Trade in Services and Human Development: A First Look at the Links

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Abstract

Some services directly produce outputs that are important for human development, such as basic human services. Many other services are important inputs into the production and distribution of goods that are necessary for human development purposes. A more efficient services sector should mean that such goods and services can be made available to poor people more cost effectively and more broadly. In line with this reasoning, we find in the data that less restrictive services trade policies are associated with better human development outcomes across a range of sectors. Appropriate services trade liberalization can therefore promote human development directly through improved outcomes, in addition to indirectly effects through the income channel.

JEL Classification: F13, O15, O24

Contents

1. INTRODUCTION

The services sector is becoming increasingly important in modern economies: In many of the most developed, it can represent two thirds or even three quarters of all economic activity. International trade in services is also increasing in importance, and has been growing more rapidly than goods trade over recent years (World Trade Organization (WTO), 2008). It has also proved more resilient to the global financial crisis and resulting trade collapse (Borchert and Mattoo, 2009).

Existing work on services trade has largely concentrated on two questions that do not directly relate to human development. The first is the determinants of international trade flows. Using methodologies such as the gravity model, researchers have investigated the range of factors that can promote or inhibit trade in services. In general, they have found that many of the factors known to impact goods trade—geographical distance, market size, and cultural or historical factors—also exert a strong influence on services trade (Kimura and Lee, 2006).

The second strand of research on services trade has examined its implications for economic efficiency. These studies tend to have shown that a more restrictive services environment is associated with less efficient and lower-quality service provision, inefficient resource allocation, and slower economic growth (Arvis et al., 2010; Eschenbach and Hoekman, 2006; and Findlay and Warren, 2000). Because services are often important inputs in the production of manufactured goods, an inefficient services sector can have economy-wide implications—including a loss of competitiveness for manufacturers and exporters (Arnold, Mattoo, and Narciso, 2008).

It has long been recognized that services trade can influence economic and social outcomes through a variety of mechanisms. On the one hand, the economic gains from reform are significant (Organisation for Economic Co-operation and Development. (OECD), 2003; World Bank, 2002), and thus have the potential to promote human development by increasing per capita incomes.[1] We refer to this linkage as the income channel. However, there has been considerable controversy as to possible incompatibilities between openness to services trade and the provision of human development-related services such as electricity, water, and telecommunications. More broadly, a tension has emerged in the human development literature between the economic case for liberalizing services markets, and a perceived social case for maintaining stricter regulations in order to promote human development objectives (United Nations Conference on Trade and Development (UNCTAD), 2005; United Nations Development Programme (UNDP), 2006).

This paper will bring some of the first empirical evidence to bear on the direct links between services sector regulation and human development, going beyond the income channel. From an economic point of view, there are good reasons to believe that services liberalization might be positively—not negatively—associated with at least some human development outcomes. The reason is that more efficient provision of public and private services that are important for development can lead to lower prices for consumers, and more widespread availability of human development-related goods and services. For instance, Chile's liberalization and privatization of its telecommunications sector, along with its use of "smart" subsidies, led to a strong increase in availability of telecommunications services, and thus an increase in the general population's ability to access information and participate in political and social life (Wellenius, 2002).

A second example of the links between openness to services trade and human development outcomes is the role that the distribution sector plays in reducing the cost of moving vital goods to the hinterland of poor countries (Sarley, Allain, and Akkihal, 2005). Examples include basic foodstuffs, medicines, and mosquito nets. Only with a relatively well-developed and efficient distribution sector is it possible to ensure that these types of products reach

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[1] That per capita income is an important determinant of overall human development outcomes is reflected in the fact that the Human Development Index includes income as one of its components.

those who need them at lowest possible private and public cost. For instance, (Sarley, Allain, and Akkihal, 2005) found that the logistics cost of moving bed nets from port to hinterland in Liberia amounts to nearly half the cost of the product. Reducing the logistics cost wedge clearly has great potential to help bring more bed nets to those who need them.

In this paper, we examine the association between human development and services trade using simple nonparametric and parametric regression techniques. Our approach is to use an indicator of human development as the dependent variable, and (at least) per capita income and a measure of services sector policy restrictions as the independent variables. Our measures of policy restrictiveness vary at the sector level, so we run separate regressions using sector-specific measures of human development. Controlling for gross domestic product (GDP) per capita means that we take account of the fact that it is an important determinant of human development, and that it tends to be strongly inversely correlated with service sector restrictiveness. We face formidable data constraints, however, and are generally unable to include a wide range of other control variables due to small sample size. The best we can do is to pool observations from three sectors, and use country and sector fixed effects to control for other influences. Our results should therefore be interpreted as providing a first indication of some important correlations in the data. In particular, they should be interpreted in terms of associations between variables rather than as evidence of causal links.

The paper proceeds as follows. In the next section, we discuss our methodology and data in more detail. The section after that presents and discusses our results. We cover education, distribution, engineering, and telecommunications services, as well as pooled results across all sectors. The final section concludes with some policy implications and suggestions for further research.

2. METHODOLOGY AND DATA

Our objective in this paper is to provide some first evidence on the direct links between services trade policies and human development. By "direct", we mean independent of income effects. For example, we expect that a less restrictive policy environment in the distribution sector should lead to more efficient and less costly service provision, and thus to wider availability of important human development products such as vaccines. More generally, we will test the following hypotheses using nonparametric and parametric regression techniques:[2]

1. Is openness to trade in *education* services correlated with human development performance, as measured by indicators such as: the human development index, poverty rates, per capita income, and the democracy index?

2. Is openness to trade in *distribution* services correlated with human development performance in the form of higher immunization rates?

3. Is openness to trade in *engineering* services correlated with human development performance, as measured by indicators such as: road network density, and the availability of basic telecommunications services?

4. Is openness to trade in *telecommunications* services correlated with human development performance, as measured by indicators such as: the HDI knowledge and education index, a political voice and accountability indicator, and the availability of basic telecommunications services?

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[2] Ideally, we would also like to include health services in the above list. However, data constraints mean that it is currently impossible to do so. The appendix, instead, discusses the human development dilemma involved in health services, and gives a somewhat more descriptive analysis of possible correlation of health services with human development outcomes such as equity and access.

For each of these hypotheses, our dependent variable is a particular measure of human development performance. Most data are sourced from the World Bank's World Development Indicators and the Human Development Report. For data on democracy and political voice and accountability, we use Freedom House and the World Governance Indicators respectively. As our main independent variable, we use sector-specific measures of policy restrictiveness sourced from the Australian Productivity Commission (APC).[3] These data are currently available for a single year only (2000), which we take as our base year for all empirical work. The database includes two main measures per sector, each of which is a numerical summary of a wide range of underlying policy information. The first ("domestic") index represents the entry barriers and ongoing cost burdens to which domestic firms in a particular sector are subject. The second ("foreign") index contains the same information in respect of foreign firms. The difference between the two represents the extent to which trade policy is discriminatory vis-à-vis overseas operators.

Our methodology proceeds in two steps. First, we use a common nonparametric technique, the multivariate Locally Weighted Scatterplot Smoother, to examine graphically the correlations among the variables of interest. The advantage of this method is that it allows us to analyze the relationship between the dependent and independent variables without imposing any particular functional form. It proceeds by running an ordinary least squares (OLS) regression separately for each data point, using a centered 80% sample of the original data as an estimating window. In the second step of our methodology, we run standard OLS regressions using the same independent and dependent variables to confirm the impressions given by the nonparametric regressions.

3. RESULTS AND DISCUSSION

3.1 Education Services

Education services have an obvious link with human development. Liberal policies towards education can increase availability of education services and improve student access to them. Greater access boosts adult literacy and enrolment rates. As more people have access to education, this can also indirectly improve life expectancy, not only as a result of better knowledge of hygiene but also, possibly, because of greater life satisfaction and empowerment derived from being able to harness individual talents and capacities. Education also helps increase income. As increased human capital leads to growth in productivity (Benhabib and Spiegel, 1994), income growth follows. Education is also seen as a great 'equalizer' because it makes social and income mobility possible. Schooling also has an impact on the quality of public governance and democracy because it makes people more informed about society and enables them to better understand and assess potential risks and opportunities. Hence, education is an important foundation for democratic societies.

