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Services, firm performance, and exports

The case of the East African Community

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Services, Firm Performance, and Exports: The Case of the East African Community

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Abstract: This paper shows a significant positive link between local productivity in key services sectors and the export of goods, focusing on the case of the East African Community (EAC; Burundi, Kenya, Rwanda, Tanzania, and Uganda). At country average input use specifications, a 10% increase in services productivity is associated with an increase in manufacturing productivity of 0.32% in Burundi, 0.41% in Kenya, 0.34% in Rwanda, 0.67% in Tanzania, and 0.55% in Uganda. This relationship translates into increases in exports of 0.24% in Burundi, 0.30% in Kenya, 0.25% in Rwanda, 0.50% in Tanzania, and 0.41% in Uganda. Cross-country differences are related to differences in firm-level input use, which in turn may be related to applied services sector policies, including trade policies. EAC countries can benefit from further reforms in this area. A gravity model analysis indicates that the returns may be higher than expected based on the firm-level regressions due to aggregate effects. If EAC countries were to reduce services trade restrictions to the regional best practice (observed in Ghana), exports of EAC countries could increase by more than 10 percent. These findings reinforce the importance of backbone services sectors in the development context, and bring out the potential for reforms—such as removal of market access restrictions, including on investment and movement of service providers—to boost goods exports in addition to increasing economic efficiency.

JEL Codes: F14; D24; L80.

Keywords: East Africa; Services Sector; Trade in Goods.

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1 INTRODUCTION

Recent research has analyzed the links between services sector trade and investment policies and the impact of liberalization of services trade barriers on the productivity of manufacturing. Francois and Hoekman (2010) and Christen, Francois, and Hoekman (2013) survey much of the extant literature in this area. This direction of research has revealed that sector-level measures of services trade and FDI policies are positively associated with manufacturing productivity. There is a strong case for expecting such a link to exist. OECD-WTO Trade in Value Added (TiVA) data reveal that services inputs account for 43% of the gross value of manufacturing goods exports for the countries for which data are available. Given that firm productivity is a key determinant of export performance, a two-stage relationship is likely to exist, with services productivity in part determining the productivity of downstream sectors, and the productivity of the latter determining firm export performance.

This paper examines both linkages—from services productivity to manufacturing productivity, and then on to export performance—using a mix of firm-level data and information on services trade and investment policies, the presumption being that policies will impact on average productivity by affecting competition in markets.

The approach is to use firm-level data from the World Bank Enterprise Surveys to calculate average measures of firm-level services productivity at the level of sub-national regions, and then to relate these data to firm-level productivity in agri-business and manufacturing sectors, controlling for a variety of firm-level variables that may affect performance. The second stage of the analysis then relates agri-business and manufacturing firm productivity to exports taking into account the first stage determination of that variable by (in part) services sector productivity, as well as firm characteristics such as the intensity of services input use. An independent third part of the analysis uses a gravity model to examine the impacts of services sector policies on manufacturing exports, based on the mechanisms analyzed in the first two stages. The end results of the analysis will be an assessment of the linkage between productivity in services sectors and manufactured goods export performance, and an assessment of the effects of service sector policies on economic performance.

This paper uses datasets that span all available countries for the analysis. But it applies all results to the member countries of the East African Community (EAC). This is an addition to the literature, as most existing work on linkages between services and manufacturing focus on developed or transition economies (India being a notable exception); we are not aware of any previous work on this subject in Africa. Of course, caution is required in interpreting results: regressions using global data provide average relationships between variables based on observed experiences in different countries, so although our approach represents a basis for drawing inferences for the EAC countries in particular, it is not a substitute for detailed country-level work that deals more specifically with conditions on the ground. The two approaches are complementary.

Another way in which our paper adds to the literature is by extending the linkage discussion to deal with exports of goods. Most papers look just at the connection between manufacturing firm productivity and services sector performance, and perhaps policy. Given the vast literature on productivity-based self-selection into exporting, our extension is a logical one, and one with important development policy implications in light of the goal of most developing countries of increasing integration into the global trading economy.

The paper's key findings can be summarized in terms of the three analytical steps discussed above. First, we find that local services productivity is an important determinant of manufacturing productivity at the firm level. We are confident that the effect we have identified is genuinely due to an input-related linkage, because an interaction term between local services productivity and intensity of services input use is positive and statistically significant: so services productivity matters more for those firms that use services relatively intensively in their overall input mix. Concretely in terms of the average levels of services input use seen in the EAC countries, a 10% increase in services productivity is associated with an increase in manufacturing productivity of 0.32% in Burundi, 0.41% in Kenya, 0.34% in Rwanda, 0.67% in Tanzania, and 0.55% in Uganda.

In terms of the second linkage, we use an instrumental variables strategy to achieve identification, and find that there is indeed a linkage between services and manufacturing productivity, which in turn feeds in to merchandise trade performance. Specifically, higher local services productivity tends to increase exports, again through an input linkage mechanism. At country average input use specifications, a 10% increase in services productivity is associated with an increase in manufacturing exports of 0.24% in Burundi, 0.30% in Kenya, 0.25% in Rwanda, 0.50% in Tanzania, and 0.41% in Uganda. The strength of the productivity linkage therefore varies substantially within the group, from approximately the world average (0.27) in Burundi, Kenya, and Rwanda, to substantially above it in Tanzania and Uganda. The reason for the variation is differing intensities of use of services inputs in the production process. In all countries, there is clear potential to boost manufacturing exports by improving productivity in services.

The third stage in our analysis is the gravity model, which includes importer-specific services trade policy data as a proxy for services sector regulation more generally. Even after controlling for goods market policies, we find that services policies are a significant determinant of bilateral merchandise trade. At a sectoral level, services like retail distribution and transport are particularly important—a result that is intuitive, given that these services directly affect the ability of goods producers to get their production to market. We conduct a counterfactual to show that the EAC countries could benefit in terms of increased merchandise exports if they improved service sector policies to the same level as the leading Sub-Saharan African country. Concretely, country impacts are as follows: Burundi 4.4%, Kenya 18.6%, Rwanda 13.0%, Tanzania 19.8%, and Uganda 23.1%. These estimated effects are economically meaningful in all cases. They serve to stress the potential economic gains from reform to services policies, and emphasize the downstream linkage to goods exports. Increasing merchandise trade is an important objective for most developing countries, including those in the EAC, and the size of the estimated counterfactual results indicates that services reform is an area that is deserving of attention within the framework of achieving that broader goal.

The paper proceeds as follows. The next section outlines the services environment in EAC, noting the sector's size relative to GDP, the significance of services trade, and the role of policy. Section 3 describes the data used in the paper. The following section presents our empirical models and results. The final section concludes and discusses policy implications.

