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Services trade policy and sustainable development

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ABSTRACT

The realization of many of the sustainable development goals (SDGs) depends on bolstering the performance of services sectors and improving access to specific services in developing countries. We show that when the level of economic development or the quality of institutions is sufficiently high, openness to services trade and investment is positively related to access to financial, ICT and transport services – three activities that are inputs into several SDGs. An implication is that facilitating trade and investment in services may help realize SDGs that depend on the performance of services sectors. In the absence of comparable cross-country panel data on services trade policies, country-specific analyses are needed to better understand the specific channels through which services trade policies impact on SDGs.

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1. Introduction

The sustainable development goals (SDGs) are a major focal point for international efforts to promote global welfare for the next decade (United Nations, 2015). The SDGs span 17 broad objectives ranging from poverty reduction to improving public health and protecting the environment.[1] International trade and trade policy is one means of implementing the SDGs. A number of goals explicitly reference trade-related measures as instruments that can help to attain the objective concerned. Thus, for instance, Goal 2 (ending hunger) includes a call to correct and prevent distortions in world agricultural markets, including through the elimination of all forms of agricultural export subsidies and measures with equivalent effect.

The main link between the SDGs and trade policy is made in Goal 17 (strengthening the global partnership for sustainable development). This stresses the importance of a universal, rules-based, open, non-discriminatory and equitable multilateral trading system; timely implementation of duty- and quota-free market access on a lasting basis for all LDCs; and respecting national policy space and leadership to establish and implement policies to realize the goals.

Implicitly if not explicitly, the conceptualization of the role of trade in the wording of the SDGs emphasizes measures to facilitate merchandise exports by firms in developing countries. In practice, low-income economies may have a revealed comparative advantage in services such as transport, travel and tourism-related activities or business process outsourcing. Services of all types are becoming easier to trade as a result of technological change, creating opportunities for firms in developing countries to expand trade in non-traditional products, services as well as goods. About one quarter of all LDCs are net exporters of services. For the LDCs as a group, services exports grew more rapidly than for the world as a whole during the 2000s. LDCs increased their share of global trade in services from 0.4 percent in 2005 to 0.8 percent in 2015, with commercial services exports growing by 14 percent over this period, more than twice the rate of other countries, and services exports as a whole represented some 20 percent of total LDC exports of goods and services in 2015 (WTO, 2016).

Services matter for the realization of the SDGs not just because they are a potential source of exports and associated employment and household income, but because realization of many of the SDGs is conditional on enhancing the performance of a range of specific services sectors in developing countries. Attaining the SDGs is to a significant extent a services agenda. Eliminating poverty and hunger, improving health and educational outcomes, or

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[1] Appendix A lists all of the SDGs.

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reducing regional inequalities will require boosting services capacity and the productivity of a range of services activities, including transport, distribution, logistics, ICT, vocational training, medical services and so forth.

In this paper we consider the role of trade in services and services trade policy in the effort to attain the SDGs. While there is a growing literature that investigates whether greater openness to services trade may support economic development by fostering performance improvement of firms and industries that use services as intermediate inputs (see for instance Arnold, Mattoo, & Narciso, 2008; Arnold, Javorcik, & Mattoo, 2011; Arnold, Javorcik, & Mattoo, 2016; Barone & Cingano, 2011; Bas, 2014; Bourlès, Cette, Lopez, Mairesse, & Nicoletti, 2013; Hoekman & Shepherd, 2017; Saez et al., 2015), the relationships between services trade policy and SDGs are relatively unexplored.

Services trade policies may impact directly on the performance of specific services that matter for one or more SDGs. They may also affect the SDGs indirectly, insofar as service sector performance influences economic growth and real incomes. The focus of our empirical analysis is on trade policies targeting specific services sectors or activities that are relevant for specific SDGs. The hypothesis is that services trade policies can be relevant to efforts to realize the SDGs by enhancing access to services. Certain services are important "inputs" for some of the SDGs – for example, higher quality financial services or services that improve connectivity (logistics or ICT services).

The feasibility of cross-country quantitative study of the channels through which services trade and services trade policies may impact on SDGs is affected by data constraints. Comparable time series data on services trade policies do not exist, severely impeding empirical analysis that can appropriately consider potential endogeneity and identification issues. The analysis that follows is based on cross-section data for services trade policies. It is therefore exploratory in nature: it is not possible to infer to what extent more restrictive services trade policies have a negative impact on SDG outcomes. Our goal is simply to assess whether services trade policies are associated with indicators of the availability of (access to) financial, ICT and transport services, activities that figure prominently in the description of several SDGs. We find there is a positive relationship between services trade policy regimes and access to (performance of) services sectors, and that it is influenced by the level of economic development and quality of prevailing regulatory institutions. A policy implication of the analysis is that more attention should be given to trade policies for services and related regulatory and economic governance institutions in the international effort to attain the SDGs.

Which types of services and services trade policies matter (more) for different SDGs requires country-specific analysis. Such analysis is likely to be less affected by the data limitations that constrain cross-country empirical exercises, as it should be feasible to construct country-specific panel datasets for services trade and investment policies. We hope that our findings will motivate more detailed country level research and stimulate greater consideration of services trade policies in efforts to attain the SDGs.

In what follows, Section 2 presents a conceptual framework to guide thinking about the role of services and services trade policy in achieving the SDGs. Section 3 presents the empirical approach we use to undertake an initial empirical analysis of the relationship between services trade policy and SDGs. Results are discussed in Section 4. Section 5 concludes.

2. Services and the SDGs

The performance of services sectors in an economy may impact on the prospects of attaining the SDGs through two types of channels. The first is direct: improving access to, and the quality of, specific types of services that are central to a number of the SDGs. The second is indirect: better services performance may affect per capita incomes, as more efficient and productive services sectors can increase aggregate productivity performance (economic growth) which in turn can be expected to be important for the overall achievement of the SDGs.

2.1. Direct channel

Service sector performance is very salient for many dimensions of the SDGs and their associated specific targets.[2] Some SDGs directly depend on the performance of specific services sectors (e.g., health services in SDG 3 or education services in SDG 4). Eleven of the 17 SDGs explicitly refer to (or implicate) at least one distinct service sector as a means of attaining the goal in question. This generally spans one or more of the following elements:

Access to services:
expanding access or improving the affordability of a given service activity, output or product;

Quality of services:
enhancing the quality, efficiency, capacity or resilience of a service sector; and

Environmental services:
reducing the environmental footprint (negative spillover effects) of an economic activity.

Table 1 illustrates some of the linkages between services and SDGs. It reports the services sectors that various SDGs refer to, based on a text search of the keywords embodied in the description of the SDGs and the focal point for action implied by (needed to attain) the respective goals.

This text-based mapping exercise illustrates that the intersection between the SDGs and the performance of services sectors is substantial. Beyond access to basic services[3] in the areas of health, education, sanitation, water and energy, access to financial services is identified in five SDGs (the most frequent reference across services sub-sectors). Other services that are mentioned include ICT services, improved quality, efficiency, capacity and resilience of R&D services, tourism, transport, construction and waste management services. SDGs that aim at reducing the negative environmental footprint of economic activity also identify specific services sectors, including sanitation, water and energy related distribution services, transport, construction, and waste management services.