We test the links between various human development outcomes and education services by regressing restrictions in education services[4] against various human development indicators. We use the Human Development Index (HDI), the education index of the HDI, per capita GDP, and a democracy index. Our hypothesis is that more open trade in education services will help improve the overall HDI and the HDI-education index (literacy and enrolment). Since education helps people find jobs and earn their living, it should also contribute to overall development and increase per capita income—an example of the income channel,

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[3]The Restrictions on Trade in Services Database is available online at http://www.pc.gov.au/research/researchmemorandum/servicesrestriction

[4] We use restrictions on tertiary education services. The reason for this choice is that the collected restrictions on tertiary education across countries in the study by the Australian Productivity Commission are more comprehensive, while those for elementary and secondary education services are incomplete. The sample consists of 20 countries.

discussed above. Finally, because education increases social and political awareness, it should help develop a more robust democracy. The converse of the above is that restrictions in services trade, therefore, restrict democracy, restrain income growth, and dampen the overall achievement of better human development.

Unlike the other service sectors used in the rest of this paper, the APC study provides a breakdown of restrictions in education services trade by mode of supply. To take advantage of this wealth of information, we regress each of the modal restrictions on the different human development outcomes to understand which of the mode of supply restrictions exercise greater influence on human development. We also made a simple average of the different modal restriction indices to come up with a foreign restriction index,[5] which we also regress against each of the other chosen dependent variables to make the results for education services comparable with those of other service sectors below. But unlike the rest of the paper, we do not examine the domestic restriction index's effect on human development outcomes because data on domestic modal restrictions in the original APC study on education services are highly incomplete.[6]

The results show strong links between selected human development indicators and restrictions in education services. Significantly, of the four modes of supply, restrictions on commercial presence appear to have greater influence in affecting human development outcomes than restrictions in cross-border trade, consumption abroad, or movements of natural persons.

Nonparametric estimates using the HDI education index[7] show that foreign restrictions on commercial presence in education services have a more pronounced negative effect than restrictions on other modes of supply. Figure 1 shows that while restriction indices on consumption abroad, cross-border supply, and movement of natural persons have ambiguous relationships with education outcomes, the relationship in the case of commercial presence restrictions is clearly negative. Using the overall HDI index yields similar results as shown in Figure 1.

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[5] The limitation with taking the simple average of the modes of supply restrictions is that each of the modes is assumed to have equal weight or importance in the overall restrictions to trade in education services. Nonetheless, we try this simple method to be consistent with the rest of the paper, which uses overall foreign restriction indices.

[6] For details of the restriction index construction for education services, see Nguyen-Hong and Wells (2003).

[7] The HDI education index is comprised of literacy rates and school enrolment rates.

Figure 1: Non-parametric Regressions of Human Development Index (HDI) Education Index Variable on Indices of Education Services Restrictiveness
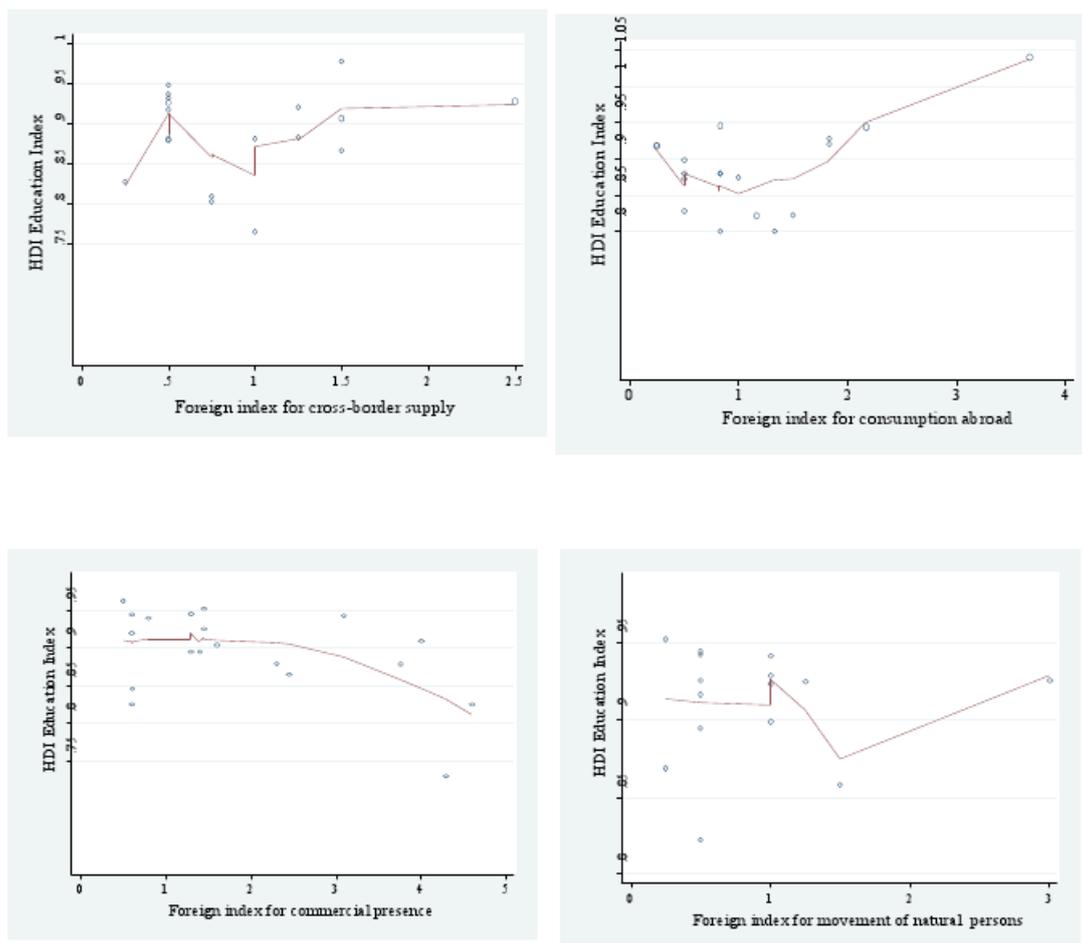
Data Source: UNDP (2005); Nguyen-Hong and Wells (2003).

Table 1 corroborates the statistically strong negative correlation between foreign restrictions on commercial presence and the HDI.[8] Per capita GDP (in log form) strongly and positively correlates with the HDI indices, while restrictions on the commercial presence mode of supplying education services correlate negatively. The correlation is slightly weaker with the HDI than with the HDI education index, which is to be expected in light of the broader range of influences for which the former accounts. We also regress the simple average of the modal restrictions, the foreign restriction index, on the HDI and the HDI education index, but this yields no statistically significant results. This perhaps reflects the fact that the three other modes of supply—consumption abroad, cross-border, and movement of natural persons— have been found to have insignificant relationships with the HDI indices.

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[8] The HDI is comprised of both education and health indicators. Education indicators include enrolment and literacy rates, while health indicators include life expectancy and income.

Table 1: Regressions on Human Development Indicators (HDI)

	(1)	(2)	(3)	(4)
Dependent Variable:	HDI	HDI	HDI Education Index	HDI Education Index
Log (gross domestic product per capita)	0.81***	0.087***	0.048***	0.056**
	(0.01)	(0.012)	(0.15)	(0.022)
Commercial Presence	-0.012*		-0.024**	
	(0.01)		(0.011)	
Foreign Index (Combined)		-0.01		-0.027
		(0.02)		(0.026)
Constant	0.113	0.045	0.495***	0.402*
	(0.088)	(0.13)	(0.149)	(0.228)
Observations	19	19	19	19
R^2	0.92	0.91	0.69	0.64

Notes: All regressions are estimated using ordinary least squares. Standard errors are reported in parentheses. Separate regressions using other modes of supply yielded no significant results. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: UNDP (2005) for human development index (HDI) and HDI education index; World Development Indicators (WDI) online database of the World Bank for GDP per capita; and Nguyen-Hong and Wells (2003) for foreign restrictiveness indices in higher education.

