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Reshaping Economic Geography of East Africa: From Regional to Global Integration

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ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
EAPP	East Africa Power Pool
EIZ	Economic integration zone
EU	European Union
ICT	Information and communications technology
MERCOSUR	Common Market of the South (Mercado Común del Sur)
REC	Regional economic community
SAR	Special administrative region
SEZ	Special economic zone
SIP	Singapore–Suzhou Industrial Park
TTRI	Total Trade Restrictiveness Index
VET	Vocational Education and Training
WAEMU	West African Economic and Monetary Union

All dollar amounts are U.S. dollars unless otherwise indicated.

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Technical annexes

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Annex 1. Measuring and quantifying economic integration in the EAC and the WAEMU

This annex discusses measures of economic integration used for comparing economic integration in the EAC and the WAEMU. The optimum currency area (OCA) theory provides a framework for analysis of whether countries are sufficiently integrated to introduce common currency. Selection of measures of economic integration is based on Dorrucci *et al.* (2002), with some exceptions. Due to lack of data, financial market integration is omitted. Similarly, because the WAEMU has already adopted common currency, exchange rate and interest rate volatilities are also omitted. Therefore, measures included are:

Convergence of business cycles. To introduce common currency, business cycles among member countries should be synchronized, driven by the common external shocks. The higher synchronization, the lower is the cost of pursuing common monetary policies. The convergence of business cycles is measured by the difference of real GDP growth rate from the regional averages.

Convergence of income. Deeper economic integration should enhance the convergence of income across the member countries. In more integrated and open economies where capital and labor mobility is enhanced, income level may be converged thanks to optimal resource allocation. The convergence of income is measured by the percentage difference real GDP per capita from the regional averages.

Convergence of inflation rate. Common monetary policy is most beneficial if inflation rates are already reasonably similar among the members participating in the regional arrangement. The convergence of inflation is measured by the percentage point deviation of the consumer price inflation from the regional averages.

Trade integration. A high degree of goods market integration indicates that how the economies are integrated overall. More economic integration should enhance regional trade among member countries. The ratio of intra-regional trade to GDP is employed as an indicator of trade openness.

The degree of regional integration is captured by dissimilarity among the member countries, using distant metric. The distant metric employed here is a Euclidean distance defined for each indicator described above:

$$d(i,j) = \sqrt{\sum_{k=1}^{p} (x_k^{i,j} - x_{ave}^{i,j})^2}$$

Here $d(i,j)$ measures the dissimilarity of country of k in region i from the regional average measured by indicator. The dissimilarity is captured by the (percentage) difference from the regional averages. Furthermore, the indicators are normalized with the same mean (zero) and standard deviation (unity) for comparison purpose.

Total distance metric in region i is defined as follows:

$$D(i) = \sqrt{\sum_{j=1}^{q} d(i,j)^2}.$$

Table A1-1 reports results of the analysis for EAC and WAEMU

Table A1-1. Measures of dissimilarity for economic indicators of the EAC and the WAEMU

Indicator	Region	1990-94	1995-99	2000-04	2005-09
Total	EAC	1.77	1.40	1.18	1.11
	WAEMU	2.22	2.02	1.44	1.27
Per capita GDP	EAC	1.04	1.01	0.99	0.98
	WAEMU	0.88	0.86	0.86	0.85
Inflation	EAC	0.93	0.96	0.99	0.96
	WAEMU	1.51	1.52	1.45	1.29
GDP growth	EAC	0.46	0.54	0.55	0.56
	WAEMU	0.85	0.81	0.83	0.79
Trade/GDP	EAC	0.86	0.86	0.85	0.85
	WAEMU	0.96	0.96	0.96	0.96

Source: World Development Indicators and World Bank staff calculations

Annex 2. Analysis of the international trade of EAC partner states based on the gravity model

This annex employs a gravity model to investigate the recent trade performance of the EAC countries.

The Gravity Model: Data and Methodology

The gravity model is the workhorse of empirical international trade. In addition to strong explanatory power, the gravity model now also has sound microeconomic credentials in the form of a number of underlying theories that give rise to gravity-like equations. The standard benchmark in the literature is now the "gravity with gravitas" model of Anderson and Van Wincoop (2003). Their gravity equation takes the following form:

$$(1)\ \log(X_{ij}) = \log(E_j) + \log(Y_i) - \log(Y) + (1-s)\log(t_{ij}) - (1-\sigma)\log(P_j) - (1-s)\log(\Pi_i) + e_{ij}$$

where: X_{ij} is exports from country *i* to country *j*; E_j is expenditure in country *j*; Y_i is production in country *i*; t_{ij} is bilateral trade costs; *s* is the intra-sectoral elasticity of substitution (between varieties within a sector); and e_{ij} is a random error term satisfying standard assumptions. The P_j and Π_i terms represent multilateral resistance, i.e. the fact that trade patterns are determined by the level of bilateral trade costs relative to trade costs elsewhere in the world. Inward multilateral resistance $(P_j)^{(1-s)} = \sum_{i=1}^{N}(\Pi_i)^{(s-1)} w_i (t_{ij})^{(1-s)}$ captures the dependence of country *j*'s imports on trade costs across all suppliers. Outward multilateral resistance $(\Pi_i)^{(1-s)} = \sum_{i=1}^{N}(P_j)^{(s-1)} w_j (t_{ij})^{(1-s)}$ captures the dependence of country *i*'s exports on trade costs across all destination markets. The *w* terms are weights equivalent to each country's share in global output or expenditure.

To operationalize the model, a specification is needed for the trade costs function t_{ij}. It is common in the gravity literature to include a range of data on geographical and historical factors that are believed to influence trade costs, and that approach is followed here. International distance is included as a proxy for transport costs, and dummy variables for landlocked countries, countries that are geographically contiguous, those that share a common language, those once in a colonial relationship, and those that were colonized by the same power.

Since this analysis looks at the trade performance of the EAC relative to other international trading areas, I follow the regional integration literature in supplementing those data with three sets of dummy variables for each regional integration structure (Soloaga and Winters, 2001; Dee and Gali, 2003; and Coulibaly, 2007).[1] Using the EAC as an example, the first dummy variable ("EAC both") is equal to unity only if the exporting and importing countries are both EAC members. The second dummy variable ("EAC exporter") is equal to unity if the exporting

[1] Egger (2002) points out the disadvantages of a common alternative approach based on the analysis of gravity model forecast errors as a measure of "trade potential". The problem is two-fold. First, systematic (i.e. non-random) variation in forecast errors tends to indicate model misspecification. Second, the search for systematic variation in forecast errors is necessarily confounded by the assumed presence of random noise. The dummy variable approach taken here ensures that only systematic variation is extracted from the data.

country is an EAC member. The third dummy variable ("EAC importer") is equal to unity if the importing country is an EAC member. The last two dummies reflect the overall openness of a given regional arrangement to exports and imports respectively. The first dummy reflects the additional effect on trade when both countries belong to the same arrangement. Negative signs on any of these coefficients would be consistent with an interpretation in which EAC countries under-trade relative to what is observed on average.

To provide a solid basis for comparison, I include the following regional integration arrangements in addition to the EAC, adopting the three dummy variable approach in each case: NAFTA, EU, Mercosur, ASEAN, SADC, COMESA, and SAFTA. Although this is obviously not an exhaustive list of regional integration arrangements, inclusion of these variables means that the regression results account for EAC's performance relative to major trading blocs with common market objectives.

Consolidating, the trade costs function takes the following form:

$$(2) t_{ij} = b_1 EAC_{ij}^{Both} + b_2 EAC_i^{Exp} + b_3 EAC_j^{Imp} + b_4 LPI_i + b_5 LPI_j + b_6 \log(1 + tariff_{ij}) + b_7 Contig_{ij} + b_8 Comlang_{ij} + b_9 Colony_{ij} + b_{10} ComCol_{ij} + b_{11} Landlocked_i + b_{12} Landlocked_j + \sum_{r=1}^{R} a_r RTA_{ij}^{Both} + \sum_{r=1}^{R} c_r RTA_i^{Exp} + \sum_{r=1}^{R} d_r RTA_j^{Imp}$$

Estimation of the Anderson and Van Wincoop (2003) model most commonly proceeds using fixed effects: dummy variables for each importer and exporter account for market size as well as multilateral resistance. The benefit of this approach is that it avoids having to estimate the nonlinear multilateral resistance terms directly, while still accounting for their effects. However, it makes it impossible to include data that vary in the same dimension as the fixed effects. This difficulty is crucial in the present context: fixed effects estimation would lead two of the three sets of dummy variables discussed above to drop out of the equation.

Baier and Bergstrand (2009) provide a neat solution that takes account of multilateral resistance simply and transparently, but without relying on fixed effects estimation. They use a first-order Taylor series to approximate the multilateral resistance terms of the original Anderson and Van Wincoop (2003) model. Under comparable specifications, the Baier and Bergstrand (2009) approximate multilateral resistance terms provide results that are very close to those obtained using fixed effects. Their gravity model specification, which I apply here, takes the following form:[2]

$$(3) \log(X_{ij}) = \log(E_j) + \log(Y_i) - \log(Y) + (1 - s)\left[\log(t_{ij}) - \frac{1}{N}\sum_{i=1}^{N}\log(t_{ij}) - \frac{1}{N}\sum_{j=1}^{N}\log(t_{ij}) + \frac{1}{N^2}\sum_{j=1}^{N}\sum_{i=1}^{N}\log(t_{ij})\right] + e_{ij}$$

[2] In fact, Baier and Bergstrand (2009) take the assumption of unit income elasticities seriously, and move the two GDP terms to the left hand side of equation (3) to avoid the potential for endogeneity bias (since exports enter GDP). Results in the present case, however, suggest that the unit elasticity assumption is too strong. I therefore leave the GDP terms on the right hand side of the estimating equation. In their meta-analysis of over 1,000 sets of gravity model estimates, Disdier and Head (2008) find that correcting for endogeneity bias in the GDP terms does not make any statistically significant difference to estimates of the distance coefficient.

where N is the total number of countries.

Baier and Bergstrand (2009) estimate their model using OLS. However, Santos Silva and Tenreyro (2006) point out that it is usually more appropriate to use the Poisson estimator as the benchmark in log-linearized models such as gravity. In addition to allowing the inclusion of zero trade observations in the estimating sample, the Poisson estimator deals with a particular type of heteroskedasticity that can result in biased coefficient estimates in addition to the more usual problem of biased standard errors. For these two reasons, I prefer Poisson estimates in the present case, and present OLS for comparative purposes only.

Data for the gravity model are drawn from standard sources (Table A2-1). Trade data come from UN-COMTRADE, and are disaggregated into two macro-sectors, industry and agriculture, using the relevant WTO definitions based on the Harmonized System. Import data are generally believed to be more reliable than exports, and so are used whenever possible. When import data are missing, mirror export data are used instead. Simple average applied tariffs are sourced from UNCTAD's TRAINS database. These rates take account of bilateral and regional preference arrangements. As in Section 2 above, the World Bank LPI is used as an indicator of overall trade facilitation performance. Finally, geographical and historical variables are sourced from CEPII's distance database (Mayer and Zignago, 2006).

Table A2-1: Data sources

Variable	Definition	Year	Source
"Bloc" Both	Dummy variable equal to unity if the importer and exporter both belong to "bloc" (EAC, NAFTA, EU, Mercosur, ASEAN, SADC, COMESA, SAFTA)	n/a	Author
"Bloc" Exporter	Dummy variable equal to unity if the exporter belongs to "bloc" (EAC, NAFTA, EU, Mercosur, ASEAN, SADC, COMESA, SAFTA)	n/a	Author
"Bloc" Importer	Dummy variable equal to unity if the importer belongs to "bloc" (EAC, NAFTA, EU, Mercosur, ASEAN, SADC, COMESA, SAFTA)	n/a	Author
Border	Dummy variable equal to unity for exporting and importing countries with a common land border	n/a	CEPII
Colony	Dummy variable equal to unity when the exporter and importer were once in a colonial relationship	n/a	CEPII
Common Colonizer	Dummy variable equal to unity when the exporter and importer were once colonized by the same power	n/a	CEPII
Common Language	Dummy variable equal to unity for exporting and importing countries with a common language (ethnographic basis)	n/a	CEPII
Exporter GDP	Nominal GDP in the exporting country, in USD.	2007	WDI
Exporter Landlocked	Dummy variable equal to unity if the exporter is landlocked	n/a	CEPII
Exporter LPI	Exporting country's LPI score (1-5).	2007	LPI
Importer GDP	Nominal GDP in the importing country, in USD.	2007	WDI
Importer Landlocked	Dummy variable equal to unity if the importer is landlocked	n/a	CEPII
Importer LPI	Importing country's LPI score (1-5).	2007	LPI

Tariffs	Importing country's simple average applied tariff rate, including preferences (percent ad valorem)	2007	WITS-TRAINS
Trade	Value of imports into the importer from the exporter, using mirror data if direct data are unavailable	2007	WITS-COMTRADE

Results and Discussion

Results from estimating the gravity model appear in Tables A2-2 — A2-5. The first two Tables use data on trade flows in industrial products only. The second two Tables use data on trade in agricultural products only. This section presents and discusses each set of results in turn.

Industrial Products

Table A2-2 presents regression results for industrial products, using alternately OLS and Poisson as estimators. Commonly used gravity variables such as GDP, distance, and geographical and historical factors generally have coefficients with the expected signs and magnitudes, and which are statistically significant under OLS; a number of the geographical variables are correctly signed but statistically insignificant under Poisson.[3] The only real exception is the dummy for landlocked exporting countries, which is unexpectedly positive and statistically significant. However, the dummy for landlocked importers remains negative and statistically significant under OLS; it is statistically insignificant under Poisson. In terms of policy variables, tariffs have a negative and statistically significant coefficient, while the LPI coefficients for the importing and exporting countries both have positive and statistically significant coefficients under OLS, but only the exporter coefficient is statistically significant under Poisson.

Columns 5-6 contain results for the baseline model, which includes tariffs and trade facilitation data. Both sets of estimates have a positive and statistically significant coefficient on the EAC importer dummy, which suggests that EAC's trade performance is relatively strong on the import side. There is evidence from the OLS regression that EAC member countries tend to trade more than expected among themselves, but the Poisson results do not support this conclusion. In none of the regressions is there any evidence that the EAC countries' export performance is statistically different from what would be expected based on their economic fundamentals.

Table A2- 2 highlights the quantitative importance of tariffs and trade facilitation in terms of EAC's trade performance. Evaluated at the sample average, results suggest that a one percentage point decrease in tariffs would be associated with a 3.75 percent increase in trade in industrial products. Similarly, a one percent increase in the exporting country's LPI score would be associated with a 0.25 percent increase in trade in industrial products.

[3] Due to different data and specifications, it is difficult to directly compare results with previous work looking at the impacts of particular regional integration agreements. The finding that only a few regional agreements appear to have strong trade effects is, however, reflected in the pattern of results in some previous work, such as Dee and Gali (2003). There is also overlap in some cases between the configuration of dummy variable coefficient signs reported here and those in Soloaga and Winters (2001) and Dee and Gali (2003).

Table A2-1: Regression results for EAC countries jointly, industrial products only.