The fact that services are not explicitly referenced in the description of some SDGs and for that reason are not listed in Table 1 does not mean, of course, that services do not matter for such goals. In the case of SDG 5 (gender equality), for example, or the SDGs addressing environmental sustainability (13, 14 and 15), services can be very relevant. Ngai and Petrongolo (2017) document the evolution of what they call the comparative advantage of women in the services sector. Services involve safer, cleaner working conditions as well as potentially shorter and more flexible

[2] See Annex 1 for a list of the 17 SDGs and https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals for the more detailed targets associated with each SDG. In what follows we consider both the SDGs and the more detailed targets that have been defined for the respective SDGs insofar as they involve specific services activities.

[3] The term 'basic services' is used in the description of some SDGs and related targets, but is not defined in the main SDG document (United Nations, 2015). Based on other UN publications, basic services are understood here as including health, education, sanitation services as well as water delivery and energy (UN Habitat, 2003).

Table 1
Services referenced in the SDGs.

Services sector	SDG	Activity mentioned in respective SDG	Focal point
Health services	1	Basic services	A
	3	Health services/Sexual and reproductive health services	A and Q
Education services	1	Basic services	A
	4	Pre-primary/Primary/Secondary/ Vocational/Tertiary education	A and Q
Sanitation services	1	Basic services	A
	6	Sanitation	A, Q and EF
ICT Services	1	New technology	A
Financial services	1	Financial services/Microfinance	A
	2	Financial services	A
	3	Financial risk protection	A
	8	Financial services	A
	9	Financial services	A
R&D services	2	Seeds; climate resistance	A and Q
	3	R&D of vaccines and medicines	Q
	8	Technological innovation	Q
	9	Scientific research/Technological capabilities/Innovation/R&D workers	Q
Water services	1	Basic services	A
	6	Drinking water/Water quality/Water use and management	A, Q and EF
Energy services	1	Basic services	A
	7	Distribution of energy	A, Q and EF
Tourism	8	Sustainable tourism	Q and EF
Transport services	9	Infrastructure	A, Q and EF
	10	Transport systems/Public transport	A, Q and EF
Construction Services	9	Infrastructure	Q and EF
Waste management services	11	Waste management	Q
	12	Recycling/Reuse	Q and EF

Notes: Focal points comprise access (A), quality (Q) and environmental footprint (EF).

working hours than jobs in factories (Goldin, 2006).[4] Services are in general not very energy intensive, with the notable exception of transport. This makes services activities relevant for the sustainability of development strategies – an increase in the services share or services-intensity of economic activity may be associated with a smaller carbon footprint. Services can also contribute to improving environmental sustainability as inputs into the design of less carbon-intensive production: the basic research, engineering and R&D that is required to identify more sustainable production techniques comprise services activities.[5] Other services sectors such as finance and insurance are also key 'facilitators': helping to mobilize and channel the resources required to fund investments needed to reduce environmental footprints across economic sectors more generally.

2.2. Indirect channel: services and economic development

Improving services performance may also matter indirectly for the SDGs, insofar as this affects economic growth and real incomes. Services sector performance is important for economic development for a number of reasons (Francois & Hoekman, 2010). Some services will help determine the productivity of basic factors of production, capital (R&D services) and labour (health and education services). Moreover, financial services intermediaries are critical in providing funds to firms that have been generated by households seeking to invest their savings. Other services are the backbone of connectivity, 'facilitating' the physical movement of goods and people (transport services) and the exchange of knowledge and information (communications services) (OECD/WTO, 2017). Telecommunications are crucial to the dissemination and diffusion of knowledge including through the Internet. ICT services are a transport mechanism for information services and other products that can be digitized. Similarly, transport services affect the cost of shipping goods and movement of workers within and between countries. Business services such as accounting, engineering, consulting and legal services reduce transaction costs associated with the operation of financial markets and the enforcement of contracts, and are a channel through which process innovations are transmitted across firms in an industry and across industries. Health and education services are key inputs into and determinants of the stock and growth of human capital. In short, the overall productivity of the economy will be influenced by the performance of services sectors. From an SDG perspective, therefore, services performance may also matter through its potential effect on income growth.

2.3. Services trade policy and the SDGs

Given a presumption that services performance has a bearing on the prospects for attainment of many SDGs, the policy challenge is to encourage improvement in service sector performance. This is a multi-facetted question that in practice will be inherently sector-specific. National entities responsible for the operation and regulation of health, education, transport, finance, etc. services sectors will need to undertake diagnostic analysis and identify priorities for action. Such sector-level engagement constitutes a major dimension of the activities of governments and the support that is provided by development agencies to achieve the SDGs (e.g., Abbott, Sapsford, & Binagwaho, 2017; Joshi, Hughes, & Sisk, 2015; Koehler, Thomson, & Hope, 2015; Ssozi & Amlani, 2015). Our focus in what follows is on the supportive role services trade and investment policy can play in complementing sector-specific interventions and policy reforms to improve the productivity performance of services sectors and enhance access to services.

There is a long tradition of characterizing many services as non-tradable, reflecting their non-storable and intangible nature. An implication of these features of services is that international trade often will require the cross-border movement of providers or consumers, in turn involving the movement of capital and labour. The need for such factor movement has been declining as technical change has allowed services to be digitized and exchanged cross-border through ICT networks, and the declining cost of air transportation and information services has facilitated identification of market opportunities. Innovations in information and telecommunications sectors have increased direct exports of services by allowing the sale/provision of services over ICT networks. While digitization of products, new software applications, business process outsourcing, and the like attract much attention, these activities are all dependent on a variety of services inputs that determine the ability of entrepreneurs to participate in international value chains or to sell products directly to clients through B2B or B2C e-commerce platforms. The quality, price and availability of such inputs is determined in part by a country's services trade and investment policies, including measures that affect the feasibility

[4] See also Galor and Weil (1996), Rendall (2013).
[5] See, for example, Dihel (2010) for a detailed discussion of environmental services and trade in environmental services.

and cost for foreign firms to establish production and distribution facilities in a market.

Trade costs for services remain much higher than trade costs for goods, and the rate of decline in such costs has been much less than for goods (Miroudot & Shepherd, 2016).[6] The result is to reduce the volume of trade in services. High services trade costs are in part the result of barriers to trade in services. There is growing evidence of positive effects of services trade liberalization for trade and investment flows in services sectors (see Francois & Hoekman, 2010 for a review and Nordås & Rouzet (2015) for a recent contribution using new OECD services trade policy data). Studies discussing services trade patterns, related policies and their effects from an economic development perspective (see for instance Balchin et al., 2016; Cali, Ellis, & te Velde, 2008; Dihel & Goswami, 2016; Mattoo & Payton, 2007; Saez et al., 2015; World Bank, 2010), have complemented research on developed economies (e.g. Breinlich & Criscuolo, 2011; Wagner, 2012). A robust finding is that an important determinant of service sector performance and thus economy-wide productivity is the role that many services play as inputs into production of both goods and other services.