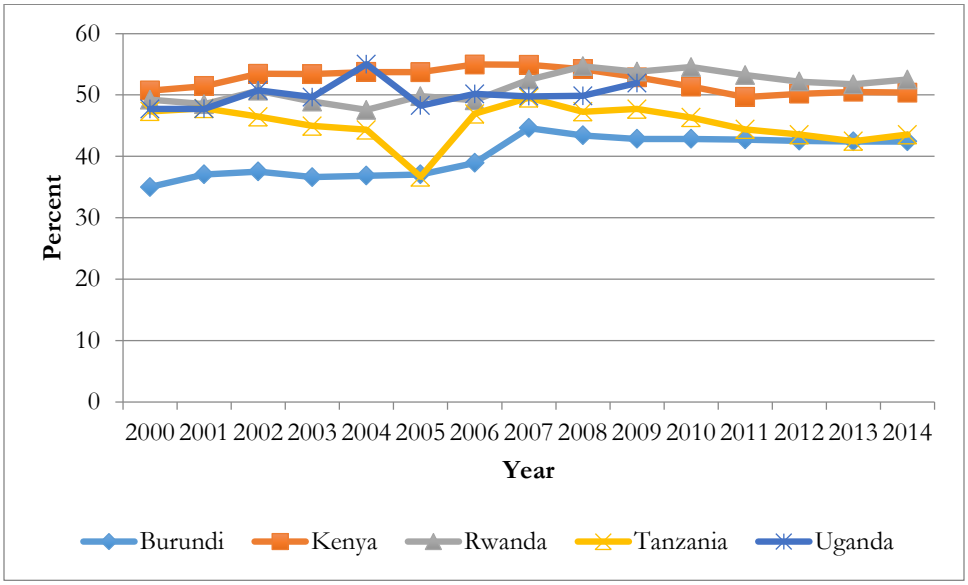
2 SERVICES IN THE EAC

As an economy develops and moves up the per capita income ladder, the services sector typically expands. In high income countries, it accounts for the bulk of economic activity. What is less widely recognized is that services also make up a significant part of the economy in developing countries, even low-income countries and least developed countries. Of the five EAC countries, four are in the

current World Bank low income group, and are classed as LDCs by the United Nations; the fifth, Kenya, is a lower middle income country.

Figure 1 shows the proportion of GDP accounted for by services in the five EAC countries over the last fifteen years. With the exceptions of Burundi and Tanzania, the share is reasonably stable over time at about 50%. This figure is lower than the Sub-Saharan African average for 2014 of 58%. In Tanzania, the share of services in GDP has fallen to around 40%, whereas in Burundi it has risen from a low level of 35% to over 40%. Of course, these data need to be taken with caution—they are drawn from national accounts, but many Sub-Saharan African countries are known to have substantial data quality issues in that area. Of course, the national accounts do not include the informal sector, which is typically large in the region. Many services are provided informally, and so we conjecture that the true level of contribution of services to the economy as a whole is larger than what the national accounts indicate. In any case, it is plain that services account for a substantial share of all economic activity in the EAC countries, a trend that is likely to intensify with economic growth and development.

Figure 1: Services contribution to GDP, percent, 2000-2014[3]



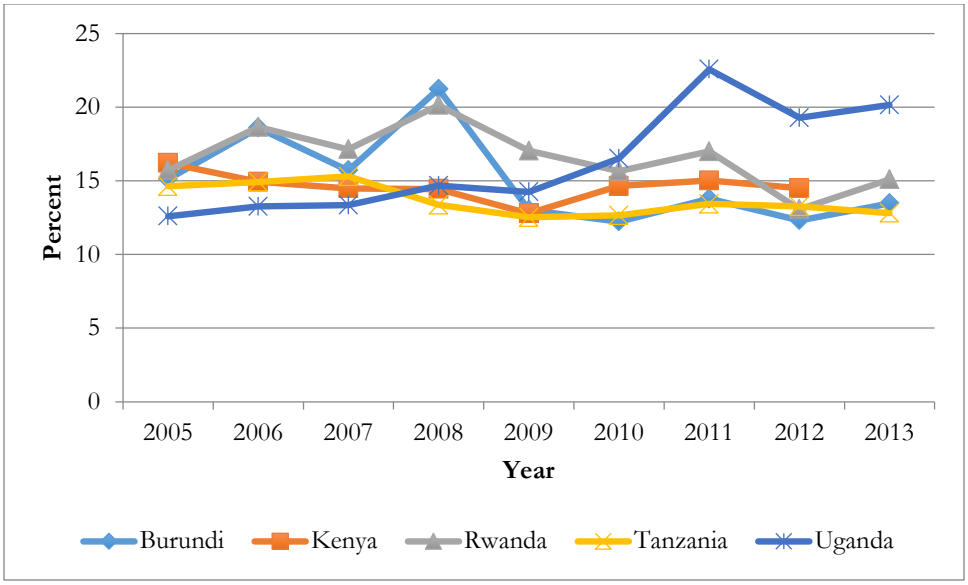
Source: World Development Indicators. Note: Data for 2010-2014 unavailable for Uganda.

In line with the stability of services as a proportion of GDP, services trade in the region is growing in line with the economy as a whole. As a result, the ratio of services trade to GDP (Figure 2) is stable in four of the five EAC countries, at 10-15%. The only substantially different country is Uganda, where the ratio has risen to around 20% over the last few years. With the exception of Uganda, the EAC numbers are quite typical for Sub-Saharan Africa, where the average ratio is 11%. The level indicates that services trade is still relatively small compared with what is observed in higher income environments, but the stable trend through time indicates that substantial growth in services trade is taking place. Again, a caution is in order: this analysis is based on statistics taken

[3] These figures include services provided by government, and so overstate the true size of the privately contestable services market in each country. Nonetheless, the graph is still informative as to the general pattern observed across countries.

from the Balance of Payments and so only accounts for, approximately, Modes 1 (pure cross border trade) and 2 (movement of the consumer) under the General Agreement on Trade in Services (GATS). The figure would be somewhat higher if all modes of supply were included, but data on Modes 3 (sales of foreign affiliates) and 4 (temporary movement of service providers) are notoriously scarce in the developing world. Despite this shortcoming, it is clear that services trade is an emerging issue for the region, and again is one that is likely to become more important over time, both as technological changes make services more tradeable on a broad basis, and as country income levels increase with growth and development.