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
EAC (Both)	**2.212*** **	**0.642**	**2.003*** **	**0.538**	**2.016*** **	**0.585**
	(0.000)	**(0.268)**	**(0.001)**	**(0.332)**	**(0.000)**	**(0.310)**
EAC (Exporter)	**2.383**	**6.804**	**2.528**	**5.296**	**1.170**	**-3.299**
	(0.526)	**(0.481)**	**(0.501)**	**(0.590)**	**(0.759)**	**(0.720)**
EAC (Importer)	**38.749*** **	**28.555*** **	**38.791*** **	**30.334*** **	**39.388*** **	**29.220*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Log(Importer GDP)	1.041***	0.743***	1.041***	0.757***	1.037***	0.751***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Exporter GDP)	1.016***	0.833***	1.016***	0.832***	0.999***	0.832***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Distance)	-1.487***	-0.489***	-1.470***	-0.476***	-1.470***	-0.468***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+Tariff)			-3.592***	-4.062***	-3.464***	-4.011***
			(0.000)	(0.004)	(0.000)	(0.004)
LPI Exporter					1.720*	8.387***
					(0.071)	(0.006)
LPI Importer					11.173***	4.364
					(0.000)	(0.263)
Common Border	0.535***	0.683***	0.500***	0.680***	0.497***	0.676***
	(0.001)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)
Common Language	0.830***	0.533***	0.780***	0.510***	0.786***	0.503***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Colony	0.878***	0.043	0.894***	0.072	0.887***	0.081
	(0.000)	(0.772)	(0.000)	(0.619)	(0.000)	(0.568)
Common Colonizer	1.116***	0.137	1.111***	0.174	1.113***	0.163
	(0.000)	(0.743)	(0.000)	(0.669)	(0.000)	(0.687)
Landlocked Exporter	10.362***	13.090***	10.358***	14.223***	10.795***	18.169***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Landlocked Importer	-18.947***	2.270	-18.921***	1.655	-11.329***	4.343
	(0.000)	(0.502)	(0.000)	(0.646)	(0.000)	(0.357)
NAFTA (Both)	-2.074	-0.272	-2.151	-0.391	-2.143	-0.346
	(0.151)	(0.374)	(0.130)	(0.201)	(0.132)	(0.261)
NAFTA (Exporter)	13.127**	37.234	13.348**	29.723	6.525	26.658

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
	(0.017)	(0.130)	(0.016)	(0.222)	(0.344)	(0.283)
NAFTA (Importer)	-104.203***	-82.405***	-103.939***	-81.895***	-129.764***	-87.119***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EU (Both)	-0.163	0.240	-0.134	0.219	-0.147	0.276
	(0.101)	(0.158)	(0.176)	(0.193)	(0.137)	(0.109)
EU (Exporter)	1.112	5.752*	1.079	7.151**	-1.695	-8.893
	(0.219)	(0.068)	(0.234)	(0.024)	(0.350)	(0.165)
EU (Importer)	22.391***	8.536***	22.089***	8.216***	8.004***	0.793
	(0.000)	(0.001)	(0.000)	(0.001)	(0.008)	(0.902)
MERCOSUR (Both)	-0.477	-0.160	-0.787	-0.578	-0.776	-0.532
	(0.739)	(0.770)	(0.584)	(0.310)	(0.592)	(0.359)
MERCOSUR (Exporter)	13.996***	-3.594	14.046***	-1.357	15.626***	-7.442
	(0.000)	(0.567)	(0.000)	(0.830)	(0.000)	(0.296)
MERCOSUR (Importer)	3.934	-14.385	4.023	-12.533	-5.903	-16.717
	(0.341)	(0.147)	(0.329)	(0.205)	(0.178)	(0.118)
ASEAN (Both)	-0.883*	0.986***	-1.082**	0.833***	-1.067**	0.810***
	(0.071)	(0.001)	(0.027)	(0.007)	(0.028)	(0.009)
ASEAN (Exporter)	9.901***	32.654***	9.950***	35.287***	7.483**	29.347***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.013)	(0.000)
ASEAN (Importer)	-9.813***	13.552*	-9.967***	12.269*	-19.705***	9.204
	(0.000)	(0.065)	(0.000)	(0.094)	(0.000)	(0.246)
SADC (Both)	1.644***	0.923	1.518***	0.689	1.531***	0.682
	(0.000)	(0.141)	(0.001)	(0.279)	(0.001)	(0.296)
SADC (Exporter)	-7.209***	-5.697	-7.226***	-5.266	-7.636***	-4.843
	(0.001)	(0.119)	(0.000)	(0.149)	(0.000)	(0.185)
SADC (Importer)	4.540	-21.362***	4.836*	-21.202***	8.420***	-21.241***
	(0.121)	(0.004)	(0.098)	(0.006)	(0.005)	(0.005)
COMESA (Both)	1.427***	1.558***	1.258***	1.222***	1.246***	1.211***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.002)
COMESA (Exporter)	-4.482**	3.393	-4.552**	3.246	-4.078*	5.324
	(0.035)	(0.522)	(0.032)	(0.541)	(0.055)	(0.312)
COMESA (Importer)	-5.812***	-10.956***	-5.670***	-11.084***	-7.553***	-10.964***
	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.002)
SAFTA (Both)	-0.943	-0.754	-1.007	-0.852	-1.005	-0.836

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
	(0.177)	(0.329)	(0.136)	(0.271)	(0.129)	(0.281)
SAFTA (Exporter)	-9.657**	0.566	-9.731**	-0.245	-8.835**	-1.630
	(0.014)	(0.963)	(0.013)	(0.984)	(0.024)	(0.893)
SAFTA (Importer)	-11.303***	-3.552	-11.172***	-3.891	-9.212**	-5.063
	(0.002)	(0.643)	(0.003)	(0.613)	(0.013)	(0.504)
Constant	-45.979***	-21.322***	-46.016***	-21.648***	-37.104***	-13.621***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
R2	0.695	0.640	0.696	0.642	0.698	0.645
Obs.	14273	15263	14273	15263	14273	15263

*Standard errors are corrected for clustering by country-pair. P-values appear in parentheses below the parameter estimates. Statistical significance is indicated by: * (10 percent), ** (5 percent), and *** (1 percent). R2 for the Poisson models is calculated as the squared coefficient of correlation between actual and fitted values, as in Santos Silva and Tenreyro (2006).*

To test whether the OLS estimator is appropriate, I use the Park regression suggested by Santos Silva and Tenreyro (2006, equation 11). Using fitted values from the benchmark model, the null hypothesis is strongly rejected (prob. = 0.000). This result tends to indicate that the log-linearized OLS estimates might be unreliable. There is thus good reason to prefer the Poisson estimates.

By removing variables from the baseline model, it is possible to get an idea of the importance of selected determinants of the EAC countries' trade performance. Columns 1-2 exclude all policy variables, and columns 3-4 include tariffs only. Although a number of the variables of primary interest—the EAC dummies—are statistically insignificant in one or more specifications, it is possible to use observed changes in their magnitudes to give a first indication of some interesting features of the data. Of course, these results should be interpreted cautiously, because the changes involved are small relative to the imprecision with which the relevant coefficients are estimated.

The first result to note is that intra-regional trade performance as captured by the EAC both dummies fall noticeably once tariffs are accounted for. Preferences would therefore seem to be an important part of the regional trading environment. In addition, the EAC importer dummy increases in value when tariffs are added to the regression, which reflects the fact that import performance is strong despite relatively restrictive trade policy settings, as discussed above.

The second interesting result to emerge from these regressions relates to the role of logistics and trade facilitation. The EAC exporter dummy decreases noticeably between columns 3-4 and 5-6, and even turns negative but statistically insignificant in the Poisson regression. The EAC importer dummy also decreases in the Poisson specification, but it increases in the OLS model. This evidence reinforces the analysis presented above to the effect that trade facilitation and logistics performance is a significant impediment to greater international integration of goods markets in the region. Poor trade logistics would appear to be hampering local firms as they attempt to source goods from overseas, or export to foreign markets.

Table A2-3 goes deeper into these results by using country dummies instead of dummies for the EAC region. This approach makes it possible to examine whether particular countries in the region exhibit stronger or weaker trade performance than expected. The configuration of dummies makes it possible to identify unexpected trade performance vis-à-vis the world as a whole (simple country dummies), or with other partners in the EAC region (country dummies interacted with the EAC both dummy).

Columns 5-6 present the baseline results. As in the previous discussion, Poisson results are preferred on the basis of a Park test (prob. = 0.000). Under Poisson, it is only Burundi that appears to trade more than average with the rest of the world: its country dummy coefficient is positive and statistically significant. There is also evidence from OLS of strong trade performance in Kenya, Uganda, and Tanzania, but it is not backed up by the Poisson model. In terms of intra-regional trade performance, Burundi and Rwanda stand out as having positive and statistically significant coefficients, i.e. they trade more than expected with their regional partners. In light of the evidence on very strong recent trade growth in Burundi presented in Section 2, it is to be expected that that country's performance should stand out in the gravity models too.

Again, the inclusion of policy variables covering tariffs and trade facilitation accounts to some extent for these findings. Moving from left to right across Table A2-3 shows that the EAC

countries generally tend to exhibit closer to average trade performance as policy variables are added in. This finding is particularly strong for the LPI, which again highlights the importance of logistics and trade facilitation for international integration in the region.

Table A2--2: Regression results for EAC countries individually, industrial products only.

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
Kenya	**46.108*** **	**1.811**	**46.125*** **	**3.483**	**43.729*** **	**0.768**
	(0.000)	**(0.895)**	**(0.000)**	**(0.801)**	**(0.000)**	**(0.957)**
Uganda	**21.478*** **	**6.606**	**21.762*** **	**6.303**	**21.995*** **	**3.117**
	(0.000)	**(0.476)**	**(0.000)**	**(0.501)**	**(0.000)**	**(0.743)**
Tanzania	**20.910*** **	**-6.137**	**20.933*** **	**-4.586**	**25.366*** **	**-1.192**
	(0.007)	**(0.708)**	**(0.006)**	**(0.785)**	**(0.001)**	**(0.944)**
Rwanda	**7.643**	**9.347**	**7.590**	**11.599**	**6.965**	**10.374**
	(0.115)	**(0.371)**	**(0.117)**	**(0.281)**	**(0.149)**	**(0.339)**
Burundi	**32.047*** **	**48.484*** **	**32.176*** **	**47.024*** **	**33.011*** **	**44.291*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Kenya-EAC	**0.005**	**0.106**	**-0.063**	**0.082**	**-0.055**	**0.097**
	(0.995)	**(0.783)**	**(0.944)**	**(0.832)**	**(0.950)**	**(0.803)**
Uganda-EAC	**1.491**	**0.151**	**1.412**	**0.129**	**1.424**	**0.139**
	(0.154)	**(0.704)**	**(0.174)**	**(0.749)**	**(0.153)**	**(0.729)**
Tanzania-EAC	**1.307**	**1.042** **	**1.061**	**0.750**	**1.071**	**0.780**
	(0.188)	**(0.049)**	**(0.283)**	**(0.166)**	**(0.240)**	**(0.146)**
Rwanda-EAC	**1.305***	**1.134*** **	**1.248***	**1.135*** **	**1.303***	**1.240*** **
	(0.081)	**(0.006)**	**(0.093)**	**(0.006)**	**(0.060)**	**(0.004)**
Burundi-EAC	**1.598***	**1.667** **	**1.498***	**1.680** **	**1.420**	**1.470** **
	(0.079)	**(0.017)**	**(0.094)**	**(0.017)**	**(0.109)**	**(0.034)**
Log(Importer GDP)	1.029***	0.731***	1.029***	0.742***	1.026***	0.739***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Exporter GDP)	1.040***	0.847***	1.040***	0.847***	1.022***	0.848***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Distance)	-1.485***	-0.488***	-1.468***	-0.477***	-1.469***	-0.471***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+Tariff)			-3.617***	-3.483**	-3.493***	-3.441**
			(0.000)	(0.013)	(0.000)	(0.014)
LPI Exporter					0.649	2.721
					(0.491)	(0.373)
LPI Importer					10.964***	5.489

					(0.000)	(0.176)
Common Border	0.533***	0.694***	0.499***	0.694***	0.497***	0.692***
	(0.002)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)
Common Language	0.834***	0.549***	0.784***	0.529***	0.790***	0.525***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Colony	0.878***	0.025	0.894***	0.048	0.888***	0.055
	(0.000)	(0.865)	(0.000)	(0.742)	(0.000)	(0.702)
Common Colonizer	1.115***	0.178	1.110***	0.205	1.112***	0.201
	(0.000)	(0.649)	(0.000)	(0.595)	(0.000)	(0.600)
Landlocked Exporter	12.337***	11.706***	12.326***	12.498***	12.405***	13.816***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Landlocked Importer	-17.061***	0.307	-17.031***	0.020	-9.560***	3.594
	(0.000)	(0.926)	(0.000)	(0.995)	(0.000)	(0.438)
NAFTA (Both)	-2.072	-0.273	-2.151	-0.377	-2.142	-0.350
	(0.152)	(0.359)	(0.131)	(0.208)	(0.133)	(0.246)
NAFTA (Exporter)	10.966*	46.021*	11.169*	39.238	9.961	38.317
	(0.053)	(0.065)	(0.050)	(0.113)	(0.159)	(0.125)
NAFTA (Importer)	-95.166***	-84.907***	-94.877***	-84.903***	-119.633***	-92.069***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EU (Both)	-0.164	0.283*	-0.135	0.260	-0.146	0.296*
	(0.100)	(0.090)	(0.175)	(0.116)	(0.141)	(0.083)
EU (Exporter)	1.602*	6.760**	1.567*	7.880**	0.558	2.750
	(0.083)	(0.032)	(0.091)	(0.013)	(0.756)	(0.662)
EU (Importer)	20.976***	8.118***	20.674***	7.838***	6.948**	-1.181
	(0.000)	(0.002)	(0.000)	(0.003)	(0.022)	(0.855)
MERCOSUR (Both)	-0.478	-0.208	-0.790	-0.568	-0.779	-0.549
	(0.737)	(0.687)	(0.580)	(0.288)	(0.588)	(0.308)
MERCOSUR (Exporter)	13.651***	3.326	13.690***	5.153	14.904***	3.469
	(0.000)	(0.622)	(0.000)	(0.441)	(0.000)	(0.625)
MERCOSUR (Importer)	3.329	-17.918*	3.426	-16.536*	-6.165	-21.115**
	(0.419)	(0.063)	(0.406)	(0.085)	(0.160)	(0.042)
ASEAN (Both)	-0.888*	0.883***	-1.088**	0.761**	-1.073**	0.753**
	(0.058)	(0.004)	(0.020)	(0.012)	(0.021)	(0.013)
ASEAN (Exporter)	10.385***	42.117***	10.427***	44.014***	9.157***	41.375***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)

ASEAN (Importer)	-9.733***	16.923**	-9.915***	15.684**	-19.240***	12.004
	(0.000)	(0.022)	(0.000)	(0.032)	(0.000)	(0.126)
SADC (Both)	1.643***	0.954	1.516***	0.752	1.527***	0.741
	(0.000)	(0.145)	(0.001)	(0.253)	(0.001)	(0.265)
SADC (Exporter)	-5.165**	4.034	-5.183**	4.192	-5.738***	4.020
	(0.016)	(0.315)	(0.015)	(0.298)	(0.007)	(0.320)
SADC (Importer)	6.762**	-17.153**	7.070**	-16.895**	9.932***	-17.470**
	(0.033)	(0.024)	(0.025)	(0.030)	(0.002)	(0.024)
COMESA (Both)	1.425***	1.579***	1.248***	1.299***	1.238***	1.290***
	(0.000)	(0.000)	(0.001)	(0.002)	(0.000)	(0.002)
COMESA (Exporter)	-14.465***	-0.448	-14.516***	-1.029	-14.201***	-0.445
	(0.000)	(0.929)	(0.000)	(0.841)	(0.000)	(0.929)
COMESA (Importer)	-3.064*	-7.944*	-2.935	-7.962*	-4.008**	-7.134*
	(0.094)	(0.069)	(0.108)	(0.072)	(0.029)	(0.096)
SAFTA (Both)	-0.946	-0.845	-1.010	-0.926	-1.008	-0.915
	(0.170)	(0.255)	(0.129)	(0.213)	(0.122)	(0.218)
SAFTA (Exporter)	-15.179***	-11.069	-15.242***	-11.589	-15.005***	-12.553
	(0.000)	(0.346)	(0.000)	(0.326)	(0.000)	(0.297)
SAFTA (Importer)	-9.789***	-5.981	-9.663***	-5.968	-8.065**	-7.175
	(0.009)	(0.425)	(0.010)	(0.425)	(0.031)	(0.327)
Constant	-46.136***	-21.325***	-46.170***	-21.624***	-38.052***	-16.409***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R2	0.695	0.643	0.695	0.644	0.697	0.647
Obs.	14273	15263	14273	15263	14273	15263

*Standard errors are corrected for clustering by country-pair. P-values appear in parentheses below the parameter estimates. Statistical significance is indicated by: * (10 percent), ** (5 percent), and *** (1 percent). R2 for the Poisson models is calculated as the squared coefficient of correlation between actual and fitted values, as in Santos Silva and Tenreyro (2006).*

Taking all of these regression results together, it appears that the EAC region has relatively strong import performance, but that export and intra-regional trade performance are more or less in line with expectations. In terms of individual country performance, only Burundi and perhaps Rwanda stand out as doing better than expected. Tariffs at home and abroad (see Section 2) go part of the way towards explaining these findings. But there is also some evidence to suggest that trade facilitation and logistics might constitute a significant barrier to increased trade in industrial products for the EAC countries.

Agricultural Products

Table A2-4 presents results using data on agricultural products only, and incorporating dummies for EAC membership. Columns 5-6 contain the baseline model. Results on standard gravity model variables are again largely in line with expectations in terms of sign, magnitude, and statistical significance. As was the case for industrial products, the landlocked exporter dummy has an unexpected positive and significant coefficient under OLS, but it is negative and statistically insignificant using Poisson. However, the landlocked importer dummy has a negative and statistically significant coefficient in both specifications. In line with the results of Santos Silva and Tenreyro (2006), a Park test (prob. = 0.000) suggests that the OLS estimates may be unreliable, and there are therefore good reasons for preferring Poisson as a workhorse estimator in this case.

In terms of intra-regional trade, there is consistent evidence across all models that EAC countries perform better than expected in relation to agricultural products: the coefficient on the EAC both dummy is positive, statistically significant, and stable in magnitude across all specifications. The picture is less clear in relation to the importer and exporter dummies, however, due to qualitatively different results from OLS and Poisson. Preferring Poisson on the basis of the Park test suggests that the EAC countries' export performance is perhaps a little below expectations—although the result is not statistically significant—but that import performance is generally strong. These results are quite in line with those for the industrial products sector.

Interestingly, tariffs and trade facilitation play a less important role as determinants of agricultural trade patterns than they do for industrial products. Removing these variables from the model (columns 1-4) results in estimates of core coefficients that are very little different. Indeed, in the baseline Poisson model, none of the three policy variables—tariffs, importer LPI, and exporter LPI—have statistically significant coefficients. (The tariff coefficient is 12 percent significant, and the exporter LPI coefficient is borderline significant at the 15 percent level.)

Table A2-3: Regression results for EAC countries jointly, agricultural products only.