For the purposes of our current investigation, we build on this body of research to hypothesize that greater openness to services trade may be associated with attainment of SDGs. The mechanisms highlighted in the literatures noted above also suggest services trade liberalization may be associated with country-level per capita incomes and thus, indirectly, have a bearing on SDGs.

3. Services trade policy and the SDGs: empirical framework

In this Section we focus on the relationship between services trade policy and indicators of SDG-relevant outcomes, such as poverty reduction, life expectancy or income and gender equality. Beyond indicators that speak to non-services specific dimensions of sustainable development, we look at access to a subset of the services that are highlighted in the various SDGs, in particular access to financial, ICT and transport services. These three sectors are frequently referenced in the context of different SDGs and their associated targets (see Table 1). The empirical analysis focuses on the direct channel between services trade policies and SDGs presented in Section 2.1. Regression results reported in the working paper version of this article reveal only weak evidence of a relationship between services trade policies and per capita incomes, suggesting the indirect channel between services trade openness and SDGs is not very relevant.[7]

The central element in the empirical analysis is the World Bank's Services Trade Restrictiveness Database (STRD). This is the only source which provides comparable information on sector-specific services trade policy for a wide range of countries. The STRD covers 103 economies, 79 of which are developing countries, and provides information on services trade policy for major services sectors including finance, telecommunications, transport and professional services. Moreover, the database provides information on policies affecting international exchange of services that distinguishes between different modes of supplying services across borders. These include cross border trade in services using ICT networks (the internet) (mode 1), trade through commercial presence (foreign direct investment) (mode 3) and trade via the temporary movement of services providers (natural persons) (mode 4). The database is used to establish Services Trade Restrictiveness Indexes (STRIs) that range between a value of 0 – representing maximum openness to services trade – and 100, reflecting policy environments where trade in services is prohibited. For a detailed description of the STRD see Borchert, Gootiiz, and Mattoo (2014). While its country coverage makes the World Bank's STRD the best data-source for cross-country analysis it has a serious limitation: the STRIs represent a snapshot of the trade policy regime prevailing in each country in the late 2000s. There is no time series dimension. This feature of the database constrains econometric analysis to a cross-section framework and thus limits the tools at our disposal to appropriately address the endogeneity of services trade policy. The results that are obtained from the empirical analysis are therefore only indicative of the relationship between services trade policies and the SDGs. In all regressions presented below observations are at the country level.

As a first step in the analysis we regress a number of SDG-related indicators on the STRI that aggregates all sectors and all modes of supply. We derive ordinary least squares (OLS) estimates of the following bivariate linear model

$$SDG = \alpha + \beta STRI + \epsilon \quad (1)$$

where the dependent variable "SDG" is in turn an indicator of poverty reduction, life expectancy, income and gender equality, access to water and pollution reduction; and ϵ is an error term.[8] We measure poverty reduction as the percentage of the population living on more than $3.2 a day at 2011 international prices. More precisely, we compute the poverty reduction indicator as 100 minus the poverty headcount ratio at $3.20 a day (2011 PPP) (% of population). The results reported in the next Section are robust to using a $5.5 threshold or the poverty gap instead of the headcount poverty measure. Life expectancy is proxied by life expectancy in years at birth for the total population. The indicator of income equality used is the share of income accruing to the bottom 20% of the income distribution. The ratio of women to men enrolled at tertiary level in public and private schools is used as the proxy for gender equality. Access to water is measured by the percentage of the rural population with access to at least basic water services. Results are not affected when looking at urban or the overall population. Finally, we take the inverse of CO2 emissions (kg per 2005 US$ of GDP) as a measure of pollution reduction. All these variables come from the World Bank World Development Indicators database. For each indicator we take a simple average of available information for the 3 year period 2010–2012 in order to introduce a suitable lag between services trade policy – measured around the end of the 2000s – and the SDG outcome indicators. Results are qualitatively robust to using time averages for the period 2013–2015. Summary statistics for these variables computed for the respective estimation samples are reported in Table B-1. Table B-3 reports the countries included in each specification.

As many SDGs are influenced by the level of development attained by a country, and this may be correlated with STRIs, we extend the bivariate regression by adding GDP per capita (measured on a purchasing power parity basis) as a control variable. This extended specification is given by

$$SDG = \alpha + \beta STRI + \gamma GDPpc + \epsilon \quad (2)$$

These simple regressions provide indicative, qualitative information on the relationship between services trade policy and different dimensions of SDGs. In order to sharpen the analysis we exploit the sector-specific dimension in the STRI as well as in the SDGs. We regress sectoral indicators of services access that are relevant

[6] Miroudot and Shepherd (2016) compute trade costs for services and manufacturing sectors using the gravity-based methodology proposed by Novy (2013).

[7] A possible explanation for this finding is that the empirical measures of services trade policy by themselves are unlikely to fully capture the policy factors that constrain services trade and investment. Recent research concludes that the effect of services trade policies may be conditional on other policies that affect the business environment, such as the quality of domestic institutions and economic governance (see for instance van der Marel, 2012; Beverelli, Fiorini, & Hoekman, 2017).

[8] We assume the error terms to be independently and normally distributed.

to different SDGs on the corresponding sector-specific STRIs. We focus on access to financial, ICT and transport services. As noted in Section 2.1 these sectors are very relevant for SDGs (especially through the access dimension).

For each of these sectors we run a simple bivariate linear regression model and use OLS to estimate the conditional expectation function of access to services given the prevailing sector-specific trade policy regime, as follows:

$$\text{Access}_i = \alpha_i + \beta_i \text{STRI}_i + \epsilon_i \quad \text{with } i = \text{Finance}, \text{ICT}, \text{Transport} \tag{3}$$

The presumption is that less restrictive trade policies should be associated – via higher trade and investment – with better services performance (better access to or availability of services) which in turn supports the realization of the services dimension of the relevant SDGs.[9] This would be reflected in a negative sign for the estimate of β.

We augment the sector-specific bivariate models with controls capturing broad features of the economic environment that subsume country-specific factors potentially confounding the empirical relationship of interest. The controls used are economic development, as proxied by GDP per capita, and the quality of institutions, measured by an indicator of the quality of economic governance. Since these variables are also likely to affect the relationship between services trade policy and SDG outcomes, we include in the regression the interaction between each variable and the relevant STRI. For each sector i, the following augmented specifications are estimated using OLS:

$$\text{Access}_i = \alpha_i + \beta_i \text{STRI}_i + \gamma_i \text{GDPpc} + \delta_i (\text{STRI}_i \times \text{GDPpc}) + \epsilon_i \tag{4}$$

$$\text{Access}_i = \alpha_i + \beta_i \text{STRI}_i + \zeta_i \text{Institutions} + \eta_i (\text{STRI}_i \times \text{Institutions}) + \epsilon_i \tag{5}$$