We next tried other human development indicators like per capita income and a democracy index as dependent variables. Non-parametric estimates with the democracy index and log per capita GDP as dependent variables yield a different result from that of HDI indices. In these non-parametric regressions, all modes of supply restrictions show a significantly negative correlation with per capita income (Figure 2) and a positive correlation with the democracy index. The democracy index represents a worsening of democratic conditions as the index rises, hence the positive relationship with education services restrictions (Figure 3).

Figure 2: Non-parametric Regressions of GDP per capita on Indices of Education Services Restrictiveness
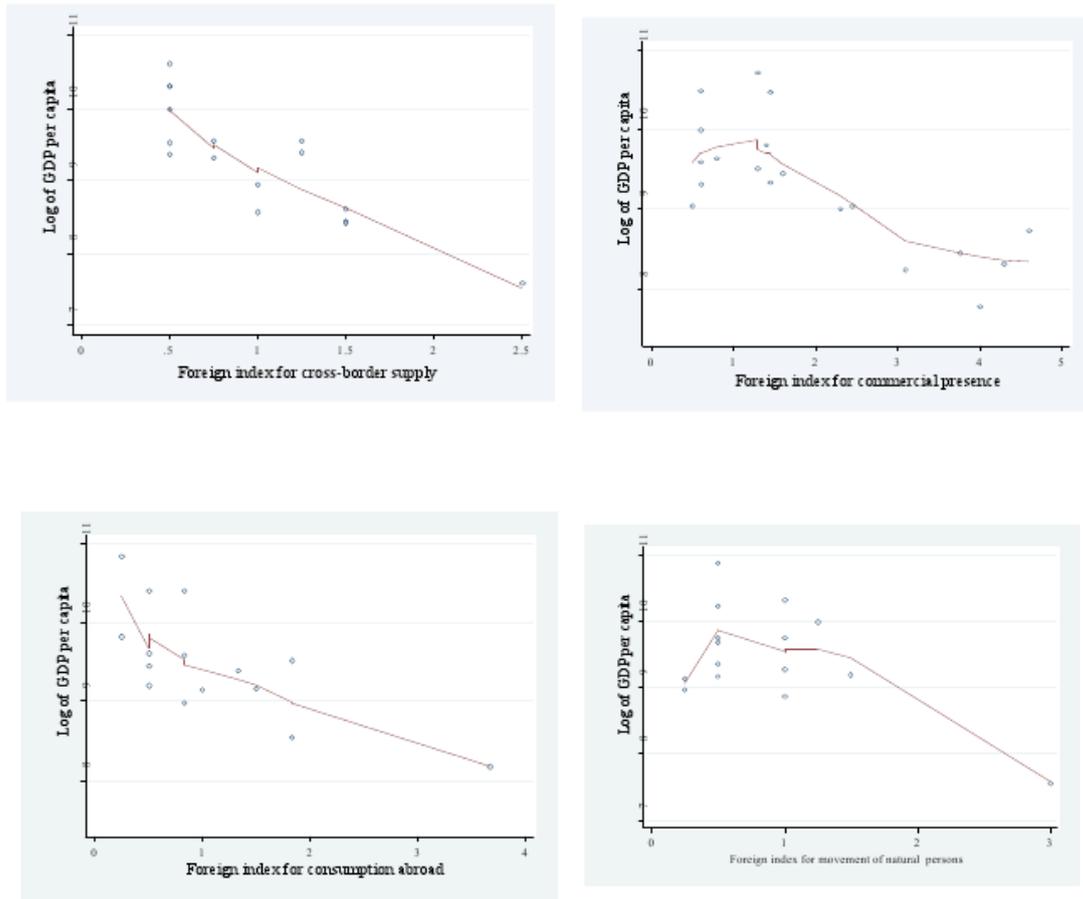
Data Source: UNDP (2005); World Bank (2002); Nguyen-Hong and Wells (2003).

**Figure 3: Non-parametric Regressions of the Democracy Index on Indices of
Education Services Restrictiveness**
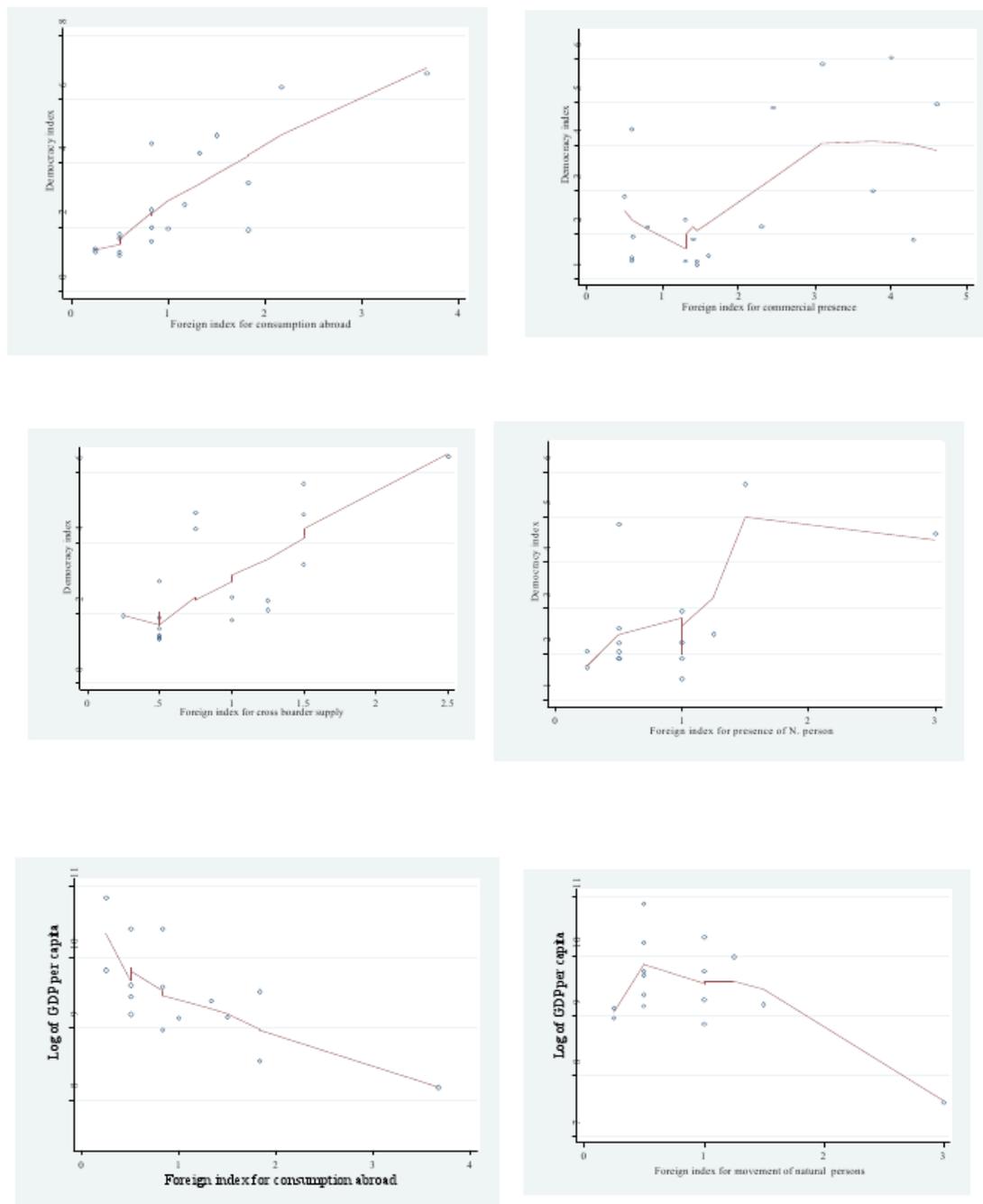
Data Source: UNDP (2005); World Bank (2002); Nguyen-Hong and Wells (2003).