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
EAC (Both)	**1.524****	**1.330*****	**1.315****	**1.241*****	**1.368****	**1.310*****
	(0.011)	**(0.002)**	**(0.032)**	**(0.006)**	**(0.021)**	**(0.005)**
EAC (Exporter)	**7.523****	**-5.527**	**7.671*****	**-5.392**	**5.864***	**-5.401**
	(0.011)	**(0.299)**	**(0.010)**	**(0.316)**	**(0.051)**	**(0.311)**
EAC (Importer)	**0.083**	**19.285*****	**0.097**	**19.584*****	**-1.155**	**19.615*****
	(0.979)	**(0.002)**	**(0.976)**	**(0.001)**	**(0.713)**	**(0.001)**
Log(Importer GDP)	0.648***	0.649***	0.648***	0.648***	0.640***	0.648***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Exporter GDP)	0.251***	0.382***	0.249***	0.384***	0.220***	0.382***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Distance)	-1.324***	-0.320***	-1.321***	-0.319***	-1.324***	-0.318***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+Tariff)			-2.422***	-1.392	-2.320***	-1.393

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
			(0.000)	(0.108)	(0.000)	(0.114)
LPI Exporter					2.389***	2.360
					(0.002)	(0.152)
LPI Importer					8.029***	-0.795
					(0.000)	(0.715)
Common Border	0.735***	0.817***	0.707***	0.813***	0.709***	0.814***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common Language	0.733***	0.550***	0.680***	0.540***	0.685***	0.542***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Colony	1.122***	0.218*	1.139***	0.228*	1.119***	0.231*
	(0.000)	(0.083)	(0.000)	(0.069)	(0.000)	(0.068)
Common Colonizer	0.932***	0.503**	0.921***	0.511**	0.930***	0.505**
	(0.000)	(0.013)	(0.000)	(0.010)	(0.000)	(0.012)
Landlocked Exporter	0.405	-2.969	0.302	-3.313*	2.145*	-1.560
	(0.680)	(0.127)	(0.759)	(0.090)	(0.069)	(0.388)
Landlocked Importer	-24.740***	-5.683***	-24.770***	-5.927***	-18.233***	-6.483***
	(0.000)	(0.004)	(0.000)	(0.002)	(0.000)	(0.003)
NAFTA (Both)	-2.472	0.313	-2.600	0.237	-2.586	0.255
	(0.407)	(0.312)	(0.380)	(0.427)	(0.387)	(0.386)
NAFTA (Exporter)	8.010**	-3.123	8.002**	-4.365	-0.716	-12.671
	(0.022)	(0.668)	(0.024)	(0.521)	(0.872)	(0.231)
NAFTA (Importer)	12.810**	58.106***	12.718**	57.868***	-6.305	59.831***
	(0.013)	(0.000)	(0.014)	(0.000)	(0.272)	(0.000)
EU (Both)	0.400***	1.097***	0.294**	1.029***	0.276**	1.036***
	(0.001)	(0.000)	(0.012)	(0.000)	(0.017)	(0.000)
EU (Exporter)	2.398***	1.033	2.503***	1.376	-0.945	-2.042
	(0.001)	(0.441)	(0.000)	(0.270)	(0.461)	(0.442)
EU (Importer)	9.461***	6.167***	9.303***	6.014***	0.926	7.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.425)	(0.005)
MERCOSUR (Both)	-0.141	0.150	-0.313	0.037	-0.295	0.015
	(0.825)	(0.760)	(0.622)	(0.940)	(0.644)	(0.976)
MERCOSUR (Exporter)	9.643***	-11.425**	9.833***	-11.244**	8.774***	-14.843**
	(0.001)	(0.026)	(0.001)	(0.029)	(0.004)	(0.018)
MERCOSUR (Importer)	-19.128***	-7.625	-19.568***	-7.705	-22.487***	-6.987

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
	(0.000)	(0.109)	(0.000)	(0.106)	(0.000)	(0.146)
ASEAN (Both)	0.307	0.927***	0.180	0.865***	0.168	0.862***
	(0.402)	(0.000)	(0.621)	(0.001)	(0.637)	(0.001)
ASEAN (Exporter)	13.413***	-0.618	13.456***	-0.103	9.896***	-3.269
	(0.000)	(0.876)	(0.000)	(0.979)	(0.000)	(0.526)
ASEAN (Importer)	1.853	18.802***	1.843	18.851***	-3.355	19.133***
	(0.392)	(0.000)	(0.393)	(0.000)	(0.128)	(0.000)
SADC (Both)	1.421***	1.321***	1.362***	1.241***	1.402***	1.320***
	(0.001)	(0.002)	(0.002)	(0.006)	(0.001)	(0.009)
SADC (Exporter)	8.323***	-2.604	8.267***	-1.862	7.669***	-1.884
	(0.000)	(0.525)	(0.000)	(0.635)	(0.000)	(0.639)
SADC (Importer)	0.471	-0.316	0.611	-0.247	2.930	-0.658
	(0.828)	(0.926)	(0.778)	(0.942)	(0.177)	(0.838)
COMESA (Both)	-0.270	0.682	-0.469	0.457	-0.486	0.463
	(0.590)	(0.199)	(0.349)	(0.389)	(0.326)	(0.407)
COMESA (Exporter)	-6.870***	2.841	-6.921***	2.741	-6.612***	1.819
	(0.000)	(0.332)	(0.000)	(0.346)	(0.000)	(0.513)
COMESA (Importer)	3.015**	-8.366***	3.152**	-8.410***	2.627*	-8.437***
	(0.044)	(0.001)	(0.035)	(0.000)	(0.077)	(0.000)
SAFTA (Both)	-0.196	-0.016	-0.252	-0.061	-0.269	-0.024
	(0.823)	(0.979)	(0.766)	(0.917)	(0.733)	(0.968)
SAFTA (Exporter)	-2.096	-14.047**	-2.256	-15.358***	-1.517	-15.572***
	(0.535)	(0.021)	(0.504)	(0.010)	(0.654)	(0.007)
SAFTA (Importer)	5.897**	23.357***	6.033**	23.231***	7.444***	23.203***
	(0.030)	(0.000)	(0.026)	(0.000)	(0.006)	(0.000)
Constant	-19.489***	-10.229***	-19.537***	-10.323***	-8.114***	-8.901***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
R2	0.501	0.671	0.503	0.674	0.507	0.676
Obs.	11301	12660	11301	12660	11301	12660

*Standard errors are corrected for clustering by country-pair. P-values appear in parentheses below the parameter estimates. Statistical significance is indicated by: * (10 percent), ** (5 percent), and *** (1 percent). R2 for the Poisson models is calculated as the squared coefficient of correlation between actual and fitted values, as in Santos Silva and Tenreyro (2006).*

Table A2-5 presents results using individual country dummies, rather than regional dummies. The configuration of dummy variables vis-à-vis the rest of the world and the region is as in Table A2- 3. Again, a Park test suggests that the OLS estimates may be unreliable (prob. = 0.000). Focusing on the Poisson results for the baseline model (column 6), there is evidence that

agricultural trade performance with the rest of the world is strong in Kenya, Uganda, and Rwanda. Performance is approximately in line with expectations for Burundi. Tanzania, however, has much weaker than expected performance. In terms of intra-regional trade, the model suggests that Uganda, Rwanda, and Burundi perform strongly, but that the other countries are approximately in line with what would be expected based on their fundamentals. Both sets of results are reasonably consistent across all Poisson specifications in Table A2- 5, which again suggests that tariffs and trade facilitation play a less significant role in relation to agricultural trade than they do in industrial sectors.

Table A2-4: Regression results for EAC countries individually, agricultural products only.

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
Kenya	**12.174*** **	**26.446*** **	**12.048*** **	**26.593*** **	**6.959**	**27.849*** **
	(0.007)	**(0.001)**	**(0.008)**	**(0.001)**	**(0.126)**	**(0.001)**
Uganda	**20.344*** **	**15.780** **	**20.431*** **	**16.278** **	**17.477*** **	**16.247** **
	(0.000)	**(0.024)**	**(0.000)**	**(0.019)**	**(0.000)**	**(0.020)**
Tanzania	**4.726**	**-19.281** **	**4.884**	**-19.626** **	**9.291***	**-19.596** **
	(0.399)	**(0.043)**	**(0.385)**	**(0.037)**	**(0.098)**	**(0.036)**
Rwanda	**-4.151**	**24.016*** **	**-4.012**	**23.997*** **	**-4.186**	**23.964*** **
	(0.417)	**(0.007)**	**(0.432)**	**(0.007)**	**(0.406)**	**(0.006)**
Burundi	**-28.062*** **	**-0.175**	**-27.848*** **	**0.528**	**-32.098*** **	**0.506**
	(0.000)	**(0.987)**	**(0.000)**	**(0.961)**	**(0.000)**	**(0.963)**
Kenya-EAC	**1.145**	**-0.014**	**1.077**	**-0.002**	**1.087**	**0.001**
	(0.149)	**(0.973)**	**(0.168)**	**(0.996)**	**(0.154)**	**(0.997)**
Uganda-EAC	**1.557***	**1.183*** **	**1.488***	**1.196*** **	**1.498***	**1.187*** **
	(0.069)	**(0.003)**	**(0.079)**	**(0.004)**	**(0.052)**	**(0.005)**
Tanzania-EAC	**-0.303**	**0.645***	**-0.576**	**0.435**	**-0.555**	**0.488**
	(0.700)	**(0.079)**	**(0.458)**	**(0.254)**	**(0.441)**	**(0.218)**
Rwanda-EAC	**0.243**	**1.180** **	**0.216**	**1.215** **	**0.330**	**1.281*** **
	(0.732)	**(0.013)**	**(0.756)**	**(0.011)**	**(0.626)**	**(0.009)**
Burundi-EAC	**1.061**	**2.490** **	**0.955**	**2.513** **	**0.917**	**2.681** **
	(0.179)	**(0.017)**	**(0.220)**	**(0.017)**	**(0.224)**	**(0.013)**
Log(Importer GDP)	0.656***	0.661***	0.657***	0.660***	0.647***	0.660***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Exporter GDP)	0.256***	0.389***	0.254***	0.390***	0.224***	0.387***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(Distance)	-1.320***	-0.316***	-1.317***	-0.315***	-1.320***	-0.315***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Log(1+Tariff)			-2.408***	-1.384	-2.310***	-1.392

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
			(0.000)	(0.124)	(0.000)	(0.126)
LPI Exporter					2.696***	1.972
					(0.000)	(0.257)
LPI Importer					8.028***	-1.907
					(0.000)	(0.395)
Common Border	0.751***	0.815***	0.724***	0.811***	0.725***	0.811***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Common Language	0.729***	0.567***	0.676***	0.557***	0.681***	0.559***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Colony	1.127***	0.225*	1.143***	0.234*	1.124***	0.232*
	(0.000)	(0.073)	(0.000)	(0.061)	(0.000)	(0.064)
Common Colonizer	0.928***	0.503**	0.918***	0.511**	0.927***	0.505**
	(0.000)	(0.013)	(0.000)	(0.010)	(0.000)	(0.012)
Landlocked Exporter	1.571	-3.972*	1.454	-4.284**	3.587***	-2.805
	(0.124)	(0.058)	(0.156)	(0.041)	(0.003)	(0.158)
Landlocked Importer	-23.240***	-4.512**	-23.289***	-4.765**	-16.832***	-6.066***
	(0.000)	(0.036)	(0.000)	(0.026)	(0.000)	(0.008)
NAFTA (Both)	-2.471	0.383	-2.599	0.306	-2.585	0.309
	(0.406)	(0.258)	(0.378)	(0.346)	(0.385)	(0.337)
NAFTA (Exporter)	8.633**	-6.436	8.632**	-7.662	-0.093	-14.136
	(0.017)	(0.429)	(0.019)	(0.304)	(0.983)	(0.180)
NAFTA (Importer)	13.837***	55.195***	13.732***	55.005***	-5.202	60.247***
	(0.007)	(0.000)	(0.007)	(0.000)	(0.363)	(0.000)
EU (Both)	0.400***	1.085***	0.295**	1.020***	0.276**	1.018***
	(0.001)	(0.000)	(0.011)	(0.000)	(0.016)	(0.000)
EU (Exporter)	1.243*	-0.465	1.356*	-0.147	-2.557**	-2.967
	(0.080)	(0.725)	(0.058)	(0.904)	(0.048)	(0.301)
EU (Importer)	9.487***	4.647***	9.331***	4.476***	1.028	6.840***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.375)	(0.008)
MERCOSUR (Both)	-0.186	0.154	-0.357	0.040	-0.338	0.026
	(0.771)	(0.761)	(0.574)	(0.938)	(0.591)	(0.959)
MERCOSUR (Exporter)	9.560***	-10.602**	9.738***	-10.266**	8.740***	-14.005**
	(0.001)	(0.024)	(0.001)	(0.030)	(0.004)	(0.024)
MERCOSUR (Importer)	-18.342***	-15.485***	-18.773***	-15.576***	-21.426***	-14.184***

	OLS	**Poisson**	**OLS**	**Poisson**	**OLS**	**Poisson**
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.004)
ASEAN (Both)	0.313	0.928***	0.187	0.863***	0.176	0.862***
	(0.403)	(0.001)	(0.616)	(0.001)	(0.630)	(0.001)
ASEAN (Exporter)	12.937***	-0.734	12.982***	-0.196	8.532***	-2.767
	(0.000)	(0.866)	(0.000)	(0.963)	(0.000)	(0.623)
ASEAN (Importer)	2.116	16.312***	2.111	16.348***	-2.890	17.302***
	(0.323)	(0.000)	(0.323)	(0.000)	(0.186)	(0.001)
SADC (Both)	1.438***	1.393***	1.377***	1.312***	1.414***	1.385***
	(0.001)	(0.002)	(0.002)	(0.005)	(0.001)	(0.007)
SADC (Exporter)	8.365***	-0.106	8.290***	0.721	6.632***	0.769
	(0.000)	(0.984)	(0.000)	(0.884)	(0.003)	(0.877)
SADC (Importer)	1.902	3.880	2.009	4.025	3.617	3.293
	(0.390)	(0.236)	(0.363)	(0.219)	(0.103)	(0.290)
COMESA (Both)	-0.354	0.721	-0.566	0.473	-0.579	0.519
	(0.512)	(0.196)	(0.297)	(0.403)	(0.279)	(0.366)
COMESA (Exporter)	-6.100***	-4.835	-6.101***	-5.069	-5.219***	-6.007*
	(0.001)	(0.152)	(0.001)	(0.122)	(0.003)	(0.064)
COMESA (Importer)	0.487	-10.653***	0.626	-10.724***	0.869	-10.907***
	(0.760)	(0.000)	(0.695)	(0.000)	(0.585)	(0.000)
SAFTA (Both)	-0.180	0.024	-0.236	-0.017	-0.252	0.015
	(0.837)	(0.967)	(0.780)	(0.976)	(0.750)	(0.979)
SAFTA (Exporter)	-0.311	-16.146**	-0.452	-17.501***	0.776	-17.569***
	(0.927)	(0.015)	(0.894)	(0.006)	(0.820)	(0.004)
SAFTA (Importer)	5.415**	21.197***	5.539**	21.095***	6.842**	21.211***
	(0.046)	(0.000)	(0.041)	(0.000)	(0.011)	(0.000)
Constant	-19.688***	-11.240***	-19.733***	-11.339***	-7.939***	-11.355***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R2	0.504	0.661	0.506	0.642	0.511	0.667
Obs.	11301	12660	11301	12660	11301	12660

*Standard errors are corrected for clustering by country-pair. P-values appear in parentheses below the parameter estimates. Statistical significance is indicated by: * (10 percent), ** (5 percent), and *** (1 percent). R2 for the Poisson models is calculated as the squared coefficient of correlation between actual and fitted values, as in Santos Silva and Tenreyro (2006).*

Annex 3. Econometric analysis of migration flows

This annex looks at the potential flows of migrants that may take place in the future among countries of the EAC given different developments in terms of income growth, demographic variables and education expansion across countries in the region. Since data on migration flows are not available at a global level, we rely on bilateral data on stocks of migrants available from the Development Research Centre on Migration, Globalization and Poverty at the University of Sussex.

Using these data, one can estimate gravity models which explain bilateral migration stocks as a function of the income level and size of the respective economies (usually proxied by their GDP per capita levels and their total population, respectively), the distance between the two countries and other socio-economic variables. Given the differential characteristics of migration flows in Africa, we concentrate exclusively on migration towards African countries in our model. The basic model is given by

$$\ln ms_{ij} = \alpha + \beta_1 \ln GDPpc_i + \beta_2 \ln GDPpc_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln d_{ij} + \mathbf{x}\theta + \varepsilon_{ij},$$

where ms_{ij} is the stock of migrants in country *i* with country of origin *j*, $GDPpc_i$ ($GDPpc_j$) and POPi (POPj) are the GDP per capita and population levels of the destination (origin) country, dij is the distance between country *i* and *j* and the vector x summarizes other variables which are assumed to affect migration. We include variables proxying the level of educational attainment of the destination and origin countries (proportion of individuals with secondary educational attainment or higher in the age group 15-64), a dummy for contiguous countries, a dummy for common language, a dummy for a common colonial past and a dummy for coastal countries.

Table A3-1 presents the results for different specifications of the model. The results indicate that relatively higher growth rates of GDP tend to attract migrants, and that migration tends to occur towards countries which have relatively higher educational attainment levels. Variables which capture similarities in cultural and historical characteristics enter significantly and with the expected sign in the model, as well as those which account for geographical proximity. After controlling for other covariates, coastal countries in Africa tend to have a higher stock of migrants. The third specification includes the interaction of the coastal dummies with a dummy variable which takes the value one for bilateral migration stocks corresponding to countries below median income in the sample. The effect of being a coastal country on migrant stocks appears thus to be driven by the relatively poorer subsample in the data.

