Services Trade Restrictions and Company Profits: Telecommunications

Tamar Khachaturian

Abstract

This paper examines the effect of trade barriers on telecommunications companies' profit margins using both one-step and two-step estimation methods. The main finding of this paper is that barriers to entry inflate the profits of incumbent companies, a result which is fairly robust across estimation methods. Additionally, there is some evidence that the effect of trade policies on firm profits is related to firm characteristics. However, further research is necessary to improve modeling of profits in the telecommunications industry.

United States International Trade Commission:
Office of Industries

Working Paper ID-042
November 2015

United States International Trade Commission

Services Trade Restrictions and Company Profits: Telecommunications

Tamar Khachaturian

Office of Industries
U.S. International Trade Commission (USITC)
September 2015

The author is an International Trade Analyst with the Office of Industries of the U.S. International Trade Commission (USITC). Office of Industries working papers are the result of the ongoing professional research of USITC staff and solely represent the opinions and professional research of individual authors. These papers do not necessarily represent the views of the U.S. International Trade Commission or any of its individual Commissioners. Working papers are circulated to promote the active exchange of ideas between USITC staff and recognized experts outside the USITC, and to promote professional development of office staff by encouraging outside professional critique of staff research.

This paper represents solely the views of the author and is not meant to represent the views of the U.S. International Trade Commission or any of its commissioners. 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: 202-205-2359, email: tamar.khachaturian@usitc.gov.

Address Correspondence To:

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

Services Trade Restrictions and Company Profits: Telecommunications

www.usitc.gov

Services Trade Restrictions and Company Profits: Telecommunications

November 2015
No. ID-15-042

This working paper was prepared by:

Tamar Khachaturian
tamar.khachaturian@usitc.gov

Administrative Support

Johnita Glover

Monica Sanders

Phyllis Boone

Acknowledgements

The author would like to thank past and present members of USITC's Services Division for their cooperative efforts to analyze barriers to trade at the firm level across services industries and to Richard Brown and Martha Lawless in particular, for their support of this project. The author would also like to thank David Riker from USITC's Office of Economics for his review and suggestions and Johnita Glover, Monica Sanders, Phyllis Boone, and Cindy Payne for help with tables, layout, and formatting.

Table of Contents

Table of Contents 5

Introduction 7

Telecommunications Services and Economic Development 8

Liberalization and Telecommunication Performance 9

Barriers to Trade and Profit Margins 10

Empirical Analysis 13

Firm Data 13

STRI 15

Methodology, Data, and Variables 17

Results: STRIs and EBITDA Margins 23

Conclusion 28

Bibliography 29

Appendix A ORBIS Research 33

Appendix B Global Ultimate Owners 41

Appendix C Tables 45

Appendix D Data Table for Figure 55

Figures

Figure 1: GDP per capita and broadband penetration 8

Tables

Table 1: Top 50 Telecommunication Companies in Orbis 14
Table 2: Average EBITDA margins and STRI scores 17
Table 3: Variables downloaded from ORBIS 18
Table 4: Calculated variables 19
Table 5: Descriptive statistics of logged variables 19
Table 6: Descriptive statistics of level variables 19
Table 7: Sources for macro-economic variables 22
Table 8: First stage regressions, dependent variable – log of EBITDA margin 23
Table 9: Second stage regressions, comparisons across dependent variables 24
Table 10: Tariff Equivalents 26

Table 11: One stage regressions, dependent variable – EBITDA margin.....27
Table C.1: Second stage regressions, dependent variable – conditional EBITDA margin 47
Table C.2: Second stage regressions, dependent variable – average of EBITDA margin logs.....49
Table C.3: Second stage regressions, dependent variable – average of EBITDA margin levels 51
Table C.4: One stage regressions, dependent variable – EBITDA margin 53
Table D.1: GDP per capita and broadband penetration.....57

Introduction

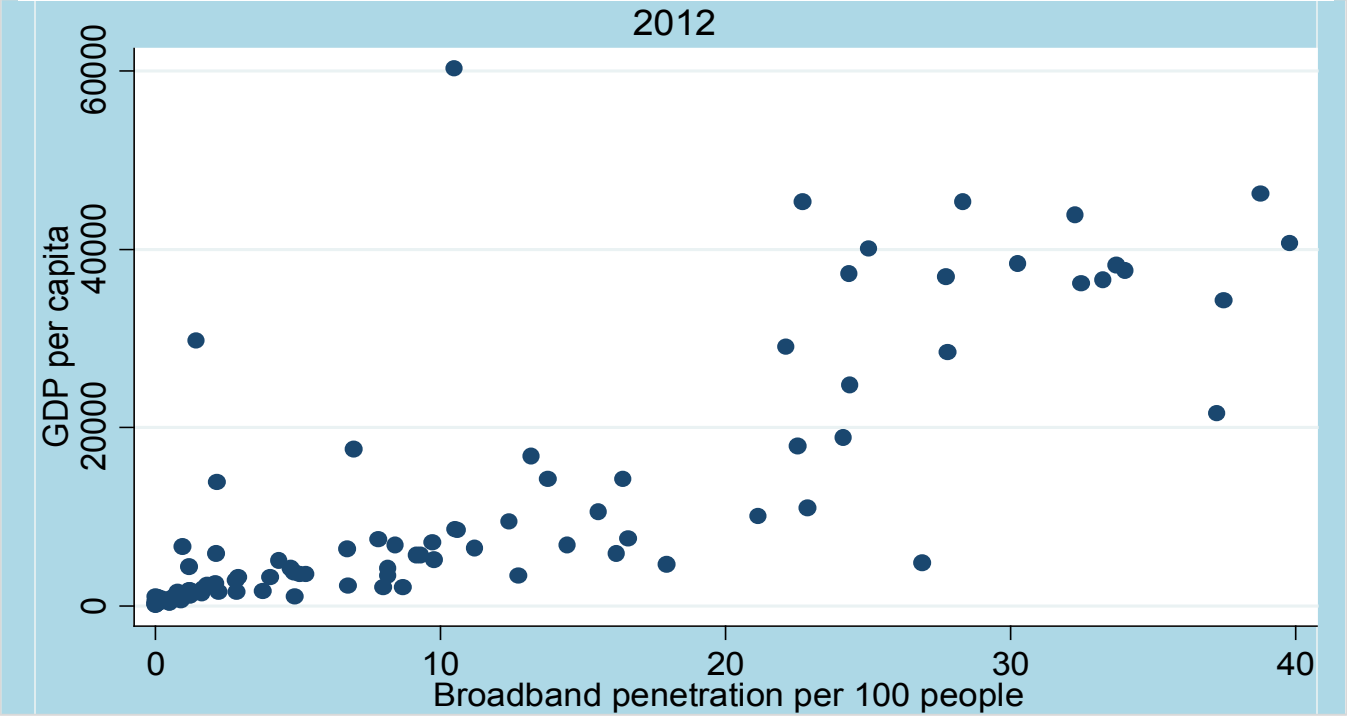
The focus of this paper is the impact of barriers to trade on performance (profits) of telecommunications companies. Building upon previous literature, both one-stage and two-stage models are used to estimate the impact of trade barriers on firm profitability, as measured by EBITDA margins (earnings before interest, taxes, depreciation, and amortization as a share of net sales). In the two-step framework, after firm-level models are estimated, conditional margins are regressed on macroeconomic variables such as economic development and population density, as well as telecommunications sector services trade restrictions (STRIs). A modified approach is also carried out with unconditional EBITDA margins, using the same macro variables. In the one-step framework, the firm and macro-economic variables are pooled into a single cross-sectional regression to examine the same relationship using a slightly different method, which also allows for interactions of firm-level variables and the STRIs. Results generally indicate a positive and significant impact of STRIs on telecommunication companies' margins and suggest that STRIs may have a differential impact on more capital intense firms. Estimated increases in profit margins associated with trade restrictions are an indication that incumbent firms are able to extract higher profits than they would be able to in the absence of those restrictions. Countries with larger estimated profit effects have higher potential gains from liberalizing their markets in the form of lower prices/costs available to consumers.

The remainder of the introduction reviews empirical research on 1) the importance of telecommunications services for economic development, 2) the relationship between liberalization and performance of the sector, and 3) previous research on the impact of trade restrictions on companies' profit margins. The following section discusses firm-level data and the World Bank STRIs used in the empirical analyses, outlines the empirical methodology, and presents results. The final section concludes.

Telecommunications Services and Economic Development

Countries with higher penetration of telecommunications services also tend to be more economically developed.[1] The positive relationship between telecommunication penetration and economic development is captured in figure 1 (fixed broadband internet subscribers per 100 people and GDP per capita for 100 countries in 2012).[2] The same relationship, focusing on mobile penetration, is shown in Djiofack-Zebaze and Keck (2009) for Sub-Saharan African countries.[3]

Figure 1: GDP per capita and broadband penetration



Source: World Development Indicators, April 2014. (See appendix table D.1)

Note: Data shown for 100 countries for which World Bank STRIs are available, except Argentina, Cote d' Ivoire, and Congo.

[1] Telecommunications services are inputs into the production and enable the delivery of other services and goods, which includes providing the infrastructure over which other services are traded. See WTO Website, https://www.wto.org/english/Tratop_e/serv_e/gats_factfiction3_e.htm (accessed February 14, 2015) and OECD, "STRI Sector Brief," May 2014.

[2] Data from the World Bank, World Development Indicators (accessed April 2014). Fixed broadband internet subscribers is defined as "the number of broadband subscribers with a digital subscriber line, cable modem, or other high-speed technology."

[3] Djiofack-Zebaze and Keck, "Telecommunications Services in Africa," 2009. Mattoo et al. (2006) show that telecommunication liberalization positively impacts economic growth for a cross section of countries.

Liberalization and Telecommunication Performance

Measured in various ways, liberalization of the sector has been established as a significant indicator of performance in the telecommunication sector, as captured by penetration or productivity. Warren (2000) and Warren (2000) develop an index of trade/investment barriers in telecom and generally find a positive relationship between increased liberalization and fixed and mobile penetration across a range of countries.[4] Boylaud and Nicoletti (2000) find a positive relationship between the degree of competition and productivity in telecommunications markets in OECD countries.[5] Fink et. al (2003) find that complementary reforms in competition, privatization, and regulation (or only privatization) have a positive impact on labor productivity in the telecommunications sector across a group of developing countries.[6] Inklaar et al. (2008) estimate the impact of regulatory barriers to entry in post and telecommunications across a set of OECD countries and find they have a negative and significant impact on multifactor productivity growth in the sector.[7] Djiofack-Zebaze and Keck (2009) find a positive relationship between the degree of competition on performance measures (penetration and price) in sub-Saharan Africa and for a wider cross section of countries.[8] More recently, the OECD has developed detailed indicators of services trade restrictions across a number of industries, including telecommunications, for OECD countries plus Brazil, China, India, Indonesia, Russia, and South Africa. Preliminary analysis using the data

[4] Warren, "The Identification of impediments to Trade and Investment in Telecommunications Services," 2000 and Warren, "The Impact on Output of impediments of Trade in Telecommunications Services," 2000.

[5] Boylaud, Nicoletti, "Regulation, Market Structure and Performance in Telecommunications," 2000. Productivity is measured as output per employee across the international, trunk, and mobile segments; their analysis on prices was extended in Doove et. al, "Price Effects of Regulation," 2001.

[6] Fink, Mattoo, and Rathindran, "An Assessment of Telecommunications Reform in Developing Countries," 2003. Their various econometric models indicate that while complementary reforms or only privatization have a positive impact on productivity, competition does not have a robust effect on productivity across different specifications. In the most basic econometric specification, the authors find that privatization and competition (separately and in the presence of an independent regulator) have a positive and significant effect on labor productivity, as measured by the number of mainlines per employee. However, in the specification that includes an interaction between privatization and competition, the interaction or only privatization have a positive and significant effect on productivity, suggesting that competition works in a complementary way with privatization to impact productivity. Relatedly, the strongest gains in productivity are found in cases when all three reforms (competition, privatization and independent regulation) are implemented. Also see Li and Xu (2004).

[7] Inklaar et al.,"Market Services Productivity," 2008.