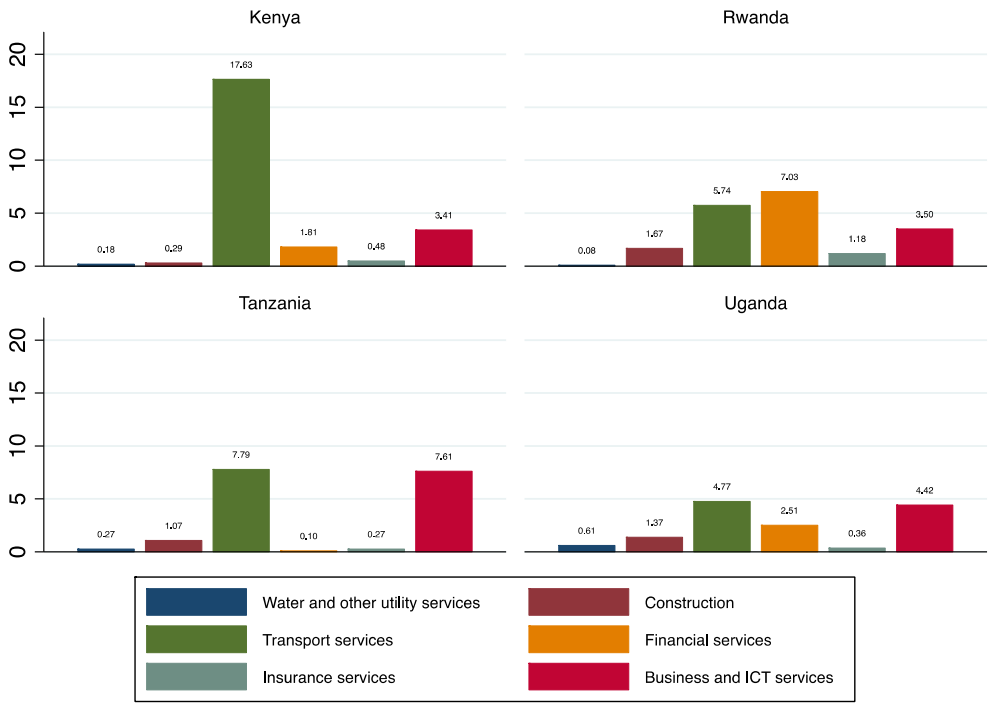
Figure 2: Services trade relative to GDP, percent, 2005-2013



Source: World Development Indicators.
Note: Data before 2005 and for 2014 are not available, as are data for 2013 in Kenya.

Services are an important part of emerging value chains around the world, including in East Africa. Figure 3 shows the degree of forward linkages observed for services sectors in the EAC countries for which data are available. This indicator captures the proportion of services that are used as inputs into other countries' exports, and is thus one good proxy for the degree of importance services have in value chains. As can be seen, performance varies considerably across countries and sectors. Transport and business services (including ICTs) stand out as having particularly strong forward linkages—which is unsurprising given their strong potential for internationalization. The overall finding that emerges from the figure is that services are important sources of international business activity in East Africa, including through their linkages with other sectors—the issue this paper sets out to investigate.

Figure 3: Forward linkages in East African services sectors (percent)

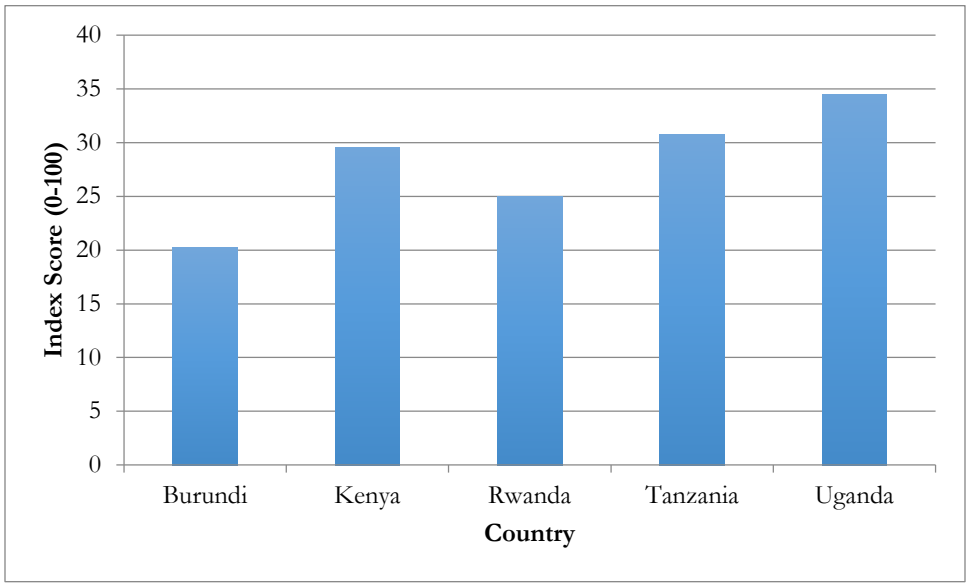


Source: World Bank EVA Database.

As in goods markets, services policies are important for sectoral performance. A broad range of factors can influence the restrictiveness of services policy settings. The line between trade policy and domestic regulation becomes more blurred for services than it is for goods, as there are few equivalents of the types of border policies that are familiar from trade in goods. Regulation is key for services markets, both as a factor affecting domestic competitiveness and an influence on trade patterns and trends. However, no comprehensive services policy indicator is available for developing countries.

Against this background, it is informative to look at country scores on the World Bank's Services Trade Restrictions Index (STRI). The STRI is a numerical summary of applied services policies believed to affect trade flows. It covers five sectors and, as appropriate, Modes 1, 3, and 4. Figure 3 presents overall results, in the sense of a summary number that covers all sectors and modes. A higher score indicates a more restrictive policy environment, with 100 being the highest. The Sub-Saharan African average STRI is 32, which means that the EAC countries are typically more liberal than other parts of the continent, except in Uganda. Of course, policy settings vary considerably by sector and by mode, but the overall picture that emerges is one of a reasonably liberal policy stance.

Figure 4: Services Trade Restrictions Index, 2009



Source: World Bank Services Trade Restrictions Database.

In terms of the modal distribution of services trade policies, the general picture that emerges from the World Bank database is that the EAC countries are quite liberal on Mode 1 (pure cross-border trade), but have higher levels of restrictiveness in place for Mode 3 (sales through establishment by foreign affiliates). However, policy measures vary considerably by sector and country. For instance, the EAC countries typically have few restrictions on foreign investment in the retail sector, except in Uganda and to a lesser extent Tanzania. Professional services, by contrast, are more restrictive in Mode 3, as is the case in many countries around the world. Professional services are also quite restricted in relation to Mode 4 (temporary movement of service providers), which means that forthcoming discussions on labor mobility in the region are of particular importance. Interestingly, the transportation sector is more restrictive in Mode 1 than in Mode 3 in all countries, and in some cases—such as Rwanda and Uganda—is relatively closed. Regulatory measures affecting transportation, such as axle load requirements for trucking, as well as cabotage restrictions, mean that there is considerable scope to liberalize this important sector that shapes the way in which the region trades.

Of course, more than a reasonably liberal trade policy is needed to develop competitive services sector offerings domestically. Services are relatively intensive in human capital, so it is important to ensure the provision of high quality educational services at primary, secondary, and as it becomes appropriate, tertiary level. More generally, development of supply side capacity in the services sector requires attention to a range of policy areas, including the investment climate and business environment. There is also an important private sector development agenda in relation to services: in some sectors, the state has historically been an important supplier, but economic reforms have meant that it has receded from that role to a notable extent. It is therefore important to develop a basis of skills and factor availability that can support the emergence of private sector service suppliers in key areas such as telecommunications, finance, and transport.