Table A3-1: Models for bilateral migration stocks: Sample of African destination countries

	Model 1	Model 2	Model 3
GDP per capita dest.	0.210***	0.204***	0.326***
	[0.0186]	[0.0434]	[0.0460]
GDP per capita orig.	-0.0571***	-0.0288	0.0238
	[0.0125]	[0.0242]	[0.0258]
Population dest.	0.709***	0.859***	0.852***
	[0.0136]	[0.0227]	[0.0229]
Population orig.	0.515***	0.594***	0.588***
	[0.00907]	[0.0180]	[0.0179]
Distance	-1.270***	-1.033***	-1.040***
	[0.0343]	[0.0597]	[0.0594]
Educational attainment dest.		0.823***	0.679**
		[0.275]	[0.271]
Educational attainment orig.		0.154	0.11
		[0.147]	[0.146]
Contiguity		3.188***	3.152***
		[0.243]	[0.245]
Common language		0.416***	0.414***
		[0.0847]	[0.0843]
Colony		2.069***	2.054***
		[0.371]	[0.371]
Coastal		0.148**	-0.103
		[0.0711]	[0.0824]
Coastal × Poor			0.642***
			[0.109]
Observations	9,537	3,720	3,720
R^2	0.49	0.505	0.51

Robust standard errors in brackets. (*) (**) [***] stands for significance at the 10 percent, (5 percent) and [1 percent] level. Dependent variable is the (logged) bilateral migrant stock. All regressions include a constant, not reported in the Table.

Annex 4. The demographic-economic model and its estimation

The estimation builds on the work of Lindh and Malmberg (2007), who have developed a demographically based forecasting model for GDP. The model includes a number of demographic variables and allows for some systematic country heterogeneity as well as for time-specific effects. In particular, the estimated equation is:

$$\log y_{it} = \alpha \log e_{0it} + \sum_{k=0-14}^{65+} (\beta_k + \gamma_k \log e_{0it}) a_{kit} + \eta_i + \nu_t + \varepsilon_{it} \qquad (1)$$

Where:

y = level of GDP per capita

e_0 = life expectancy at birth

a_{kit} = the share of age group k in the total population of country i in year t, k=0–14, 15–29, 30-49, 50–64, and 65+

η_i = country-specific effects

ν_t = time-specific effects

The interaction terms allow for changing age-share coefficients contingent on how far the demographic transition has progressed. The subdivision into age groups was made to differentiate children, young adults, mature adults, middle-aged adults, and old dependents, respectively, in terms of their contribution to the economy.

Life expectancy is included to capture human capital effects (see Kelley and Schmidt (2005)). Increases in life expectancy and years of schooling are mutually reinforcing (longer life span encourages greater investment in education, and the other way around), and in many countries the relationship between them is nearly linear.[4] Controlling for country-specific effects allows for country unobserved heterogeneity. Controlling for time-specificity allows for influences in time which are common to all countries, such as the world business cycle, world market price fluctuations, etc.[5] Equation (1) was first estimated as a panel on a sample of 109[6] countries with sufficiently long time series (minimum 20 years) for the log of annual purchasing power parity GDP, the dependent variable.

The fact that the variables are trended raises questions of spurious regression. Lindh and Malmberg (2007) show that the age variables can probably be treated as if co-integrated with GDP. Even if this were not true, the panel context makes spurious results less likely. However,

[4] Technological change and other trends are also accounted for by this variable, at least to some extent.

[5] However, there will always be more complex heterogeneity, such as differences in technology and preferences that vary over time and across countries. The estimation result must therefore be interpreted as valid for an average country conditional on the controls. In the sample individual countries will be distributed around the average model with deviations that may be more or less important. For instance, the tsunami in the Indian Ocean or the genocide in East African Community, as discussed in the main text, will cause deviations from the average model.

[6] There were originally 108 countries. The 109th one corresponds to the East African Community and was created as a weighted average of its country members' values; the weights were determined by the share of the total population in each country. This had to be done in order to obtain estimators for the Community´s fixed effects.

the crucial argument is that the forecasting performance of the model out-of-sample is quite good on average and yields very reasonable long-term predictions for growth rates. Spurious regression parameters would not perform that well. Furthermore, the impact of demographic variables depends on several factors, such as policies that are conducive (or not) to the increase of employment and labor force participation as the supply of potential workers increases, and some favorable or less favorable circumstances, which might be related, for example, to geography or the prevalence of diseases.

To the extent that such circumstances are inherent and constant disadvantages, this will be picked up by country-specific intercepts in the regressions, but when these factors are episodic and changing over time we would expect them to turn up in the form of systematic underperformance or over-performance relative to the model we estimate. Having estimated the equation (1) using the whole sample of 109 countries we next subdivided it into two: over-performers (countries with a higher average growth rate than the one predicted by the model) and underperformers. Table A4-1 report estimation results for the full sample as well as for the two subsamples. The results were used to produce the forecasts for the East African Community and its member countries presented in this note.

Table A4-1: Regression output for the full sample

	Coef.	**Std. Err.**	**t**	**P>|t|**
le	-1.648234	1.771226	-0.93	0.352
lshare0	5.458865	2.20896	2.47	0.013
lshare15	11.62073	1.628169	7.14	0.000
lshare30	9.089534	1.470862	6.18	0.000
lshare50	-7.673813	.8576696	-8.95	0.000
lshare65w	-.7199914	.508813	-1.42	0.157
le_lshare0	-1.395678	.5047209	-2.77	0.006
le_lshare15	-2.694263	.3741868	-7.20	0.000
le_lshare30	-1.938024	.3418723	-5.67	0.000
le_lshare50	1.937233	.203668	9.51	0.000
le_lshare65w	.207865	.1223499	1.70	0.089

Most coefficients are different from zero at conventional significance levels. The coefficient pattern indicates that with increasing life expectancy the positive correlations of the younger active age groups will tend to become negative.

Measuring the difference in actual and predicted growth rate in the last ten years (2000 - 2009) over-performing (underperforming) countries were defined as having a higher (lower) growth rate than the demographically predicted. This cut the sample into two groups of 47 and 62 countries respectively (table A4-2). Equation (1) was then estimated for each sub-sample.

Table A4-2: Regression output for over-performing sample

	Coef.	Std. Err.	t	P>|t|
le	1.416866	2.735804	0.52	0.605
lshare0	-.8711401	3.575023	-0.24	0.808
lshare15	13.6221	2.479107	5.49	0.000
lshare30	8.151345	2.341248	3.48	0.001
lshare50	-11.81129	1.314194	-8.99	0.000
lshare65w	.0525972 -	.7009006	0.08	0.940
le_lshare0	-.0465593	.8203688	-0.06	0.955
le_lshare15	-3.244204	.5747911	-5.64	0.000
le_lshare30	-1.726417	.5488017	-3.15	0.002
le_lshare50	2.8551	.3176451	8.99	0.000
le_lshare65w	.0535536	.1703092	0.31	0.753

R squared: 0.7075

Overall, the pattern and magnitude of the coefficients is similar to that of the full sample regression; when it is not, the coefficient is not statistically significant.

Table A4-3: Regression output for under-performing sample

	lny	Coef.	Std. Err.	t	P>|t|	[95 percent Conf. Interval]
le	3.649447	2.28137	1.60	0.110	-.8235651	8.12246
lshare0	5.944908	2.726227	2.18	0.029	.5996795	11.29014
lshare15	2.287005	2.191919	1.04	0.297	-2.010623	6.584632
lshare30	4.042225	1.885013	2.14	0.032	.3463381	7.738112
lshare50	1.672747	1.090658	1.53	0.125	-.4656724	3.811166
lshare65w	-7.906113	.8049797	-9.82	0.000	-9.484412	-6.327814
le_lshare0	-1.399306	.6239805	-2.24	0.025	-2.622725	-.1758862
le_lshare15	-.5017088	.5039687	-1.00	0.320	-1.489825	.486407
le_lshare30	-.7368975	.4359789	-1.69	0.091	-1.591708	.1179129
le_lshare50	-.1142196	.2566816	-0.44	0.656	-.6174874	.3890482
le_lshare65w	1.821025	.1920068	9.48	0.000	1.444563	2.197487

R squared: 0.6275

Data

The sample was limited to 108[7] countries with fairly complete data from 1950 or at latest 1960 / 1961 onwards.

Data on GDP per capita 1950-2009 in 2005 PPP USD was extracted from the Penn World Tables Version 7.0 (May 2011). The specific measure used is RGDPCH, a chain index obtained by first applying the component growth rates between each pair of consecutive years, t-l and t (t=1951 to 2000) to the current price component shares in year [t-1] in order to obtain the domestic currency expressed in international dollars (DA) growth rate for each year. This DA growth rate for each year t is then applied backwards and forwards from 1996, and summed to the constant price net foreign balance to obtain the chain GDP series.

Demographic annual data 1950-2010 was extracted from the World Population Prospects, 2010 Revision by the United Nations, Department of Economic and Social Affairs, Population Division. For countries in the East African Community also the projections for the 2010-2050 were used. 5-year age groups were aggregated to children (0-14), young adults (15-29), mature adults (30-49), middle-aged adults (50-64), and elderly (65+). This roughly represents clearly distinguishable life phases with differences in economic behavior and the resources available. Population shares for the different age groups have then been computed. Life expectancy at birth was also extracted.

The **fertility assumptions** are as follows:

Medium-fertility assumption. The projection of fertility is carried out using two probabilistic models according to which fertility tends toward 2.1 children per woman in the long run and the future fertility paths for a given country are generated taking into account the specific past fertility trends in that country, those of countries within the same region and the trends in all countries. The probabilistic approach permits the simulation of many future fertility paths for each country (100,000) so that their median can summarize a central tendency. The median path is used to generate the medium variant.

High- and low-fertility assumptions. The low and high projection variants differ from the medium variant in that their fertility remains half a child below and half a child above that of the medium variant during 2010-2050. As a result, they produce smaller and larger projected populations than the medium variant and the difference between the two increases over time.

Constant-fertility assumption. For each country, fertility remains constant at the level estimated for 2005-2010.

[7] The 109th country in the sample corresponds to the East African Community and was created as a weighted average of its country members' values. See footnote 4 for more details.

Annex 5. Estimating the costs of demographic pressure in terms of education expenditure in EAC

Simple projection exercises are used to assess the size of fiscal transfers that would be necessary to (at least partly) outweigh the imbalances in education expenditure caused by different demographic developments in the East African Community. The aim of the exercise is to quantify the potential costs of a coordinated policy effort to bring educational expenditures per child to the level that would correspond to a scenario where fertility rates across EAC countries have converged to a common level. This simulation should help assess the challenges in terms of convergence of educational expenditure measures related to the different demographic developments which EAC countries currently face.

Results are presented from two sets of simulations. The first group of scenarios concentrate on medium-run fertility dynamics in the region. These scenarios aim to find out the increase in educational expenditure per child that would be implied by convergence to a fertility rate of four children per woman over the following decades. Based on this baseline scenario, the costs attached to the lack of fulfillment of such convergence in fertility rates are quantified. In the second set of simulations, longer-term dynamics are explored by analyzing the costs implied by lack of convergence in fertility in scenarios of convergence in educational expenditure per child until the year 2050.

Fertility convergence scenarios

The exercise is carried out as follows. In a first simulation setting, assuming that educational expenditures as a share of GDP remain constant in the future, the average educational expenditure per child is estimated in two different scenarios:

• *Constant fertility scenario*: The constant fertility scenario assumes that fertility rates remain at the level observed in 2010 in the forthcoming decades.

• *Fertility convergence scenario*: fertility convergence is assumed to take place in the region and concentrate on the improvements in educational expenditure per child taking place until the threshold fertility rate of 4 children per woman is achieved. According to the fertility projections (medium variant) available from the World Population Prospects, by the Population Division of the United Nations Department of Economic and Social Affairs (UN, 2008), this level will be attained by the countries in the sample in the period 2010-2050, albeit at different points in time. Burundi and Kenya are expected to reach such a fertility level in the period 2015-2020, Rwanda in 2020-2025, Tanzania in 2025-2030 and Uganda in the period 2030-2035.

For each scenario, the expected increase in educational expenditure per child (defined as individuals in the age group 5-14) implied by such a reduction in fertility is estimated. Thus, it observes a measure of the fiscal effort in terms of educational expenditure that would be necessary to achieve such a level today. The financing required to increase educational expenditures per child from the levels obtained in the constant fertility scenario to those in the two fertility convergence scenarios will be taken as an estimate of the potential costs attached to the delay in the demographic transition.

For the projection of educational expenditure per child it is assumed that the ratio of educational expenditure to GDP remains constant at the levels observed in 2008 (the last observation for

which there are data on all five countries in the sample).[8] This implies that educational expenditures are assumed to grow at the same rate of GDP, and that a projection model for GDP growth needs to be used to obtain an estimate of educational expenditure per child once fertility rates have reached the level implied by each scenario. A model is constructed based on a production function approach, taking into account the growth effects of income convergence dynamics and human capital accumulation. The model is described in detail later.

In order to obtain projections of GDP, predicted figures of individuals per educational attainment level and age group are obtained using the assumption of constant enrollment rates over the period analyzed and are used to obtain GDP projections of the model. The projection model put forward by KC et al. (2010) is used to obtain such predictions of individuals by age group and educational attainment level if enrollment rates by schooling level are assumed to remain constant until 2050. In the fertility convergence scenarios the UN medium variant projection[9] is used to predict population in the age group 5-14, while the corresponding constant fertility projections, also published by the UN, are used in the constant fertility scenario.

The projected values are used to compute the educational expenditure per child achieved by each country for the period in which their fertility rate falls below 4 children per woman. The results of the projection exercise are presented in Table A5- 1, where it shows the predicted growth rate in GDP implied by the demographic and human capital dynamics of each country, the projected growth rate of population in the age group 5-14 and the resulting change in terms of expenditure per child that would be necessary to achieve the levels observed in the period where fertility rates are below 4. The results in Table A5- 1 indicate that the hypothetical process of convergence in fertility rates simulated would lead to a trend towards convergence in educational expenditure per child. In particular, large percentage increases in expenditure per child are present in the scenarios for Burundi, Tanzania and Uganda, which are the countries with lowest expenditure ratios in 2008. Kenya and Rwanda, where the levels of education expenditure per child are higher and the fertility reduction trend has already started, would increase this measure less in relative terms.[10]

It should be noted that the higher absolute increase in educational expenditure per child in Kenya and Rwanda is related to the sharp decrease in fertility rates experienced by the former since the mid-seventies and projected to happen in the latter since the mid-eighties. The sizable reduction in the young-age dependency ratio and the momentum of such a development allow for further large increases in educational expenditure per child even with growth rates of GDP comparable to those experienced by the rest of the countries in the EAC.

[8]Assuming that educational expenditures per unit of GDP converge across countries as their income per capita levels converge would just reinforce the results presented here. The results in the following subsection deal explicitly with such a case.

[9]The projections by education attainment level and age group are based on the medium variant of the UN projections, which implies that potential extra effects of education expansion on fertility that go beyond the fertility convergence path implied by the UN scenario are not considered in the analysis.

[10]The coefficient of variation in expenditure levels across countries in 2008 is 0.84, and the value in the scenario, assuming fertility convergence to 4 children per woman, would fall to 0.80.

Table A5- 1: Projection outcomes: education expenditure per child after fertility decrease

	Period with fertility rate below 4	Projected yearly growth of GDP	Projected yearly growth population 5-14	Projected yearly growth expenditure per child	Expenditure per child 2008 (US$)	Expenditure per child equivalent in scenario (US$)	Percentage change in expenditure per child
Constant fertility scenario (for the period until convergence to 4 children per woman in the fertility convergence scenario 1)							
Burundi	-	4.89 percent	2.58 percent	2.31 percent	29.29	36.81	22.86 percent
Kenya	-	3.98 percent	3.47 percent	0.51 percent	189.98	199.87	5.07 percent
Rwanda	-	3.18 percent	4.02 percent	-0.83 percent	85.02	74.97	-12.58 percent
Tanzania	-	3.84 percent	4.56 percent	-0.72 percent	39.2	26.47	-39.25 percent
Uganda	-	3.71 percent	5.91 percent	-2.20 percent	46.21	33.94	-30.87 percent
Fertility convergence scenario							
Burundi	2015-2020	4.89 percent	1.80 percent	3.09 percent	29.29	46.2	57.74 percent
Kenya	2015-2020	3.98 percent	2.95 percent	1.03 percent	189.98	210.43	10.76 percent
Rwanda	2020-2025	3.18 percent	2.95 percent	0.23 percent	85.02	88.00	3.45 percent
Tanzania	2025-2030	3.84 percent	2.87 percent	0.96 percent	39.2	47.49	21.16 percent
Uganda	2030-2035	3.71 percent	2.92 percent	0.79 percent	46.21	56.25	21.73 percent

In order to quantify the potential fiscal costs of the desynchronization of demographic transitions in the EAC, projections based on the same GDP growth projections are obtained, but assuming that fertility rates remain constant at the level observed in 2010. The projections under the constant fertility scenario from the UN Population Division are used to obtain predictions for the population ages 5 to 14 and compute the corresponding education expenditure per capita under this assumption using the GDP projections described above. The resulting estimated educational expenditures per child are presented in the bottom of Table A5- 1 and show marked decreases in Uganda and Tanzania, as well as, to a lesser extent, in Rwanda. On the other hand, a trend towards divergence in educational expenditure per child takes place in the constant fertility scenario.

Comparing the results from this scenario with those of the fertility convergence scenario one can compute the necessary financing required to keep education expenditure per child at the same

level as implied by the simulations presented in Table A5- 1 for the years in which the fertility convergence dynamics would take place.