For many SDGs, increasing per capita income is important for the achievement of the goal, suggesting a need also to test whether the relationship between services trade policy and access is moderated by the level of income. We expect a stronger negative relationship between STRIs and access to services when the process of improving the latter is less constrained by low income levels, i.e. at higher values of per capita GDP ($\delta_i < 0 \ \forall i$).[10] Testing the moderating role of the quality of economic institutions is in the spirit of Beverelli et al. (2017), where economic governance is identified as a key factor shaping the effect of services trade restrictiveness on productivity of downstream manufacturing industries, controlling for the intensity of use of services inputs into production. The focus here is on access to services as a function of services trade policy. This will be affected by the same type of institutional interdependence relationships that have been found to be important by Beverelli et al. (2017). Notwithstanding technological advances that are making cross-border trade in services through the internet more feasible, the non-storability and intangibility of services continues to give rise to a proximity burden that affects many services: the agent providing a service must be in the same location as the buyer or consumer (Francois & Hoekman, 2010). As a consequence, exporters of services often must perform at least some stages of their economic activity in the importing country, and thus will be affected by local regulations and the prevailing business environment, i.e., the quality of economic governance and related institutions. Accordingly, better institutions should attract more productive services providers and support higher levels of services performance. Therefore, we expect a stronger positive relationship between services trade openness and access to services in countries with higher quality regulatory institutions ($\eta_i < 0 \ \forall i$).[11]

The share of the population that is at least 15 years of age and has an account at a formal financial institution is used as the indicator for access to financial services and is obtained from the World Bank Global Financial Development Database (GFDD). In the case of ICT services we use the number individuals per 100 people who have used the internet in the last 12 months (from any location and via any device) as our access indicator. These data are sourced from the International Telecommunication Union, as reported in the World Bank's Millennium Development Goals (MDG) database. Finally, we proxy access to transport services with data from World Bank Logistics Performance Index (LPI) database. Specifically, we use one of the domestic LPI variables, the share of respondents in each country rating available domestic road transport services as high or very high quality.

For each of the access variables noted above a corresponding sector-specific STRI is used. We take the overall-modes STRI which, in the case of ICT services corresponds to the STRI for mode 3 (inward foreign direct investment). As in the previous exercise, since the STRI data reflect policies prevailing in the late 2000s, we use the average of available observations over the 2010–2012 period for each access indicator taken as the dependent variable. Merging the services access indicators with the trade policy data by sector, we end up with three cross-section datasets where the number of countries (observations) is determined by the intersection of the country coverage of the source databases.

Finally, we use data on institutional regimes from the Worldwide Governance Indicators (WGI) database. We use the WGI measure of regulatory quality as a proxy for the prevailing institutional framework. Our results are robust to using other indicators such as the rule of law, control of corruption or political stability. Table B-2 presents summary statistics by sector.

4. Results

Regressing the indicators of SDG-type outcomes discussed above on the aggregate measure of the STRI (all sectors-modes) reveals a mostly positive relationship between lower barriers to services trade and SDG-related indicators. Fig. 1 reports a graphical representation of the results from Eq. (1) estimated for each of the six SDG-related dependent variables.

Lower services trade barriers (a one standard deviation (sd) decrease in the STRI) are associated with greater poverty reduction (11 percentage points increase in the share of the population living on more than $3.2 a day, which comprises a 0.4 sd increase in the poverty reduction variable); higher life expectancy (1.8 more years – a 0.21 sd increase – in life expectancy at birth); greater gender equality (0.1 more units – a 0.26 sd increase – in the ratio of women to men enrolled at tertiary level education); greater access to basic water services (5.25 percentage points increase – a 0.24 sd increase – in the share of the rural population with access to at least basic water services); and higher pollution reduction (0.39 more units – a 0.17 sd increase – in the inverse of CO2 emissions measured as kg per 2005 US$ of GDP). The only SDG indicator for which there appears to be no statistically significant relationship with the STRI is income equality.

When we augment the bivariate specifications and control for the 2010–2012 average of the log GDP per capita (PPP)

[9] See for example D'Amelio, Garrone, and Piscitello (2016).

[10] As pointed out to us by a referee, an alternative mechanism that would motivate a moderating role of economic development is that low values of STRI for low-income countries may reflect government restrictions to market operations designed to ensure services delivery to the poor.

[11] The role of governance institutions in shaping economic incentives and outcomes has been investigated extensively in the literature, often using the World Bank's Worldwide Governance Indicators and Doing Business databases. Barattieri, Borchert, and Mattoo (2016) show that the effect of STRIs on cross-border mergers and acquisitions in services sectors may be conditional on other policies targeting governance institutions and related country-specific characteristics.

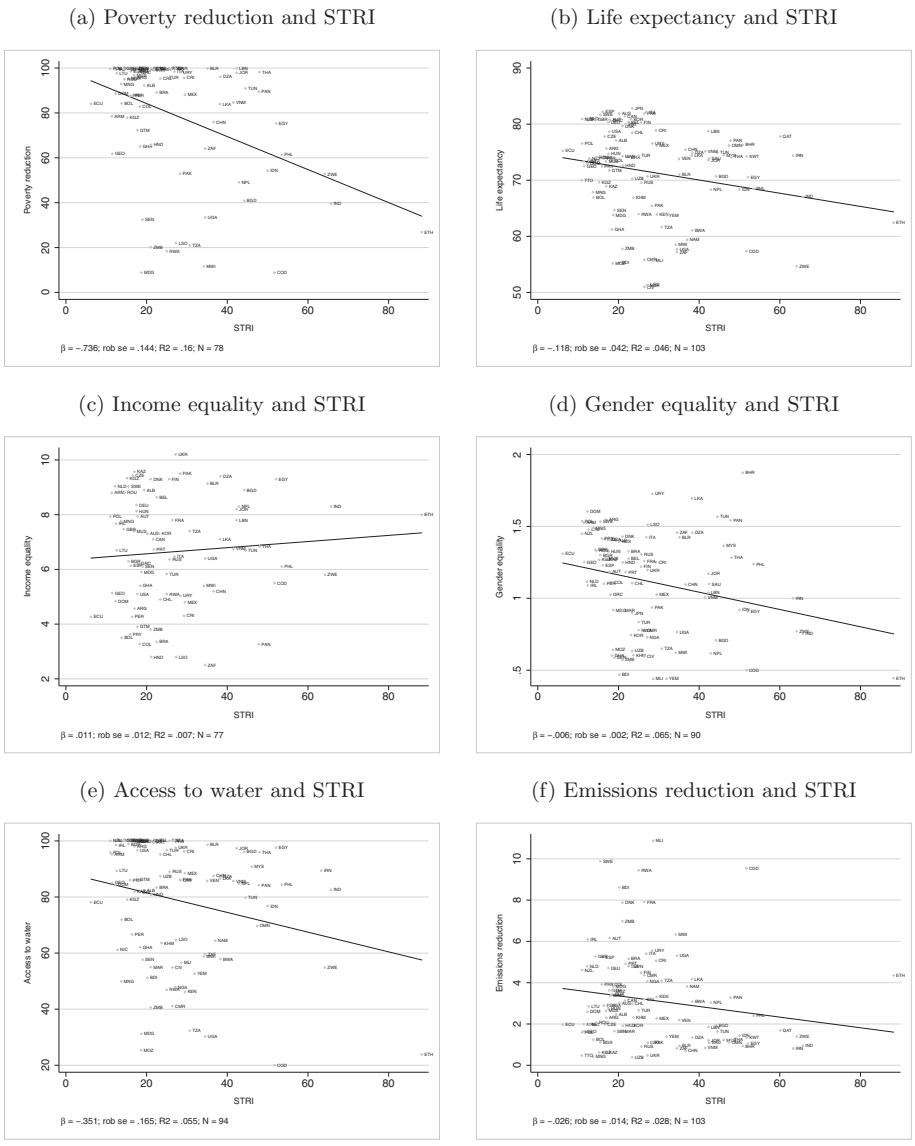

Fig. 1. SDGs and STRI.