Table 2 validates the results from the non-parametric estimates.[9] Least squares regression results show that all modes of supply restrictiveness indices have negative signs and strong statistical significance. Regressions with the democracy index as the dependent variable likewise yields a significantly positive correlation. The result shows that greater restriction on education services, in all modes of supply, is correlated with a worsening of democracy. We also tried regressing poverty rates, the Gini inequality index, and the cost of tertiary

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[9] We are conscious that the per capita GDP regressions exclude a number of variables usually included in income and growth regressions. The reason is our very small sample size. These results should be taken as indicative only.

education on the restriction indices. The poverty rates regressions yielded no statistically significant correlation with any of the restriction indices for education services. This is surprising as one would immediately associate greater provision and efficiency of education services with opening opportunities to a wider population and thus reducing poverty, but the result is not sufficiently conclusive. One reason might be that we are using restrictions in the tertiary education sector, due to unavailability of data for the more poverty-relevant primary and secondary sectors. Using the Gini coefficient as the dependent variable yielded significant results for restrictions in commercial presence, but with a positive sign. This means that, instead of education supplied via commercial presence reducing inequality, it instead worsens it. Again, this might be linked to our use of tertiary education data. The regression of cost of education,[10] however, yielded a significant negative correlation with restrictions on commercial presence. That is, education services that are open to foreign commercial presence are associated with a lower cost of education.

Table 2: Regressions on Income and Democracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable:	Log of gross domestic product (GDP) per capita					Democracy Index				
Population Growth	-0.768***	-0.382*	-0.756***	-0.723***	-0.534***					
	(0.16)	(0.206)	(0.155)	(0.208)	(0.174)					
Log (GDP per capita)						-0.244	-0.457	-0.368	-0.9056*	0.038
						(0.34)	(0.48)	(0.35)	(0.42)	(0.39)
Consumption Abroad	-0.749***					1.4921***				
	(0.17)					(0.4)				
Commercial Presence		-0.461***					0.5891*			
		(0.16)					(0.29)			
Cross-Border Supply			-1.22***					2.0013***		
			(0.26)					(0.41)		
Presence of Natural Persons				-0.846***					1.2669***	
				(0.16)					(0.41)	
Foreign Index (Combined)					-0.985***					2.0615***
					(0.21)					(0.42)
Constant	10.75***	10.54***	11.078***	10.77***	11.003***	3.441	5.874	4.402	10.1571**	-0.145
	(0.23)	(0.31)	(0.32)	(0.22)	(0.31)	(3.45)	(4.81)	(3.51)	(4.23)	(4)
Observations	18	19	18	15	19	18	19	18	15	19
R^2	0.65	0.54	0.6	0.46	0.67	0.64	0.44	0.59	0.65	0.67

[10] The cost of education is represented by expenditure per student in tertiary education as a percentage of per capita GDP. Poverty rates are the percentage of the population living below $1.25/day. For the poverty equation, we used tobit regression due to the many zeros in the dependent variable representing developed country situations.

Notes: All regressions are estimated using ordinary least squares. Standard errors are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: Freedom House (www.freedomhouse.org) for the Democracy Index; World Development Indicators (WDI) online database of the World Bank for GDP per capita and population growth; and Nguyen-Hong and Wells (2003) for the foreign restrictiveness indices in higher education.

Using individual components of the HDI as dependent variables, however, surprisingly did not yield the predicted results. For example, regressions with life expectancy, adult literacy rates, and gross enrolment in tertiary education as dependent variables did not give significant correlations with the restrictiveness index. Neither did restrictions in education services show a correlation with the size of the college-educated labor force. However, restrictions in consumption abroad (mode 2), cross-border supply (mode 1), and movement of natural persons (mode 4) are negatively correlated with the life satisfaction index (Table 3).[11]

Table 3: Results of Regressions Using Different Dependent Variables

Dependent Variable	Result
Life Expectancy at Birth	No significance observed for any restrictiveness index.
Adult Literacy	No significance observed for any restrictiveness index.
Gross Enrollment in Tertiary Education	No significance observed for any restrictiveness index.
Labor Force with Tertiary Education (% of Total Labor Force)	No significance observed for any restrictiveness index.
Predicted Life Satisfaction Index (Value Range 0-10 (High Satisfaction))	Foreign restrictiveness indices for *consumption abroad, cross border supply*, and *movement of natural persons* are significant at 1%, 5%, and 10% respectively.
Gini Index	Foreign restrictiveness index for *commercial presence* is significant at 10%, but the sign is negative.
Expenditure per Student, Tertiary (% of gross domestic product per capita)	Foreign restrictiveness index for *consumption abroad* and *overall foreign index* are significant at 1% and 10% respectively with positive coefficients.
Poverty Headcount Ratio at $1.25 a Day (purchasing power parity) (% of Population)	No significance observed for any restrictiveness index.

Source: Authors' own estimates.

In summary, our results show that restrictions on education services are not only associated with poorer human development results, but also that some restrictions on modes of supply have a greater impact than others. In particular, it appears that restrictions on commercial presence take on greater importance for human development than restrictions on other

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[11] Detailed regression results used in Table 3 are available from the authors upon request.

modes of supply. But for democracy and per capita income, all modes of supply restrictions are significantly associated with these outcomes. The life satisfaction index is negatively correlated with restrictions on all modes of supply except commercial presence, while the Gini coefficient regression seems to suggest that restrictions in commercial presence, surprisingly, lessen inequality.

3.2 Distribution Services

There are many potential links between distribution services and human development. A variety of human development outcomes rely on the ability to move important goods efficiently and cost-effectively from one point to another. (Sarley, Allain, and Akkihal, 2005), for instance, analyze the cost of upgrading supply chains as part of meeting the increased movements of certain goods inherent in achieving the Millennium Development Goals. One example is agricultural staples: an effective distribution network enables poor households to access markets for basic produce, either as buyers or sellers. Economic and nutritional wellbeing are therefore both linked to the quality of distribution services.

Vaccines are another important example. Most developing countries lack the means to manufacture basic vaccines locally. Even in those with domestic capacity, economies of scale mean that production is usually concentrated in just a few central locations. To maximize the human development impact of the availability of vaccines, it is of course vital that they be distributed to those in need. An efficient, high quality, and cost-effective distribution network represents a necessary intermediate link in the chain between vaccine producers and consumers.[12] To the extent that regulation of the sector influences prices, costs, and quality of service provision, it is therefore possible that trade and regulatory policies in distribution directly affect human development outcomes such as vaccine availability.

Non-parametric regression analysis provides some initial support for this hypothesis of a link between distribution sector regulation and vaccine availability. Figure 4 shows that even after controlling for GDP per capita, there is a noticeable negative association between the restrictiveness of domestic regulation in the distribution sector, and the rate of the diphtheria, pertussis, and tetanus (DPT) vaccination. A very similar relationship is observed using the measles immunization rate as the dependent variable (Figure 5).

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[12] Public procurement policies are also likely to affect the vaccination outcomes we are interested in here. However, we do not have data with which to measure such policies in the same way as we can measure restrictions on trade in distribution services.

Figure 4: Non-parametric Regression of the Diphtheria, Pertussis, and Tetanus (DPT) Immunization Rate on per capita Gross Domestic Product (GDP) and an Index of Distribution Services Restrictiveness. One Outlier Excluded
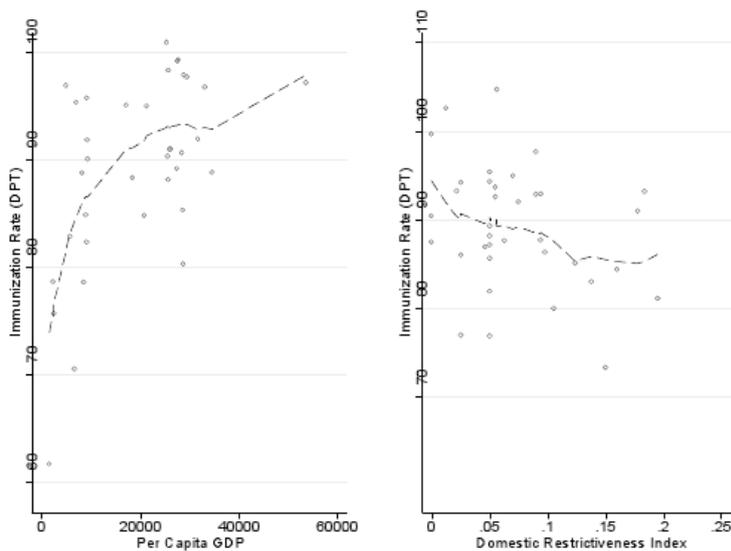
Data source: World Development Indicators online database of the World Bank; Australian Productivity Commission's database of restrictions to services trade for the restrictiveness indices.