In order to understand the challenges in terms of fiscal coordination implied by demographic differentials in the EAC, it is assumed here that fiscal transfers within the community are possible to reduce the disparities in educational expenditures per child implied by these two scenarios. Here it is also assumed that a fixed percentage of GDP is contributed by each country to a fund financing education expenditures and aimed at covering the costs of reducing the disparities implied by the constant fertility scenario. The full cost of reducing the education expenditure disparities would amount to roughly 1.2 percent of the community GDP in 2008. This is to be understood as a lower bound to the medium-run fiscal costs of lack of synchronization in demographic developments, since the constant fertility scenario is based on identical GDP growth assumptions (and thus growth of educational expenditures) as the fertility convergence scenario. This estimated financing gap is thus exclusively based on the differential growth rate of the population in the age group 5-14 and does not take into account that the human capital dynamics implied by the constant fertility scenario will lead to a reduction of the growth rate of GDP over the period projected as compared to the fertility convergence scenario. This effect can be very sizable in terms of financing needs: assuming that the growth rate of GDP is reduced by 0.5 percent in EAC countries due to the reduction in the accumulation of human capital under the constant fertility scenario, the financing needs increase to approximately 2.5 percent of the community GDP. A reduction of 1 percent in the average GDP growth rate in the period corresponding to the fertility convergence would result in financing needs of approximately 3.7 percent of the GDP of the community. Should additional demographic dividends associated to the decrease of the youth-dependency ratio effects play a role in the growth path of the fertility decline scenario, the financing needs may be even larger.

Education expenditure convergence scenario

In the second set of simulations estimates for the period 2010-2050 are obtained assuming that a strong trend in convergence in educational expenditure per child takes place in the EAC in the period 2010-2050. The path of educational expenditures per child are kept for Kenya (the highest in the region) as projected by the fertility convergence scenario described above until the year 2050. For that purpose, GDP growth rates are projected until 2050 for Kenya using the model put forward later and the predicted growth rates are used to simulate the path of educational expenditure. It is assumed that the rest of the countries in the region carry out an extra effort in terms of increasing educational expenditure in the forthcoming decades so that in 2050 they achieve a level of education expenditure per child which equals ϕ percent of that of Kenya. Assuming that fertility rates remain constant over the following decades, the extra costs are evaluated that would be necesary to achieve such a target as compared to the scenario where fertility rates follow the convergence path implied by the UN medium variant scenario.

Table A5- 2 present the basic information related to the scenarios carried out, which correspond to values of ϕ of 50, 75 and 100. The scenarios assuming convergence in educational expenditure per child imply very sizable increases in the growth rate of educational expenditures over the forthcoming decades, well above the projected rates of GDP growth. This is particularly the case for Burundi, Tanzania and Uganda.

Table A5- 2: Projection parameters: Education expenditure convergence

	Expenditure per child 2008 (US$)	Expenditure per child 2050	Yearly growth pop. 5-14 (fert. conv.)	Yearly growth pop. 5-14 (const. conv.)	Implied yearly growth ed. exp. (fert. conv.)
ϕ = 50 percent					
Burundi	29.29	202.21	0.59 percent	3.69 percent	15.35 percent
Kenya	189.98	404.41	1.36 percent	5.31 percent	4.18 percent
Rwanda	85.02	202.21	1.61 percent	5.54 percent	5.05 percent
Tanzania	39.20	202.21	2.37 percent	8.66 percent	12.57 percent
Uganda	46.21	202.21	2.17 percent	6.92 percent	10.80 percent
ϕ = 75 percent					
Burundi	29.29	303.31	0.59 percent	3.69 percent	23.98 percent
Kenya	189.98	404.41	1.36 percent	5.31 percent	4.18 percent
Rwanda	85.02	303.31	1.61 percent	5.54 percent	8.03 percent
Tanzania	39.20	303.31	2.37 percent	8.66 percent	19.02 percent
Uganda	46.21	303.31	2.17 percent	6.92 percent	16.27 percent
ϕ = 100 percent					
Burundi	29.29	404.41	0.59 percent	3.69 percent	32.61 percent
Kenya	189.98	404.41	1.36 percent	5.31 percent	4.18 percent
Rwanda	85.02	404.41	1.61 percent	5.54 percent	11.00 percent
Tanzania	39.20	404.41	2.37 percent	8.66 percent	25.46 percent
Uganda	46.21	404.41	2.17 percent	6.92 percent	21.74 percent

Using the simulated paths of educational expenditure, the fiscal redistribution within the EAC is evaluated that would be necessary to maintain such a path of educational expenditure per child if fertility rates were to remain unchanged over the period under study. The financing needs to increase strongly over time, as new cohorts in the constant fertility scenario grow as compared to the baseline fertility convergence scenario. Over the whole period, the financing needs are particularly large for Burundi, Tanzania and Uganda, which would require expenditures of between 22 percent and 36 percent of their GDP to account for the extra costs of high fertility in

2050 in the scenario where full convergence to Kenyan level of expenditure per child takes place.

Obtaining GDP growth projections

Projections of GDP growth are obtained using a model estimated with panel data for 104 countries of the world spanning the period 1970-2005 in 5-year subperiods. The specification is based on a production function with differentiated labor input based on education levels. The production function is thus given by

$$Y_t = A_t K_t^{\alpha} \prod_{j=0}^{3} L_{jt}^{\beta_j}, \tag{1}$$

where $Y(t)$ is GDP, A_t is total factor productivity, K_t is the capital stock and L_{jt} is labor input with education level j (four educational attainment levels aer concidered: no education, primary, secondary and tertiary education). In growth rates, equation (1) implies

$$\Delta \ln Y_t = \Delta \ln A_t + \alpha \Delta \ln K_t + \sum_{j=0}^{3} \beta_j \Delta \ln L_{jt}, \tag{2}$$

where the growth rate of GDP is thus related to the growth rates of inputs of production. The conditional income convergence dynamics implied by neoclassical economic growth models can be included in the model by assuming that the growth rate of total factor productivity depends on the distance to the technological frontier, which in turn depends on the level of development of the country,

$$\Delta \ln Y_t = \phi(y_t) + \alpha \Delta \ln K_t + \sum_{j=0}^{3} \beta_j \Delta \ln L_{jt}, \tag{3}$$

where y_t is income per capita (as a proxy of backwardness) and $\phi(\cdot)$ is an unspecified function. In the paradigm of technology adoption models (see Nelson and Phelps, 1966, for a seminal contribution), the level of human capital in an economy plays the role of a catalyst of technology innovation and adoption and is considered a determinant of TFP growth. The expanded specification taking this factor into account is given in a general form by

$$\Delta \ln Y_t = \phi\left(y_t, \frac{L_{0t}}{L_t}, \frac{L_{1t}}{L_t}, \frac{L_{2t}}{L_t}, \frac{L_{3t}}{L_t} \right) + \alpha \Delta \ln K_t + \sum_{j=0}^{3} \beta_j \Delta \ln L_{jt}, \tag{4}$$

where $\frac{L_{jt}}{L_t}$ is the proportion of individuals with educational attainment j in the labor force ($L_t = \sum_j L_{jt}$). Models (2) ,(3) and (4) are estimated using data on GDP (at PPP), investment rates, GDP per capita (all from the Penn World Tables 6.3), and population by educational attainment level (from the IIASA-VID dataset). The first column of Table A5- 3 shows the estimates of the model assuming a fixed country-specific TFP growth level (captured by a country fixed effect). The second column shows the estimates from (3), where the initial income per capita for the corresponding subperiod is included in the regression. Column (3) shows the estimates of the full

model, where educational attainment levels and their interaction with income per capita are included in the specification, in the spirit of Benhabib and Spiegel (1992). The full model is used to obtain projections of GDP growth for the countries in the study.

The results emphasize the importance of human capital dynamics as a determinant of economic growth. In particular, improvements in the growth rate of the working age population with secondary education tend to be related to periods with higher growth of GDP, while the significant interaction of income per capita with the shares of population with primary and tertiary education education

Table A5- 3: GDP growth regressions: Production function estimates

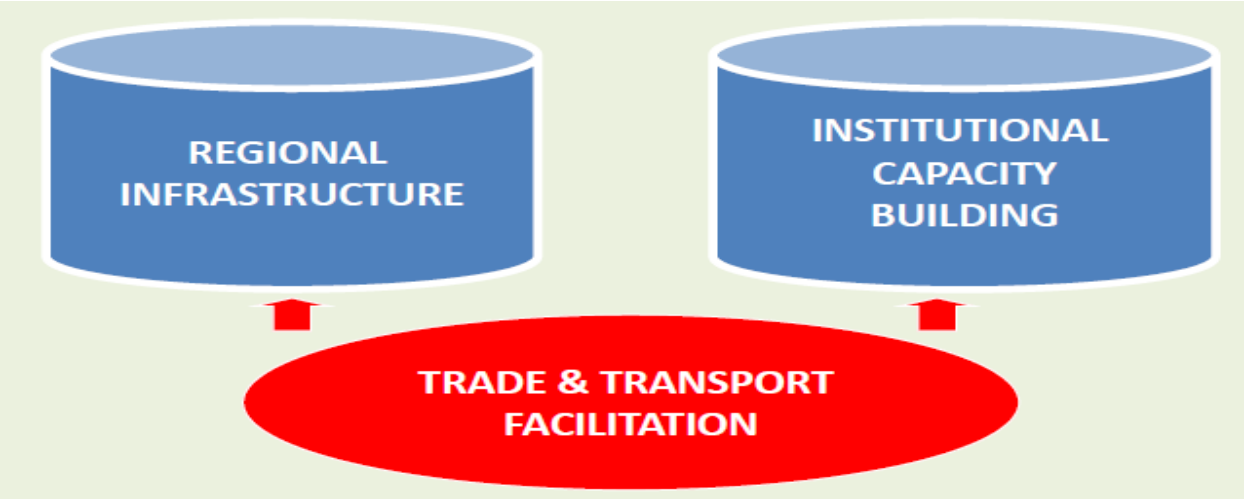
Investment	-0.0133	0.0258	0.027
	[0.0374]	[0.0317]	[0.0320]
Growth in pop. no education	0.235*	0.148	0.145
	[0.141]	[0.133]	[0.136]
Growth in pop. prim. Education	0.0522	0.0964	0.0217
	[0.135]	[0.109]	[0.115]
Growth in pop. sec. education	0.190**	0.236***	0.223***
	[0.0745]	[0.0721]	[0.0723]
Growth in pop. tert. Education	0.0492	0.0843	0.122
	[0.0706]	[0.0815]	[0.0818]
Initial income per capita		-0.0524***	-0.019
		[0.00847]	[0.0176]
Share of working age pop. with prim. ed.			0.650***
			[0.195]
Share of working age pop. with sec. ed.			-0.0472
			[0.293]
Share of working age pop. with tert. ed.			1.541*
			[0.786]
Initial income × Share primary			-0.0776***
			[0.0241]
Initial income × Share secondary			-0.00226
			[0.0305]
Initial income × Share tertiary			-0.155**
			[0.0772]
Observations	665	665	665
Countries	104	104	104
Adj. R-squared	0.098	0.23	0.25

Robust standard errors in brackets. * (**) [***] stands for significance at the 10 percent (5 percent) and [1 percent] level. Dependent variable is the average yearly growth rate of GDP at PPP levels over the corresponding 5 year-period. All regressions include country fixed effects and period dummies, not reported in the table.

Annex 6. Conceptual framework for regionalization of infrastructure

An important reciprocal relationship exists between infrastructure and regional economic integration (Figure A6-1). Efficient infrastructure is necessary for globalization and regional integration to achieve their maximum potential to expand and integrate markets, exploit economies of scale, and attract foreign direct investment and technology. Indeed, the key driving forces behind the recent wave of globalization are lower barriers to trade and investment, and lower transportation and communication costs. Major efficiency improvements in transportation and the application of

Figure A6-1: Regional Integration—Two Strategic Pillars



modern information and communication technologies have facilitated the geographic division of production processes. A much larger set of geographically dispersed production units can participate, contributing to the value added chain according to their comparative advantage. Thus the opportunities of individual economies to participate in international production networks have been broadened considerably (ESCAP, 2007).

The development of regional markets, in turn, creates interdependencies that increase the demand for infrastructure. After all, infrastructure networks are the conduits through which these flows move. Transportation infrastructure is at the heart of regional integration. Traded goods flow through roads, railways, inland waterways, ports and airports, as do people seeking to take advantage of attractive services or job opportunities in other nations. Therefore, an efficient and integrated transport system facilitates trade and factor mobility. An integrated communications system also can spur the growth of trade as well as reduce costs by enhancing the accessibility and affordability of information, facilitating long-distance transactions, and linking the region with the rest of the world (ADB, 2006a). Not surprisingly, limited development of transport, communications, and energy networks is one of the most frequently cited obstacles to cross-border trade and investment and ultimately to connectivity in many regions of the world.

Whereas infrastructure has long been recognized as having a crucial role in facilitating economic integration, some ancillary propositions are not widely recognized. First, greater welfare gains

from economic integration can be realized through deeper forms of regional integration that entail harmonization of legal institutions. Second, reforms that reduce cross-border transaction costs and improve the performance of infrastructure services are arguably more important for the creation of an open, unified regional economic space than trade policy reforms narrowly defined (Stiglitz 2006). Third, all economies benefit from more rational use of resources that arises from coordination of regional infrastructure development.

For these reasons the framework for regional economic integration in several parts of the world includes coordination of policies in core infrastructure industries such as transport, telecommunications, and electricity (APEC, 2007). Infrastructure development is included in many regional treaties to provide the framework for aligning sector policies, designing regional master plans, developing a portfolio of synergistic projects, harmonizing regulatory regimes and investment codes, and mobilizing investment resources. Increasingly, nations are moving away from integration strategies that are based solely on formal trade agreements and towards strategies that include at least some integration of infrastructure policies (Moreira, 2006).

Disparities of regulatory treatment across borders introduce distortions that hinder both trade and regional investment patterns. Similarly, market restructuring in infrastructure industries generates greater benefits if it is accompanied by parallel reforms and reciprocity across countries. Otherwise, significant differences in market structures and regulatory policies can hinder cross-border trade. Hence, regulatory harmonization has become an important component of regional economic integration.

Economic Benefits of Regional Infrastructure

A large number of studies have uncovered strong empirical evidence on the important economic benefits of infrastructure in general. In contrast, the impact of regional infrastructure—i.e., the additional economic benefits of connecting national infrastructure networks and regionalizing infrastructure reform—has not been as extensively analyzed and is less clearly understood. Regional infrastructure is explained more fully in Box A6-2.

Connective infrastructure can effectively reduce the economic distance between locations—the time and cost of trading between them—and thus expand and link cites of production, markets and cities. The distance between people, cities, and production cites is shorter because of high-speed and high capacity modes of transportation, the emergence of pipeline transportation and fiber-optic communications. By enhancing connectivity, regional infrastructure (especially in the form of transport and communication corridors) can facilitate the exploitation of economies of scale and scope, make possible greater specialization in production, and allow for more efficient division of labor.

Box A6-1 What is regional infrastructure?

In one sense, nearly all infrastructure is national—or indeed local—in that is situated in a single country. Among the exceptions are bridges and tunnels that connect two countries, along with power lines, pipeline, and fiber optic cables that may span several countries. But many national infrastructure projects have a wider regional dimension: they may be planned and coordinated with several countries, connect to existing regional networks, or have spillover effects on neighboring countries.

Regional infrastructure ranges from simple projects that involve two countries, such as building a road link or bridge across a boundary river, to complex ones that involve several countries such as gas pipelines in which many countries cooperate and coordinate to create networks for common benefit. Soft infrastructure also has a regional dimension, since cross-border trade and movement often require, or at least benefit from following common rules, standards, and procedures. For instance, rail connections are smoother if countries use the same rail gauge, and customs procedures are simpler and faster if countries harmonize their rules and standards.

Regional infrastructure projects are defined as:

- projects that involve physical construction works and/or coordinated policies and procedures spanning two or more neighboring countries; and
- national infrastructure project that have a significant cross-border impact:
  - their planning and implementation involve cooperation or coordination with one or more countries;
  - they aim to stimulate significant amounts of regional trade and income; and
  - they are designed to connect to the network of a neighboring or third country.

Source: ADB (2009).

In November 2007, eight countries agreed to invest $18 billion to improve Central Asia's infrastructure networks—roads, railway lines, airports, and seaports—and make the region a vital transit route between Europe and Asia. A strategy for regional investment was agreed upon at a meeting in Dushanbe, Tajikistan, attended by Afghanistan, Azerbaijan, People's Republic of China, Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, and Uzbekistan. The key objective of the plan was to establish competitive transport corridors so as to facilitate the cross-border movement of goods and people, and to develop effective, efficient, safe, and fully integrated transportation systems across the region (ADB, 2007).

Economies of scale

In an increasingly globalized world with strong competitive pressures, it is vital for firms to reach minimum scale of efficiency in production. Under increased global contestability, the pressures of international competition reduce considerably the scope for inefficiency in production; i.e., they render any inefficient organization of a national industry increasingly

unsustainable. The incumbent national firms must operate in an efficient manner because any unnecessary costs, like any excess profit, would simply invite entry and lead to their displacement by global entrants who can supply the same output at lower cost. Thus the incumbent national firms must minimize costs.

Physical isolation implies that producers are confined to small markets for their goods and services. Moreover, they would be constrained to using only the inputs available in their geographic location. By enhancing connectivity, regional infrastructure effectively increases market size and consequently the ability of national firms to: exploit economies of scale; draw from a larger and more specialized pool of workers; and have greater access to the right kind of raw materials and equipment. Thus the effective expansion of market areas can lead to substantial gains in efficiency through the exploitation of economies of scale and scope, and increased competition.