(see Eq. (2)) the magnitude, sign and statistical significance of the STRI coefficients do not change much. Results are reported in Table 2.

Surprisingly, there is not a strong and significant association between per capita GDP (PPP) and SDG indicators. If the estimations reported in Table 2 are replicated using real per capita GDP measures in constant 2005 US Dollars instead of per capita GDP adjusted by purchasing power parity, we find a positive and significant relationship between GDP and SDG indicators and a much weaker association with the STRI. Thus, these findings are suggestive of a positive association between services trade reforms and dimensions of sustainable development, but the relationships derived in these basic regressions are not sufficiently stable to infer robust economic implications. Moreover, these results are not informative about the mechanism(s) at work. The very low values of the adjusted R^2 reveal that much of the variation in the sustainability indicators is left unexplained in this simple specification.

To improve upon this basic framework, we shift attention to services-specific dimensions of SDGs and their relationship with sector-specific trade policy. Results for this exercise are reported in Table 3. For each services sector *i*, specifications (3), (4) and (5) are estimated. The negative signs of the estimated coefficients in the bivariate models (columns 1, 4 and 7 of Table 3) indicate that a lower level of trade restrictiveness for a sector is associated with better access to the services concerned. This relationship is statistically significant for all three services sectors. These patterns are consistent with the hypothesized positive role of international trade in improving access to services and are robust to using other measures of access to services. In particular, the negative relationship between services trade barriers and access to financial services holds for other proxies for consumer access to basic finance, as well as for access to financial services by firms, which is an important determinant of enterprise-level performance (see Chauvet & Jacolin, 2017). In the case of access to ICT services, we also find a negative and statistically significant coefficient when replacing the measure of internet use with one that reflects access to cellphones. Finally, results in column 7 are stable when considering rail instead of road transport services.

Turning to the interaction models, the coefficient estimates for GDP per capita and regulatory quality are positive and strongly significant, meaning that higher levels of economic development and better quality of institutions are positively associated with services access indicators. More interestingly, the coefficient for the interaction term is always negative. When statistically significant,

Table 2
Services trade policy and service components of SDGs.

SDG dimension	Poverty reduction (1)	Life expectancy (2)	Income equality (3)	Gender equality (4)	Access to water (5)	Emissions reduction (6)
STRI	−0.722***	−0.115***	0.015	−0.006***	−0.352**	−0.025*
	(0.153)	(0.041)	(0.013)	(0.002)	(0.168)	(0.015)
log GDPpc (PPP)	2.270	0.406	0.440	−0.046	−0.110	0.062
	(4.904)	(1.233)	(0.411)	(0.061)	(3.667)	(0.377)
Observations	78	103	77	90	94	103
Adjusted R^2	0.162	0.047	0.024	0.072	0.055	0.029

Notes: All estimations include a constant. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3
Services trade policy and service components of SDGs.

Sector i	Finance			ICT			Transport		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$STRI_i$	−0.438**	1.872***	0.138	−0.342***	0.280*	−0.008	−0.003**	0.017**	−0.001
	(0.192)	(0.444)	(0.128)	(0.109)	(0.150)	(0.083)	(0.001)	(0.007)	(0.001)
log GDPpc		21.203***			16.563***			0.165***	
		(1.491)			(0.953)			(0.025)	
$STRI_i \times$ log GDPpc	−0.221***				−0.039**			−0.002***	
	(0.045)				(0.017)			(0.001)	
Institutions			37.284***			26.631***			0.279***
			(2.902)			(2.650)			(0.044)
$STRI_i \times$ Institutions			−0.536***			−0.111			−0.003**
			(0.084)			(0.079)			(0.002)
Observations	100	100	100	103	103	103	100	100	100
Adjusted R^2	0.058	0.747	0.628	0.105	0.849	0.651	0.030	0.319	0.339
F-stat		160.866	76.676		270.112	68.742	22.912	22.788	
p-value		0.000	0.000		0.000	0.000		0.000	0.000
$STRI_i$ at mean value of moderator		0.039	0.055		−0.040	−0.023		−0.003**	−0.002
		(0.106)	(0.130)		(0.040)	(0.083)		(0.001)	(0.001)

Notes: All estimations include a constant. Robust standard errors in parentheses. The last two rows of the table report the estimated coefficient for $STRI_i$ and the respective standard errors when the variables log GDPpc and Institutions are taken in demeaned values (the means are computed over the estimation samples). For this reason these estimates have to be interpreted as marginal effects at the mean value of the moderator (log GDPpc and Institutions respectively). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

this reflects a moderating role – of either economic development (per capita income) or quality of institutions – in shaping the relationship between services trade policy and measures of access to services that are relevant for the SDGs. In particular, the negative sign implies that at higher values of the moderator variable it will be more likely to observe a positive and significant relationship between services trade openness and access to services. The interaction term between GDP per capita and the sectoral STRIs is statistically different from 0 for all three sectors, while the interaction between STRIs and the quality of domestic institutions is significant for finance and for transport. The moderating role of institutions suggested by these estimates is consistent with the literature on the complementarities between trade (policy) and institutions (see for instance Ahsan, 2013; Beverelli et al., 2017; Freund & Bolaky, 2008; Rodriguez & Rodrik, 2014). Accounting for these moderating factors increases substantially the goodness of fit, suggesting that conditioning on the level of economic development and/or the quality of institutions is an important component of the mechanism through which services trade policy relates to sustainable development. Overall, the results remain robust when removing countries with the lowest and highest values of access to services from each sample and to increasing the lag between the dependent variable and STRI. Regression tables for these robustness tests are reported in Appendix C.

To provide a first quantification of the results, the last two rows of Table 3 report the coefficients for $STRI_i$ and the respective standard errors estimated using demeaned moderator variables (log GDPpc and Institutions). These estimates can then be interpreted as the marginal effect of $STRI_i$ when the moderator variable (either log GDPpc or Institutions) is at its sample mean value. The signs of the coefficient estimates are negative for the interaction models in the ICT and Transport regressions and positive for the Finance regressions. With the exception of model (8) they are not statistically different from 0. This suggests that, controlling for log GDPpc or Institutions and their role in shaping the relationship between access to services and services trade policy, the positive relationship found between services trade openness and access to services becomes weaker, especially for financial and ICT services. The positive and statistically significant association is re-established only at higher levels of economic development or quality of institutions.

Finally, to better characterize the relationship between services trade policy and access to services as predicted by the multivariate regressions in Table 3 consider as an example the specification in column (2). In that model, the link between STRI and access to financial services is a function of per capita GDP.[12] The marginal effect of $STRI_{Finance}$ on $Access_{Finance}$ is equal to the partial derivative with respect to $STRI_{Finance}$ of Eq. (4) which is a linear function of GDPpc given by the formula $\beta_{Finance} + \delta_{Finance} \times$ GDPpc. This function is plotted in Fig. 2 by replacing the coefficients $\beta_{Finance}$ and $\delta_{Finance}$ with their empirical estimates from Table 3. Relevant statistics from the distribution of GDPpc are highlighted on the horizontal axis.