[8] Djiofack-Zebaze and Keck, "Telecommunications Services in Africa," 2009. Results vary across segments of the sector.

shows that trade restrictions are negatively correlated with sector performance, as measured by telecommunications density (internet subscribers per 100 inhabitants).[9]

Barriers to Trade and Profit Margins

Previous literature that focuses on profit effects of trade barriers specific to telecommunications sector include Dihel and Shepherd (2007) and Fontagne and Mitaritonna (2009). To construct trade restrictiveness indices, Dihel and Shepherd (2007)[10] gather information from a variety of sources, including questionnaires, WTO Trade Policy Reviews, and the OECD Product Market Regulations Database and construct aggregate and modal restrictiveness indices separately for the fixed and mobile segments. The indices are then used in an analysis estimating their impact on performance (profit margins) within a two stage framework. The first step estimates firm level factors that influence profitability and in the second step, the conditional margins are regressed on macroeconomic variables, including the trade restrictiveness indices.

Overall, their results appear inconclusive as to the effect of trade barriers. The coefficient on the aggregate trade restrictiveness index varies across models and is only significant in one specification (in the fixed telecom estimations); while the sign of the coefficient is typically negative but only significant in one specification (in the mobile telecom estimations). Further, the authors include two interactions: 1) trade barriers with a dummy variable indicating whether a country has signed at least one RTA in each sector and 2) trade barriers with a dummy variable indicating whether a country has at least one MFN exemption in each sector. The former tends to have a positive and significant coefficient in the fixed specification and positive and at times significant in the mobile specification; while the interaction of MFN and trade barriers tends to vary in the fixed specification and is negative and not significant in the mobile specification.

[9] OECD, "STRI Sector Brief," 2014 and OECD, "The Impact of Services Trade Restrictiveness on Trade Flows," September 15, 2014; the latter also measures the impact of services trade restrictiveness index on cross border trade in the sector, and trade in manufactured goods for telecommunications separately and pooled with other sectors. Also see Experts Meeting on The Services Trade Restrictiveness Index (STRI), "Services Trade Restrictiveness," July 2-3, 2009 (description of OECD index and analysis of the index in gravity regressions - FDI and foreign affiliates sales in the telecom sector). Other related research on telecommunications barriers includes Barattieri, Borchert, Mattoo, "Cross-Border Mergers and Acquisitions in Services," 2014 (impact of investment policies on the probability of merger and acquisitions, pooled analysis and disaggregated at sectoral level, including telecom) and Riker, "Estimates of the Impact of Restrictions on Cross-Border Trade in Services," August 26, 2014 (impact of World Bank STRIs on cross-border trade in services using sector-level gravity model and simulation for removal of barriers).

[10] Dihel, N. and B. Shepherd, "Modal Estimates of Services Barriers," 2007. The countries included in the analysis: (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Moldova, Romania, Serbia and Montenegro and Russia), selected countries in Asia (China, India, Malaysia and Thailand), Latin America (Argentina, Brazil, Bolivia, Chile, Columbia, Ecuador, Peru and Venezuela), Africa (Egypt, Morocco, Tunisia and Zambia) and the Middle East (Jordan).

Fontagne and Mitaritonna (2009) also calculate trade restrictiveness indices based on information gathered from questionnaires for their focus group of eleven countries.[11] They then estimate the impact of the indices on firms' profit margins separately for fixed and mobile sectors in a one-stage regression, combining firm and macro-level variables. When estimated alone, trade restrictions do not have a significant effect on price-cost margins. However, they also include preferential trading arrangements as well as most favored nation (MFN) exemptions in their model. When the interaction terms (trade restrictiveness indices and the presence of an RTA or trade restrictiveness indices and the presence of an MFN exemption) are included, the coefficient on the trade index is negative and significant, suggesting that "discriminatory enforcement of regulations" matter and are "cost-enhancing" rather than "rent-creating." On the other hand, coefficients on the interaction terms (trade restrictiveness indices and RTA and trade restrictiveness indices and MFN) are positive, which the authors interpret as evidence of their anticompetitive/differential advantage effects.

Both papers also calculate "tax" or "tariff equivalents" of restrictions, calculated by comparing margins under current trade policies with potential values if trade barriers were to be removed, and thus indicate the percentage effect of trade barriers on prices/costs.

[11] Fontagne, and Mitaritonna. "Assessing Barriers to Trade in the Distribution and Telecom sectors in Emerging Countries," 2009. They calculate tariff equivalents for the telecom and distribution sectors. The questionnaires were provided by Queen Mary University; the countries include Argentina, Brazil, China, Egypt, India, Indonesia, Malaysia, Morocco, Singapore, Thailand, Philippines and Tunisia. They also use data from Dihel and Sheperd (2007) in their estimation, which covers a broader range of countries.

Empirical Analysis

This section begins with a discussion of the firm level data and an overview of the World Bank STRI database used in the analyses, followed by an outline of the methodology and presentation of results.

Firm Data[12]

The firm level data used in this analysis comes from the proprietary firm-level database, "ORBIS."[13] ORBIS reports official, sourceable company financial data which is standardized and comparable across countries and is comprehensive in that it is not restrictive in terms of world region, industry, size of company, or whether a company is listed on an exchange or privately held. However, the availability of such information varies according to reporting regulations across countries. For example, since U.S. regulations do not require privately held entities to report financial information, detailed information is more readily available for publically listed companies, banks, and insurance companies. By comparison, in Europe and Asia, company information is readily available and reliable for private entities since there are reporting requirements for unlisted companies.[14]

Unlike the previous literature which analyzed fixed and mobile sectors separately, the firm data used here pools firms across different telecommunications services areas. Most of the top 50 telecommunications companies[15] are classified as global ultimate owners (GUOs)[16] and appear to provide both fixed and wireless services, as well as other activities.[17] This may be due to the fact that companies in the telecommunications industry are increasingly "enhanced service providers" and "complex enterprises," engaged in cable, telephone, internet-broadband, and wireless activities.[18] Consequently, since data on separate business lines is not available,[19] firm-level telecommunications analyses must be an aggregate of the fixed and wireless segments.

Relatedly, in terms of NAICS classifications, a majority of the top 50 telecommunications firms are categorized in ORBIS with a primary NAICS code of 5179 (other telecommunications), as

[12] See appendix A for a thorough explanation of Orbis search.
[13] Bureau van Dyke, Orbis dataset.
[14] Based on telephone communication, Orbis representative, March 23, 2015.
[15] Total Telecom, "Global100," October 2011, 10.
[16] A "global ultimate owner" is an Orbis term indicating that a company is the head of the corporate group.
[17] It is fairly typical that a company appears to be involved in a wide range of telecommunications activities or it is difficult to isolate which segment of the industry the company is involved, which is true for parents and at least some subsidiaries.
[18] Industry representative, telephone interview by Commission staff, June 11, 2013.
[19] Data on separate business lines is currently not available through Orbis for the telecommunications industry.

opposed to NAICS codes 5171 or 5172 (wired and wireless telecommunication carriers, respectively). Because of the ORBIS coding, any ORBIS pull of companies in the telecommunications industry should include NAICS 5179. However, since NAICS 5179 is a broad category, the firm level data for the sector is extracted with a textual search.[20] Table 1 lists the top 50 telecommunication companies that appear in the download of the ORBIS data used in this analysis.

Table 1: Top 50 Telecommunication Companies in Orbis

Company name	Orbis industry code (primary)	Orbis GUO name/notes	Company name	Orbis industry code (primary)	Orbis GUO name/notes
América Móvil	5179	America Movil S.A.B. DE C.V.	Telecom italia	5179	Telecom Italia S.P.A.
BCE	5179	BCE Inc.	TeliaSonera	5179	Teliasonera AB
Belgacom	5179	Belgamcom SA	Telmex	5179	Taken over by America Movil
Bt	5179	BT Group Plc	Telstra	5179	Telstra Corporation Limited
China Telecom	5179	China Telecom Corporation Limited	Telus	5179	Telus Corporation
China Unicom	5179	China United Network Communications Limited (Formerly known as China Unicom)	Vodafone	5179	Vodafone Group Public Limited Company
Etisalat	5179	Etihad Etisalat Co (PLC)	AT&T	5171	AT&T INC.
France Telecom	5179	Orange (France Telecom SA until 01/07/2013)	Bharti Airtel	5171	Bharti Airtel Limited (may be owned by Singapore Telecommunications Ltd)
Kpn	5179	Koninklijke KPN NV	CenturyLink	5171	Centurylink, Inc.
KT	5179	KT Corporation	Comcast	5171	Comcast Corporation
LG Telecom	5179	Previously known as LG Telecom, now LG Uplus Corp.	NTT	5171	NIPPON TELEGRAPH AND TELEPHONE CORPORATION
MegaFon	5179	Open Joint Stock Company Megafon	Qwest Comms	5171	CenturyLink, Inc. acquired Qwest Corporation in 2011
Mtn	5179	MTN Group Limited	Turk Telekom	5171	Turk Telekomunikasyon A.S.
oTE	5179	Hellenic Telecommunications Organization S.A.	Deutsche Telekom	5172	Deutsche Telekom AG
PT Telkom	5179	PT Telekomunikasi Indonesia TBK	Kddi	5172	Kddi Corporation
Qatar Telecom	5179	Ooredoo Q.S.C. (Qatar Telecom (Q-TEL) QSC until 6/27/2013)	Sprint	5172	Sprint Communications, Inc.(GUO is Softbank Corp) (Sprint Nextel Corporation until 10/7/2013)

[20] Additionally, all three NAICS sectors are manually cleaned. See Appendix A.

Company name	Orbis industry code (primary)	Orbis GUO name/notes	Company name	Orbis industry code (primary)	Orbis GUO name/notes
Rogers	5179	Rogers Communications Inc	Telefónica	5172	Telefonica SA
Saudi Telecom	5179	Saudi Telecom Company (Saudi Joint Stock Company)	Verizon	5172	Verizon Communications Inc
SK Telecom	5179	SK Telecom Co.,Ltd.			

This table lists the Total Telecom Top 50 companies that appeared in Orbis search of companies (downloaded in April and May 2014). Some companies did not appear in Orbis download because of search restrictions and some companies did not appear to be included in Orbis. A few companies listed above (including America Movil, Bt, Mtn, and AT&T) are not included in regression analysis either because they were missing EBITDA data or because they were classified in Orbis as a holding company.

STRI

The trade policy measure used in this analysis comes from the World Bank's Services Trade Restrictions Database.[21] The World Bank provides data on NTMs affecting mode 3 (commercial presence)[22] separately for the fixed and wireless segments of the telecom industry or, as is used here, an average of the two.

The World Bank collects discriminatory measures toward foreign service providers, including 1) those affecting the entry of foreign service providers, including restrictions on FDI, legal form of entry, and licensing; 2) regulations affecting ongoing operations, such as nationality requirements for board of directors and restrictions on repatriation of earnings; and 3) restrictions unique to the sector, including equity restrictions on foreign ownership in state-owned entities, restrictions on international gateway, and restrictions on Voice over Internet Protocol.[23]

Scores range from 0 (open without restriction) to 1 (completely closed) for 103 countries. Among the countries that score above the average of 27, six are in the Middle-East (Bahrain, Oman, Iran, Kuwait, Qatar, Yemen), four are in South Asia (Bangladesh, India, Sri Lanka, Nepal), five are in Southeast Asia (China, Korea, Philippines, Thailand, Vietnam) and ten are in Sub-Saharan Africa (Botswana, Congo, Ethiopia, Mali, Malawi, Mozambique, Namibia, Rwanda, Zimbabwe, Zambia).[24] It appears that certain binding restrictions drive the overall score.[25] For

[21] The World Bank's Services Trade Restrictions Database http://iresearch.worldbank.org/servicestrade/default.htm.
[22] See USITC, Recent Trends, chapter 5, 2014 for discussion on prevalence of trade via commercial presence.
[23] Borchert et al., "Guide to the Services Trade Restrictions Database," 2012. See Borchert et al., "Policy Barriers to International Trade in Services," 2012, 27–30 for analysis of telecommunications STRI across countries.
[24] The remaining countries with an above average score include Belarus, Canada, Colombia, Costa Rica, Honduras, Mexico, New Zealand, Paraguay, Russia, Uruguay, and Uzbekistan. It is likely that some countries' policies have changed since the data refer mostly to 2008.
[25] Borchert et al., "Guide to the Services Trade Restrictions Database," 2012, page 17 and Annex Tables 3 and 4.

example, in most instances the mobile telecom score for countries involved in the Trans-Pacific Partnership is driven by equity restrictions.[26]

Preliminary analysis of the STRI indicates that more restrictive countries tend to have companies with higher profit margins, a lower number of total companies, and lower number of SMEs. Table 2 lists the average STRIs for three groups of countries, according to their average EBITDA margin. The first group, with negative average EBITDA margins, has the lowest STRIs; the second group, with positive average margins under .29, has higher STRIs on average, and finally, the third group with the highest average margins has the highest STRIs scores.