Network externalities

Many infrastructure services that are important for economic development, connectivity, and trade expansion exhibit network externalities. A good(service) is subject to a network externality when the value of the good(service) to an individual is greater when a larger number of other people also use that good(service) Infrastructure networks exhibiting service externalities include telecommunications and transportation.

The most important benefits of regional infrastructure derive from network externalities. The integration of network industries (e.g., telecommunications, electricity, transport) can generate significant economies of scale and scope (Economides, 1998). Moreover, integration can give rise to network effects. It increases the size of the network and thus it expands: the number of economic agents that interact with each other; or the range of complementary products and services that are available to its members.

Network externalities give rise to significant opportunities for smaller economies and landlocked countries. Regional cooperation and integration in a given network increases the effective size of the network in terms of its user base and market size. Thus, by integrating with larger or better geographically located neighboring countries, small and landlocked countries could offer foreign investors the benefits of a larger network and market. In general, the benefits of regional integration are mutual for all participating countries—the value of the networks of even the larger and better located countries will increase as their networks are connected with those in hinterlands and neighboring smaller countries. There is strong evidence that network externalities are prevalent in the infrastructures of developing countries (Hurlin, 2006).

Economic corridors

The benefits of regional infrastructure are frequently realized through the creation of cross-border economic corridors—improved connections between centers of economic activity that reduce the cost of moving and trading along them. Such corridors encourage trade, investment, and other economic activities and thus can promote economic development and growth.

The development of economic corridors involves systematic and coordinated planning. It also frequently entails policy and institutional changes. In effect, they extend the scope for regional

cooperation beyond the provision of collective infrastructure projects to seek to promote economic activities around them and to improve soft infrastructure (ADB, 2006b).

The Benefits of Regionalizing Infrastructure Reform

Regionalizing infrastructure reform has the potential to reduce the vulnerability of national regulatory systems to political and industry capture—a common problem in Eurasia. It can also help developing countries overcome their constrained regulatory capacity through the pooling and efficient allocation of scarce regional resources and technical expertise. And can effectively create an institutional mechanism that imposes restraints on arbitrary administrative intervention at the national level, and thus give potential investors the needed assurance that the value they add to infrastructure will not be expropriated. This assurance could facilitate private infrastructure investment in regions where it is urgently needed (such as in Central Asia and the Caucasus) and where it has been historically hampered by the inability of national governments to credibly commit to a stable and fair regulatory process.

Political Factors Influencing Domestic Regulation and the Risk of Capture

The textbook "public interest" theory of regulation presumes that the purpose of regulatory intervention is the enhancement of economic welfare via improved efficiency and that regulatory agencies faithfully pursue this objective. The "positive political theory" (PPT) of regulation explicitly challenges these assumptions. PPT seeks to explain how particular forms of regulation emerge and change by evaluating the gains and losses of organized interests arising from alternative institutional arrangements. This model of regulatory policy decisions identifies two extreme conditions that produce poor performance by regulated firms: "capture" (when regulators work to enhance the market power of a regulated firm) and "expropriation" (when regulators refuse to allow a regulated firm to recover the reasonable long-run costs of service). According to PPT, where a regulatory agency lies on the continuum between capture and expropriation depends on how it is organized, the resources that it has, and its relationship to the political process.

The PPT of regulation is based on simple but important insights. Regulation is a coercive policy instrument that can be used to provide valuable benefits to particular groups. All regulatory policy decisions are inherently conflictual in that they pit one firm against another, or suppliers against their customers. PPT views regulatory policy decisions as the result of a competition among organized interests seeking their own private gains. But this competition does not normally produce an efficient outcome due to representation bias: that is, some groups have few or no resources to devote to influencing regulatory policy.

Participants in the regulatory process seek to influence policy in several ways. One way of exercising influence is to seek intervention by political allies. Another is to submit information to regulators that supports a favorable decision. Still another is outright corruption. All of these require that an interest has financial and political resources to expend on regulatory policy-making processes. Representation bias arises because groups differ in their access to these resources.

An important source of representation bias is incomplete information. Because information is imperfect, policy makers seek data from more expert sources. For information pertaining to the

details of technology, demand and costs in an industry, those who supply services frequently have extensive private information that is necessary for making efficient policy. Because all parties can be expected to submit information that is beneficial to their interests, on balance the effect of the information that they do submit will bias policy outcomes in favor of those with relevant private information, such as the incumbent infrastructure monopoly provider.

Another equally important source of representation bias relates to the interests and experiences of regulators. This bias arises when agencies are staffed by officials who are not fully representative of all of the groups affected by a regulatory policy, whether organized or not. For example, in a parliamentary system with ideologically based parties, each important economic interest (say, labor versus owners, or one industry versus another) may be represented by only one party, so that swings in the partisan control of government cause swings in the identity of the advocates that regulators will favor. In addition, regulatory officials may be inclined to favor some interests for other than political reasons. For example, regulators may expect to have short government careers, and so may seek to enhance their post-regulation prospects by favoring a likely future employer. Or, some specialized skills of regulators may be obtained or usefully applied only in organizations that actively participate in the regulatory process, so that regulators naturally are inclined to think like those who are represented before their agency. An example of a common source of representation bias in newly liberalizing countries arises when the staff of the regulatory agency is selected from among the staff of the incumbent state-owned service provider or the ministry that oversees its operation.

Representation bias can lead to the common problem of regulatory capture because regulated firms are generally much better organized and able to manipulate the political process than are their customers and suppliers. This happens in two main ways. First, producers may work through elected officials to have laws passed and decrees issued that correct what they perceive to be a pressing problem. Sometimes the problem is alleged destructive competition. Or it may reflect producers' desire to avoid splitting the market through new entry. Second, even when elected officials have only the public interest at heart in passing regulatory laws, and regulatory agencies are established for "public interest" purposes, they subsequently can become the tools of the industry they regulate. This happens because the regulated enterprise has superior technical knowledge upon which regulatory agency staffs come to depend, as noted earlier, and because regulated firms can use their political influence to have friendly regulators appointed.

The Risk of Expropriation and the Importance of Commitment

Services delivered by infrastructure industries are both economically and politically important. Their economic importance arises from the fact that they are used by virtually the entire population and are regarded as essential for both a reasonable standard of living and the efficient operation of much of the economy. These industries account for as much as ten percent of gross domestic product and, because they are capital intensive, represent as much as twenty percent of gross domestic investment. Consequently, expenditures on infrastructure services at cost-based prices represent a substantial proportion of the budget for many households, and can be beyond the means of the poorest families if the industries are inefficient and their services are not reasonably priced. Moreover, since infrastructure services are essential intermediate inputs for other sectors of the economy, their quality and prices are a major determinant of the production costs and international competitiveness of infrastructure-intensive industries.

The political significance of infrastructure industries arises from both their economic importance and their ubiquitous consumption by all or nearly all citizens. Because of their importance and ubiquitous presence, the prices of infrastructure services typically are scrutinized by interest groups and even the general public, and so receive considerable political attention. In fact, public opinion frequently opposes a policy for consumers to pay the full cost of services, and this attitude, if present, changes relatively slowly. As a result, price increases frequently generate considerable public opposition.

These characteristics can motivate governments to behave opportunistically vis-à-vis privatized utilities. The fact that utility industries are monopolistic and provide services that are deemed essential leads to considerable public scrutiny of their conduct and politicization of their prices. The presence of only one or two utility operators raises immediate concerns about concentrated power, excessive prices and profits, and restriction of freedom of choice. Also, since utility services are massively consumed, they create significant opportunities for political mobilization.

A utility can continue operating so long as operating revenues exceed operating costs. Because a large portion of infrastructure costs are fixed and sunk, once the investment is made, operating costs are only a small fraction of total costs. Moreover, fixed assets with sunk costs, by definition, cannot be redeployed elsewhere. Thus, utilities are vulnerable to administrative expropriation of their quasi-rents, i.e. revenues in excess of operating costs that recover sunk costs. For example, after an investment in a utility is made, the government can effectively expropriate this investment by setting prices too low to allow full recovery of sunk costs. In addition, political interference in investment and operations decisions for the purpose of benefiting core support constituencies of incumbent politicians can cause unnecessary cost increases by dictating inefficient investment, procurement and employment practices.

Private utilities and investors that are vulnerable to administrative intervention can be expected to demand high risk premia and to under-invest in infrastructure unless the government is able to make a credible commitment not to expropriate these sunk costs. Therefore, a necessary condition for effective private participation in infrastructure is the creation of mechanisms that enforce substantive and procedural restraints on regulatory discretion and limit political opportunism in regulatory policy.

The extent of the commitment problem is determined by the interaction of technology and politics—the characteristics of the technology underlying the industry's production, the demand facing its products, and the country's institutional and political endowment. In sectors like water where technology is changing very slowly, the rate of depreciation of investments is low, and the product is considered vital to human life, sunk costs and the risk of expropriation are very high. In telecommunications, on the other hand, technology is changing very rapidly, the rate of depreciation is high, and the product, while important, is not as vital to human life. Thus the risk of expropriation is lower and the commitment problem will be less severe.

Regionalizing Regulation to the Mitigate Representation Bias and Facilitate Commitment

An important advantage of regionalizing regulatory reform is that it can be used to elevate the domestic political debate about regulation from narrow particularistic issues to matters of national economic performance and regional economic cooperation or integration. From a political perspective, making regulatory reform a regional issue is highly desirable. A common

political barrier to domestic regulatory reform is that if reform is perceived as a domestic matter and debated one issue at a time, well-organized special interests are more likely to have the political power to block it. For most specific regulatory issues, the beneficiaries of reform are numerous, but their per capita benefits are frequently too low or indirect to generate significant political pressure for reform. If the reform debate is elevated to a matter of regional policy that encompasses numerous reform issues, broader attention and participation from all interests is more likely, thereby reducing the ability of a single group to block reform.

A useful analogy is to the process of setting tariffs. When each nation independently sets each tariff, the outcome is likely to be tariffs that are higher than the tariffs that would be negotiated bilaterally as part of a comprehensive regional trade agreement. The reason is that debating tariffs one product at a time maximizes the opportunity for organized interests with a direct stake in a policy to be unduly influential. If a tariff on a specific product is under review, the domestic industry that produces the product is likely to be intensely interested to exercise whatever political influence it has to obtain a policy decision favorable to itself. However, because the final price of the product is less important to each buyer than to each producer, the former are less likely to participate in the debate. Consequently, each important domestic industry may receive and preserve a tariff or a favorable regulation when policy is debated in a purely domestic context one industry at a time, but receive neither protective tariffs nor protective regulation when policy is developed regionally and covers many industries.

When each regulation is considered separately as a matter of domestic concern within a specialized agency, the government is likely to be under less pressure to adopt an efficient policy. If a regulation imposes unnecessary costs uniformly on firms in a domestic industry, sales of the industry's product may be suppressed somewhat by higher prices, but the individual firms are unlikely to suffer very much because none is being disadvantaged relative to a competitor. If regional/international trade threatens the industry, however, the industry will energetically seek relief. The politically expedient response may be to inhibit trade competition, either by using regulation as an indirect trade barrier or by banning trade while invoking a rhetorical attack on the lax standards of a trading partner. This approach placates the regulated industry and the other interests that place high value on the regulatory policy. The primary organized interest that is harmed, that of foreign producers, is more easily ignored because they do not participate in domestic politics.

Just as simultaneous negotiations over tariffs on all products facilitate reaching agreements that provide freer trade, so too do simultaneous negotiations of numerous areas of regulation facilitate eliminating indirect trade barriers. As with tariffs, the inclusion of multiple regulatory policies within the same negotiation creates more opportunities and more mutually beneficial bargains to reduce distortions simultaneously on all fronts. Thus, the incorporation of regulation into regional trade agreements should follow the same principles that have been generally followed with respect to tariffs and quotas. Specifically, if regulatory policy is part of a regional/international agreement, it must reduce, not increase, distortions in the regional/international economy and extend, not contract, the extent of liberalization. Introducing regulation into single-product negotiations is prone to lead to increased trade distortions (by using regulation to inhibit trade). In particular, negotiations about a single product or area of regulation run the risk of creating an alliance between protectionists and the most ardent advocates of a particular regulatory policy who seek regulations that go far beyond those that maximize net social benefits.

The same argument applies to the enforcement of agreements not to adopt anticompetitive regulations. If enforcement powers reside solely in domestic agencies, a case in which a regulation disadvantages foreign producers rests on unbalanced underlying politics. Domestic producers are likely to be more effectively represented than foreigners in the agency and the background political system in which the agency must operate. And domestic regulatory agencies are frequently willing to sacrifice competition as well as some of the effectiveness of regulatory policies in order to advantage domestic producers. Regional institutions for resolving regulatory issues, on the other hand, operate in a more balanced political environment. These institutions can be a means through which nations mutually can commit to maintain pro-competitive regulatory reforms.

For these reasons, regionalization/internationalization of regulatory reform can succeed by enfranchising foreign producers in domestic regulatory policy across a spectrum of industries. In the context of a dispute about the trade effects of a particular regulation, intervention by an international organization frequently is met with cries of outrage — an intervention by foreigners into domestic policy. All international agreements entail some loss of the ability to act independently in order to achieve something else of value, which in this case is a worldwide regulatory system that is more efficient and freer of trade distortions. Such an institution generates net economic benefits to each country, even if some cases create domestic losers. The creation of institutions for enforcing agreements to eliminate indirect trade barriers is a means to balance the political influence of these domestic losers.

Annex 7. Analysis of the relationship between economic and institutional integration for the EAC

Following Dorrucci *et al*. (2004), this annex examines how institutional and economic integration interact and whether institutional integration leads to economic integration in the East Africa. The analysis confirms that institutional, economic and trade integration mutually work to deepen regional integration. The magnitude of impact is larger from economic and trade integration to institutional integration than the reverse direction. Institutional integration has relatively small but persistent positive impact on economic and trade integration. Economic integration promotes institutional integration in the long run and enhances trade integration in the medium term. Trade integration strongly boosts institutional integration in the long run and also foster economic integration in the medium term.

An index of institutional regional integration for the EAC

Following seminal contribution by Balassa (1961), regional integration is classified into five main stages. The five stages of regional integration are summarized as follows:

- Stage 1: Free Trade Area (FTA) − an area where tariffs and quotas are abandoned for imports from member countries while they are retained for non-member countries;
- Stage 2: Customs Union (CU) − an FTA establishing common tariffs and quotas for trade with non-members;
- Stage 3: Common Market (CM) − a CU abolishing non-tariff barriers to trade and restrictions on factor movement. Member countries promote the integration of product and services markets and capital and labor markets, respectively;
- Stage 4: Economic Union (EUN) − a CM with a significant degree of coordination of economic policies and harmonization of relevant domestic laws; and
- Stage 5: Total Economic Integration (TEI) − an EUN with all relevant economic policies conducted at the supranational level, possibly in compliance with the principle of subsidiarity. To achieve this, both supranational authorities and supranational laws need to be in place.

The degree of institutional integration in the EAC can be quantified by assigning scores to the level of integration achieved for each of the five categories above in the sample period from 1996 to 2010, and by aggregating them to measure the overall degree of regional institutional integration at a given point in time. [11]

Although now the EAC includes five countries, the institutional integration index is constructed for the three founding members, Kenya, Tanzania and Uganda, as a whole under the framework of the EAC.[12] Burundi and Rwanda followed different path before joining the EAC and

[11] Score 0 is assigned to years before 1996.

[12] The three countries joined the Preferential Trade Area in 1981, which was replaced by the Common Market for Eastern and Southern Africa (COMESA) in 1994. Under the framework of the COMESA, they implemented trade liberalization polices. However, in this paper, attention is paid to regional integration policies under the EAC framework, which are exclusively administrated by them.

proceeded at a different pace of integration after joining. This makes composite index for the current five member countries difficult to interpret although it is feasible to construct.

The methodology works as follows. Scores from 0 to 25 are assigned to the observed extent of regional integration in each month in the development of a free trade area/customs union (FTA/CU, considered jointly), a common market (CM), an economic union (EUN) and an area with total economic integration (TEI), respectively. The institutional integration index is obtained by summing up the scores achieved for each category in each month. The index ranges from 0 (no economic integration at all) to 100 (complete economic integration, including monetary and financial integration).[13]

Two points need to be mentioned here. First, scores are not assigned to the date when some policy decision is made (e.g., signing of an agreement establishing the Permanent Tripartite Commission for the East Africa Cooperation in November 1993) but to the date when such a decision is in effect (e.g., launch of the Permanent Tripartite Commission for the East Africa Cooperation in March 1996).[14] Second, stages of integration tend to overlap. This implies that the extent of regional integration does not necessarily deepen chronologically. For instance, when the EAC became a customs union in 2005 (scored for CM), it had already inaugurated the East African Legislative Assembly and the East African Court of Justice in 2001 (scored for TEI).