Figure 5: Non-parametric Regression of the Measles Immunization Rate on per capita Gross Domestic Product (GDP) and an Index of Distribution Services Restrictiveness One Outlier Excluded
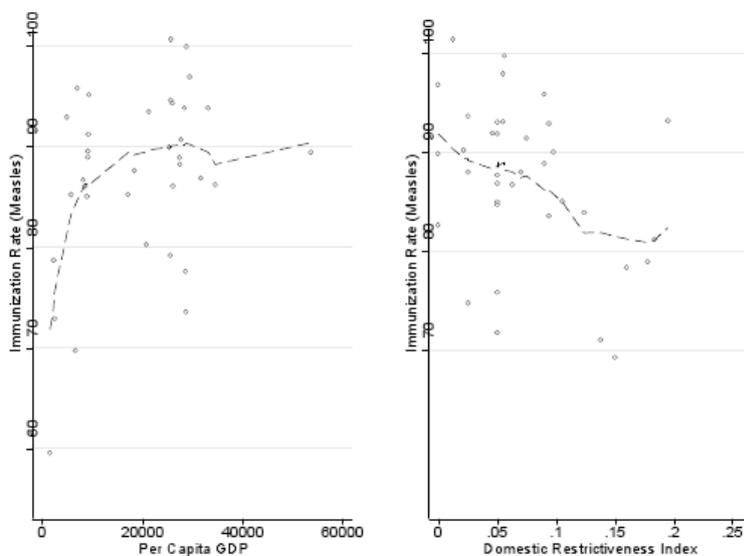
Data source: World Development Indicators online database of the World Bank; Australian Productivity Commission's database of restrictions to services trade for the restrictiveness indices.

Evidence from standard OLS regressions confirms these insights (Table 4).[13] Of course, results need to be interpreted cautiously in light of the simplicity of the model and the very small number of observations. But the first indications are that a more restrictive set of distribution sector regulations is associated with lower immunization rates: both regressions using the domestic restrictiveness index show negative and statistically significant coefficients. This result is robust to the inclusion of per capita GDP as a control variable. This last point is important because of the strong role played by income in determining human development outcomes such as vaccination rates. Our results show that even after controlling for income, more liberal distribution sector regulations are linked to stronger immunization outcomes.

Interestingly, it is only the regressions using the domestic restrictiveness index that produce significant results (columns 1 and 3). Neither regression using the foreign restrictiveness index has a statistically significant coefficient (columns 2 and 4). This result suggests that it is the overall quality of regulation that matters for distribution sector performance, not just the degree of discrimination against foreign service providers.

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[13] Results are qualitatively identical if we use a fractional logit model to take account of the fact that the dependent variable is bound between zero and unity (Papke and Wooldridge, 1996).

Table 4: Regression Results Using Distribution Restrictiveness Indices

	(1)	(2)	(3)	(4)
Dependent Variable:	Immunization Rate for diphtheria, pertussis, and tetanus (DPT)	Immunization Rate (DPT)	Immunization Rate (Measles)	Immunization Rate (Measles)
Log (GDP per capita)	6.697***	6.981***	5.096**	4.880**
	(0.000)	(0.001)	(0.014)	(0.043)
Domestic Restrictiveness Index	-40.677*		-59.944**	
	(0.082)		(0.049)	
Foreign Restrictiveness Index		10.509		-10.358
		(0.425)		(0.495)
Constant	27.800*	19.971	42.503**	42.681*
	(0.086)	(0.287)	(0.031)	(0.076)
Observations	36	37	36	37
R^2	0.46	0.42	0.32	0.22

Notes: All regressions are estimated using OLS with robust standard errors. Prob. values are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%). One outlier is excluded in each regression.

Data Source: World Development Indicators online database of the World Bank for immunization rates and GDP per capita; and the Australian Productivity Commission's database of restrictions to services trade for the restrictiveness indices.

For this sector, we can also adopt an alternative empirical strategy that allows us to greatly increase the number of observations in our sample. To do so, we use one component of the World Bank's Logistics Performance Index (LPI 2007) as a measure of sectoral performance in place of the Australian Productivity Commission regulatory indicators. The LPI is based on a survey administered to around 1,000 logistics professionals around the world. By asking them to rate performance in a number of countries with which they trade, the overall sample size is increased to around 5,000 observations. The LPI itself is a composite of six indices based on average responses to survey questions. The component we use here asks respondents to rate on a one to five scale the quality and competence of logistics services in a given country.

Although a valid measure of the performance of service providers in this area, the LPI data clearly differ from the policy restrictiveness measures used elsewhere in this paper in that they measure private sector development rather than public sector regulation. Nonetheless, using the LPI data makes it possible to greatly expand the sample, and thus to include additional explanatory variables that help demonstrate the robustness of our results. In particular, we include controls for the total spend on health in GDP—to account for the fact that a higher level of health spending should produce higher vaccination rates—and the

overall level of government effectiveness, i.e. the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. We also include an interaction term between the LPI services component and per capita GDP, to account for the possibility that logistics affects vaccination rates differently in developed versus developing countries.

Results using OLS are in Table 5.[14] The signs of all control variables are as expected: countries at higher incomes, those that spend more on health, and those with more effective governments tend to have higher levels of immunization for DPT and measles. All control variables have coefficients that are statistically significant at the 1% level. In addition, the LPI services component has a positive and 1% significant coefficient: in line with the smaller sample results presented above, better logistics performance is associated with higher immunization rates. Interestingly, the interaction term is negative and 1% statistically significant, which indicates that the link between performance in logistics services and vaccination rates becomes weaker as countries get richer. This result highlights the main argument of this paper, namely that getting service delivery right is particularly important for poor people in developing countries.

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[14] Again, we obtain qualitatively identical results using the fractional logit model.

Table 5: Regression Results Using the Logistics Performance Index (LPI)

	(1)	(2)
	Immunization Rate for diphtheria, pertussis, and tetanus (DPT)	Immunization Rate (Measles)
LPI (services)	0.475***	0.448***
	(0.006)	(0.004)
LPI*Log (GDP per capita)	-0.056***	-0.054***
	(0.002)	(0.001)
Log (GDP Per Capita)	0.171***	0.166***
	(0.000)	(0.000)
Total Health Spending % GDP	1.156***	0.842*
	(0.006)	(0.062)
Government Effectiveness Index	0.072***	0.071**
	(0.007)	(0.014)
Constant	-0.611	-0.546
	(0.139)	(0.146)
Observations	142	142
R^2	0.355	0.305

Notes: All regressions are estimated using ordinary least squares with robust standard errors. Prob. values are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: World Development Indicators (WDI) online database of the World Bank for immunization rates, GDP per capita, and total spending on health as a percentage of GDP; the World Governance Indicators for the index of government effectiveness; and the World Bank's Logistics Performance Index for the LPI services component.

3.3 Engineering Services

We also expect regulation in the engineering services sector to be correlated with a number of important human development outcomes. Engineering services are an important input in many development areas. Construction projects that improve the quality of life in rural areas are an example. So too is the extension of basic services such as telephony. To the extent that engineering services are available on a high-quality and cost-effective basis, these kinds of projects become easier and less expensive to implement. We therefore expect that a regulatory stance that tends to reduce cost in the sector should be associated with better development outcomes in these areas.

In this case, the data provide only mixed evidence in relation to this hypothesis. Non-parametric regressions using telecommunications outcomes as the dependent variables tend to support it. This is true for the number of telephone users and Internet users per 100 population (Figures 6–7): in both cases, there is an apparent negative relationship between engineering sector restrictiveness and development outcomes after controlling for per capita income. Surprisingly, the same result does not hold for road density: there is no obvious relationship between this outcome variable and engineering sector restrictiveness (Figure 8).