At the same time, it is important to be aware of the political economy dynamics that lie behind more liberal services policies. As with any kind of trade policy, reforms to policies that affect services trade

have distributional consequences. It is important to be aware of the gains and losses associated with reform, so that appropriate adjustment policies can be designed and put in place. The EAC countries do not yet have strong and effective social safety net policies, but governments can still put in place policies to ensure that the gains from trade are broadly distributed, including through lower prices and greater availability to poor people.

The core contention of this paper is that reforming services markets can boost productivity and exports in goods sectors through an input use relationship: services are an important input into the production and export of goods. The case is easily seen with services such as electricity, telecommunications, and transport—no business can function without them, in particular an exporter. Although the services sector in the EAC countries is not as developed as it is in higher income countries, this input linkage is still empirically important. The Enterprise Surveys data used in the empirical part of this paper (see below for a presentation) show that using a broad definition, services account for 22.2% of total input costs in the EAC countries, which is higher than the full sample average. (The full sample is largely composed of developing countries, but includes all regions of the developing world.) In part, this result might reflect inefficiencies in EAC services markets that keep prices unnecessarily high; this is simply a conjecture, however. The important point to take away is that EAC firms that produce and export goods rely on a range of services to do so, and services account for an empirically important proportion of total input use. As a result, the linkages that this paper contends exist between different types of firms should find expression in the EAC case.

Reforming services sector regulations makes good sense from an economic efficiency standpoint. This paper aims to quantify one aspect of reform that is often ill-understood by policymakers: the potential of services sector reforms to have knock on effects to productivity in goods sectors, and from there to merchandise trade performance. Showing that services sector reforms not only increase economic efficiency but also contribute to goods trade performance is one way of helping to support reform-minded coalitions in developing countries.

3 DATA

The data source for the first two stages of the research is the World Bank Enterprise Surveys. That project covers over 130,000 firms in 135 countries. We use the current standardized version of the dataset, which includes data from firms in 119 countries over the period 2006-2011. After cleaning to remove unreliable observations,[4] the dataset covers a total of 58,875 firms in manufacturing and services. Firm activities are identified at the ISIC 2 digit level, with 23 manufacturing sectors and 26 services sectors. To ensure sufficient within-sample variation, estimations are conducted using the full world sample. Discussion of issues specific to the EAC countries is then presented, based on the application of full sample associations.

Each survey covers a cross-section of firms for a single year of data in a given country, with firms selected by stratified random sampling. Some countries are surveyed over multiple years, but it is not possible in the standardized dataset to determine whether or not individual firms are included multiple times due to the way in which the World Bank assigns anonymous identifiers to firms in each survey. It is therefore not possible to observe entry or exit, or to estimate TFP using techniques

[4] Observations are considered to be unreliable if the survey administrator indicates that answers provided to questions on perceptions and opinions are not truthful, or questions regarding figures (productivity and employment numbers) are arbitrary and unreliable.

that require the availability of true panel data at the firm level. Productivity is therefore measured as labor productivity (sales per employee).

Data and sources for the gravity model that relates services policy to goods trade flows are largely standard. The only series that requires elaboration is our measure of services trade restrictiveness: the World Bank's Services Trade Restrictiveness Index (Borchert et al., 2012a; and Borchert et al., 2012b). The STRI compiles data on services trade policies for 103 developed and developing countries, and five sectors. As appropriate based on sectoral realities, it covers pure cross-border trade in services (GATS Mode 1), sales of foreign affiliates (GATS Mode 3), and temporary movement of service providers (GATS Mode 4). The data upon which the various STRIs are based come from surveys administered in developing countries, and data collected from OECD countries. The World Bank STRI has the broadest country coverage of applied services trade policy, and has been validated in empirical work such as van der Marel and Shepherd (2013), where the authors show that it is generally negatively associated with bilateral services trade, although sectoral specificities are also evident.

Table 1 presents a summary of data and sources for the firm level dataset; Table 2 presents the same information for the gravity model. Tables 3 and 4 report descriptive statistics for each of these datasets, organized similarly.

Table 1: Data and sources for the firm-level dataset

Variable	Definition	Source
Foreign	Dummy variable equal to unity for establishments that were owned more than 50% by foreign private individuals, companies, or organizations.	World Bank Enterprise Surveys question b2b.
Limited Partnership	Dummy variable equal to unity for establishments that are identified as a limited partnership.	World Bank Enterprise Surveys question b1.
Log(Capacity Utilization)	Logarithm of the level of utilization of facilities.	World Bank Enterprise Surveys question f1.
Log(Capital Intensity)	Logarithm of the establishment's purchases of machinery, vehicles, equipment, land, buildings, and information technology, divided by the number of employees.	World Bank Enterprise Surveys questions l1, l6, n5a, n5b, and n5c.
Log(Employees)	Logarithm of the total number of permanent full time employees and full time seasonal/temporary workers for the last fiscal year.	World Bank Enterprise Surveys questions l1 and l6.
Log(Exports)		
Log(Labor Productivity)	Logarithm of total sales divided by the number of employees.	World Bank Enterprise Surveys questions d2, l1, and l6.
Log(Manager's Experience)	Logarithm of the number of years' experience working in the sector the establishment's top manager has.	World Bank Enterprise Surveys question b7.
Log(Services Productivity)	Logarithm of the sub-national regional average of sales per employee in services establishments.	World Bank Enterprise Surveys questions a2x, ISIC, d2, l1, and l6.
Partnership	Dummy variable equal to unity for establishments that are identified as a partnership.	World Bank Enterprise Surveys question b1.
Privately Held Company	Dummy variable equal to unity for establishments that are identified as a privately held limited liability company.	World Bank Enterprise Surveys question b1.
Publicly Listed Company	Dummy variable equal to unity for establishments that are identified as a publicly listed company.	World Bank Enterprise Surveys question b1.
Sole Proprietorship	Dummy variable equal to unity for establishments that are identified as a sole proprietorship.	World Bank Enterprise Surveys question b1.
Services % Inputs	Total annual cost of services inputs (electricity, communications, transport, and water) divided by total annual cost of all inputs (services plus labor, raw materials and intermediate goods, fuel, and rental of land/buildings, equipment, and furniture).	World Bank Enterprise Surveys questions n2a-n2h.

Table 2: Data and sources for the gravity model dataset

Variable	Definition	Year	Source
Colony	Dummy variable equal to one if the exporter and the importer were once in a colonial relationship.	NA	CEPII.
Common Colonizer	Dummy variable equal to one if the exporter and the importer were once colonized by the same power.	NA	CEPII.
Common Language	Dummy variable equal to one if the exporter and the importer share a common language (ethnographic basis).	NA	CEPII.
Contiguous	Dummy variable equal to one if the exporter and the importer share a common land border.	NA	CEPII.
Distance	Geodesic distance between the exporter and the importer.	NA	CEPII.
GDP	Gross domestic product in purchasing power parity terms.	2012	World Development Indicators.
OTRI	Overall Trade Restrictiveness Index.	2012	Kee et al. (2009).
RTA	Dummy variable equal to one if the exporter and the importer are in the same RTA.	2012	De Sousa (2012).
STRI	Services Trade Restrictiveness Index.	2012	World Bank STRI Database.
Trade	Total exports of manufactured goods from country i to country j in USD, manufactured goods only.	2012	WITS-COMTRADE.