Institutional integration in the EAC

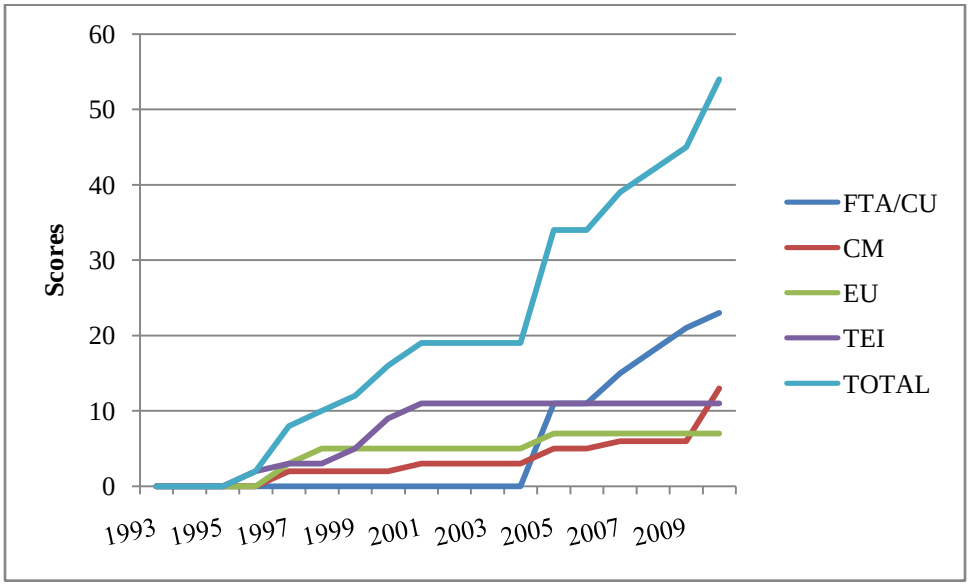
Figure A7-1 exhibits the evolution of each stage and the composite index of institutional integration for the EAC from 1993 to 2010. Interestingly, the EAC achieved a score of 54 out of 100 in seventeen years at the end of 2010. This means that the process of institutional integration in the EAC has recently proceeded at faster pace than the one achieved by the founding members of the EU in seventeen years between 1957 and 1974.[15] The score is comparable to the one achieved by the EU in the mid 1980s. The EAC developed a customs union and is moving toward a common market by removing non-tariff barriers and restrictions on capital and labor mobility. Further steps are envisaged in coordinating economic policies and establishing supranational institutions and laws.

[13] Dorrucci *et al.* (2002) provides detailed explanations on how to assign scores based on specific indicators and criteria.

[14] This implies that those policy decisions which were never implemented are not scored.

[15] Dorrucci *et al.* (2002) reports that the EU achieved a score of 47 of 100 in 1974 after seventeen years since the Treaty of Rome was ratified in 1957 and scores of 55 in 1986 and 86 in 2001, respectively.

Figure A7-1: Institutional Integration in the EAC



Detailed analysis on scores for each stage clarifies the evolution of institutional integration for the EAC. In Stage 1, the EAC obtains a score of 14 out of 15 for FTA and 9 out of 10 for customs union, respectively, and in total 23 out of 25. This indicates that the EAC is almost a complete customs union. In 2005, the East African Customs Management Act was enacted, leading to scheduled reduction and elimination of internal tariffs by 2010 and establishing a three-band common external tariff, with a minimum rate of 0 percent and a maximum rate of 25 percent.[16] In 2010, tariffs were completely removed between Tanzania and Uganda, while some tariffs are still in place for goods from Kenya.[17]

The EAC achieves a score of 13 out of 25 in Stage 2 by removing some non-tariff barriers and restrictions on capital and labor mobility. Non-tariff barriers are lifted step-by-step by implementation of the Protocol on Standardization, Quality Assurance, Metrology, and Testing in 2001 and Common Rules of Origin, and enactment of the Free Right of Establishment. In 2010 under the Protocol for Common Market, Kenya and Uganda opened up their capital accounts. Labor market mobility is enhanced by launch of the East African Passport in 1997 and the free movement of professionals and services in 2010. [18]

In Stage 3, the EAC achieves a score of 7 out of 25 through microeconomic policy coordination. The EAC enacted the Tripartite Agreement on Avoidance of Double Taxation in 1997, the Tripartite Agreements on Road Transport and Inland Waterway Transport in 1998 and the Common Export Promotion Mechanism in 2005.[19] However, macroeconomic policy coordination has yet been implemented in the EAC unlike the EU where the process of monetary

[16] In January 1999, within the COMESA framework, Kenya had tariff reduction of 90 percent, while Tanzania and Uganda had tariff reductions of 80 percent.
[17] Tariffs between Tanzania and Uganda are completely removed in January 2010, while some tariffs are still in place for goods from Kenya. Excise duties still remain in place.
[18] The East African Passport is multi-entry, renewable, and valid for six months.
[19] In 2008, the COMESA-EAC-SADC Joint Competition Authority is established, seeking to harmonize policy of the three communities.

integration was initiated at the initial stage of the regional integration. To achieve further regional integration in the EAC, macroeconomic policy coordination should be pursued.

The EAC achieves a score of 11 out of 25 in Stage 4. Since launch of the Permanent Tripartite Commission for East Africa Cooperation in March 1996, some supranational authorities and joint rule making were established, such as regional strategy for agriculture in 1999 and inauguration of the EAC in 2000 and the East African Legislative Assembly and the East African Court of Justice in 2001.

Measuring economic integration

Following Dorrucci *et al.* (2004), the measures described below will be used to examine how economic integration interacts with institutional integration.[20]

Convergence of inflation rate. Deepening institutional integration, especially toward introduction of a common currency, is most beneficial if inflation rates are already reasonably similar among the members participating in the regional arrangement. Actually, inflation convergence is a key element for the Maastricht Treaty for the creation of a single currency. The convergence of inflation is measured by the standard deviation of the consumer price inflation from the region's lowest.

Trade integration. A high degree of goods market integration indicates that how the economies are integrated. More economic integration should enhance regional trade among member countries. The ratio of intra-regional trade to GDP is employed as an indicator of trade openness.[21]

Convergence of interest rate. The convergence of interest rate is used to measure not only the extent of financial market integration but also the degree of similarity of monetary policy stance among member countries. The rationale for adopting this measure is that the higher the initial correlation in interest rates is, the lower the cost for sharing common monetary policy. The convergence of interest rate is calculated using the annual correlation of percentage changes in monthly real interest rates. Nominal short-term deposit rates, deflated by CPI inflation rates, are used.

Convergence of income. More economic integration should also enhance the convergence of income across the member countries. In more integrated and open economies where capital and labor mobility is enhanced, income levels may converge thanks to optimal resource allocation. The convergence of income is measured by the standard deviation of the log of real GDP per capita for member countries.

*Exchange rate volatility. The Optimal Currency Area (*OCA) theory implies that different countries can benefit more from reducing or even eliminating exchange rate volatility if they are integrated through trade. Literature shows that stable real exchange rate movements can proxy the degree of actual economic integration through trade, finance and factor market integration.

[20] Although not used in its empirical analysis, Dorrucci *et al.* (2004) documents evolution of the degree of synchronization of the business cycle and financial market integration to illustrate the path of economic integration in the EU. These data are not available for the East Africa.

[21] We avoid using the ratio of intra-regional trade to total trade because the ratio may not reflect increase in intra-regional trade in case of even higher growth in extra-regional trade.

Due to limited data availability, exchange rate variability is measure by annual correlation of nominal exchange rate vis-à-vis US dollar.[22]

The stages of EAC's economic integration

The EAC has long history of collapse and reincarnation of regional integration. In this sub-section, however, due to limited availability for economic data, the period from 1982 to 2009 and following three sub-periods are considered (Table A7-1).

Table A7-1: Development of economic integration

Sub-period	Main characteristics
Jan. 1982 - Oct. 1993	Dissolution of former EAC
Nov. 1993 - June 2000	Launch of Permanent Tripartite Commission on East African Cooperation
July 2000 onwards	Establishment of EAC; implementation of customs union and progress towards common market

Table A7-2 shows the list of the five indicators of economic integration described above for the three sub-periods. Figure A7-2 provides five-year moving averages of these indicators along with institutional integration index. Both Table A7-2 and Figure A7-2 confirm that regional integration measured by indicators above is accelerated.

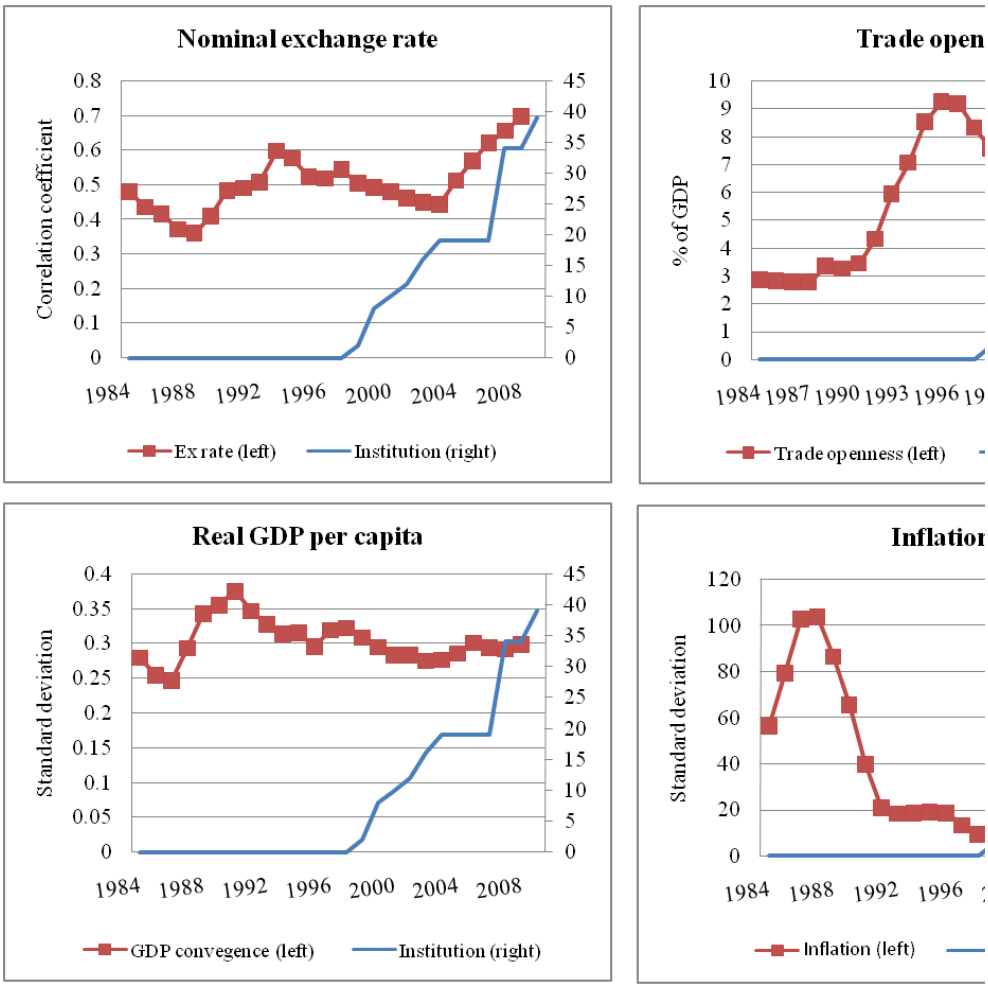
The indicators, however, exhibit varying patterns of integration. Nominal exchange rate correlation against US dollar demonstrates increase in correlation since the mid-2000s, following the institutional integration since the mid-1990s. Contrarily, trade openness increases the ratio in the early 1990s, preceding the institutional integration. These countries continuously made an effort to reduce and simplify tariff structure, abolish quantitative restrictions and eliminate export subsidies since the mid-1980s. Inflation rate shows higher degree of co-movement in accordance with the institutional integration process. This is attributed to better macroeconomic policy management in Uganda and Tanzania which experienced hyper and high inflation during the 1980s and early 1990s, respectively. Even though real GDP per capita and real interest rate do not show strong trends of co-movement, they already achieved high level of correlation compared with the EU and Latin America at their initial stage of regional integration.

Table A7-2: Indicators of economic integration

	Real GDP per capita	Inflation rate	Real interest rate	Exchange rate	Trade openness
1982-93	0.327	56.00	0.471	0.467	3.100
1994-2000	0.293	13.71	0.445	0.527	8.403
2001-09	0.286	4.91	0.483	0.559	7.893

[22] McKenzie and Brooks (1997) show that it is irrelevant whether real or nominal exchange rate is used because the volatility in the exchange rate is sourced solely from the nominal exchange rate.

Figure A7-2: Dynamics of economic integration



Testing for the causal link between institutional and economic integration: a VAR analysis

The VAR analysis has been employed to test whether it is innovations in institutional integration that drive economic integration or *vice versa*. A simple, non-structural VAR model has been used. The model consists of a system of jointly estimated reduced form equations with few restrictions on lag structure. This makes it possible to treat each variable symmetrically and to regress all variables on a common number of lags. This system of equations treats variables on the left hand side as endogenous, allowing us to test the direction of causality in the system. In indentifying the structural innovations, Cholesky decomposition is used by assuming that the variables do not have contemporaneous effect on each other. The system is specified as:

$$X_t = c + \sum_{i=1}^{p} \Gamma_i X_{t-1} + \varepsilon_t$$

where c and ε denote a vector of constants and white noise disturbances, respectively. Γ is the vector of parameters estimated and X is a vector of six variables to be examined, defined as follows:

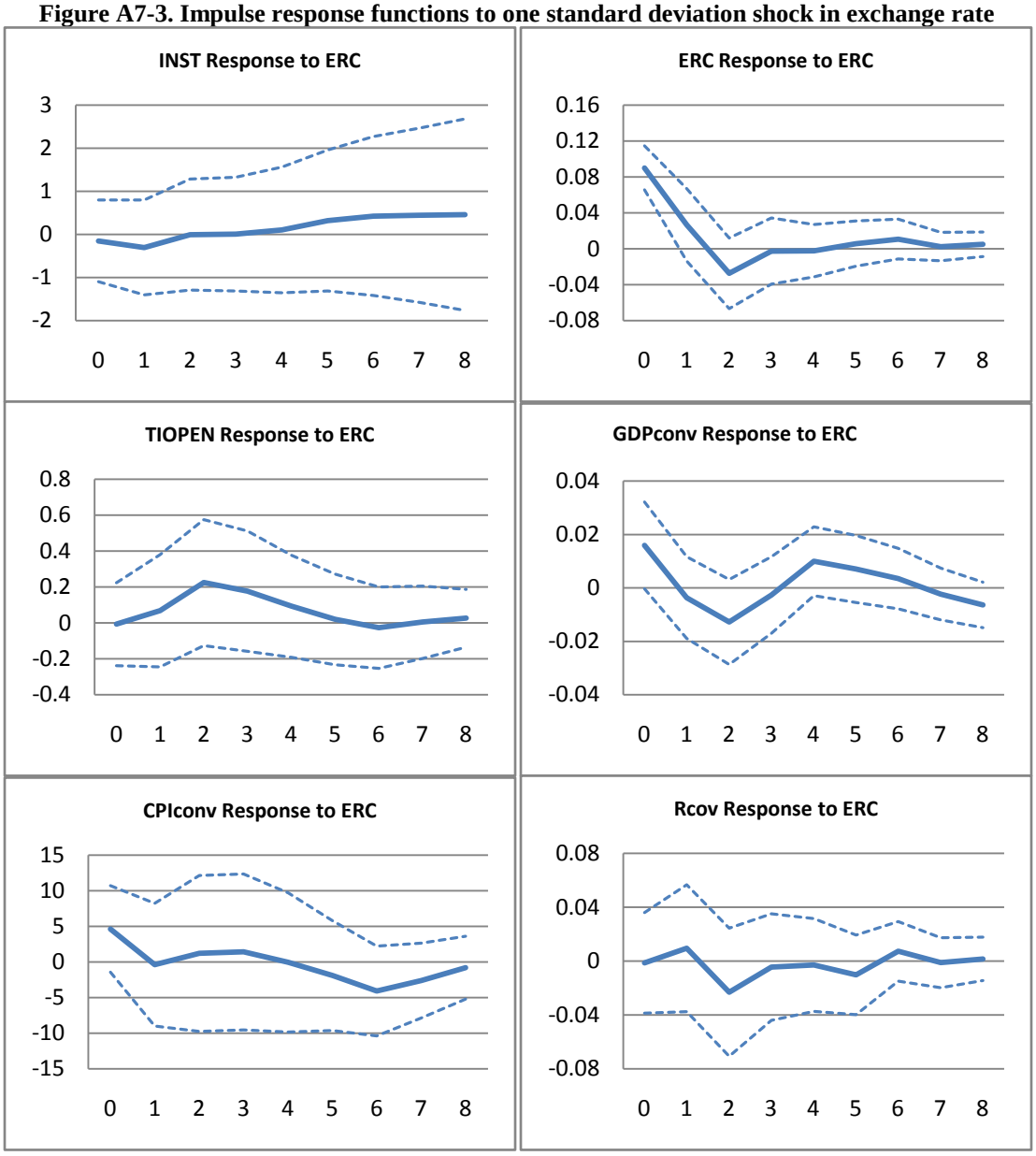
- *ERC* is the indicator of nominal exchange rate correlation among member countries against US dollar.
- *INST* is the index of institutional integration in the EAC.
- *TOPEN* is a measure of trade openness within the EAC defined by total intra-regional trade over regional GDP.
- *Rconv* is the annual correlation of percentage changes in monthly real interest rates.
- *CPIconv* is the standard deviation of consumer price inflation in the EAC from the region's lowest inflation.
- *GDPconv* is the standard deviation of the log of real GDP per capita in the EAC.

It is important to note that lower value of *CPIconv* and *GDPconv* implies higher degree of convergence in inflation and real GDP per capita. Augmented Dickey-Fuller test confirms that all variables are either stationary or trend stationary. The lag length (p) is chosen to set as 2 based on standard lag order selection criteria and avoid losing too much degree of freedom. Estimation of the above VAR system gives us impulse response functions, which allows to see how an exogenous positive shock to each variable affects to endogenous variables. Responses to one standard deviation shock are analyzed over 8 years with error bands of 2 standard errors.