It is important to note that with greater availability of data per country, it is likely that some companies will be SMEs and some will have negative profits, as in the first group. However, there do not seem to be obvious biases in the data in that there are data across income groups and the availability of data for SMEs does not seem to be linked to development levels.[27]

Although it is not shown in the table, the analysis also reveals a negative relationship between STRIs and the average number of companies – as average STRI scores increase, the average number of companies' decreases. Where there is available information, the proportion of SMEs also tends to be lower for the group of countries with the highest STRIs. The following sections provide econometric results which show that the relationship between trade barriers and inflated EBITDA margins holds across various specifications.[28]

[26] Sensitivity analyses suggest that the STRIs are driven by equity caps. The STRI is replaced in regressions with a dummy variable which equals 1 if a country has any type of telecom foreign equity cap as indicated by the World Bank STRI database (this can be in the fixed or mobile segment, it can range from a low cap all the way to 100%, and it can apply to one firm, segments of the market, or the whole market). The substantive results on the relationship between the restrictions and average profit margins remain the same.

[27] More specifically, the analysis is restricted to those companies with EBITDA and sales data and to those observations which fit into the industry definition (See Appendix A). Out of data for 59 countries, 30 are high income and the remainders are middle or low income; the high income group has a greater average number of companies per country than the rest of the countries, which may reflect the actual distribution of companies. Further, there is a low correlation between the ratio of SMEs per country and high-income level category (.34) and the mean of the SME ratio for the high income group is .59 and for the rest of sample is .34. Income groups are defined by the World Bank.

[28] Econometric results, not discussed in this paper, also show that trade restrictions have a negative (limiting) impact on the number of firms and the ratio of SMEs operating in the market.

Table 2: Average EBITDA margins and STRI scores

Group 1 (negative average EBITDA margins)			Group 2 (positive average EBITDA margins, under .29)			Group 3 (positive average EBITDA margins, above .29)		
Country	Average EBITDA margin	STRI	Country	Average EBITDA margin	STRI	Country	Average EBITDA margin	STRI
Greece	-3.95	0	Italy	0.06	0	Chile	0.30	25
United States	-2.29	0	Romania	0.07	0	Malawi	0.30	50
Australia	-1.51	25	Korea	0.08	50	Argentina	0.31	0
Hungary	-1.00	0	Canada	0.09	50	Sri Lanka	0.33	50
Sweden	-0.91	0	United Kingdom	0.10	0	Mexico	0.33	37.5
Poland	-0.83	0	Pakistan	0.12	12.5	Qatar	0.33	100
Germany	-0.27	0	Iceland	0.13	0	Brazil	0.35	0
Bulgaria	-0.17	25	Finland	0.15	0	Kazakhstan	0.35	25
Belgium	-0.16	0	Kyrgyz Republic	0.15	0	Bahrain	0.35	50
France	-0.15	12.5	India	0.16	50	Peru	0.36	0
Averages	**-1.13**	**6.25**	Tunisia	0.16	25	Egypt	0.39	25
			Saudi Arabia	0.16	25	Kenya	0.40	25
			Portugal	0.17	0	Denmark	0.40	0
			China	0.18	50	Lithuania	0.40	0
			Colombia	0.18	50	Jordan	0.40	25
			Japan	0.18	25	Russia	0.41	50
			Czech Republic	0.21	0	Kuwait	0.41	75
			Viet Nam	0.21	50	Oman	0.45	62.5
			South Africa	0.25	25	Thailand	0.46	50
			Spain	0.25	0	Indonesia	0.47	25
			Turkey	0.26	0	Nepal	0.50	50
			Austria	0.26	0	Philippines	0.53	50
			Netherlands	0.28	0	Senegal	0.54	25
			Malaysia	0.28	25	Bangladesh	0.72	62.5
			New Zealand	0.29	37.5	***Averages***	**0.41**	**35.94**
			Averages	**0.18**	**19.00**			

Note: For each country, the average EBITDA margin is the average of the individual companies; the group average is the average of the country averages.

Methodology, Data, and Variables

Within the two-stage framework, the first step estimation uses firm-level financial data from 2012 for the telecommunications sector from ORBIS. The log-log specification assumes the following form:

$$(1)\quad ln(EBITDA\,Margin)_{j2012} = \beta_1 + \beta_2 ln(sales)_{j2012} + \beta_3 ln(capital\,intensity)_{j2012} + \beta_4 ln(labor\,productivity)_{j2012} + + \beta_5 ln(market\,share)_{j2012} + \beta_6 ln(sales\,growth)_{j2012} + \Sigma_{i(j)} country\,dummies + \varepsilon_{j2012}$$

The dependent variable for the first step equation is the log of the EBITDA margin in company *j* in 2012, which is calculated as operating profit plus depreciation (EBITDA) divided by net sales. Independent variables included in the regressions are logs of net sales, capital intensity, labor

productivity, market share, and sales growth. These variables are mostly consistent with Fontagne and Mitaritonna (2009) and Dihel and Shepherd (2007) and all are expected to positively impact profitability. Tables 3 and 4 list and define all variables downloaded from Orbis and all calculated variables used in the estimation, respectively. Tables 5 and 6 show descriptive statistics for the variables used in the estimations.[29]

Table 3: Variables downloaded from ORBIS

ORBIS variable name	Section of ORBIS database	ORBIS definition, if available
Capital	(Industrial companies/balance sheets/liabilities & equity)	
EBITDA	(Industrial companies/profit & loss account/memo lines)	Operating profit+ Depreciation
Employees	(Financial data/key financials & employees)	Total number of employees included in the company's payroll
Intangible fixed assets	(Industrial companies/balance sheets/assets)	All intangible assets such as formation expenses, research expenses, goodwill, development expenses and all other expenses with a long terms effect
Operating P/L [=EBIT]	(Industrial companies/profit and loss account)	All operating revenues – all operating expenses
Operating revenue	(Financial data/key financials & employees)	Total operating revenues (net sales + other operating revenues + stock variations)
Research and development expenses	(Industrial companies/profit & loss account/memo lines)	Total amount of expenses on research and development activities
Sales	(Industrial companies/profit & loss account)	Net sales
Solvency ratio (Asset based) (%)	(Financial data/key financials and employees)	
Stock	(Industrial companies/balance sheets/assets)	Total inventories (raw materials + in progress+ finished goods)
Tangible fixed assets	(Industrial companies/balance sheets/assets)	All tangible assets such as building, machinery, etc.
Total assets	(Financial data/key financials and employees)	Fixed assets + current assets
Working capital	(Industrial companies/balance sheets/memo lines)	
Working capital per employee	(Industrial companies/per employee ratios)	

[29] Table 5 lists descriptive statistics of the logged variables, while table 6 lists descriptive statistics for levels of the same variables. Table 5 has 163 less observations of EBITDA margins since there are 163 negative observations which get dropped from the sample.

Table 4: Calculated variables

Variable name	Definition	Source
EBITDA margin	EBITDA/Sales	Orbis
Log of EBITDA margin	Log of EBITDA margin	Orbis
Sales	Net Sales	Orbis
Log of sales	Log of sales	Orbis
Labor productivity	Sales/employees	Orbis
Log of labor productivity	Log of labor productivity	Orbis
Capital intensity1	Total fixed assets/sales	Orbis
Log of capital inensity1	Log of capital intensity1	Orbis
Capital intensity3	Total assets/sales	Orbis
Log of capital inensity3	Log of capital intensity3	Orbis
Sales growth (1 year lag)	$Sales_{YearX}$-$Sales_{YearX-1}$/$Sales_{YearX-1}$	Orbis
Log of sales growth (1 year lag)	Log of sales growth (1 year lag)	Orbis
Sales growth (2 year lag)	$Sales_{YearX}$-$Sales_{YearX-2}$/$Sales_{YearX-2}$	Orbis
Log of sales growth (2 year lag)	Log of sales growth (2 year lag)	Orbis
Market share	Sales/Revenue (All Telecommunications)	Orbis and International Telecommunications Union
Log of market share	Log of market share	Orbis and International Telecommunications Union

Table 5: Descriptive statistics of logged variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Log of EBITDA margin	969	-2.11	1.30	-7.93	2.58
Log of sales	969	17.78	2.50	9.71	25.48
Log of capital intensity	969	0.06	1.09	-4.81	5.20
Log of labor productivity	725	12.99	1.33	5.33	17.79
Log of market share	962	-6.03	2.67	-14.52	4.41
Log of sales growth	627	-2.09	1.38	-6.32	3.65

Note: table refers to observations where the log of EBITDA margin is not missing values.

Table 6: Descriptive statistics of level variables

Variable	Observations	Mean	Std. Dev.	Min	Max
EBITDA margin	1132	-0.30	5.37	-121.17	13.24
Sales	1132	1,470,000,000	7,800,000,000	154	116,000,000,000
Capital intensity	1132	72	1,566	0	50,030
Labor productivity	833	1,129,537	2,988,855	206	53,400,000
Market share	1125	0.13	2.46	0.00	82.27
Sales growth	1094	0.31	2.49	-1.00	47.23

Note: table refers to observations where EBITDA margin is not missing values.

In the first of three second-step estimations, the dependent variable is the conditional EBITDA margin for each country i, calculated by adding the coefficient of each country dummy to the constant from the above first-step regression. The conditional margins of 59 countries are regressed[30] on one or more of the following variables: the STRI, GDP, GDP per capita, recent growth of industry revenue, percent of the population that is urban, telecommunication

[30] Though the exact number of countries varies between models due to data availability.

penetration, telecommunication subscriptions, a dummy variable indicating EU membership, and the Rule of Law Index. The second-step specification is as follows:[31]

$$(2)\ \boldsymbol{Conditional\ EBITDA\ Margin_{i2012}} = \\ = \boldsymbol{\beta_1} + \boldsymbol{\beta_2 STRI_{i\,2008}} + \boldsymbol{\beta_3 GDP_{i\,2012}} + \boldsymbol{\beta_4 GDP\ per\ capita_{i2012}} \\ + \boldsymbol{\beta_5 recent\ growth\ of\ industry\ revenue_{i\,2012}} \\ + \boldsymbol{\beta_6 percent\ of\ population\ that\ is\ urban_{i\,2012}} \\ + \boldsymbol{\beta_7 telecommunication\ penetration_{i\,2012}} + \boldsymbol{\beta_8 telecommunication\ subscritpions_{i2012}} \\ + \boldsymbol{\beta_9 EU\ dummy_i} + \boldsymbol{\beta_{10} rule\ of\ law_{i\,2012}} + \boldsymbol{\varepsilon_{i\,2012}}$$

As indicated above, estimations are also carried out using averages of the log and levels of unconditional EBITDA margins (simply averages of company margins across countries). Using the averages of the log of the EBITDA margins circumvents the potential endogeneity problems when carrying out the first stage regression while allowing for a direct comparison with the initial framework. Using the averages of the levels of EBITDA margins has a further advantage in that it allows for companies with negative EBITDA margins to be incorporated (they are excluded from the firm-level regression model since it is carried out in logs). The equations look identical to (2), except the dependent variable is the unconditional average EBITDA margins (of levels or logs).