Table 3: Descriptive statistics for the firm-level dataset

	Observations	Mean	Std. Dev.	Min.	Max.
Foreign	78079	0.077	0.266	0.000	1.000
Limited Partnership	78462	0.067	0.250	0.000	1.000
Log(Capacity Utilization)	41113	4.232	0.438	-0.693	4.654
Log(Capital Intensity)	30963	12.041	3.123	-6.802	26.801
Log(Employees)	78913	3.418	1.396	0.000	10.539
Log(Exports)	68434	4.112	7.320	0.000	34.081
Log(Labor Productivity)	69227	13.359	2.751	-3.977	32.648
Log(Manager's Experience)	77670	2.640	0.760	0.000	9.210
Log(Services Productivity)	72987	14.927	2.550	9.315	24.283
Partnership	78462	0.065	0.247	0.000	1.000
Privately Held Company	78462	0.495	0.500	0.000	1.000
Publicly Listed Company	78462	0.055	0.227	0.000	1.000
Sole Proprietorship	78462	0.297	0.457	0.000	1.000
Services % Inputs	59013	0.136	0.211	0.000	1.000

Table 4: Descriptive statistics for the gravity dataset

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Colony	16512	0.015	0.122	0.000	1.000
Common Colonizer	16512	0.076	0.265	0.000	1.000
Common Language	16512	0.135	0.341	0.000	1.000
Contiguous	16512	0.019	0.136	0.000	1.000
Distance	16512	8038	4649	60	19904
GDP	16348	717bn	2100bn	0.534bn	16000bn
OTRI	10184	0.096	0.098	0.000	0.550
RTA	14762	0.206	0.404	0.000	1.000
STRI	11256	26.4	14.1	6.2	88.2
Trade	18090	658.7	6875.7	0.0	429394.3

4 EMPIRICAL ANALYSIS

This section presents the paper's analytical framework and results. As noted above, there are three components. The first subsection discusses the linkage between services productivity and manufacturing productivity using firm-level data. The second subsection uses the same data to extend the analysis to exports. Finally, the third subsection uses country-level data to estimate a gravity model that includes services trade policy variables.

4.1 Productivity Linkage

The first model we estimate has labor productivity (sales per worker) in manufacturing, measured at the firm level, as the dependent variable. To construct the main independent variable, we calculate firm-level labor productivity in services sectors, and then take the average by sub-national region. The relationship we are interested in is between a given manufacturing firm's productivity and the average productivity of services firms in the same sub-national region. This approach implies a focus on local linkages, and allows the inclusion of country-sector-year fixed effects in the regressions to control for outside influences.

The second independent variable of interest is a measure of the intensity with which manufacturing firms use services inputs. Services intensity is defined as the percentage of total costs accounted for by electricity, communications, transport, and water services.[5] We expect to observe a positive interaction effect, which would indicate that the link between services productivity and manufacturing productivity is stronger for firms that use services inputs more intensively. A positive and statistically significant interaction term would provide a strong indication that the effect identified is indeed a productivity linkage due to the input relationship, and not an artifact of some omitted factor.

[5] The classification of water and electricity as services can be problematic. So too is the fact that they are often provided directly by governments rather than through private markets. However, our results do not hinge on their inclusion. Regression results are identical in terms of sign and statistical significance if water and electricity are excluded from the services intensity calculation.

We use OLS to estimate an econometric model of the following form:

$$(1)\ \log\left(Labor\ Productivity_{fcsrt}\right) = b_1 \log(Services\ Productivity_{csrt}) + b_2 \log(Services\ Productivity_{csrt}) * Services\ \%\ Inputs_{fcsrt} + b_3 Services\ \%\ Inputs_{fcsrt} + \sum_i b_i X^i_{fcsrt} + \sum_j d_{cst} + e_{fcsrt}$$

where *f* indexes firms, c indexes countries, *r* indexes sub-national regions, and *t* indexes time. Labor productivity in manufacturing and services is measured as described above. The *X* variables refer to firm-level controls. The first group includes size (number of employees), capital intensity, and dummy variables for different types of firm organization. The second group includes a dummy for foreign-owned firms. The third group includes data on capacity utilization and the top manager's number of years of experience in the sector as proxies for management competence. Finally, the *d* terms refer to a full set of country-sector-year fixed effects. Estimation is conducted using the full data sample, i.e. covering all countries including the five EAC member countries.

Results in Table 5 show that there is indeed a positive, statistically significant association between services and manufacturing productivity, as expected. Moreover, a positive and statistically significant interaction term shows that the linkage gets stronger as firm-level services input use intensity increases. The control variables have the expected signs, and are typically significant at the 10% level or better: larger firms, more capital intensive firms, and firms with higher management competence display higher levels of productivity. Most of the firm type dummies have statistically insignificant coefficients; the exceptions are the two partnership dummies, which have negative signs that indicate that firms organized in that way tend to be less productive than others.

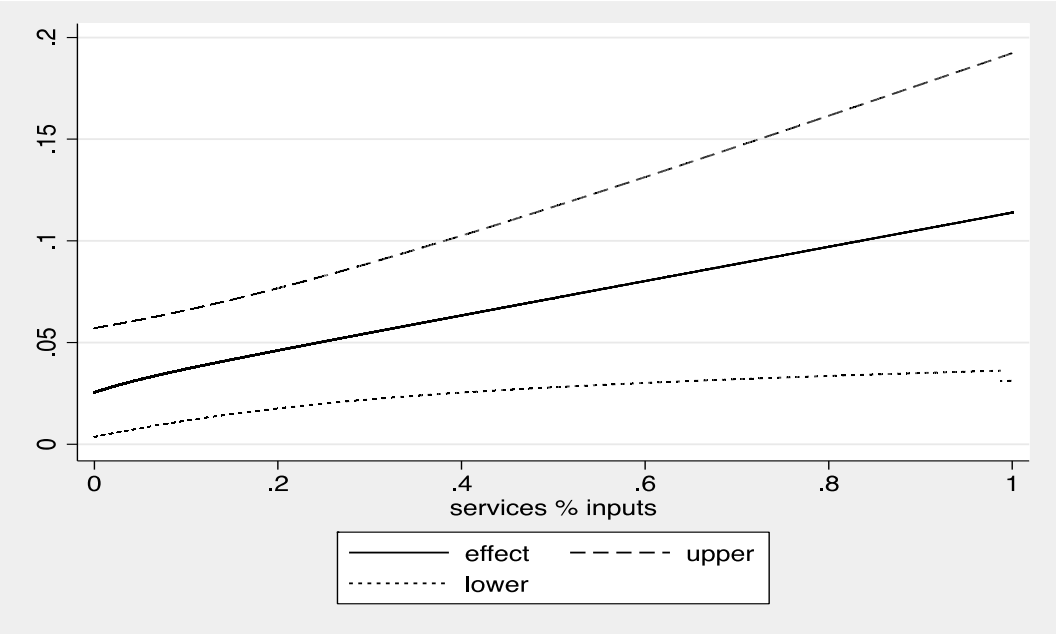
As noted above, our result on the interaction term between local services productivity and firm-level input intensity is important. It provides strong evidence that our model is indeed capturing a productivity linkage effect due to an input transmission channel. Figure 4 shows that the total effect of local services productivity on manufacturing firm productivity is positive and statistically significant—after accounting for interactions—at almost all levels of input intensity. Importantly, at observed levels of services input use in the EAC countries, the effect is positive and significant.