At the sample median of log GDP per capita the estimated marginal effect is slightly positive (0.021) but not statistically different from zero. It starts to become negative at levels of log per capita

[12] The same qualitative pattern emerges when considering the quality of institutions as moderator variable or when focusing on access to ICT and transport services regressions.

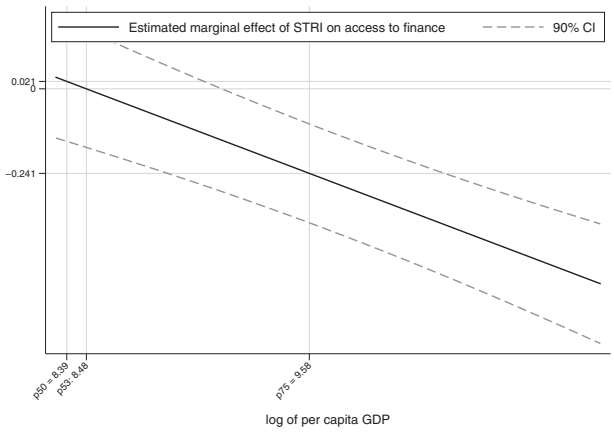

Fig. 2. Access to financial services and STRI Finance: the role of initial conditions.

GPD higher than 8.48 (53rd percentile of the distribution). At the 75th percentile of the distribution (log of per capita GDP equal to 9.58) the estimated marginal effect is equal to −0.241, indicating that a reduction in services trade barriers of 1 sd is associated with an increase in access to finance of about 0.15 of a sd.

Overall, these findings reveal a positive association at the individual sector level between services trade openness and access to services. This positive relationship is mediated by the level of economic development as well as by the quality of institutions at the country level. Thus, an open policy regime for trade in a specific services sector is associated with more (better) access to those services only when per capita GDP or the quality of regulations is high enough.

5. Conclusion

The realization of many of the SDGs depends in part on bolstering the performance of services sectors and improving access to specific services in developing countries. In principle, services trade policy should affect the availability and quality of services, and thus can be a relevant instrument for efforts to attain the SDGs. Our empirical analysis reveals a positive association between services trade and investment policies and indicators of access to services that matter for the realization of a number of SDGs, suggesting that reducing levels of services trade and investment restrictiveness could help enhance access to services sectors that are important to the SDGs. Many other policies will in practice be more important in affecting the performance of services, most obviously sector-specific policies and regulatory regimes. These appropriately are the focus of SDG-related analysis and projects around the developing world. When it comes to trade as a means of implementation for the SDGs, the focus of international attention is on measures to facilitate trade in goods and to enhance productive capacity in developing countries. This is certainly important, but it risks neglecting the potential complementary role that services trade and investment can play. Our goal in this paper has been to undertake an initial, exploratory analysis to assess whether services trade policies can make a contribution.

The results, while only indicative, suggest that analysis of the potential role of services trade policies should be part of country-level diagnostics and prioritization efforts. Most discussion on the scope to leverage the potential of trade to support achievement of the SDGs is restricted to merchandise trade. This is exemplified in the Agenda 2030 document that incorporates the SDGs, which highlights measures such as duty-free, quota-free access for exports of goods from LDCs (United Nations, 2015). A policy implication of our empirical results is that the focus on trade policies should not be limited to merchandise trade but also span services trade and investment regimes.

Lowering services trade costs is a neglected dimension of the challenge of realizing the SDGs. Of course, reducing the restrictiveness of services trade policies is just one mechanism to lower services trade costs. Moreover, the formal (explicit) barriers to trade that are captured by the STRIs are just one element of the set of policies that influence the level of competition on services markets and thus the prices and quality of services available in a country. When it comes to services trade, the quality of economic governance institutions is likely to be particularly important, given that FDI is a major vehicle for the provision of services by foreign suppliers. Identification of services trade policy-related priorities from the perspective of specific SDGs requires country-level analysis and panel datasets for both services trade policy variables and measures of services sector performance. Such data would allow the limitations of the econometric framework used in the present paper to be overcome, most notable the use of cross-sectional data on services trade policy and the associated parsimonious specifications that give rise to concerns about potential omitted variable bias. Panel data is needed to analyze the causal links between the liberalization of trade in services and the different outcome indicators. Whether countries that lower services trade restrictions achieve an improvement in sustainability goals compared to countries that do not can be determined through standard difference in difference analysis if panel data on the relevant policies can be compiled. Our results suggest that such efforts and analysis are worth undertaking as part of the broader effort to attain the SDGs. We hope that our findings will motivate more detailed research on the effects of services trade policies.

Conflict of interest

None.

Acknowledgement

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Appendix A. List of the sustainable development goals

Goal 1	End poverty in all its forms everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduce inequality within and among countries

Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12 Ensure sustainable consumption and production patterns
Goal 13 Take urgent action to combat climate change and its impacts
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development

Appendix B. Descriptives

Table B-1
Summary statistics: SDGs bivariate regressions.

Variable	Source	#	Mean	Median	Std. Dev.	Min.	Max.
Poverty reduction							
100-[poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)], avg 2010–2012	WDI, World Bank	78	79.0	92.6	27.4	8.7	99.9
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	78	27.1	22.1	14.9	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	78	33.2	33.1	0.6	31.9	34.4
Life expectancy							
Life expectancy in years at birth (total population), avg 2010–2012	WDI, World Bank	103	71.4	73.8	8.2	51.0	82.9
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	103	28.3	23.7	14.9	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	103	33.2	33.2	0.6	31.9	34.4
Income equality							
Income share held by lowest 20%, avg 2010–2012	WDI, World Bank	77	6.6	6.7	2.0	2.5	10.2
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	77	26.8	21.8	14.8	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	77	33.2	33.0	0.6	31.9	34.2
Gender equality							
Ratio of women to men enrolled at tertiary schools, avg 2010–2012	WDI, World Bank	90	1.1	1.2	0.3	0.4	1.9
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	90	28.1	23.5	14.8	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	90	33.2	33.2	0.6	31.9	34.4
Access to water							
People using basic drinking water services, rural (% of rural population), avg 2010–2012	WDI, World Bank	94	78.9	85.8	21.9	20.0	100.0
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	94	27.6	23.5	14.6	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	94	33.2	33.2	0.6	31.9	34.4
Emissions reduction							
1/[CO2 emissions (kg per 2005 US$ of GDP)], avg 2010–2012	WDI, World Bank	103	3.1	2.6	2.3	0.4	10.9
STRI (all sectors, all modes)	Services Trade Restrictiveness Database, World Bank	103	28.3	23.7	14.9	6.2	88.2
log of GDP per capita (PPP), avg 2010–2012	WDI, World Bank	103	33.2	33.2	0.6	31.9	34.4

Table B-2
Summary statistics: sector-specific SDGs regressions.