Further, a one-stage estimation is also carried out, where the EBITDA margins across companies j in each country i are regressed on the same macroeconomic variables and the trade policy variable as in the two-stage framework. Interactions between the trade policy variable and firm variables (employee size and capital intensity) are also included. The specification looks as follows:

$$(3)\ \boldsymbol{EBITDA\ Margin_{i\,j2012}} = \\ = \boldsymbol{\beta_1} + \boldsymbol{\beta_2 STRI_{i\,2008}} + \boldsymbol{\beta_3 GDP_{i\,2012}} + \boldsymbol{\beta_4 GDP\ per\ capita_{i\,2012}} \\ + \boldsymbol{\beta_5 recent\ growth\ of\ industry\ revenue_{i\,2012}} + \boldsymbol{\beta_6 percent\ of\ population\ that\ is\ urban_{i\,2012}} \\ + \boldsymbol{\beta_7 telecommunication\ penetration_{i\,2012}} + \boldsymbol{\beta_8 telecommunication\ subscritpions_{i\,2012}} \\ + \boldsymbol{\beta_9 EU\ dummy_i} + \boldsymbol{\beta_{10} Rule\ of\ law_{i\,2012}} + \boldsymbol{\varepsilon_{i\,2012}}$$

While the expected relationship between GDP per capita and EBITDA margins is negative since higher development levels is typically associated with greater competition and lower prices, the impact of GDP is indeterminate since the variable is included a control for the size of the economy. The expected relationship between percent of people living in urban areas and EBITDA margins are positive since fixed costs can be partly mitigated by serving large/dense

[31] The second stage variables depart from previous empirical work described above. For example, both and Dihel and Shepherd (2007) and Fontagne and Mitaritonna (2009) included RTAs and MFN exemptions, not included here. Dihel and Shepherd (2007) also included percent of digital mainlines and a proxy for sectoral regulation.

populations. Variables that capture telecommunication penetration (mobile subscriptions per 100, fixed telephone lines per 100, and internet broadband subscriptions per 100) are expected to negatively impact margins, since greater availability of telecommunications services likely indicates greater competition. Like penetration, the number of subscriptions (to mobile, fixed telephone lines, and internet broadband) is expected to negatively impact margins. A dummy variable capturing whether a country is part of the EU and a rule of law index (with positive numbers reflecting higher confidence in the rule of law) are also included in the regressions.[32] Both are expected to have a negative impact on profit margins - the former because of certain EU-specific regulations likely hamper profits and the latter because countries that enforce the rule of law are less likely to foster business environments with high rents. Recent growth of industry revenue is expected to have a positive impact on EBITDA margins since industry-level and firm-level performance likely coincide. Finally, the main policy variable of interest, the World Bank STRI index, is expected to have a positive impact on margins. Discriminatory policies tend to decrease competition and thereby raise prices that incumbents are able to set; lowering barriers to entry to foreign service providers would introduce more competition and thereby reduce prices and increase welfare to consumers, and lower profit margins of companies. Therefore, higher barriers are associated with higher profit margins. See table 7 for a list of second stage estimation variables.[33]

[32] These variables, along with broadband penetration, GDP per capita, and percent of population that is urban, were included as suggestions from industry representatives (Industry representatives, telephone interview by Commission staff, June 11, 2013). Additional variables suggested include the gini coefficient (not widely available enough to be incorporated), and percent of phone subscriptions that are smartphones (not included here).
[33] Descriptive statistics for macro variables are not reported and are used in tables 9, 11 and appendix tables.

Table 7: Sources for macro-economic variables

Variable	Year	Source	Units
GDP	2012	World Bank, World Development Indicators	constant 2005 US$ (divided by 1,000,000)
GDP per capita	2012	World Bank, World Development Indicators	constant 2005 US$ (divided by 1,000)
Urban population % of total	2012	World Bank, World Development Indicators	percent
Mobile subscriptions	2012	World Bank, World Development Indicators	per 100 people
Fixed telephone lines	2012	World Bank, World Development Indicators	per 100 people
Internet broadband subscriptions	2012	World Bank, World Development Indicators	per 100 people
Mobile subscriptions	2012	World Bank, World Development Indicators	number
Fixed telephone lines	2012	World Bank, World Development Indicators	number
Internet broadband subscriptions	2012	World Bank, World Development Indicators	number
Industry Revenue Growth	2011-2012	International Telecommunications Union	percent
EU Dummy	n/a		0 or 1
Rule of law index	2012	Worldwide Governance Indicators (World Bank)	-2.5 (weak) to 2.5 (strong)
Services Trade Restrictiveness Index, telecom	2008 for most countries	World Bank Services Trade Restrictiveness Index; overall score for telecommunications including fixed and mobile sectors	0 (open) to 100 (closed)

World Bank data accessed April, 2014 and ITU data accessed March, 2015. GDP is divided by 1,000,000 and GDP per capita is divided by 1,000 in the estimations.

Results: STRIs and EBITDA Margins

The first step estimation results are listed in table 8. The results indicate that sales, except for one instance in model 3, and capital intensity have the expected positive and significant impact on EBITDA margins.[34]

Table 8: First stage regressions, dependent variable – log of EBITDA margin

Independent Variables	m1 b/t	m2 b/t	m3 b/t	m4 b/t	m5 b/t
Log Sales	0.095***	0.080***	0.015	0.071***	0.145*
	(7.16)	(4.95)	(0.70)	(4.22)	(2.38)
Log Capital Intensity (Total Assets)	0.670***	0.694***	0.672***	0.692***	0.725***
	(16.65)	(15.41)	(16.72)	(14.67)	(12.90)
Log Labor Productivity		-0.096*			-0.114*
		(-2.49)			(-2.33)
Log Market Share			0.078***		-0.073
			(4.47)		(-1.11)
Log Sales Growth (1 year lag)				-0.067*	-0.051
				(-2.14)	(-1.48)
Constant	-3.726***	-2.339***	-1.981***	-3.379***	-3.613*
	(-13.39)	(-4.85)	(-6.08)	(-10.39)	(-2.46)
R-Square	0.478	0.509	0.479	0.503	0.526
Number of Observations	969	725	962	627	459

Note: * p<0.05, ** p<0.01, *** p<0.001

Since the expectation is that higher labor productivity and sales growth increase profit margins, the coefficients on both the log of labor productivity and sales growth are counterintuitive.[35] Market share appears to have a positive and significant impact on margins when estimated in model 3 - however the effect of sales is no longer significant, likely due to multicollinearity between sales and market share.

Second stage regressions using conditional margins are based on model 1 specifications, since it has the highest number of observations. Second stage estimation results are shown in detail in Appendix tables C.1 through C.3 and in summary form in table 9.

[34] Most observations of the levels of the variables, including sales, are below the mean values of the regression sample. Model 1 substantive results remain consistent, however, when running the analysis on firms with sales below the mean value of 1,470,000,000. Results also stay consistent when removing GUOs from the sample, see Appendix B.

[35] Previous literature did not uncover a significant relationship between labor productivity and price-cost margins (though the coefficient was positive) while sales growth did not have a consistently positive and significant impact (Dihel and Shepherd (2007) and Fontagne and Mitaritonna (2009)). When model 3 from table 8 is run separately for large and small firms (with 500 or more employees as the definition for large and under 500 the criteria for small), the coefficient on labor productivity is positive and significant just under conventional levels for large firms while negative and significant for small firms (the effect of sales and capital intensity are substantively similar).

Table 9: Second stage regressions, comparisons across dependent variables

	Adjusted EBITDA margin		Average of EBITDA margin logs		Average of EBITDA margin levels	
	m1	m2	m3	m4	m5	m6
Independent Variables	b/t	b/t	b/t	b/t	b/t	b/t
STRI telecom - World Bank	0.001	0	0.009**	0.006*	0.008*	0.007*
	(0.26)	(-0.08)	(3.46)	(2.07)	(2.24)	(2.19)
GDP	0		0		-0.000**	
	(-1.04)		(-0.26)		(-2.87)	
GDP per capita	-0.004		-0.009		-0.007	
	(-0.87)		(-1.74)		(-1.30)	
Urban population % of total	-0.002	-0.002	0.001	0.003	0.001	0.001
	(-0.52)	(-0.52)	(0.35)	(1.07)	(0.44)	(0.40)
WB internet broadband subscriptions		-0.000***		0		0
		(-3.95)		(-1.44)		(-0.81)
WB internet broadband subscriptions per 100		-0.006		-0.021**		-0.015
		(-1.38)		(-2.97)		(-1.91)
Constant	-3.432***	-3.381***	-1.695***	-1.570***	-0.021	0.07
	(-14.58)	(-14.52)	(-7.04)	(-7.09)	(-0.08)	(0.27)
R-Square	0.083	0.101	0.24	0.297	0.245	0.18
Number of Observations	57	58	58	59	58	59

Note: * p<0.05, ** p<0.01, *** p<0.001

In two out of three two-stage specifications, the results show that the STRI has a positive and significant impact on profit margins, indicating that barriers to entry inflate the profits of incumbent companies. The remaining explanatory variables, however, mostly do not have significant impact on company margins, although in some specifications (models 3, 4, and 5) the model explains a quarter or more of the variation in average margins.

- The coefficient on the STRI is positive (as expected) but not significant when the dependent variable is the conditional margin (table C.1); however, the coefficient is positive and typically significant when the dependent variable is the unconditional average of logs or levels (tables C.3 and C.4, respectively).
- Development and size of economy tend to have a negative, but not statistically significant impact, on company margins. The sign on the coefficient on GDP per capita is negative (as expected), but is typically not significant across models. Interestingly, when the coefficient of GDP per capita is significant, it is usually in models 2 where it is included alone; this may be because GDP per capita is highly correlated with other variables, including fixed broadband penetration. The coefficient on GDP is significant in the specifications where the dependent variable is the unconditional averages of the level of EBITDA margins (table C.3).
- Recent growth of industry revenue has a generally positive (but not statistically significant) impact on company margins when estimations are run on the unconditional averages as the dependent variable (tables C.2 and C.3).

- Similarly, the impact of urban population has a positive impact in the specifications with the unconditional averages of the levels of the margins (except model 15).
- Across the models, the signs on the penetration variables vary and are typically not significant.[36]
- Finally, the coefficient on the EU dummy is typically negative but not significant across specifications while the rule of law index is typically positive, contrary to expectations, but not significant.

Table 9 provides a summary of these results across the three dependent variables using paired down specifications: STRI and urban population, along with size and development of economy (models 1, 3, 5) and size and development of the industry (models 2, 4, 6).[37] From these simplified model results, "tariff equivalents," or the percentage change between the observed EBITDA margins and the hypothetical margins that would exist with the removal of trade restrictions, are calculated (table 10). The tariff equivalents show, for example in the case of Australia, that average profits are 16 percent higher than they would be absent the STRI restrictions or, as in the case of Qatar, that average profits are 82 percent higher than they would be absent STRI restrictions.[38] Another way of interpreting these results shows, as in the case of Australia, a 25 point reduction in the STRI score would be associated with a reduction of average profits by 15 percent or, as in the case of Qatar, a 100 point reduction would be associated with a reduction of average profits by 60 percent.[39]

[36] The sign of the coefficient on penetration variables in Dihel and Shepherd (2007) varied and were not significant while the sign of the coefficient on subscriptions were negative and significant in some specifications.
[37] Broadband penetration is a particularly good indicator of the level of infrastructure development.
[38] Calculated using the equation (100*(eSTRI coefficient*STRI score -1); the STRI coefficient is taken from Table 9, model 4.
[39] Calculated by multiplying the same coefficient as above with the reduction in the STRI value. Both examples refer to the model where the dependent variable is the average of logged profits. When the dependent variable is the average of profit levels, the results show that in the case of Australia a 25 point reduction in the STRI value would be associated with a decrease in the average EBITDA margin by .175 and in the case of Qatar a 100 point reduction in the STRI value would be associated with a decrease in the average EBITDA margin by .7 (calculated by multiplying the coefficient from table 9, model 6 with the respective change in the STRI value).

Table 10: Tariff Equivalents

Country	STRI	Tariff Equivalent	Country	STRI	Tariff Equivalent
Argentina	0	0	Kyrgyz Republic	0	0
Australia	25	16	Lithuania	0	0
Austria	0	0	Malawi	50	35
Bahrain	50	35	Malaysia	25	16
Bangladesh	62.5	45	Mexico	37.5	25
Belgium	0	0	Nepal	50	35
Brazil	0	0	Netherlands	0	0
Bulgaria	25	16	New Zealand	37.5	25
Canada	50	35	Oman	62.5	45
Chile	25	16	Pakistan	12.5	8
China	50	35	Peru	0	0
Colombia	50	35	Philippines	50	35
Czech Republic	0	0	Poland	0	0
Denmark	0	0	Portugal	0	0
Egypt	25	16	Qatar	100	82
Finland	0	0	Romania	0	0
France	12.5	8	Russia	50	35
Germany	0	0	Saudi Arabia	25	16
Greece	0	0	Senegal	25	16
Hungary	0	0	South Africa	25	16
India	50	35	Spain	0	0
Indonesia	25	16	Sri Lanka	50	35
Ireland	0	0	Sweden	0	0
Italy	0	0	Thailand	50	35
Japan	25	16	Tunisia	25	16
Jordan	25	16	Turkey	0	0
Kazakhstan	25	16	United Kingdom	0	0
Kenya	25	16	United States	0	0
Korea	50	35	Viet Nam	50	35
Kuwait	75	57			

Note: Profit margins calculated using the STRI coefficient taken from Table 9, model 4.

The one-stage estimation echoes the results of the unconditional average models in that the STRI appears to have a positive and significant impact on EBITDA margins and GDP tends to have a negative and significant impact (table 11, models 1-3 as a summary and in full in table C.4). Additionally, fixed subscriptions tend to have a positive and significant impact while broadband subscriptions typically have a negative and significant impact.