Table 5: Firm-level regression results (productivity linkage)

	(1)	(2)	(3)	(4)	(5)	(6)
Log(Services Productivity)	0.067***	0.044***	0.032**	0.028**	0.026*	0.026*
	(0.000)	(0.001)	(0.017)	(0.034)	(0.057)	(0.063)
Log(Services Productivity) * Services % Inputs		0.107***	0.051	0.068*	0.077*	0.084**
		(0.005)	(0.131)	(0.083)	(0.051)	(0.030)
Services % Inputs		-2.870***	-2.369***	-2.688***	-2.841***	-2.921***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Employees)			0.131***	0.113***	0.106***	0.078***
			(0.000)	(0.000)	(0.000)	(0.000)
Log(Capital Intensity)			0.242***	0.236***	0.236***	0.232***
			(0.000)	(0.000)	(0.000)	(0.000)
Foreign				0.419***	0.425***	0.416***
				(0.000)	(0.000)	(0.000)
Log(Capacity Utilization)					0.193***	0.196***
					(0.000)	(0.000)
Log(Manager's Experience)					0.022*	0.021*
					(0.070)	(0.077)
Privately Held Company						0.008
						(0.911)
Sole Proprietorship						-0.010
						(0.858)
Partnership						-0.320***
						(0.000)
Limited Partnership						-0.192***
						(0.005)
Other						-0.088
						(0.190)
Observations	35939	31899	23838	23479	22518	22498
R2	0.556	0.246	0.645	0.640	0.640	0.628
First Stage F-Test	23.26***	51.93***	115.08***	71.26***	76.85***	80.56***

*Note: The dependent variable is log(labor productivity) in all cases, and the estimation sample is limited to manufacturing firms. Estimation is by OLS with robust standard errors clustered by country-sector-year. All models contain fixed effects by country-sector-year. P-values are in parentheses below the parameter estimates. Statistical significance is indicated by * (10%), ** (5%), and *** (1%).*

Figure 5: Interaction term as a function of services input intensity



Note: EAC countries' average proportion of inputs accounted for by services are as follows: Burundi 6.7%, Kenya 17.6%, Rwanda 9.4%, Tanzania 48.8%, and Uganda 35.0%.

As noted above, Table 5 is based on the full world sample, so as to maximize the number of observations and ensure sufficient within sample variation. However, it is important for the purposes of this project to examine the ways in which these results apply to the EAC countries. To do that, we calculate elasticities of manufacturing productivity with respect to services productivity based on each country's observed average level of services input use. Application of this methodology shows that at country average input use specifications, a 10% increase in services productivity is associated with an increase in manufacturing productivity of 0.32% in Burundi, 0.41% in Kenya, 0.34% in Rwanda, 0.67% in Tanzania, and 0.55% in Uganda. The strength of the productivity linkage therefore varies substantially within the group, from approximately the world average (0.37) in Burundi, Kenya, and Rwanda, to substantially above it in Tanzania and Uganda. The reason for the variation is differing intensities of use of services inputs in the production process. In all countries, there is clear potential to boost manufacturing performance by improving productivity in services.

It could be argued that these numbers are relatively small, even given the services input intensity in the countries we are considering. One possible reason for the result is that in weak governance environments, the effect of services policies on productivity is muted by problems like corruption and lack of government effectiveness (Beverelli et al., 2015). It is widely believed that institutions play a mediating role in determining the effects of trade liberalization, and it is even more likely to be the case in services, where institutions are considered by some to be a source of comparative advantage (Van der Marel, 2011). In weak governance environments, the constraints on firms are more likely to be related to the general business climate—and in particular, uncertainty—rather than on dysfunctions in services markets. The linkage is likely to be weaker in such cases. Since the Enterprise Surveys data contain only developing countries, governance is an issue in a substantial part of the total sample, and this issue may at least partly explain the apparent weakness of the productivity connection on average. The question is explored in detail in Beverelli et al. (2015), who

find that the interaction between institutions and services policies is indeed an important part of the explanation of observed effects.

4.2 Firm-Level Export Linkage

To test the second linkage, from productivity to exports, we use a different approach. The dependent variable is firm-level exports, and the independent variables are the same as in the first stage, except that services productivity is replaced with each firm's own level of productivity (sales per worker), and the interaction term is dropped. The form of the two models is immediately suggestive of an econometric approach in which manufacturing productivity is instrumented by services productivity and the interaction between that variable and the intensity with which each firm uses services inputs, as well as use of services inputs in levels. We use two-step GMM to estimate that model, because it is more efficient than the more familiar two stage least squares approach.

Concretely, the second econometric model takes the following form:

$$(1)\ \log\left(Exports_{fcsrt}\right) = b_1 \log(Productivity_{fcsrt}) + \sum_i b_i X^i_{fcsrt} + \sum_j d_{cst} + e_{fcsrt}$$

where variable definitions and subscripts are the same as above, and productivity is each manufacturing firm's own level of sales per worker appropriately instrumented.

Again, we estimate using the full world sample to ensure sufficient variation to achieve identification. Results are in Table 6.[6] Results are in line with expectations: productivity is a significant determinant of export behavior, even when each firm's own level of productivity is instrumented using local services productivity, services input intensity, and their interaction. This result is in line with the large body of empirical work showing that exporters tend to be more productive than other firms, and that that difference arises before exporting starts. Our work is novel in instrumenting for productivity with local services productivity and the interaction term—an approach that captures the indirect effects of services productivity improvement on merchandise exports.

To examine the implications of the model for the EAC countries, we calculate elasticities of manufacturing exports with respect to services productivity, by combining results from Tables 5 and 6 with the discussion of EAC applicability in the previous subsection. At country average input use specifications, a 10% increase in services productivity is associated with an increase in manufacturing exports of 0.24% in Burundi, 0.30% in Kenya, 0.25% in Rwanda, 0.50% in Tanzania, and 0.41% in Uganda. The strength of the productivity linkage therefore varies substantially within the group, from approximately the world average (0.27) in Burundi, Kenya, and Rwanda, to substantially above it in Tanzania and Uganda. The reason for the variation is differing intensities of use of services inputs in the production process. In all countries, there is clear potential to boost manufacturing exports by improving productivity in services.

[6] Table 6 uses the full set of potential control variables identified in Table 5. As robustness checks, the export regression was also run using the alternative control variable sets, and results were qualitatively identical to those reported here.