Variable	Source	#	Mean	Median	Std. Dev.	Min.	Max.
Financial services							
Account at a formal financial institution (% age 15+), avg 2010–2012	Global Financial Database, World Bank	100	48.6	40.6	30.3	3.7	99.7
STRI Finance (all modes)	Services Trade Restrictiveness Database, World Bank	100	21.9	20.8	18.0	0.0	87.4
log of GDP per capita (constant 2005 US$), avg 2010–2012	World Development Indicators Database, World Bank	100	8.3	8.4	1.6	5.0	11.0
Regulatory quality, avg 2010–2012	World Governance Indicators, World Bank	100	0.1	0.1	0.9	−1.9	1.9
ICT services							
Internet users (per 100 people), avg 2010–2012	Millennium Development Indicators, World Bank	103	38.9	36.9	26.7	1.1	92.0

(*continued on next page*)

Table B-2 (*continued*)

Variable	Source	#	Mean	Median	Std. Dev.	Min.	Max.
STRI Telecommunication (all modes/Mode 3)	Services Trade Restrictiveness Database, World Bank	103	26.9	25.0	25.4	0.0	100.0
log of GDP per capita (constant 2005 US$), avg 2010–2012	WDI, World Bank	103	8.3	8.3	1.6	5.0	11.0
Regulatory quality, avg 2010–2012	World Governance Indicators, World Bank	103	0.1	0.1	1.0	−1.9	1.9
Transport services							
High/very high quality of domestic road services (share of respondents), avg 2010 and 2012	WDI, LPI World Bank	100	0.3	0.2	0.3	0.0	1.0
STRI Transport (all modes)	Services Trade Restrictiveness Database, World Bank	100	31.1	29.1	18.0	3.1	79.8
log of GDP per capita (constant 2005 US$), avg 2010–2012	World Development Indicators Database, World Bank	100	8.3	8.3	1.6	4.998	10.999
Regulatory quality, avg 2010–2012	World Governance Indicators, World Bank	100	0.1	0.1	0.9	−1.9	1.9

Table B-3
STRI countries and estimation sample coverages.

HIC OECD										HIC non OECD										Upper MIC									
CODE	Samples									CODE	Samples									CODE	Samples								
AUS	P	L	I	Ge	W	E	F	C	T	BHR		L		Ge		E	F	C	T	ALB	P	L	I	Ge	W	E	F	C	T
AUT	P	L	I	Ge	W	E	F	C	T	KWT		L				E	F	C	T	ARG	P	L	I	Ge	W	E	F	C	T
BEL	P	L	I	Ge	W	E	F	C	T	LTU	P	L	I	Ge	W	E	F	C	T	BGR	P	L	I	Ge	W	E	F	C	T
CAN	P	L	I			E	F	C	T	OMN		L			W	E	F	C	T	BLR	P	L	I	Ge	W	E	F	C	T
CHL	P	L	I	Ge	W	E	F	C	T	QAT		L				E	F	C	T	BRA	P	L	I	Ge	W	E	F	C	T
CZE	P	L	I	Ge	W	E	F	C	T	RUS	P	L	I	Ge	W	E	F	C	T	BWA		L			W	E	F	C	T
DEU	P	L	I		W	E	F	C	T	SAU		L		Ge		E	F	C	T	CHN	P	L	I	Ge	W	E	F	C	T
DNK	P	L	I	Ge	W	E	F	C	T	TTO		L				E	F	C		COL	P	L	I	Ge	W	E	F	C	T
ESP	P	L	I	Ge	W	E	F	C	T	URY	P	L	I	Ge	W	E	F	C	T	CRI	P	L	I		W	E	F	C	T
FIN	P	L	I	Ge	W	E	F	C	T											DOM	P	L	I	Ge	W	E	F	C	T
FRA	P	L	I	Ge	W	E	F	C	T											DZA	P	L	I	Ge	W	E	F	C	T
GBR	P	L	I	Ge	W	E	F	C	T											ECU	P	L	I	Ge	W	E	F	C	T
GRC	P	L	I	Ge	W	E	F	C	T											HUN	P	L	I	Ge	W	E	F	C	T
IRL	P	L	I	Ge	W	E	F	C	T											IRN		L		Ge	W	E	F	C	T
ITA	P	L	I	Ge	W	E	F	C	T											JOR	P	L	I	Ge	W	E	F	C	T
JPN		L		Ge		E	F	C	T											KAZ	P	L	I	Ge	W	E	F	C	T
KOR	P	L	I	Ge		E	F	C	T											LBN	P	L	I	Ge		E	F	C	T
NLD	P	L	I	Ge	W	E	F	C	T											MEX	P	L	I	Ge	W	E	F	C	T
NZL		L		Ge	W	E	F	C	T											MUS	P	L	I	Ge	W	E	F	C	T
POL	P	L	I	Ge	W	E	F	C	T											MYS		L		Ge	W	E	F	C	T
PRT	P	L	I	Ge	W	E	F	C	T											NAM		L			W	E		C	T
SWE	P	L	I	Ge	W	E	F	C	T											PAN	P	L	I	Ge	W	E	F	C	T
USA	P	L	I	Ge	W	E	F	C	T											PER	P	L	I	Ge	W	E	F	C	T
																				ROU	P	L	I	Ge	W	E	F	C	T
																				THA	P	L	I	Ge	W	E	F	C	T
																				TUN	P	L	I	Ge	W	E	F	C	T
																				TUR	P	L	I	Ge	W	E	F	C	T
																				VEN		L			W	E	F	C	T
																				ZAF	P	L	I	Ge	W	E	F	C	T

Lower MIC										LIC									
CODE	Samples									CODE	Samples								
ARM	P	L	I	Ge	W	E	F	C	T	BDI		L		Ge	W	E	F	C	T
BOL	P	L	I		W	E	F	C	T	BGD	P	L	I	Ge	W	E	F	C	T
CIV		L		Ge	W	E		C	T	COD	P	L	I	Ge	W	E	F	C	T
CMR		L		Ge	W	E	F	C	T	ETH	P	L	I	Ge	W	E		C	T
EGY	P	L	I	Ge	W	E	F	C	T	KEN		L			W	E	F	C	T
GEO	P	L	I	Ge	W	E	F	C	T	KHM		L		Ge	W	E	F	C	T
GHA	P	L	I	Ge	W	E	F	C	T	MDG	P	L	I	Ge	W	E	F	C	T
GTM	P	L	I		W	E	F	C	T	MLI		L		Ge	W	E	F	C	T
HND	P	L	I	Ge	W	E	F	C	T	MOZ		L		Ge	W	E	F	C	T
IDN	P	L		Ge	W	E	F	C	T	MWI	P	L	I	Ge	W	E	F	C	T
IND	P	L	I	Ge	W	E	F	C	T	NPL	P	L	I	Ge	W	E	F	C	T
KGZ	P	L	I	Ge	W	E	F	C	T	RWA	P	L	I	Ge	W	E	F	C	
LKA	P	L	I	Ge	W	E	F	C	T	TZA	P	L	I	Ge	W	E	F	C	T
LSO	P	L	I	Ge	W	E	F	C		UGA	P	L	I	Ge	W	E	F	C	T
MAR		L		Ge	W	E	F	C	T	ZWE	P	L	I	Ge	W	E	F	C	T
MNG	P	L	I	Ge	W	E	F	C	T										
NGA		L		Ge	W	E	F	C	T										
NIC		L			W	E	F	C	T										
PAK	P	L	I	Ge	W	E	F	C	T										
PHL	P	L	I	Ge	W	E	F	C	T										
PRY	P	L	I	Ge	W	E	F	C	T										
SEN	P	L	I	Ge	W	E	F	C	T										
UKR	P	L	I	Ge	W	E	F	C	T										
UZB		L		Ge	W	E	F	C	T										
VNM	P	L	I	Ge	W	E	F	C	T										
YEM		L		Ge	W	E	F	C	T										
ZMB	P	L	I	Ge	W	E	F	C	T										