Table 11: One stage regressions, dependent variable – EBITDA margin

	Models without interaction terms			Models with interaction terms	
Independent Variables	**m1 b/t**	**m2 b/t**	**m3 b/t**	**m4 b/t**	**m5 b/t**
STRI telecom - World Bank	0.012*	0.008	0.013*	0.006	0
	(2.12)	(1.70)	(2.42)	(1.53)	(0.28)
GDP		-0.000***			
		(-4.17)			
GDP per capita		-0.003			
		(-0.27)			
Urban population % of total		0.002	-0.003		
		(0.25)	(-0.25)		
WB internet broadband subscriptions			0		
			(-1.39)		
WB internet broadband subscriptions per 100			-0.001		
			(-0.04)		
STRI*Large firms (500 or more employees)				-0.004	
				(-1.20)	
Large firms (500 or more employees)				0.397**	
				(2.92)	
STRI*Capital Intensity (Capital intensity greater than 1)					0.023*
					(2.56)
Capital Intensity (Capital intensity greater than 1)					-1.035*
					(-2.63)
Constant	-0.442	-0.223	0.005	-0.151	0.063**
	(-1.96)	(-0.37)	(0.01)	(-1.09)	(2.80)
R-Square	0.002	0.008	0.005	0.005	0.008
Number of Observations	1132	1130	1132	841	1132

Note: * p<0.05, ** p<0.01, *** p<0.001

The one-stage estimation allows for the interaction of firm-level variables with the STRI (table 11, model models 4 and 5). Dummy variables and interaction terms for large firms (defined as 500 or greater employees) and capital intense firms (defined as capital intensity greater than 1) are incorporated into the one-stage model:

- The results suggest that the characteristic of being a large firm has a positive, significant impact on profit margins.[40] Interestingly, when a model is estimated including an interaction between the STRI and a dummy variable for whether a firm is large, the results show that the conditional impact of the STRI is greater for small firms (model 4).[41] These results, however, are not significant.

- On the other hand, capital intensity appears to be associated with lower profits.[42] Further, the conditional impact of the STRI for capital intense firms is greater for than that of less capital intense firms.[43] This significant relationship suggests that restrictions help boost profits of capital intense firms.

Conclusion

This paper shows that policies which restrict entry of foreign services providers, through limiting competition, are associated with higher profit margins of companies operating across markets. These results suggest that in the absence of restrictions, greater competition would lower profits and enhance welfare of telecommunications users.

This paper also provides preliminary evidence on the conditional impact of restrictions, depending on capital intensity. Restrictions appear to have a significant and positive impact on the profits of more capital intense firms. In light of these findings, where data is available, a fruitful area of future research lies in exploring the relationship between firm characteristics and the impact of trade policies as well as those characteristics that are drivers of performance and productivity.

[40] Both in a liberalized environment, which is the interpretation of the coefficient on large firms in model 4, and when profit margins are regressed on large firms separately (not shown).
[41] The effect for small firms (the coefficient on the STRI (.006)) is greater than that of large firms (the sum of the STRI coefficient and the coefficient on the interaction term (.002)). Results for interactions with STRI and firm size are substantively similar when the Small Business Administration definition of large firms in the telecommunications industry (1500 employees) is substituted for the definition used in this analysis (500 employees).
[42] Both in a liberalized environment, which is the interpretation of the coefficient on capital intensity in model 5, and when profit margins are regressed on capital intensity separately (not shown).
[43] The effect for less capital intense firms is simply the coefficient on the STRI (.0002) while the effect for more capital intense firms is the sum of the STRI coefficient and the coefficient on the interaction term (.0232).

Bibliography

Barattieri, Alessandro, Ingo Borchert, and Aaditya Mattoo. "Cross-Border Mergers and Acquisitions in Services: The Role of Policy and Industrial Structure." World Bank Policy Research Working Paper 6905, June 2014. http://go.worldbank.org/WLZP73VLA0.

Borchert, Ingo, Batshur Gootiiz, and Aaditya Mattoo. "Guide to the Services Trade Restrictions Database." World Bank Policy Research Working Paper 6108, June 2012. http://iresearch.worldbank.org/servicetrade/Researchs.htm.

Borchert, I., Gootiiz, B. and Mattoo, A., "Policy Barriers to International Trade in Services." World Bank Policy Research Working Paper 6109, June 2012. http://iresearch.worldbank.org/servicetrade/Researchs.htm.

Boylaud, O. and G. Nicoletti. "Regulation, Market Structure and Performance in Telecommunications." OECD Economics Department Working Papers, No. 237, OECD Publishing, 2000. http://www.oecd-ilibrary.org/economics/regulation-market-structure-and-performance-in-telecommunications_601531871521?crawler=true.

Brown, Richard. "The Estimation of Banking Tariff Equivalents." 2014.

Bureau van Dijk. ORBIS Database. https:/orbis.bvdep.com (accessed various dates).

Cowhey Peter F. and Jonathan D. Aronson. "Trade in Services Telecommunications." In *A Handbook of International Trade in Services*, edited by Aaditya Mattoo, Robert M. Stern,and Gianni Zanini, Oxford University Press, 2008.

Dihel, N. and B. Shepherd. "Modal Estimates of Services Barriers." OECD Trade Policy Papers, No. 51, OECD Publishing, 2007. http://www.oecd-ilibrary.org/trade/modal-estimates-of-services-barriers_148425814101?crawler=true.

Djiofack-Zebaze, Calvin and Alexander Keck. "Telecommunications Services in Africa: The Impact of WTO Commitments and Unilateral Reform on Sector Performance and Economic Growth." *World Development*, Vol. 37, No. 5, 919-940, 2009.

Djiofack-Zebaze, Calvin and Alexander Keck. "Telecommunications Services in Africa: The Impact of Multilateral Commitments and Unilateral Reform on Sector Performance and Economic Growth." World Trade Organization Staff Working Paper ERSD-2006-10, November 2006. https://www.wto.org/english/res_e/reser_e/ersd200610_e.pdf.

Doove, Samanta, Owen Gabbitas, Duc Nguyen-Hong, and Joe Owen. "Price Effects of Regulation: Telecommunications, Air Passenger Transport and Electricity Supply." Productivity Commission Staff Research Paper, AusInfo, Canberra, 2001. http://www.pc.gov.au/research/completed/regulation-on-air-transport-telecommunications-electricity/peor.pdf

Fontagné, L., and C. Mitaritonna. "Assessing Barriers to Trade in the Distribution and Telecom Sectors in Emerging Countries." *World Trade Review*, Vol. 12, No. 1, pp. 57–78, 2013.

Fontagné, L., and C. Mitaritonna. "Assessing Barriers to Trade in the Distribution and Telecom Sectors in Emerging Countries." CEPII, WP No 2009-37, December 10, 2009. http://www.cepii.fr/PDF_PUB/wp/2009/wp2009-37.pdf.

Fink, Carsten, Aaditya Mattoo, and Randeep Rathindran. "An Assessment of Telecommunications Reform in Developing Countries." *Information Economics and Policy* 15, 443–466, 2003.

Inklaar, Robert, Marcel Timmer, and Bart van Ark. "Market Services Productivity Across Europe and the US." *Economic Policy*, 139–194, 2008.

Li,Wei and Lixin Colin Xu. "The Impact of Privatization and Competition in the Telecommunications Sector Around the World." *Journal of Law and Economics*, 2004.

Mattoo, Aaditya, Randeep Rathindran, and Arvind Subramanian. "Measuring Services Trade Liberalization and Its Impact on Economic Growth: An Illustration." *Journal of Economic Integration*, 64–98, 2006.

Nordas, Hildegunn K., Massimo Geloso Grosso, Frederic Gonzales, Iza Lejarraga, Molly Lesher, Sebastien Miroudot, Asako Ueno, and Dorothee Rouzet. "Services Trade Restrictiveness Index (STRI): Telecommunication Services." OECD Trade Policy Papers, No. 172, OECD Publishing, 2014. http://dx.doi.org/10.1787/5jxt4nk5j7xp-en.

OECD. "Indicators for the Assessment of Telecommunications Competition." Working Party on Telecommunication and Information Services Policies, DSTI/ICCP/TISP(2001)6/FINAL, 2003.

———. "STRI Sector Brief: Telecommunications." May 2014. http://www.oecd.org/tad/services-trade/STRI_telecommunications.pdf.

———. "The Impact of Services Trade Restrictiveness on Trade Flows: First Estimates." TAD/TC/WP(2014)20, September 15, 2014.

———. Experts Meeting on The Services Trade Restrictiveness Index (STRI). "Services Trade Restrictiveness: Telecommunication Services," July 2–3, 2009.

Riker, "Estimates of the Impact of Restrictions on Cross-Border Trade in Services." U.S. International Trade Commission, Office of Economics, Research Division, August 26, 2014. http://www.usitc.gov/publications/332/rn201408a.pdf.

Total Telecom. "Global100." October 2011.

U.S. International Trade Commission (USITC). *Recent Trends in U.S. Services Trade: 2014 Annual Report*, USITC Publication 4463. Washington, DC USITC, 2014. http://www.usitc.gov/publications/332/pub4463.pdf.

Warren, T. "The Impact on Output of impediments of Trade in Telecommunications Services." In *Impediments in Trade in Services: Measurement and Policy Implications*, edited by C. Findlay and T. Warren (eds.), London: Routledge, 2000.

———. "The Identification of impediments to Trade and Investment in Telecommunication Services." In *Impediments in Trade in Services: Measurement and Policy Implications*, edited by C. Findlay and T. Warren (eds.), London: Routledge, 2000.

World Bank. Services Trade Restrictions Database. http://iresearch.worldbank.org/servicetrade/home.htm (accessed various dates).

———. World Development Indicators. http://data.worldbank.org/data-catalog/world-development-indicators (accessed April 2014).

Appendix A
ORBIS Research

Overview [2]

A majority of the top 50 telecommunications firms[44] are categorized in ORBIS with a primary NAICS code of 5179 (other telecommunications), as opposed to NAICS codes 5171 or 5172 (wired and wireless telecommunication carriers, respectively) (see table 1).[45] Because of the ORBIS coding, any ORBIS pull of companies in the telecommunications industry should include NAICS 5179. According to the industry definition, companies in NAICS code 5179 are not telecommunications carriers, but are engaged in a variety of activities including reselling wired and wireless telecommunications services and providing specialized telecommunications services.[46]

Most of the top 50 companies are global ultimate owners (GUOs)[47] and appear to provide both fixed and wireless services, as well as other activities. For example, France Telecom's company description indicates that it "provides consumers, businesses, and other telecommunications operators with a wide range of services including fixed telephony and mobile telecommunications, data transmission, Internet and multimedia, and other value-added services." Companies in the telecommunications industry are increasingly "enhanced service providers" and "complex enterprises," engaged in cable, telephone, internet-broadband, and wireless activities.[48] Consequently, unless data on separate business lines is available,[49] firm-level telecommunications analyses must be an aggregate of the fixed and wireless segments.

Additionally, many of these GUOs have subsidiaries that are active in different regions or countries. For example:

> America Movil S.A.B. DE C.V. (America Movil) is a provider of wireless communications services in Latin America. As of December 31, 2008, it had 182.7 million subscribers in 17 countries. Through Radiomovil Dipsa, S.A. de C.V., which operates under the name Telcel, the Company, provides mobile telecommunications service in all nine regions in Mexico. As of December 31, 2008, Telcel had 56.4 million subscribers in Mexico. The Company operates in Brazil through its subsidiaries, Claro S.A. and Americel S.A. (Americel), under the unified brand name Claro. Its network covers the main cities in Brazil, including Sao Paulo and Rio de Janeiro. The Company provides wireless services in Argentina, Paraguay, Uruguay and Chile. America Movil provides wireless services in Colombia under the Comcel brand. It also provides fixed-line and wireless services in Guatemala, El Salvador,

[44] Total Telecom, "Global100," October 2011, 10.
[45] Orbis also has a "core code," which through a glance appears to be consistent with the "primary code," as well as a secondary code, which appears to often be missing.
[46] See U.S. Census, "Industry Statistics Portal: 2012 NAICS: 5179 – Other telecommunications (accessed June 24, 2014) http://www.census.gov/econ/isp/sampler.php?naicscode=5179&naicslevel=4#.
[47] A "global ultimate owner" is an Orbis term indicating that a company is the head of the corporate group.
[48] Industry representative, telephone interview by Commission staff, June 11, 2013.
[49] Data on separate business lines is currently not available through Orbis for the telecommunications industry.