Table 6: Firm-level regression results (second hypothesis)

	(1)
Log(Labor Productivity)	0.739***
	(0.002)
Log(Employees)	2.455***
	(0.000)
Log(Capital Intensity)	0.163**
	(0.024)
Foreign	2.778***
	(0.000)
Log(Capacity Utilization)	0.011
	(0.930)
Log(Manager's Experience)	0.112
	(0.123)
Privately Held Company	-0.241
	(0.602)
Sole Proprietorship	-0.071
	(0.856)
Partnership	-0.806**
	(0.045)
Limited Partnership	-0.577
	(0.203)
Other	-0.723
	(0.118)
Observations	21901
R2	0.269
Hansen's J	1.878

*Note: The dependent variable is log(exports) in all cases, and the estimation sample is limited to manufacturing firms. Estimation is by two step GMM with robust standard errors clustered by country-sector-year. Log(Labor Productivity) is instrumented by Log(Services Productivity), Services % Inputs, and their interaction. All models contain fixed effects by country-sector-year. P-values are in parentheses below the parameter estimates. Statistical significance is indicated by * (10%), ** (5%), and *** (1%).*

4.3 Gravity Model and Policy

As noted above, services are an increasingly important source of imported intermediates in goods exports. As a result, measures that restrict services trade are expected to be negatively associated with goods exports. To examine this contention, we use a gravity model of bilateral trade, augmented to include data on the restrictiveness of services trade policies.

The gravity model used for this part of the empirical analysis is based on the standard Anderson and Van Wincoop (2003) framework. However, the STRI is an importer-specific variable, so it cannot be separately estimated using the standard approach of including exporter and importer fixed effects to control for multilateral resistance. Baier and Bergstrand (2009) provide a solution to the problem by deriving a Taylor series approximation of multilateral resistance.

Based on the Baier and Bergstrand (2009) approach, the model estimated here is:

(2) $$\ln Trade_{ij} = b_0 + b_1 \ln STRI_i^* + b_2 OTRI_i^* + b_3 RTA_{ij}^* + b_4 \ln Distance_{ij}^* + b_5 Contiguous + b_6 colony_{ij}^* + b_7 common\ colonizer_{ij}^* + b_8 common\ language_{ij}^* + b_9 \ln GDP_i + b_{10} \ln GDP\_j + e_{ij}$$

where: i indexes exporters, and j indexes importers; STRI is the World Bank services trade restrictiveness index in the importer; OTRI is the World Bank Overall Trade Restrictiveness Index, as a proxy for tariff and non-tariff measures affecting manufactured goods trade directly; RTA is a dummy equal to one if the exporter and the importer are in the same RTA; distance is the geodesic distance between the exporter and the importer; contiguous is a dummy equal to one if the countries in the pair share a common land border; colony is a dummy equal to one if one of the countries in the pair was once a colony of the other; common colonizer is a dummy equal to one if the countries in the pair were once colonized by the same power; common language is a dummy equal to one if the countries in the pair share a common language (ethnographic basis); GDP is gross domestic product in the importer and the exporter respectively; and e is an error term.

Variables with a star are transformed using the Baier and Bergstrand (2009) transformation to account for multilateral resistance. The transformation is as follows:

(3) $$v_{ij}^* = v_{ij} - \sum_{j=1}^{N} \frac{GDP_j}{GDP_w} v_{ij} - \sum_{i=1}^{N} \frac{GDP_i}{GDP_w} v_{ji}$$

where the w subscript indicates total world GDP. Note that the third multilateral resistance term derived by Baier and Bergstrand (2009) is constant across all country pairs, and therefore can be included in the regression constant.

In addition to the model setup, recent research has shown that the choice of econometric method is important in ensuring that results are reliable and consistent. Santos Silva and Tenreyro (2006) convincingly argue that log-linearized models like gravity can be subject to inconsistent estimation under OLS if an empirically relevant form of heteroscedasticity is present. The parameter estimates as well as the estimated standard errors suffer from this problem. In addition, application of OLS to the log-linearized model drops observations for which no trade is observed, thus resulting in sample selection bias (Helpman et al., 2008). With these points in mind, we adopt the Poisson Pseudo Maximum Likelihood estimator (PPML) approach proposed by Santos Silva and Tenreyro (2006). It is consistent under weak assumptions, and does not require that the data be distributed according to a particular law. It has also been shown to be robust in the presence of large numbers of zeros in the trade matrix (Santos Silva and Tenreyro, 2011).

Applying the same rationale as in the firm-level analysis, Tables 7 and 8 present estimation results using the full world sample. In line with expectations, services trade restrictiveness is negatively associated with manufactured goods exports. This finding holds for the overall STRI, as well as modal indices (Table 7). However, there are suggestions in the data that some sectors may be more important than others in terms of the observed trade linkage: the coefficient on the STRI (all modes) is statistically significant and correctly signed in three of the six covered sectors, with the strongest result being in the case of retail trade, which is logical because that sector directly determines the ability of goods producers to get their production to market. The finding for the transport STRI can be interpreted similarly. The only apparently counterintuitive result is for telecommunications, which has a positive coefficient that is statistically significant. Results at the aggregate country level are therefore in line with the productivity and input intensity mechanism analyzed in the two preceding

subsections. In general terms, the implications for the EAC countries are clear: there is scope to increase exports of manufactured goods by reducing services trade restrictiveness.

Table 7: Gravity model regression results (aggregate STRI)

	(1)	(2)	(3)
Ln(Overall STRI)	-0.494***		
	(0.001)		
Ln(Mode 1 STRI)		-0.158*	
		(0.062)	
Ln(Mode 3 STRI)			-0.436***
			(0.001)
Ln(1+OTRI)	-2.954***	-3.380***	-3.540***
	(0.000)	(0.000)	(0.000)
RTA	0.315	0.282	0.320
	(0.183)	(0.237)	(0.170)
Ln(Distance)	-0.467***	-0.483***	-0.465***
	(0.002)	(0.001)	(0.001)
Contiguous	0.325	0.301	0.329
	(0.316)	(0.397)	(0.311)
Colony	0.310	0.349	0.303
	(0.185)	(0.163)	(0.181)
Common Colonizer	0.0833	0.0505	0.0842
	(0.892)	(0.931)	(0.892)
Common Language	0.255	0.299	0.273
	(0.382)	(0.323)	(0.352)
Ln(Importer GDP)	1.177***	1.151***	1.184***
	(0.000)	(0.000)	(0.000)
Ln(Exporter GDP)	1.270***	1.229***	1.263***
	(0.000)	(0.000)	(0.000)
Constant	-66.02***	-63.38***	-65.90***
	(0.000)	(0.000)	(0.000)
Observations	6426	6426	6307
R2	0.655	0.629	0.649

*Note: The dependent variable is trade in all cases. Estimation is by PPML with robust standard errors clustered by country pair. P-values are in parentheses below the parameter estimates. Statistical significance is indicated by * (10%), ** (5%), and *** (1%). All trade cost proxies are transformed as per Baier and Bergstrand (2009).*

To give an indication of what is at stake for the EAC countries, it is useful to perform a simple counterfactual using the estimated gravity coefficients and the STRI data for the region examined in Section 2. As noted, the EAC countries have a reasonably liberal services trade policy stance relative to the rest of the continent. However, Ghana is the Sub-Saharan African leader on the overall STRI (covering all sectors and modes of supply), with a score of 18.4. We can use this information in combination with each EAC country's score to estimate the impact on merchandise exports of reducing services trade restrictiveness indicators to African best practice.