Notes: CODE refers to 3 digits ISO CODE. Samples are identified as follows: P stands for "Poverty reduction" and refers to the regression whose estimation results are reported in column 1 of Table 2; L for "Life expectancy" (column 2 in Table 2); I for "Income inequality" (column 3 in Table 2); Ge for "Gender equality" (column 4 in Table 2); W for "Access to water" (column 5 in Table 2); E for "Emissions reduction" (column 6 in Table 2); F refers to the SDG Finance regressions (columns 1–3 in Table 3); C to the SDG ITC regressions (columns 4–6 in Table 3); and T to the SDG Transport regression (columns 7–9 in Table 3).

Appendix C. Robustness checks

This Appendix presents a number of robustness checks for the estimates reported in Table 3. First, we replicate the estimation after removing from the sample those countries whose value of the access variables are either below the 1st percentile or above the 99th percentile from the respective distribution. Table C-1 shows that the signs, magnitude and statistical significance of all estimates are robust.

Second, we explore the stability of the baseline results reported in Table 3 when taking each dependent variable as the average value over a period after 2012. In particular we use the average of the available values for the 2013–2015 period for access to finance and ICT. We take instead the average of 2014 and 2016 values for access to transport as these are the first two available observations after 2012. Results are reported in Table C-2 and show overall robustness of the baseline findings when allowing a larger time lag between services trade policy and SDG outcomes. The only result that loses statistical significance is the moderating role of GDP per capita for the (negative and significant) effect of STRI on access to ICT services.

Finally, following the suggestions of an anonymous referee we conduct two further robustness exercises. First, we augment the ICT regressions (columns 4, 5 and 6 of Table 3) with a control dummy variable taking value one for each country that had a universal access/service policy implemented in 2008 (missing values

Table C-1
Services trade policy and service components of SDGs – Removing outliers from dependent variables' distributions.

Sector *i*	Finance			ICT			Transport		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$STRI_i$	−0.424**	1.852***	0.120	−0.307***	0.331*	0.013	−0.004**	0.016*	−0.000
	(0.190)	(0.470)	(0.129)	(0.116)	(0.174)	(0.090)	(0.001)	(0.008)	(0.001)
log GDPpc		20.941***			16.740***			0.138***	
		(1.616)			(0.978)			(0.033)	
$STRI_i \times$ log GDPpc		−0.218***			−0.042**			−0.002**	
		(0.048)			(0.019)			(0.001)	
Institutions			36.819***			26.319***			0.245***
			(2.994)			(3.125)			(0.037)
$STRI_i \times$ Institutions			−0.534***			−0.121			−0.003**
			(0.086)			(0.085)			(0.001)
Observations	97	97	97	99	99	99	68	68	68
R-squared	0.057	0.732	0.611	0.076	0.833	0.603	0.053	0.316	0.478
F-stat		141.955	69.574		232.796	54.669		13.428	29.442
p-value		0.000	0.000		0.000	0.000		0.000	0.000

Notes: All estimations include a constant. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C-2
Services trade policy and service components of SDGs – Increasing time lag between dependent variables and STRIs.

Sector *i*	Finance			ICT			Transport		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$STRI_i$	−0.477**	0.713**	0.061	−0.323***	0.042	0.008	−0.003*	0.022***	−0.001
	(0.192)	(0.308)	(0.158)	(0.120)	(0.142)	(0.097)	(0.002)	(0.007)	(0.001)
log GDPpc		18.637***			16.400***			0.191***	
		(1.294)			(0.900)			(0.031)	
$STRI_i \times$ log GDPpc		−0.076**			−0.006			−0.003***	
		(0.034)			(0.016)			(0.001)	
Institutions			32.099***			25.597***			0.361***
			(3.737)			(2.994)			(0.045)
$STRI_i \times$ Institutions			−0.379***			−0.072			−0.005***
			(0.140)			(0.091)			(0.001)
Observations	96	96	96	103	103	103	97	97	97
R-squared	0.078	0.745	0.547	0.077	0.833	0.567	0.020	0.369	0.448
F-stat		185.619	56.361		305.65	52.412		19.474	32.741
p-value		0.000	0.000		0.000	0.000		0.000	0.000

Notes: All estimations include a constant. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C-3
ICT regressions controlling for universal access.

Sector *i*	ICT		
	(1)	(2)	(3)
$STRI_i$	−0.328***	0.221	−0.007
	(0.122)	(0.166)	(0.084)
log GDPpc		16.262***	
		(1.040)	
$STRI_i \times$ log GDPpc		−0.032*	
		(0.019)	
Institutions			26.228***
			(2.892)
$STRI_i \times$ Institutions			−0.083
			(0.079)
Universal access policy dummy	8.526	1.551	7.019*
	(6.635)	(3.129)	(3.963)
Observations	88	88	88
R-squared	0.110	0.847	0.667

Notes: All estimations include a constant. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C-4
Placebo exercise for transport services.

Sector *i*	Transport		
	(1)	(2)	(3)
$STRI_i$	0.001	0.003	0.003*
	(0.002)	(0.010)	(0.002)
log GDPpc		0.110***	
		(0.041)	
$STRI_i \times$ log GDPpc		−0.000	
		(0.001)	
Institutions			0.177***
			(0.057)
$STRI_i \times$ Institutions			0.000
			(0.002)
Observations	100	100	100
R-squared	0.001	0.232	0.226

Notes: All estimations include a constant. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

are imputed looking at subsequent years up to 2012). This has the purpose of controlling for "affirmative action" type of regulatory measures which may have an effect on access to telecommunication services and that are not accounted for in (but potentially correlated with) the $STRI_{ICT}$. Sourcing the data from the ITU ICTeye database, we obtain information for 88 countries out of the 103 in the baseline estimation sample. As shown in Table C-3, results are robust to the addition of this control, notwithstanding the slightly reduced statistical power due to the smaller sample size.

Second, we conduct a placebo test for the Transport regressions (columns 7, 8 and 9 of Table 3) by replacing the dependent variable with a dimension of domestic logistic performance which is less

likely to respond to greater openness of transport services trade. Specifically, we use as alternative outcome variable the share of respondents to the domestic LPI survey declaring that the quality of national road infrastructures was not low nor too low (we took the average value across the 2010 and 2012 survey waves). Table C-4 reports the estimates for the parameters of this placebo specification. The pattern of results breaks down: more openness in transport services trade is not related with higher perceived quality of road infrastructure, not even for the high income countries or those with better institutions.

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