Nicaragua and Panama. In August 2008, the Company acquired 100% interest in Estesa Holding Corp.[50]

Including both the parent and the subsidiary in the ORBIS pull appears necessary to make sure the activity of large companies' subsidiaries across various markets are captured; yet it is likely that the financials of the entire company (including all of its subsidiaries) are included in the data for each GUO.

Search Strategy NAICS 5179

The first task is understanding the types of companies coded in ORBIS under telecommunications NAICS codes 5171 and 5172 (wired and wireless carriers), as well as NAICS 5179 (other telecommunications) and the second task is effectively weeding out any companies that appear to be outside the scope of providing telecommunications services. Given the wide range of activities included in the industry definition, the two tasks are especially relevant for NAICS 5179.

To accomplish these tasks with a manageable number of companies classified as NAICS 5179, the initial search is restricted to GUOs:[51]

- Companies like Facebook, Yahoo Japan, Google, and AOL, which do not correspond to the trade policy measure used in regression analyses, appear on the list. Such companies can be eliminated with a Boolean search restricting the list to companies which have the following words included in their primary business line/overview ("fixed," "mobile," "telecommunication," "telecommunications," "communication," "communications," "wireless," "phone," "long-distance"). Also, the search would have to eliminate terms like "cable," "holding company," and "manufacture" or "manufacturer" from the list as well as "internet service provider" (e.g. to exclude company #490, Sitestar).[52] This search strategy would eliminate outliers such as company #649 (Adavale) which is "engaged in the exploration of uranium projects" as well as #667 (X-Change Corporation) and #668 (Grandparents.Com) which are clearly not telecommunications companies.

[50] Like their parents, at least some of these subsidiaries also appear to be involved in a wide range of telecommunications activities.
[51] An unrestricted search on GUOs in the NAICS 5179 industry yields 786 companies (over 27,000 total companies). The search was conducted on April 15, 2013.
[52] Since many telecommunications companies appear to provide internet services, this is one term that could have been left in. However, see later footnote, which discusses that the inclusion/exclusion of the term does not appear to be very consequential.

- Further along the list, for example from line 701, many companies' trade descriptions state that the company is involved in "other telecommunications activities" and there is no information in the primary business line field. It seems difficult to detect if these are truly telecom companies. Most of these companies, however, do not have any financials and will not be included in estimations.

- There are also companies like #641 (Joint-Stock Company) with no information other than the primary NAICS.

Based on the above and additional information from the ORBIS list of GUO companies in NAICS 5179,[53] the search strategy below lists terms to include and exclude in the search fields for the companies, which deletes many non-seemingly telecommunications companies while preserving the top firms as listed in table 1:[54]

- *Terms to include in the search:* fixed, mobile, telecommunication, telecommunications, communication, communications, wireless phone, "long distance," "long-distance;"

- *Terms to exclude from the search:*[55] manufacture, manufacturer, manufacturers, manufactures, "internet service provider," "social media," "social networking," manufacturing, consultancy, games, education, medical, tools, healthcare, ISP, ISPs, ICT, health, consulting mining, "stock market," game, "asset management," industrial, design, gaming, consultation, advertisers, "resort-style," mineral, "traffic-control," film telemarketing,, "financial services," "info-communication," food.

Then the above search strategy is applied to all companies, not restricted by ownership type. The ORBIS results (and the final dataset), therefore, include both GUOs and subsidiaries.[56]

[53] For example, #664 (Rarus, which does not appear to be a true telecommunications firm) the terms to exclude from the trade description include "social media" and for #640 (Digitaltown) "social networking."
[54] The search is applied to GUOs in NAICS 5179 and reduces the number of GUOs from 786 to 308; the search was conducted on April 25, 2013.
[55] The following terms would have been useful to exclude but they would delete top telecom firms like MTN, KT, SK Telecom, KPN, Rogers: cable, distribution, IT, holding company, advertising, entertainment, media, equipment, internet protocol, Media Company.
[56] The result is 13,694 companies; the search was conducted on April 2, 2014.

- The assumption underlying this search strategy is that the exclusionary and inclusionary terms set up for the GUO search is valid for all companies.[57] (Fine-tuning a search not restricted by ownership type is difficult given the high number of companies).[58]

- While the search strategy preserves almost all of the top 50 firms, the exclusionary terms deleted at least one of the top 50 firms[59] and the search strategy also excludes AOL, which appear in the top 100 firms. [60]

The resulting data is manually cleaned as well – which is discussed further after the sections on NAICS 5171 and NAICS 5172.

Search Strategy NAICS 5171

Unlike other telecommunications services (NAICS 5179) which has a broader industry definition, NAICS 5171 refers specifically to the provision of voice, data, text, sound, and video using wired telecommunications networks.[61]

Therefore, the ORBIS search strategy is to keep the raw output of firms classified as NAICS 5171. However, there are some companies that will have to be deleted manually since they do not fall under the scope of a wired telecommunications carrier; the manual deletions will be discussed in the section after next.[62]

Ten of the top 50 global telecommunications companies are classified in ORBIS under NAICS 5171 (wired telecommunications carriers). An ORBIS search on NAICS 5171 restricted to GUOs yields a sampling of firms including AT&T, along with cable and other types of companies

[57] Some companies, for example, # 687 (in the unrestricted GUO Orbis search) do not have a trade description or any information in the primary business line but have a secondary NAICS code which is not 5171 or 5172. An alternative search could theoretically exclude companies with secondary codes other than 5171 or 5172. However, in some cases true telecom companies do not have any secondary codes, for example #1 (Telefonica SA). Similarly, there are other cases of true telecom companies (#31 Portugal Telecom) which have secondary codes other than 5171 or 5172. Therefore, practically, the alternative search is likely not viable.

[58] Yet another alternative search may be to use the fine-tuned GUO search results and then search for all their subsidiaries in NAICS 5171 and 5172.

[59] For this particular case, this is due to the exclusion set up for the term ("internet service provider").Many of the other top 50 companies appear to provide a range of services, including data services, and are maintained in the list; therefore, the exclusionary terms does not seem to be too restrictive. Also, on 6/23/14 running a search in Orbis keeping in "internet service provider," "ISPs" and "ISP" results in 14,449 companies while excluding those terms yields 14,431 – the difference is only 18 companies.

[60] As listed by Total Telecom; because of the exclusionary term "advertiser;" an analysis is not conducted on all firms in the top 100 list.

[61] See U.S. Census, "Industry Statistics Portal: 2012 NAICS: 5171 – Wired telecommunications carriers (accessed June 24, 2014) http://www.census.gov/econ/isp/sampler.php?naicscode=5171&naicslevel=4#.

[62] The Orbis search on all companies in NAICS 5171 contains 8,152 companies and was conducted on May 22, 2014.

(DirectTV – digital television; Time Warner – high-speed data and voice services; Comcast – video, high-speed Internet and voice services; British Sky – Digital pay television broadcasting; Cable Vision Systems – cable television systems; Mediaset – television business; Tivo – technology services for digital video recorders (DVR); Netgear – networking products). Firms including Time Warner Cable and Cablevision are included in Total Telecom's top 100 lists of telecommunications companies.

Search Strategy NAICS 5172

NAICS 5172 refers to companies that offer wireless services (including internet access, cell phone services, and video services).[63] As with NAICS 5171, the search strategy is to keep the raw output of firms classified in NAICS 5172, but also manually delete those companies that appear to fall outside the scope of the industry, discussed next.[64]

Seven of the top 50 global telecommunications companies are classified in ORBIS under NAICS 5172 (wireless telecommunications carriers), including firms Verizon and Sprint.

Pooling the three searches

The data that resulted from the three searches above were then pooled together into one dataset for the year 2012.[65] Using two ORBIS fields – "main activity" and "primary business line," the following types of companies were deleted, organized below by main activity: 1) "Manufacturing," "Manufacturing; Wholesale," or "Manufacturing, Wholesale, Services; or "Retail," (112 observations deleted); 2) "Retail; Services" and "Retail; Wholesale" (kept 8 observations); 4); "Services" (262 observations deleted);[66] 5) Services; Manufacturing" (deleted 2 and kept 4) and "Services; Wholesale" (none deleted); 6) "Wholesale" and

[63] See U.S. Census, "Industry Statistics Portal: 2012 NAICS: 5172 – Wireless telecommunications carriers (except satellite) (accessed June 24, 2014) http://www.census.gov/econ/isp/sampler.php?naicscode=5172&naicslevel=4#.
[64] For example, companies engaged in distribution of telecommunication products, the supply of communications equipment, and companies that design and market wireless devices appear to be outside the scope of the industry. The Orbis search on all companies in NAICS 5172 contains 5,246 companies and was conducted on May 22, 2014.
[65] Note that NAICS 5171search contained 8,152 observations – but only 2,766 where EBITDA margin was available. NAICS 5172 search contained 5,246 observations – but only 1,263 where EBITDA margin was available. NAICS 5179 search contained 13,690 observations – but only 769 where EBITDA margin was available. Before manually cleaning the dataset, there are 4,783 total observations with EBITDA available (reduced because of duplicates). After cleaning the dataset, there are 1,132 observations.
[66] For companies with "Services" as their main activity, the primary business line field is used to delete companies involved in (but not limited to) the following activities: investment management, air transportation, management consulting, holding companies, legal services, equipment rental and leasing services, computer programming, management of real estate properties, employment agencies, advertising agencies, certain broadcasting, call centers, certain subscription services, construction, and brokerage services. Note that this did not delete all holding companies since some companies' primary business line field does not indicate as such.

"Wholesale; Retail" and "Wholesale; Services" (66 observations deleted); 7) Main activity missing , little or no other information, or main activity "retail sales" or "other telecommunications" (6001 observations deleted); 8) Main activity missing but trade description indicates "Wired Telecommunications Activities" (none deleted); 9) Main activity missing but trade description indicates "Wireless Telecommunications Activities" (none deleted).[67]

[67] For the wider dataset with available EBIT data, deleted about 6,555 observations taking the dataset from 8,289 to 1,734 observations; for the dataset with available EBITA data, deleted about 3,651 observations, taking the dataset from 4,783 to 1,132 observations.

Appendix B
Global Ultimate Owners

It appears that global ultimate owners operate in many different segments of telecommunication services (and other activities) through their subsidiaries, which carry out more discrete tasks. For example:

> AT&T operates in four segments: Wireless, Wireline, Advertising Solutions and Other. Its Wireless subsidiaries provide both wireless voice and data communications services across the United States, and through roaming agreements, in a substantial number of foreign countries. Wireline subsidiaries provide primarily landline voice and data communication services, AT&T U-verse TV, high-speed broadband and voice services (U-verse) and managed networking to business customers. Advertising solutions subsidiaries publish Yellow and White Pages directories and sell directory advertising and Internet-based advertising and local search. AT&T's other segment includes customer information services (operator services) and corporate and other operations.[68]

By way of other examples, Verizon Communications, Vodafone, Deutsche Telekom, Telefonica, China Mobile, America Movil, and Sprint Nextel provide services through subsidiaries and at least two of these companies (Verizon and Sprint Nextel) appear to be holding companies. [69]

Since these GUOs are either holding companies (with "operations primarily conducted by subsidiaries")[70] or companies that are providing a variety of services (potentially other than telecommunications services), including them in the regression analysis might bias the results/not be conceptually correct. (Note that if a company's primary business line description indicated it was a holding company, the company was deleted from the dataset; however, some GUOs are holding companies despite lack of notation in their primary business lines.) Although they make up a minority of all companies within each NAICS code (for example there are 167 GUOs versus 7,895 non-GUOs in NAICS 5171 and only 100 GUOs out of 5,068 non-GUOs in NAICS 5172),[71] GUOs can be deleted from the regression analysis. As a rough way to delete GUOs, model 1 of table 8 is restricted to observations where the company name does not equal the GUO name (the number of observations is reduced by 214, from 969 to 755). The substantive results stay the same.

[68] Bureau van Dyke, Orbis dataset, extracted April 30, 2013.
[69] Ibid.
[70] Ibid. (Sprint Nextel Corporation trade description)
[71] Bureau van Dyke, Orbis dataset, extracted April 11, 2014.