Table 8: Gravity model regression results (sectoral STRI)

	(1) Banking	(2) Insurance	(3) Professional	(4) Retail	(5) Telecom	(6) Transport
Ln(Sectoral STRI)	-0.106*	-0.0239	-0.182	-0.783***	0.386***	-0.270***
	(0.076)	(0.693)	(0.275)	(0.000)	(0.001)	(0.001)
Ln(1+OTRI)	-3.828***	-4.025***	-4.219***	-0.139	-2.408***	-3.479***
	(0.000)	(0.000)	(0.000)	(0.865)	(0.001)	(0.000)
RTA	0.396	0.290	0.301	0.0156	0.129	0.302
	(0.135)	(0.223)	(0.218)	(0.955)	(0.512)	(0.185)
Ln(Distance)	-0.424**	-0.477***	-0.466***	-0.879***	-0.732***	-0.501***
	(0.012)	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)
Contiguous	0.306	0.314	0.315	-0.577*	-0.0865	0.280
	(0.404)	(0.391)	(0.375)	(0.052)	(0.786)	(0.411)
Colony	0.104	0.347	0.345	0.000558	0.511***	0.326
	(0.696)	(0.148)	(0.156)	(0.999)	(0.002)	(0.167)
Common Colonizer	0.0691	0.0150	0.0288	-0.0268	-0.306	0.0542
	(0.904)	(0.980)	(0.962)	(0.952)	(0.559)	(0.928)
Common Language	0.345	0.343	0.332	0.651**	0.529**	0.265
	(0.288)	(0.265)	(0.274)	(0.040)	(0.033)	(0.379)
Ln(Importer GDP)	1.133***	1.121***	1.157***	1.287***	0.979***	1.113***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Exporter GDP)	1.192***	1.207***	1.231***	1.332***	1.237***	1.247***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-61.05***	-61.50***	-63.70***	-72.70***	-60.29***	-63.21***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	5355	6426	6426	2380	5117	6426
R2	0.607	0.610	0.613	0.768	0.712	0.650

*Note: The dependent variable is trade in all cases. Estimation is by PPML with robust standard errors clustered by country pair. P-values are in parentheses below the parameter estimates. Statistical significance is indicated by * (10%), ** (5%), and *** (1%). All trade cost proxies are transformed as per Baier and Bergstrand (2009).*

Country impacts are as follows: Burundi 4.4%, Kenya 18.6%, Rwanda 13.0%, Tanzania 19.8%, and Uganda 23.1%. These estimated effects are economically meaningful in all cases. They serve to illustrate the significant potential economic gains from services policy reforms, and emphasize the downstream linkage to goods exports. Increasing merchandise trade is an important objective for most developing countries, including those in the EAC. The magnitude of the estimated counterfactual trade growth impacts indicates that services reform is an area that is deserving of attention within the framework of achieving that broader goal.

It is important to emphasize that the gravity model results are stronger in terms of the services-manufacturing linkage than those obtained using firm level data in the earlier parts of the paper. As noted above, the reason is likely that the firm level regressions are picking up general business environment constraints, and in particular institutions that mediate the relationship between services policies and input use, and input use and productivity at the firm level. The country level regressions reported in this section are more macro in nature than the first two sets of regressions, and the

strong results suggest that the mechanisms in play are perhaps more economically significant than might be thought based on the firm level data alone.

5 Conclusion and Policy Implications

This paper has shown that services policies and sectoral competitiveness are important determinants of downstream productivity and exports in goods sectors. We have contributed to the literature by extending the discussion to include trade effects, and by examining the implications of our findings specifically for the EAC countries. The size of the effects we find is quantitatively significant. In particular, findings from the gravity model suggest that the EAC countries could reap substantial merchandise trade gains by implementing additional reforms in key services sectors, in particular retail distribution and transport.

Although the EAC countries are for the most part reasonably liberal by the standards of Sub-Saharan Africa, there is still room for them to address restrictive policies that make it more difficult for foreign firms to contest local services markets, or which increase the costs of all companies serving the market, domestic and foreign alike. Similarly, there is scope to examine the extent to which reforms to services regulations could alter the regional pattern of trade and production in accordance with comparative advantage. That issue is left for further research, but we note that it is a difficult one in the context of the EAC countries due to difficulties in obtaining bilaterally disaggregated services trade data.

Of course, reforming the services sector in the region does not begin and end with trade policy, or even more generally with domestic regulation. There is also an important private sector development agenda. Governments need to actively support the acquisition of the skills and knowledge that form the backbone of the modern services economy. Investments in human capital through education policy are likely to be of particular importance going through, as are general improvements in the business and investment climates.

Although services play a lesser role in the overall economies of the EAC region than in high income countries, they still account for a substantial portion of all economic activity. Moreover, we have shown that they represent important inputs into the manufacturing process, including for export. Reform of services policies therefore dovetails well with broader growth and development objectives, such as increasing integration into the global trading economy. It is also relevant to cite the example of global and regional value chains, which rely heavily on services—particularly traded services—to link together the various points in the production network, and to provide important inputs such as research and design, as well as marketing and downstream activities. Although this business model is still in its infancy in Africa, it is not entirely absent. Over the medium term, it can be expected to become more important in relative terms, which means that the importance for goods trade of competitive backbone services markets will only increase. Policymakers in the EAC countries need to be aware of this dynamic, and ensure that the twin aspects of services sector competitiveness—regulatory reform and private sector development—are both given appropriate attention.

This paper has highlighted a number of issues that are deserving of further research. One is the impact of the goods-services productivity linkage on the pattern of services trade and production within the region. Our micro-level regressions focus on local effects, but it is plausible that openness to regional services trade flows could have similar knock-on effects to manufacturing. A second issue, linked to the first, is that we have found relatively large results in the gravity regression, but smaller effects in the firm-level regressions. The possible reasons behind this need to be elucidated.

One candidate is the impact of other country-level variables, such as institutional development and control of corruption. In closely related research, Beverelli et al. (2015) find that the positive economic effects of more open services trade regimes are strongly conditional on the quality of economic governance and related institutions as reflected in national performance on indicators such as the strength of the rules of law, control of corruption and quality of regulation. Countries with better institutional business environments will benefit much more from a more open services trade regime. In the design of policy reforms and identification of priority areas for such reforms it is important to go beyond this general finding and 'unpack' how different dimensions of the business environment and economic governance institutions impact on different services sectors. These are questions that require in-depth country-level analysis of the links between regulatory reform in services sectors and broader governance reforms. Finally, we have used global datasets to infer effects on the EAC countries, due to the need to ensure adequate within-sample variation. Our work could usefully be complemented by country-level studies that seek to document the same effects in the concrete EAC context.

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