Figure 6: Non-parametric Regression of the Number of Telephone Users per 100 Population on per capita Gross Domestic Product (GDP) and an Index of Engineering Services Restrictiveness
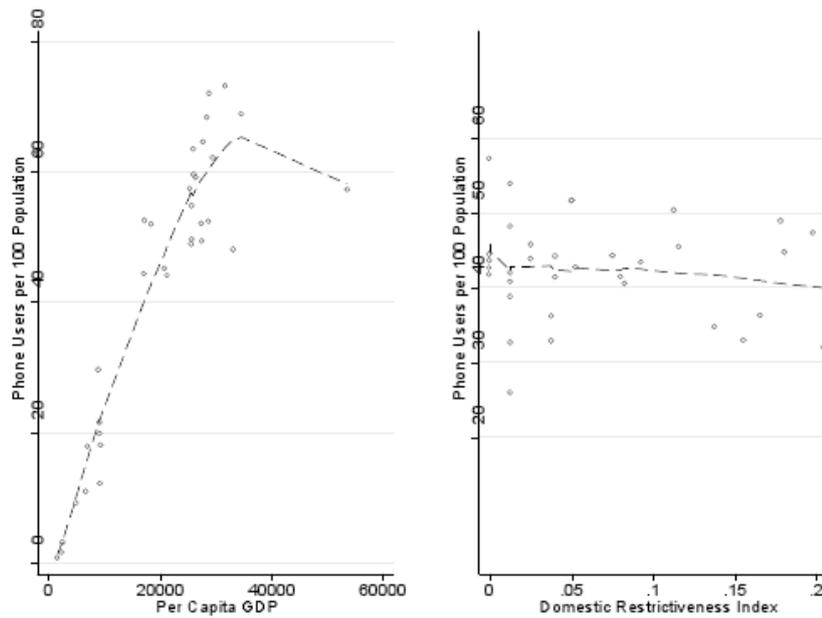
Data Source: World Development Indicators online database of the World Bank; Australian Productivity Commission database of restrictions to services trade.

Figure 7: Non-parametric Regression of the Number of Internet Users per 100 Population on per capita Gross Domestic Product (GDP) and an Index of Engineering Services Restrictiveness
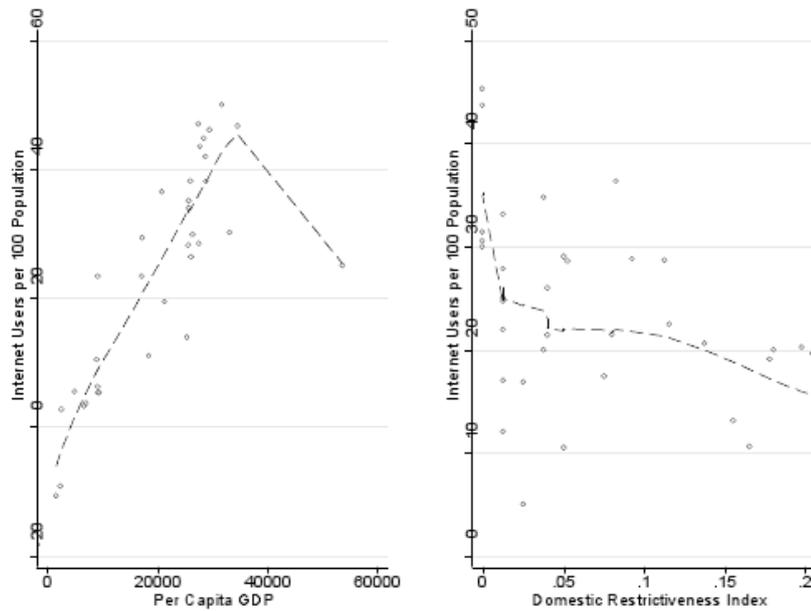
Data Source: World Development Indicators online database of the World Bank; Australian Productivity Commission database of restrictions to services trade.

Figure 8: Non-parametric Regression of Road Density on per capita Gross Domestic Product (GDP) and an Index of Engineering Services Restrictiveness
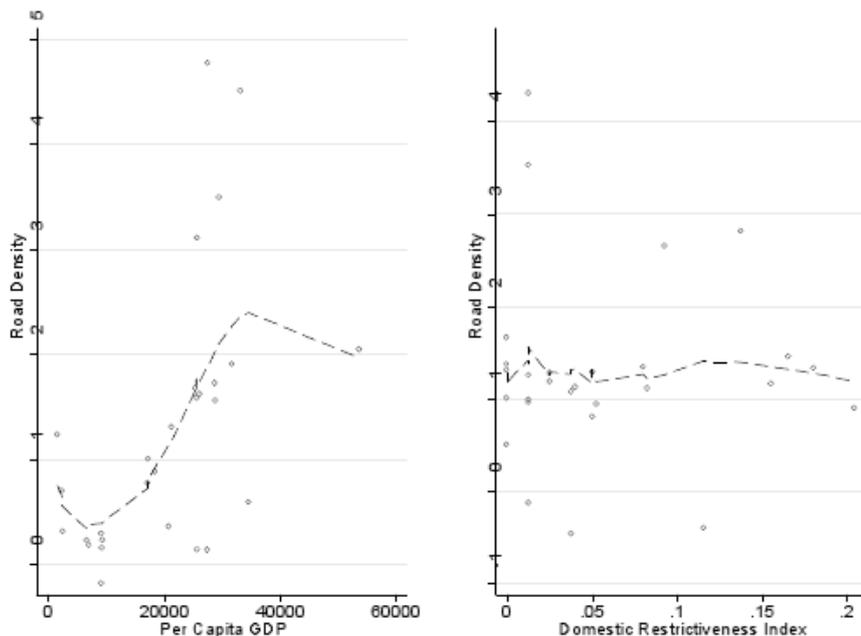
Data Source: World Development Indicators online database of the World Bank; Australian Productivity Commission database of restrictions to services trade.

Results from OLS regressions are similar to those from the nonparametric exercise (Table 6). We find that after controlling for per capita income, the restrictiveness of regulation in the engineering sector is associated with weaker outcomes in terms of telephone users (foreign index, column 4) and Internet users (domestic index, column 1). The same is true for road network density using the foreign index (column 6). Whereas in distribution services it is only the domestic index that matters for performance, here we find evidence that general regulation and the degree of discrimination vis-à-vis foreign service providers are both important.

Table 6: Regression Results Using Engineering Restrictiveness Indices

	(1)	(2)	(3)	(4)	(5)	(6)
	Internet Users per 100 Population	Internet Users per 100 Population	Phone Users per 100 Population	Phone Users per 100 Population	Road Density	Road Density
Log (GDP per capita)	15.347***	13.889***	23.644***	22.807***	0.703*	0.601**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.022)	(0.006)
Domestic Restrictiveness Index	-47.962**		-15.535		-0.870	
	(0.047)		(0.442)		(0.817)	
Foreign Restrictiveness Index		-22.015		-26.271*		-3.952*
		(0.177)		(0.074)		(0.096)
Constant	-121.343***	-106.656***	-185.161***	-173.644***	-5.439*	-3.864*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.044)	(0.050)
Observations	34	34	34	34	28	28
R^2	0.619	0.602	0.840	0.851	0.216	0.295

Notes: All regressions are estimated using ordinary least squares with robust standard errors. Prob. values are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: World Development Indicators online database of the World Bank for Internet and phone users per 100 population, road density, and GDP per capita; and the Australian Productivity Commission database of restrictions to services trade for the restrictiveness indices.

3.4 Telecommunications Services

In the information age, access to basic telecommunication services is an important part of civic life. It enables citizens to participate in economic, social, and political life. It enables them to access basic information and to communicate more easily with others. Extension of basic telecommunication services to the hinterland has long been an important development objective. Regulation has traditionally played a strong role in shaping the sector. In recent decades, however, there has been a strong move towards liberalization, which has been accompanied by a general extension of the availability of basic services.

Indeed, the telecommunications sector provides some of the strongest evidence in favor of our core hypothesis that less restrictive regulation is linked to better human development outcomes. In terms of access to basic services, nonparametric regressions strongly suggest an inverse relationship between regulatory restrictiveness and access to telephony and the Internet (Figures 9–12). The same is true for the HDI education index and the World Governance Indicators (WGI) voice and accountability indicator. In line with the discussion in the previous paragraph, these results suggest that better regulation not only increases access to basic services, but can also help improve a country's general development and

governance environment by improving internal communication links.