Results of the VAR estimation are presented in the Figures A7-3 – A7-5 and Table A7-3). Special attention is given to impulses emanating from nominal exchange rate variability (Figure A7-3) as a proxy of the degree of economic integration, index of institutional integration (Figure A7-4) and trade openness (Figure A7-5). It examines whether and how exogenous innovations to these three variables affect other economic variables and index of institutional integration. Shocks in nominal exchange rate correlation, broadly capturing economic integration through trade, financial and factor markets, have positive impact on institutional integration in the long run. This implies that deeper economic integration promotes institutional integration (left panel in the first row of Figure A7-3). A positive shock to nominal exchange rate correlation has a persistent positive impact on trade openness (left panel in the second row of Figure A7-3). This

implies that higher nominal exchange rate correlation is associated with higher trade integration among the EAC countries. This result is in accordance with observations in recent literature that exchange rate volatility has significant negative effects on trade. Shocks in nominal exchange rate correlation have mixed effects on three other economic variables in the system. Higher correlation in nominal exchange rate leads higher convergence in inflation whereas lower convergence in real GDP per capita and change in real interest rates.

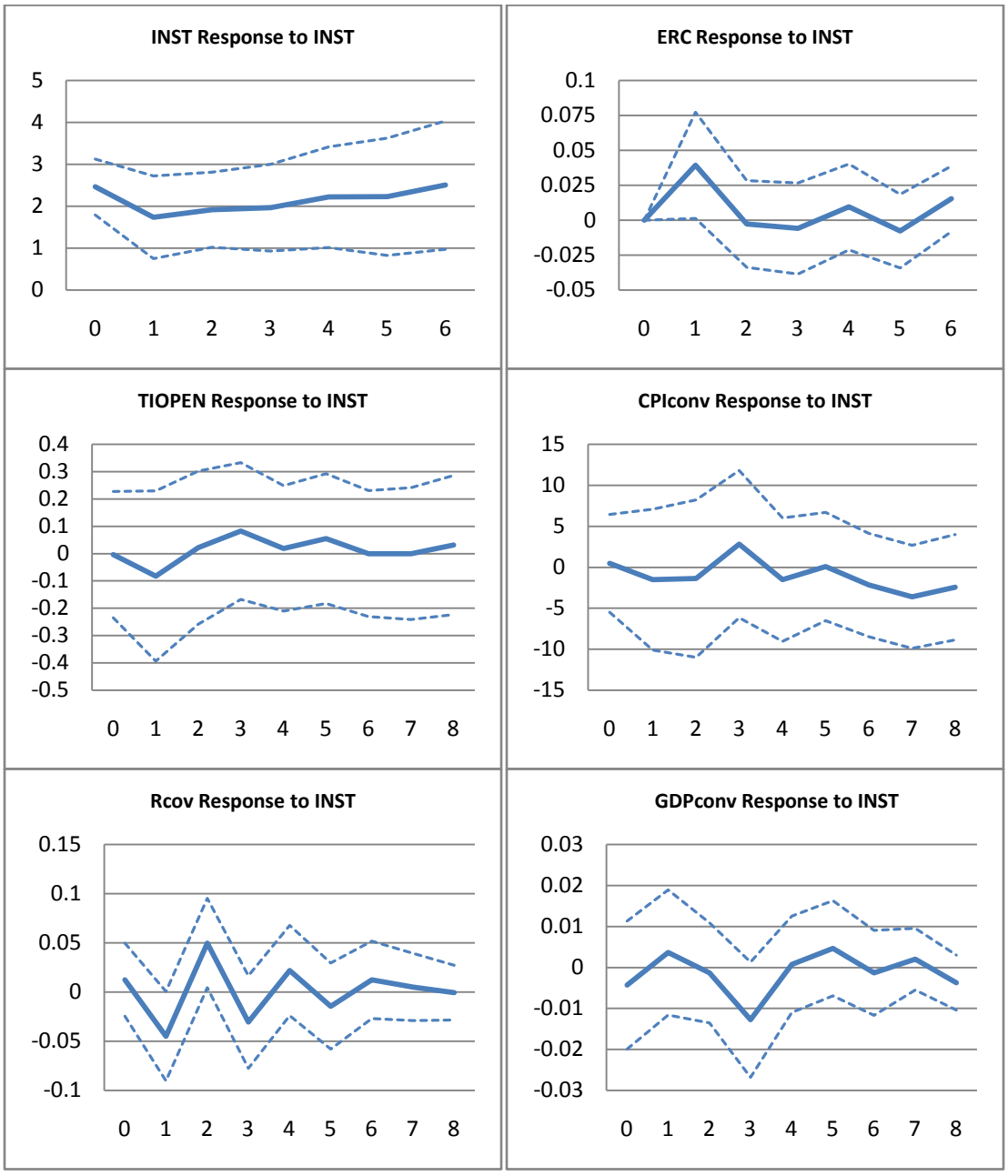
Figure A7-3. Impulse response functions to one standard deviation shock in exchange rate



Note: Thick line is impulse response to one standard deviation shock. Dotted lines are 95 percent confidence interval.

Positive shocks to institutional integration have a relatively small but persistent positive impact on exchange rate correlation and trade openness (right panel in the first row and left panel in the second row of Figure A7-4). This implies that further progress in institutional integration is associated with higher correlation in nominal exchange rates and further trade integration among the EAC countries. Contrarily, institutional integration has negative or negligible impact on other economic variables. This may reflect that institutional integration achieved so far is limited to a free trade area and a customs union which boost regional trade while macroeconomic policy coordination has yet been implemented.

Figure A7-4. Impulse response functions to one standard deviation shock to institutional integration



Finally, positive shocks to trade openness have persistent strong positive impact on institutional integration and small positive impact on exchange rate correlation (panels in the first row of Figure A7-5). This implies that enhanced trade integration promotes institutional integration in the EAC. Shocks in trade openness have mixed results for effects on three other economic variables in the system. Enhanced trade openness brings higher correlation in changes in real interest rate, lower inflation convergence and higher convergence in GDP in the short run but lower in the long run.

Figure A7-5. Impulse response functions to one standard deviation shock to trade openness

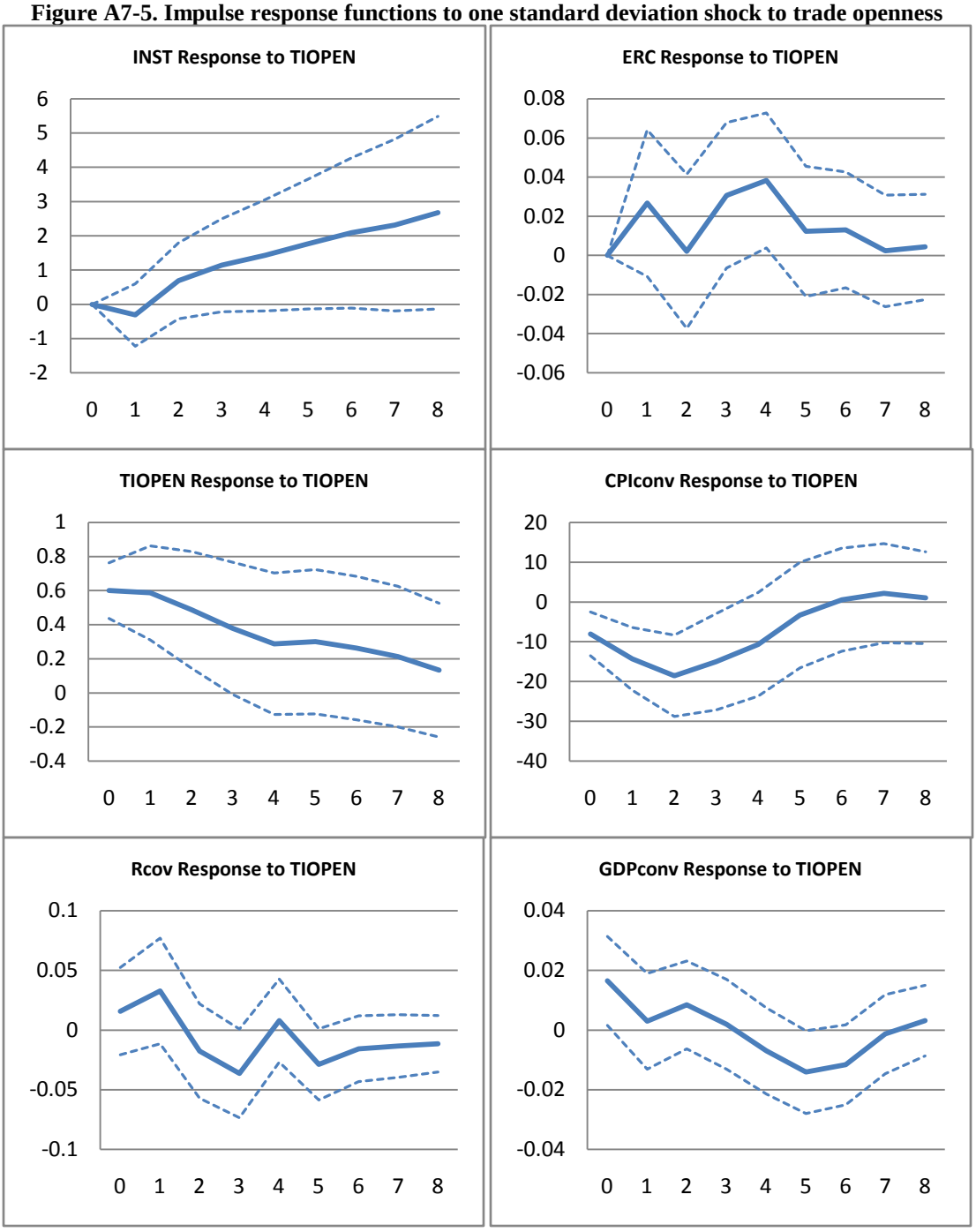


Table A7-3: VAR parameter estimates, standard deviations and significance level

	ERC	INST	TOPEN	Rcov	CPIconv	GDPconv
ERC(-1)	0.079	-2.991	1.734	0.132	-22.657	-0.039
	(0.177)	(4.834)	(1.179)	(0.190)	(31.678)	(0.086)
	(0.45)	(-0.62)	(1.47)	(0.70)	(-0.72)	(-0.46)
ERC(-2)	-0.201	2.544	1.250	-0.462	74.032	-0.179
	(0.169)	(4.645)	(1.132)	(0.182)	(30.441)	(0.082)
	(-1.19)	(0.55)	(1.10)	(-2.53)**	(2.43)**	(-2.17)**
INST(-1)	0.018	0.688	-0.034	-0.015	-0.864	0.002
	(0.006)	(0.176)	(0.043)	(0.007)	(1.153)	(0.003)
	(2.81)**	(3.91)**	(-0.79)	(-2.10)**	(-0.75)	(0.53)
INST(-2)	-0.016	0.392	0.028	0.019	0.361	-0.002
	(0.007)	(0.193)	(0.047)	(0.008)	(1.266)	(0.003)
	(-2.27)	(2.03)**	(0.59)	(2.51)**	(0.28)	(-0.52)
TOPEN(-1)	0.042	-0.409	0.886	0.059	-13.831	-0.000
	(0.029)	(0.807)	(0.197)	(0.032)	(5.286)	(0.014)
	(1.39)	(-0.51)	(4.51)**	(1.85)*	(-2.61)**	(-0.01)
TOPEN(-2)	-0.033	1.862	-0.260	-0.940	0.366	0.024
	(0.029)	(0.801)	(0.195)	(0.031)	(5.251)	(0.014)
	(-1.12)	(2.32)**	(-1.33)	(-2.99)**	(0.07)	(1.70)*
Note: VAR analysis: 6 variables. Sample period: 1984-2009.						
Standard errors and t-statistics in parentheses.						
* and ** indicate 90 percent and 95 percent significance level, respectively.						

The above VAR analysis shows evidence that there exist virtuous linkages between exchange rate stability, institutional integration and the deepening of economic integration (Table A7-4). However, the VAR analysis reveals that regional integration, especially through institutional integration, does not positively affect macroeconomic variables even though these variables are improved in the 2000s by better macroeconomic policy management. This confirms that regional integration in the EAC lacks macroeconomic policy coordination. Regardless of introduction of a common currency, the EAC needs to harmonize macroeconomic policy management to boost further regional integration.

Table A7-4: Long-term impact of integration

		Shock to		
		ERC	INST	TOPEN
Long-term response	ERC	0.005	0.006	0.004
		(0.007)	(0.010)	(0.014)
	INST	0.461	2.817	2.676
		(1.132)	(1.048)	(1.434)
	TOPEN	0.026	0.032	0.133
		(0.082)	(0.130)	(0.200)
Note: Responses to one standard deviation shock.				
Standard errors and t-statistics in parentheses.				

Table A7-5: Index of regional integration for the EAC

	TRADE		INTEGRATION OF SERVICES & FACTOR MARKETS			COORDINATED OR COMMON POLICIES		SUPRA-NATIONALITY	INEDX OF REGIONAL INTEGRATION					
	1) Tariffs & quotas	2) Common External Tariff	2) Non-tariff Barriers	3) Capital Movement	4) Labor Mobility	5) Macroeconomic Policy Coordination	6) Microeconomic Policy Coordination	7) Institutional Developments	FTA	CU	CM	EU	TEI	TOTAL
1993/11/30								Signing of an agreement establishing the Permanent Tripartite Commission for East Africa Cooperation	0	0	0	0	0	0
1996/03/01								The Permanent Tripartite Commission for East African Co-operation	0	0	0	0	1	1
1996/11/01								East African Business Council is established, facilitating private sector participation in the integration process of the	0	0	0	0	2	2
1997/04/01					East African Passport launched. It is multi-entry, renewable, and valid for six months.		Enactment of Tripartite Agreement on Avoidance of Double Taxation	1st East African Co-operation Development Strategy implemented	0	0	2	3	3	8
1998/05/01							Tripartite Agreements on Road Transport and Inland Waterway Transport enacted		0	0	2	5	3	10
1999/01/01	(COMESA: At the time, Kenya had tariff reduction of 90%, while Tanzania and Uganda had tariff reductions of 80%)							Implementation of EAC Memorandum of Understanding on Foreign Policy Co-ordination	0	0	2	5	4	11
1999/08/01								Development and Approval of Regional Strategy for Agriculture, with mandate to control of invasive species	0	0	2	5	5	12
1999/09/01								(COMESA: Tanzania drops out of COMESA)	0	0	2	5	5	12
2000/04/01								Revitalization of the Inter-University Council for East Africa, which is recognized as the only surviving institution from the former East African Community	0	0	2	5	5	12
2000/07/01								EAC is inaugurated, superceding the Permanent Tripartite Commission. Kenya, Tanzania and Uganda are founding members	0	0	2	5	9	16

Table A7-5 (cont.): Index of regional integration for the EAC

	TRADE		INTEGRATION OF SERVICES & FACTOR MARKETS			COORDINATED OR COMMON POLICIES		SUPRA-NATIONALITY	INEDX OF REGIONAL INTEGRATION					
	1) Tariffs & quotas	2) Common External Tariff	2) Non-tariff Barriers	3) Capital Movement	4) Labor Mobility	5) Macroeconomic Policy Coordination	6) Microeconomic Policy Coordination	7) Institutional Developments	FTA	CU	CM	EU	TEI	TOTAL
2001/01/01			Protocol on Standardization, Quality Assurance, Metrology, and Testing comes into effect					1st Summit of the East African Community held in Arusha, Tanzania	0	0	3	5	9	17
2001/11/01								Inauguration of East African Legislative Assembly and East African Court of Justice	0	0	3	5	11	19
2005/01/01	East African Customs Management Act enacted, leading to scheduled reduction and elimination of internal tariffs by 2010	East African Customs Management Act enacted, establishing a 3-band CET, with a minimum rate of 0% and a maximum rate of 25% (not totally harmonized for all goods)	Further product standardization, such as harmonized trade documentation and simplification of customs procedures (uncertain implementation)				Common Export Promotion Mechanism created by East African Customs Management Act	EAC joins COMESA-SADC Task Force, seeking to reduce duplication of roles between regional economic communities (some countries have membership in more than one community)	3	8	5	7	11	34
2007/07/01		Updating of the CET, with tariffs for many goods reduced and further harmonization of the CET for previously exempted products	Implementation of Common Rules of Origin					(Burundi & Rwanda join EAC)	6	9	6	7	11	39
2008/10/01							COMESA-EAC-SADC Joint Competition Authority is established, seeking to harmonize policy of the three communities.	Tripartite COMESA-EAC-SADC summit was convened. This is seen as a step for the longterm integration of the continent under the African Economic Union	9	9	6	7	11	42

Table A7-5 (cont.): Index of regional integration for the EAC

	TRADE		INTEGRATION OF SERVICES & FACTOR MARKETS			COORDINATED OR COMMON POLICIES		SUPRA-NATIONALITY	INEDX OF REGIONAL INTEGRATION					
2009/07/01	(Burundi & Rwanda start applying FTA standards)	(Burundi & Rwanda start applying CU standards)							12	9	6	7	11	45
2010/01/01	Complete reduction of tariffs between Tanzania and Uganda, while some tariffs are still in place for goods from Kenya. Excise duties still remain in place.								14	9	6	7	11	47
2010/07/01				Under Protocol for Common Market, Kenya, Rwanda and Uganda opened up their capital accounts, while other members plan to do this in the near future. Free right of establishment in every member nation, and the free movement of services is also enacted.	Protocol Common Market goes into effect, although many of its goals will not be immediately implemented. 3rd generation EAC ID is partially implemented for the region. Provisions to allow for the movement of professionals goes into effect.				14	9	13	7	11	54

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