Appendix C
Tables

Table C.1: Second stage regressions, dependent variable – conditional EBITDA margin

Independent Variables	m1 b/t	m2 b/t	m3 b/t	m4 b/t	m5 b/t	m6 b/t	m7 b/t	m8 b/t	m9 b/t
STRI telecom - World Bank	0.001	0.001	0.001	0.001	0	0	0	0.001	0
	(0.57)	(0.39)	(0.39)	(0.44)	(0.16)	(0.03)	(0.02)	(0.21)	(-0.13)
GDP per capita		-0.006			-0.007	-0.003	-0.003	-0.002	-0.001
		(-2.00)			(-1.95)	(-0.69)	(-0.61)	(-0.53)	(-0.23)
GDP			0		0	0	0	0	0
			(-1.60)		(-0.87)	(-1.00)	(-0.97)	(-0.62)	(-1.02)
Recent growth of industry revenue				-0.105	-0.122	-0.02	-0.021	-0.103	-0.072
				(-0.21)	(-0.28)	(-0.05)	(-0.06)	(-0.23)	(-0.20)
Urban population % of total						-0.005	-0.005	-0.007	-0.004
						(-1.00)	(-0.98)	(-1.31)	(-0.90)
WB fixed telephone lines per 100							0		
							(-0.03)		
WB mobile subscriptions per100								0.002	
								(0.92)	
WB internet broadband subscriptions per 100									-0.004
									(-0.52)
WB fixed telephone lines									
WB mobile subscriptions									
WB internet broadband subscriptions									
EU Dummy									
Rule of law index									
Constant	-3.650***	-3.536***	-3.608***	-3.647***	-3.491***	-3.215***	-3.215***	-3.382***	-3.209***
	(-50.96)	(-33.70)	(-46.35)	(-41.44)	(-27.29)	(-9.55)	(-9.35)	(-8.21)	(-9.34)
R-Square	0.007	0.067	0.039	0.006	0.1	0.126	0.126	0.148	0.129
Number of Observations	58	57	58	52	51	51	51	51	51

Note: The dependent variable is calculated by adding the coefficient of each country dummy to the constant from model 1 of table 7.

* p<0.05, ** p<0.01, *** p<0.001

Independent Variables	m10 b/t	m11 b/t	m12 b/t	m13 b/t	m14 b/t	m15 b/t	m16 b/t	m17 b/t	m18 b/t
STRI telecom - World Bank	0	0.001	0.001	0.001	0.002	-0.003	0.001	0.001	0.003
	(0.03)	(0.20)	(0.51)	(0.21)	(0.60)	(-0.58)	(0.20)	(0.16)	(0.89)
GDP per capita	-0.001	-0.004	-0.006	-0.004	-0.004	0.001	-0.007	-0.003	-0.012
	(-0.17)	(-0.91)	(-1.16)	(-0.88)	(-0.89)	(0.20)	(-0.69)	(-0.53)	(-1.36)
GDP	0	0	0	0	0	0	0	0	0
	(-0.68)	(0.74)	-1.6	(0.76)	(-0.50)	(-1.18)	(-0.55)	(-0.50)	(-0.38)
Recent growth of industry revenue	-0.18	0.036	0.121	0.026	0.091	-0.385	-0.095	0.032	0.236
	(-0.39)	(0.10)	(0.36)	-0.07	(0.27)	(-0.87)	(-0.21)	(0.10)	-0.75
Urban population % of total	-0.006	-0.005	-0.007	-0.005	-0.008	-0.009	-0.007	-0.008	-0.009*
	(-1.22)	(-0.98)	(-1.49)	(-0.99)	(-1.77)	(-1.60)	(-1.29)	(-1.71)	(-2.05)
WB fixed telephone lines per 100	0.004					0.003	0.006		
	(0.66)					(0.46)	-0.82		
WB mobile subscriptions per100	0.002					0.003	0.002		
	(0.89)					(1.22)	(0.89)		
WB internet broadband subscriptions per 100	-0.009					-0.001	-0.014		
	(-0.76)					(-0.13)	(-1.15)		
WB fixed telephone lines		-0.000**			0.000*			0.000*	0.000*
		(-3.00)			(2.59)			(2.52)	(2.49)
WB mobile subscriptions			-0.000**		-0.000***			-0.000***	-0.000***
			(-3.44)		(-7.37)			(-6.82)	(-7.12)
WB internet broadband subscriptions				-0.000**	-0.000*			0	-0.000*
				(-3.27)	(-2.09)			(-1.95)	(-2.12)
EU Dummy						-0.308		-0.069	
						(-1.29)		(-0.30)	
Rule of law index							0.166		0.173
							(0.80)		(0.97)
Constant	-3.385***	-3.192***	-3.028***	-3.199***	-2.959***	-3.274***	-3.303***	-2.921***	-2.865***
	(-7.86)	(-9.39)	(-9.66)	(-9.38)	(-9.32)	(-7.10)	(-7.60)	(-7.51)	(-9.82)
R-Square	0.154	0.156	0.239	0.157	0.276	0.18	0.172	0.278	0.298
Number of Observations	51	51	51	51	51	51	51	51	51

Note: The dependent variable is calculated by adding the coefficient of each country dummy to the constant from model 1 of table 7.

* p<0.05, ** p<0.01, *** p<0.001

Table C.2: Second stage regressions, dependent variable – average of EBITDA margin logs

Independent Variables	m1 b/t	m2 b/t	m3 b/t	m4 b/t	m5 b/t	m6 b/t	m7 b/t	m8 b/t	m9 b/t
STRI telecom - World Bank	0.010**	0.009***	0.010**	0.009**	0.008**	0.008**	0.007*	0.009**	0.006
	(3.47)	(3.56)	(3.34)	(2.84)	(2.90)	(2.80)	(2.06)	(3.08)	(1.75)
GDP per capita		-0.009*			-0.010*	-0.009	-0.002	-0.009	-0.001
		(-2.26)			(-2.23)	(-1.61)	(-0.32)	(-1.47)	(-0.09)
GDP			0		0	0	0	0	0
			(-0.93)		(-0.37)	(-0.37)	(-0.02)	(-0.22)	(-0.28)
Recent growth of industry revenue				0.518	0.466	0.475	0.35	0.428	0.205
				(1.08)	(1.18)	(1.21)	(0.99)	(0.94)	(0.55)
Urban population % of total						0	0.002	-0.002	0.002
						(-0.09)	(0.47)	(-0.27)	(0.47)
WB fixed telephone lines per 100							-0.013*		
							(-2.59)		
WB mobile subscriptions per100								0.001	
								(0.45)	
WB internet broadband subscriptions per 100									-0.020*
									(-2.06)
WB fixed telephone lines									
WB mobile subscriptions									
WB internet broadband subscriptions									
EU Dummy									
Rule of law index									
Constant	-1.782***	-1.629***	-1.746***	-1.742***	-1.547***	-1.522***	-1.463***	-1.617***	-1.486***
	(-17.46)	(-13.72)	(-16.26)	(-15.99)	(-11.40)	(-5.01)	(-4.80)	(-4.94)	(-4.87)
R-Square	0.172	0.238	0.183	0.171	0.256	0.256	0.309	0.259	0.298
Number of Observations	59	58	59	53	52	52	52	52	52

Note: The dependent variable is the average of the logged EBITDA margins for each country

* p<0.05, ** p<0.01, *** p<0.001

Independent Variables	m10 b/t	m11 b/t	m12 b/t	m13 b/t	m14 b/t	m15 b/t	m16 b/t	m17 b/t	m18 b/t
STRI telecom - World Bank	0.006	0.009**	0.009**	0.009**	0.010**	0.001	0.007	0.004	0.010*
	(1.99)	(2.96)	(2.94)	(3.03)	(3.05)	(0.17)	(1.83)	(0.86)	(2.29)
GDP per capita	-0.001	-0.011	-0.011	-0.011	-0.009	0.004	-0.003	-0.003	-0.011
	(-0.10)	(-1.75)	(-1.71)	(-1.76)	(-1.43)	(0.52)	(-0.20)	(-0.34)	(-0.75)
GDP	0	0	0	0	0	0	0	0	0
	(0.06)	(0.97)	(0.43)	(1.33)	(0.68)	(-1.00)	(0.10)	(-0.33)	(0.68)
Recent growth of industry revenue	0.256	0.541	0.561	0.54	0.488	-0.16	0.286	0.109	0.527
	(0.57)	(1.36)	(1.44)	(1.37)	(1.22)	(-0.40)	(0.57)	(0.27)	(1.12)
Urban population % of total	0.001	0	-0.001	0	-0.002	-0.003	0.001	-0.003	-0.002
	(0.26)	(-0.08)	(-0.32)	(-0.09)	(-0.47)	(-0.68)	(0.23)	(-0.71)	(-0.54)
WB fixed telephone lines per 100	-0.01					-0.013	-0.009		
	(-0.95)					(-1.24)	(-0.88)		
WB mobile subscriptions per100	0.001					0.003	0.001		
	(0.32)					(0.98)	(0.32)		
WB internet broadband subscriptions per 100	-0.006					0.009	-0.008		
	(-0.35)					(0.47)	(-0.42)		
WB fixed telephone lines		-0.000**			0.000**			0.000*	0.000*
		(-2.72)			(3.11)			(2.59)	(2.45)
WB mobile subscriptions			0		0			0	0
			(-1.87)		(-1.71)			(-1.49)	(-1.43)
WB internet broadband subscriptions				-0.000***	-0.000**			-0.000**	-0.000**
				(-3.55)	(-3.50)			(-2.81)	(-2.83)
EU Dummy						-0.634*		-0.443	
						(-2.43)		(-1.65)	
Rule of law index							0.058		0.047
							(0.21)		(0.18)
constant	-1.535***	-1.496***	-1.412***	-1.499***	-1.441***	-1.280**	-1.504***	-1.176**	-1.415***
	(-4.48)	(-4.94)	(-4.70)	(-4.99)	(-4.84)	(-3.40)	(-4.01)	(-3.54)	(-4.90)
R-Square	0.313	0.277	0.277	0.287	0.323	0.371	0.314	0.357	0.324
Number of Observations	52	52	52	52	52	52	52	52	52

Note: The dependent variable is the average of the logged EBITDA margins for each country

* p<0.05, ** p<0.01, *** p<0.001

Table C.3: Second stage regressions, dependent variable – average of EBITDA margin levels

Independent Variables	m1 b/t	m2 b/t	m3 b/t	m4 b/t	m5 b/t	m6 b/t	m7 b/t	m8 b/t	m9 b/t
STRI telecom - World Bank	0.010**	0.009*	0.008*	0.010*	0.008*	0.008*	0.006*	0.008*	0.007*
	(2.70)	(2.58)	(2.34)	(2.57)	(2.30)	(2.19)	(2.10)	(2.26)	(2.36)
GDP per capita		-0.010*			-0.005	-0.006	0.002	-0.006	-0.002
		(-2.07)			(-1.27)	(-1.10)	(0.20)	(-1.06)	(-0.29)
			-0.000***		-0.000**	-0.000**	0	-0.000**	-0.000*
GDP			(-3.78)		(-3.04)	(-2.96)	(-1.81)	(-2.77)	(-2.56)
				0.097	0.309	0.293	0.161	0.268	0.167
Recent growth of industry revenue				(0.17)	(0.69)	(0.68)	(0.47)	(0.58)	(0.47)
						0.001	0.003	0	0.002
Urban population % of total						(0.20)	(0.60)	(0.03)	(0.42)
							-0.013		
WB fixed telephone lines per 100							(-0.98)		
								0.001	
WB mobile subscriptions per100								(0.38)	
WB internet broadband subscriptions per 100									-0.009
									(-0.85)
WB fixed telephone lines									
WB mobile subscriptions									
WB internet broadband subscriptions									
EU Dummy									
Rule of law index									
	-0.179	0.003	-0.037	-0.19	0.057	0.014	0.077	-0.036	0.031
Constant	(-1.07)	(0.02)	(-0.21)	(-1.10)	(0.33)	(0.04)	(0.26)	(-0.11)	(0.10)
R-Square	0.105	0.158	0.228	0.096	0.235	0.235	0.272	0.236	0.241
Number of Observations	59	58	59	53	52	52	52	52	52

Note: The dependent variable is the average of the EBITDA margins for each country.