Figure 9: Non-parametric Regression of the Number of Internet Users per 100 Population on per capita Gross Domestic Product (GDP) and an Index of Telecommunication Services Restrictiveness
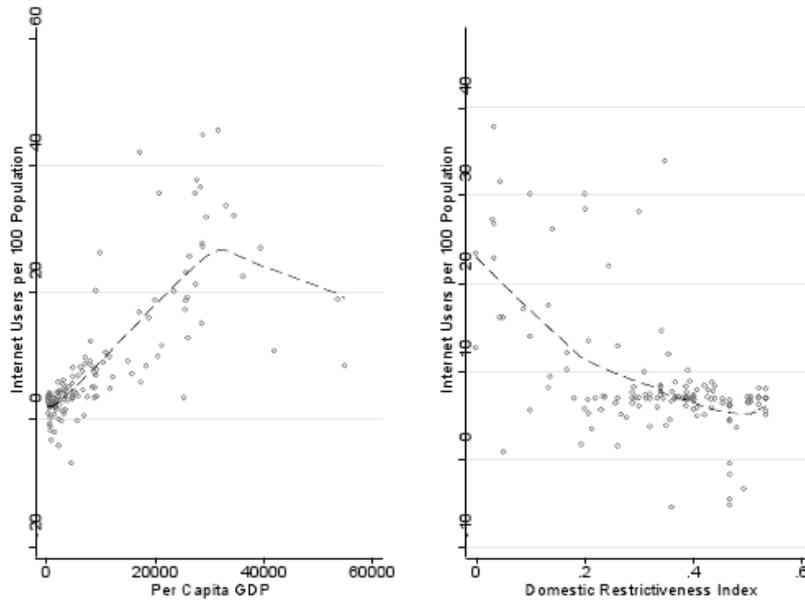
Data Source: World Development Indicators online database of the World Bank; Australian Productivity Commission's database of restrictions to services trade.

Figure 10: Non-parametric Regression of the Number of Telephone Users per 100 Population on per capita Gross Domestic Product (GDP) and an Index of Telecommunication Services Restrictiveness
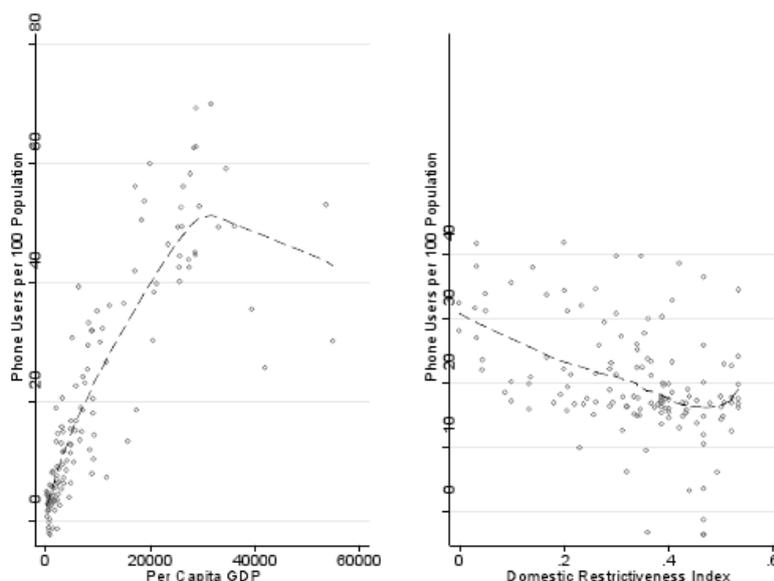
Data Source: World Development Indicators database of the World Bank; Australian Productivity Commission database of restrictions to services trade.

Figure 11: Non-parametric Regression of the Human Development Index (HDI) Education Index on per capita Gross Domestic Product (GDP) and an Index of Telecommunication Services Restrictiveness
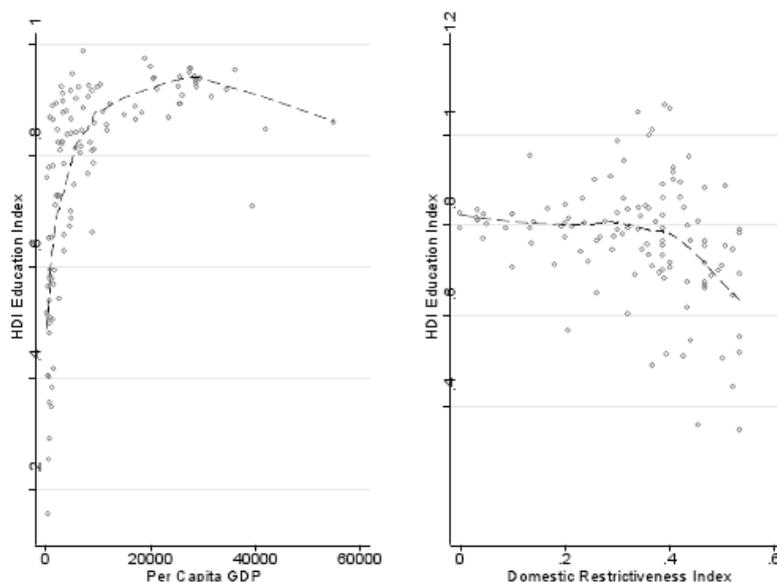
Data Source: Human development index website; Australian Productivity Commission database of restrictions to services trade.

Figure 12: Non-parametric Regression of the World Governance Indicators (WGI) Voice and Accountability Index on per capita Gross Domestic Product (GDP) and an Index of Telecommunication Services Restrictiveness
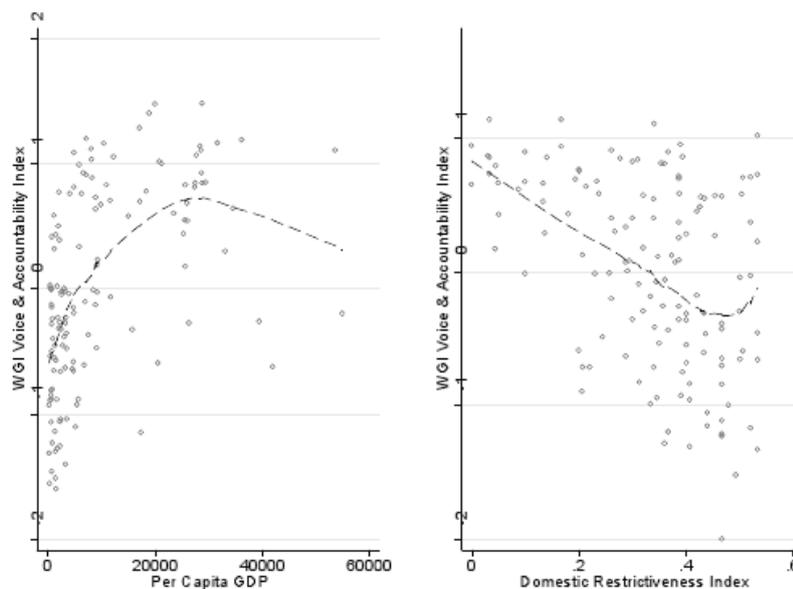
Data Source: World Development Indicators online database of the World Bank; World Governance Indicators; Australian Productivity Commission database of restrictions to services trade for the restrictiveness indices.

Parametric OLS regressions confirm these insights (Table 7). As in Table 5 above (LPI regressions), the expanded sample size available with the telecommunications data makes it possible to include some additional control variables, namely: overall government effectiveness (as defined above); and total government spending as a percentage of GDP, as an indicator of the extent to which the state is involved in service provision. The control variables generally have the expected signs, but they are not always statistically significant. In all eight regressions, however, the indices of regulatory restrictiveness are negatively and 1% statistically significantly associated with our various development outcome measures, i.e. access to the Internet and telephony, education, and voice and accountability in government. Together, these results provide strong evidence in favor of our core hypothesis.

