movement of People" categories are listed (i.e. excluding those which may be scored greater than 0 but are subsumed by a binding restriction).The average STRI score in legal services for the countries presented here is 0.510, while the average STRI for accounting services is 0.288.

Table A3: Legal and Accounting Services Restrictions by Country

Country and Score	Restrictions on Foreign Entry	Restrictions on Movement of People	Other
Austria Accounting (0.342) Legal (0.417)	Foreign equity restrictions for domestic law and auditing firms, joint stock companies for domestic law prohibited; acquisition and use of land and real estate by foreigners is restricted; commercial presence required for auditing firms	Residency requirements for board of directors of auditing firms; licensing requirements for managers of law and accounting firms; labor market tests; limitations on stay; nationality and residency requirements for licensing for practice of domestic law	Minimum capital requirements; restrictions on advertising for domestic law
Czech Republic Accounting (0.233) Legal (0.311)	Restrictions on ownership by non-locally licensed attorneys (both domestic and international) and auditors; certain restrictions on commercial association for legal services; commercial presence required to provide certain cross-border legal services	Licensing requirements for boards of directors of law firms (both domestic and international) and auditing firms; labor market tests for legal and accounting; limitations on stay; residency/domicile requirements for licensing for legal services; local examination requirements for legal services	Fee setting for legal services; minimum capital requirements
France Accounting (0.483) Legal (0.593)	Equity restrictions applying to not licensed individuals or firms for legal and accounting; certain restrictions on commercial association for legal services; commercial presence	Licensing requirements for managers and boards of directors of both law and accounting firms; labor market tests; limitations on stay; no recognition of foreign qualifications	

	required to provide certain cross-border legal services		
Greece Accounting (0.274) Legal (0.492)	Equity restrictions applying to not licensed individuals or firms (domestic law and auditing); certain restrictions on commercial association for legal services; screening requirements; acquisition and use of land and real estate by foreigners is restricted	Nationality and licensing requirements for managers and board of directors; labor market tests for legal and accounting; limitations on stay; nationality/domicile requirements for licensing in domestic law	Minimum capital requirements; restrictions on advertising
Netherlands Accounting (0.164) Legal (0.244)	Equity restrictions applying to not licensed individuals or firms (domestic law and auditing); commercial presence required to provide certain cross-border legal services	Licensing requirements for managers and board of directors; labor market tests for legal and accounting; limitations on stay; domicile required to practice domestic law; other restrictions to movement of people; local examination requirement in legal and accounting (but not auditing); practice requirement in legal and accounting (but not auditing); lack of temporary licensing	
Poland Accounting (0.234) Legal (1.000)	Restrictions on ownership by non-locally licensed attorneys (both domestic and international); legal form; certain restrictions on commercial association; board of directors and managers must be licensed lawyers; establishment requirements for host country law; acquisition and use of land and real estate by foreigners is restricted (both legal and accounting)	Labor markets tests (legal and accounting); limitations on stay (legal and accounting); domicile requirements for host country law; recognition of foreign qualifications based on reciprocity (international law, auditing) and/or education/practice in Poland (domestic law); lack of temporary licensing;	Advertising restrictions (legal and accounting); minimum capital requirements (legal and accounting)

Source: OECD Services Trade Restrictiveness Index Simulator (accessed April 12, 2017). http://sim.oecd.org/default.ashx.

Note: Most restrictive policies in the "Foreign Entry" and "Movement of People" categories are listed (i.e. excluding those which may be scored greater than 0 but are subsumed by a binding restriction).The average STRI score in architecture services for the countries presented here is 0.249, while the average STRI for engineering services is 0.233.