* p<0.05, ** p<0.01, *** p<0.001

Independent Variables	m10 b/t	m11 b/t	m12 b/t	m13 b/t	m14 b/t	m15 b/t	m16 b/t	m17 b/t	m18 b/t
STRI telecom - World Bank	0.007*	0.008	0.007*	0.008*	0.008*	0.004	0.007	0.003	0.008
	(2.21)	(2.01)	(2.03)	(2.02)	(2.05)	(1.07)	(1.94)	(0.82)	(1.57)
GDP per capita	-0.002	-0.005	-0.005	-0.005	-0.004	0	-0.002	0.001	-0.006
	(-0.32)	(-0.90)	(-0.91)	(-0.97)	(-0.68)	(0.06)	(-0.21)	(0.12)	(-0.43)
GDP	0	-0.000**	-0.000**	-0.000**	-0.000**	0	0	-0.000**	-0.000**
	(-1.63)	(-3.32)	(-3.39)	(-3.05)	(-3.35)	(-1.98)	(-1.56)	(-3.49)	(-3.21)
Recent growth of industry revenue	0.348	0.247	0.238	0.263	0.201	0.07	0.345	-0.092	0.239
	(0.73)	(0.56)	(0.54)	(0.60)	(0.45)	(0.17)	(0.60)	(-0.23)	(0.40)
Urban population % of total	0.002	0.001	0.001	0.001	0	-0.001	0.002	0	0
	(0.34)	(0.19)	(0.36)	(0.20)	(0.09)	(-0.25)	(0.37)	(-0.12)	(0.03)
WB fixed telephone lines per 100	-0.023					-0.025	-0.023		
	(-0.93)					(-0.97)	(-0.97)		
WB mobile subscriptions per100	0					0.002	0		
	(0.21)					(0.91)	(0.21)		
WB internet broadband subscriptions per 100	0.022					0.032	0.022		
	(0.77)					(0.99)	(0.88)		
WB fixed telephone lines		0			0			0	0
		(1.87)			(1.74)			(1.17)	(1.76)
WB mobile subscriptions			0		0			0	0
			(1.51)		(-0.14)			(0.09)	(-0.22)
WB internet broadband subscriptions				0	0			0	0
				(1.76)	(-1.67)			(-1.00)	(-1.59)
EU Dummy						-0.424		-0.343	
						(-1.05)		(-0.82)	
Rule of law index							-0.008		0.046
							(-0.03)		(0.18)
	0.049	-0.004	-0.057	0.003	-0.023	0.219	0.045	0.182	0.003
constant	(0.19)	(-0.01)	(-0.16)	(0.01)	(-0.06)	(1.00)	(0.18)	(0.67)	(0.01)
R-Square	0.285	0.242	0.241	0.239	0.249	0.301	0.285	0.262	0.25
Number of Observations	52	52	52	52	52	52	52	52	52

Note: The dependent variable is the average of the EBITDA margins for each country.

* p<0.05, ** p<0.01, *** p<0.001

Table C.4: One stage regressions, dependent variable – EBITDA margin

Independent Variables	m1 b/t	m2 b/t	m3 b/t	m4 b/t	m5 b/t	m6 b/t	m7 b/t	m8 b/t	m9 b/t	m10 b/t	m11 b/t
STRI telecom - World Bank	0.012*	0.008	0.009*	0.020*	0.012*	0.012**	0.008	0.014*	0.014**	0.013*	0.015*
	(2.12)	(1.57)	(2.00)	(2.53)	(2.53)	(2.83)	(1.70)	(2.24)	(2.72)	(2.46)	(2.39)
GDP per capita		-0.016			-0.001	-0.001	-0.003	0.002	-0.001	0.002	0
		(-1.29)			(-0.10)	(-0.08)	(-0.27)	(0.21)	(-0.09)	(0.12)	(0.03)
GDP			-0.000***		-0.000***	-0.000**	-0.000***	-0.000**	-0.000**	-0.000**	-0.000*
			(-5.20)		(-3.63)	(-3.49)	(-4.17)	(-3.14)	(-2.97)	(-3.38)	(-2.56)
Recent growth of industry				-3.94	-1.559	-1.559		-1.849	-1.723	-1.711	-1.845
revenue				(-1.71)	(-1.45)	(-1.39)		(-1.87)	(-1.52)	(-1.70)	(-1.80)
Urban population % of total						0	0.002	0.002	0	0.002	0.001
						0.00	(0.25)	(0.16)	(-0.00)	(0.13)	(0.06)
WB fixed telephone lines per								-0.005			-0.007
100								(-0.48)			(-0.36)
WB mobile subscriptions per 100									0.002		0.001
									(0.61)		(0.26)
WB internet broadband										-0.006	0.007
subscriptions per 100										(-0.33)	(0.22)
WB fixed telephone lines											
WB mobile subscriptions											
WB internet broadband											
subscriptions											
EU Dummy											
Rule of law index											
	-0.442	0.007	-0.146	-0.829*	-0.32	-0.32	-0.223	-0.389	-0.608	-0.367	-0.506
constant	(-1.96)	(0.02)	(-0.77)	(-2.41)	(-1.12)	(-0.50)	(-0.37)	(-0.52)	(-0.80)	(-0.50)	(-0.86)
R-Square	0.002	0.003	0.008	0.005	0.008	0.008	0.008	0.009	0.008	0.008	0.009
Number of Observations	1132	1130	1132	1116	1114	1114	1130	1114	1114	1114	1114

Note: standard errors are clustered by country.

Independent Variables	m12 b/t	m13 b/t	m14 b/t	m15 b/t	m16 b/t	m17 b/t	m18 b/t	m19 b/t	m20 b/t	m21 b/t
STRI telecom - World Bank	0.010*	0.010*	0.011*	0.010*	0.011*	0.013*	0.024*	0.014*	0.014	0.010*
	(2.47)	(2.36)	(2.52)	(2.39)	(2.14)	(2.42)	(2.04)	(2.26)	(1.91)	(2.42)
GDP per capita	0	-0.001	0	0	0.004		0.001	0.011	-0.003	0.006
	(0.03)	(-0.11)	(0.02)	(-0.04)	(0.32)		(0.06)	(0.68)	(-0.27)	(0.28)
GDP	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***		0	-0.000**	-0.000*	-0.000***
	(-5.06)	(-4.18)	(-4.94)	(-5.51)	(-4.99)		(-1.36)	(-2.89)	(-2.18)	(-5.31)
Recent growth of industry revenue	-1.677	-1.643	-1.647	-1.757	-2.024		-1.105	-1.824	-1.235	-1.798
	(-1.52)	(-1.50)	(-1.49)	(-1.59)	(-1.98)		(-0.97)	(-1.89)	(-1.03)	(-1.55)
Urban population % of total	0.001	0.005	0	0.002	0.004	-0.003	0.006	0.002	0.003	0.003
	(0.06)	(0.42)	(0.04)	(0.17)	(0.26)	(-0.25)	(0.39)	(0.18)	(0.27)	(0.31)
WB fixed telephone lines per 100								-0.011		
								(-0.60)		
WB mobile subscriptions per100							0.001	0		
							(0.34)	(-0.04)		
WB internet broadband subscriptions per 100					-0.01	-0.001	-0.016	0.017		
					(-0.57)	(-0.04)	(-0.70)	(0.52)		
WB fixed telephone lines	0.000*			0.000*	0.000*				0.000*	0.000*
	(2.64)			(2.23)	(2.25)				(2.38)	(2.30)
WB mobile subscriptions		0		0	0				0	0
		(1.96)		(0.12)	(-0.27)				(0.21)	(0.14)
WB internet broadband subscriptions			0.000**	-0.000*	-0.000*	0.000			-0.000*	-0.000*
			(2.91)	(-2.15)	(-2.01)	(-1.39)			(-2.41)	(-2.16)
EU Dummy							0.597		0.321	
							(1.08)		(0.71)	
Rule of law index								-0.292		-0.144
								(-0.94)		(-0.44)
constant	-0.421	-0.674	-0.393	-0.537	-0.541	0.005	-1.139	-0.513	-0.834	-0.629
	(-0.66)	(-0.87)	(-0.61)	(-0.63)	(-0.63)	(0.01)	(-1.00)	(-0.92)	(-0.84)	(-0.87)
R-Square	0.009	0.009	0.009	0.009	0.009	0.005	0.009	0.009	0.009	0.009
Number of Observations	1114	1114	1114	1114	1114	1132	1114	1114	1114	1114

Note: standard errors are clustered by country.

Appendix D
Data Table for Figure

Table D.1: GDP per capita and broadband penetration

Country code	Year	GDP per capita	Broadband penetration per 100 people
ALB	2012	3549.45	5.059956
ARM	2012	2237.059	6.74963
AUS	2012	37241.59	24.34224
AUT	2012	40058.38	25.02378
BDI	2012	153.1427	0.0049444
BEL	2012	36560.39	33.2655
BGD	2012	597.0206	0.3881571
BGR	2012	4633.834	17.94837
BHR	2012	16765.48	13.20113
BLR	2012	4858.437	26.91035
BOL	2012	1259.814	1.053706
BRA	2012	5721.226	9.154757
BWA	2012	6683.66	0.9400622
CAN	2012	36122.79	32.4766
CHL	2012	9447.081	12.40669
CHN	2012	3348.01	12.72148
CMR	2012	963.7739	0.6327573
COL	2012	4260.917	8.157496
CRI	2012	5716.048	9.324422
CZE	2012	14235.02	16.39851
DEU	2012	38219.83	33.70393
DNK	2012	46254.89	38.77735
DOM	2012	5053.925	4.336036
DZA	2012	3212.105	2.887346
ECU	2012	3568.187	5.284689
EGY	2012	1559.615	2.833493
ESP	2012	24816.67	24.37485
ETH	2012	253.0713	0.0073826
FIN	2012	38416.74	30.26182
FRA	2012	34239.77	37.47464
GBR	2012	37608.92	34.03872
GEO	2012	2080.58	8.666063
GHA	2012	724.3497	0.2575527
GRC	2012	18891.95	24.1388
GTM	2012	2316.642	1.814924
HND	2012	1569.106	0.7721546
HUN	2012	11000.2	22.86532
IDN	2012	1731.653	1.208357
IND	2012	1123.202	1.211301
IRL	2012	45355.77	22.7196
IRN	2012	3208.839	4.025092

Appendix D

Country code	Year	GDP per capita	Broadband penetration per 100 people
ITA	2012	29012.7	22.14012
JOR	2012	2838.558	2.811849
JPN	2012	36942.2	27.73351
KAZ	2012	5192.57	9.784773
KEN	2012	594.6179	0.0994276
KGZ	2012	572.2444	0.8789209
KHM	2012	671.6363	0.2000317
KOR	2012	21562.26	37.24735
KWT	2012	29728.62	1.445933
LBN	2012	7079.118	9.705021
LKA	2012	1884.233	1.677876
LSO	2012	928.5369	0.0707272
LTU	2012	10061.09	21.14878
MAR	2012	2516.425	2.095769
MDG	2012	273.444	0.0388761
MEX	2012	8545.382	10.5233
MLI	2012	480.204	0.0215167
MNG	2012	1629.597	3.749959
MOZ	2012	417.4455	0.0812748
MUS	2012	6496.388	11.21368
MWI	2012	219.9136	0.0075252
MYS	2012	6786.186	8.412811
NAM	2012	4372.798	1.177219
NGA	2012	1053.127	0.0084574
NIC	2012	1349.891	1.648939
NLD	2012	40639.65	39.81089
NPL	2012	398.7731	0.4837525
NZL	2012	28457.9	27.80361
OMN	2012	13884.51	2.148883
PAK	2012	772.8952	0.5173708
PAN	2012	7460.407	7.830405
PER	2012	4253.624	4.744506
PHL	2012	1501.069	2.2197
POL	2012	10575.78	15.5382
PRT	2012	17919.41	22.54522
PRY	2012	1718.309	1.191172
QAT	2012	60246.91	10.50395
ROM	2012	5834.418	16.17119
RUS	2012	6834	14.46092
RWA	2012	389.5663	0.0237044
SAU	2012	17591.3	6.949099
SEN	2012	797.4335	0.6962032

Country code	Year	GDP per capita	Broadband penetration per 100 people
SWE	2012	43830.57	32.27609
THA	2012	3352.529	8.151531
TTO	2012	14183.2	13.75442
TUN	2012	3783.328	4.854429
TUR	2012	8492.614	10.61956
TZA	2012	483.4818	0.0081619
UGA	2012	405.3429	0.1056516
UKR	2012	2094.12	8.002338
URY	2012	7497.373	16.58516
USA	2012	45335.9	28.34788
UZB	2012	845.8066	0.7453343
VEN	2012	6412.038	6.721287
VNM	2012	986.0137	4.897365
YEM	2012	778.3475	0.7013966
ZAF	2012	5878.778	2.113545
ZMB	2012	797.627	0.1051076
ZWE	2012	430.6927	0.5205724