Table 7: Regression Results Using Telecommunications Restrictiveness Indices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Internet Users per 100 Population	Internet Users per 100 Population	Phone Users per 100 Population	Phone Users per 100 Population	HDI Education Index	HDI Education Index	World governance indicators (WGI) Voice & Accountability Index	WGI Voice & Accountability Index
Log (per capita GDP)	0.004	0.003	0.056***	0.055***	0.120***	0.118***	-0.026	-0.029
	(0.545)	(0.666)	(0.000)	(0.000)	(0.000)	(0.000)	(0.710)	(0.665)
Domestic Restrictiveness Index	-0.231***		-0.220***		-0.383***		-0.918*	
	(0.000)		(0.005)		(0.001)		(0.065)	
Foreign Restrictiveness Index		-0.126***		-0.120***		-0.187***		-0.623**
		(0.000)		(0.005)		(0.002)		(0.022)
Government Effectiveness Index	0.093***	0.092***	0.108***	0.108***	-0.056**	-0.051*	0.729***	0.702***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.037)	(0.056)	(0.000)	(0.000)
Government Spending % GDP	-0.038	-0.037	0.105	0.107	0.278	0.252	-0.066	0.021
	(0.747)	(0.749)	(0.504)	(0.500)	(0.326)	(0.387)	(0.952)	(0.985)
Constant	0.123**	0.131**	-0.228**	-0.222**	-0.153	-0.151	0.447	0.529
	(0.029)	(0.021)	(0.012)	(0.013)	(0.375)	(0.382)	(0.464)	(0.375)
Observations	132	132	133	133	113	113	133	133
R^2	0.768	0.768	0.838	0.838	0.595	0.587	0.670	0.676

Notes: All regressions are estimated using ordinary least squares with robust standard errors. Prob. values are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: World Development Indicators online database of the World Bank for Internet and phone users per 100 population, GDP per capita, and total government spending as a percentage of GDP; the human development index website for the education index; the World Governance Indicators for the voice and accountability and government effectiveness indices; and the Australian Productivity Commission's database of restrictions to services trade for the restrictiveness indices.

3.5　Pooled Estimation Results

The most obvious shortcoming of the above sectoral results is that they only control for per capita income. There are many other factors that could also potentially influence human development outcomes, in addition to income and sector-level regulation. Examples include the general level of development of governance institutions, and the overall efficiency of regulation. However, small sample sizes make it impractical to account directly for these influences through the inclusion of additional control variables.

To try and deal with this problem, we also estimate models that pool data across all sectors.

This approach allows us to include fixed effects by country and by sector. The fixed effects clean out all external influences that vary in the country or sector dimensions, thereby relieving to a large extent the omitted variable bias that might be suspected in our previous results. For instance, the fixed effects control for influences such as government effectiveness, or the composition of government spending. In terms of the data, we proceed by selecting one human development indicator per sector: the DPT immunization rate for distribution; Internet users per 100 population for engineering; and phone users per 100 population for telecoms. At this stage, we do not include education in the panel estimates because of the different structure of the regulatory indicators, which measure restrictiveness by mode of supply rather than on an aggregate domestic or foreign basis, as in the other sectors.

The first two columns of Table 8 present estimation results for the pooled model using data for all three sectors. Results strongly support our contention: the domestic and foreign restrictiveness indices both have negative and statistically significant coefficients (1% and 5% respectively). The difference in magnitude between the two coefficients suggests, as noted above, that it is usually the restrictiveness of domestic regulation that makes most difference in terms of human development outcomes.

In the last two columns of Table 8, we exclude the telecom sector from our dataset. The reason for doing so is that it strongly dominates the other sectors in terms of the number of data points available. Although the domestic and foreign restrictiveness indices both have the expected negative coefficients, they are no longer statistically significant once we exclude the telecom sector. Our results in columns 1–2 are therefore being driven to a significant degree by a close link between regulation and human development outcomes in that sector. In part, this is a consequence of data limitations: our human development data are much more closely related to sectoral economic performance in telecom than in the other sectors. The greatly reduced sample size is also a constraint: our regressions in columns 3–4 have only 71 observations but a total of 39 dummy variables to account for country- and sector-level influences. The last two regressions are therefore pushing the data to their limits, and it is perhaps not surprising that our results lose precision.

Table 8: Regression Results Using Pooled Data

	(1)	(2)	(3)	(4)
	All Sectors	All Sectors	All Except Telecoms	All Except Telecoms
Domestic Restrictiveness Index	-48.676***		-15.732	
	(0.001)		(0.586)	
Foreign Restrictiveness Index		-26.702**		-4.951
		(0.007)		(0.816)
Observations	207	207	71	71
R^2	0.968	0.967	0.959	0.959
Country Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes

Notes: All regressions are estimated using ordinary least squares with robust standard errors. Prob. values are reported in parentheses. Statistical significance is indicated by: * (10%), ** (5%), and *** (1%).

Data Source: World Development Indicators online database of the World Bank for phone users per 100 population, Internet users per 100 population, and the rate of diphtheria, pertussis, and tetanus immunization; and the Australian Productivity Commission database of restrictions to services trade for the restrictiveness indices.

4. CONCLUSION

This paper has presented some first empirical evidence on the links between services trade and human development. The data generally show that a more restrictive services trade policy environment is correlated with worse human development outcomes. This finding is consistent with a mechanism in which more restrictive services policies result in higher prices of basic goods and services for consumers. It has long been argued that trade policy in services sectors can lead to higher national income, which in turn can promote human development. Our results go one step further in isolating a direct connection between service sector restrictiveness and development, which acts independently of the income channel.

One implication of our results is that the tension between service sector openness and human development outcomes, which is apparent in some of the development policy literature, has perhaps been overstated. At the very least, our results suggest that there is no systematic association between greater policy restrictiveness and better outcomes. Rather, open and efficient services sectors can help promote human development. Reducing the restrictiveness of service sector policies through well-designed liberalization programs can be one element of a successful approach to promoting economic and human development together.

There is considerable room for future research to expand on our approach and results. The main difficulty we have confronted relates to the availability of data on applied policy settings in services sectors. As data for more countries and years become available, it will be possible to expand the sample size used here, and perhaps even move to a genuine panel

data framework. Both steps are important in ensuring that our results are robust to the exclusion of additional country- and sector-specific factors from the regressions.

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APPENDIX: TRADE IN HEALTH SERVICES AND HUMAN DEVELOPMENT

Liberalizing trade in health services has both potential negative and positive results. For example, by liberalizing cross-border trade, telemedicine can help in upgrading knowledge of local medical professionals, and make available expert medical advice even in remote areas. Increased foreign investment in hospitals and clinic facilities can improve supply of medical services, both in terms of quality and quantity. Greater access to state-of-the art medical technology becomes possible. Improving facilities can help attract more foreign health consumers who are shopping around for cheaper services for simple medical procedures and can help increase foreign exchange receipts from medical tourists.

However, these positive outcomes have to be balanced with the potential downside. For example, in telemedicine, how does one control for potential medical malpractice? Who is supposed to shoulder the liabilities? Increased foreign-funded hospital facilities can generate an internal brain drain effect, whereby medical professionals move from the public hospitals or clinics to higher-paying private facilities. Liberalization's effect on quality medical access for the broader population is a serious offset to the potential benefits from greater access to advanced medical services that those in middle- to high-income groups enjoy. Freer movements of medical professionals could also lead to a brain drain situation, at the expense of huge public subsidy for educating them.

Because data in health services is difficult to obtain, it is hard to make correlations between liberalization of health services and development outcomes, particularly with regards to equity and access to medical services. On the one hand, there are not many instances of liberalization in health services, if we go by the number of General Agreement on Trade in Services (GATS) commitments in the sector—only about 32 out of 134 members have made commitments in health services. On the other, some of the potential negative effects have taken place with or without liberalization: for example, the outward migration of medical professionals, which has been observed in developing countries regardless of liberalization or GATS commitments in developed economies. Likewise, the increase in cross-border trade in medical transcription services has taken place without mode 1 commitments in many outsourcing destination countries.

As with other service sectors, it is expedient for governments to fix their national regulatory framework and understand national policies and priorities before opening up an important sector like health services, where many public services and subsidies may be affected, and in which the objective for policy goes far beyond mere economics. For many countries, their first priority is wide, high-quality health care coverage at an affordable cost. Equity and access considerations are important considerations that should be balanced out against the potential increase in foreign exchange receipts through health services exports.