REVIEWER APPENDIX: FIELD EFFECTS

(Note: The references below to tables refer to the appendix tables, not the tables in the original manuscript.)

As Reviewer One guessed, the distribution of fields is not equally representative across the three regions. As Reviewer Table 1 demonstrates, there is some parity in the fields of Geology (ranging from 7 to 8%) and Biology/Bio-technology (ranging from 23 to 33%). In Kenya and Kerala, respondents in Engineering and Information Technologies make up 10% to 20% of those sampled, while Social Sciences are only 6% in both regions. Agriculture is well represented in all three regions, but ranges from 18% in Kerala to 28% in Ghana and 46% in Kenya.

We disaggregate the full sample by region and performed an analysis of variance among by field on collaboration and total productivity. A post hoc multiple comparison showed significant variation of collaborative frequency among fields, but only in Kerala. Malayalis in Geology and Engineering and IT tended to collaborate more, while social scientists collaborate less. All regions showed some variation in productivity across fields. In Kerala, those in Biology and Biotechnology published most, a finding that applies to Kenya (also including agricultural researchers). In Ghana, it tends to be those in the 'harder sciences,' chemistry and physics. Social scientists across all three regions publish fewer articles—not dissimilar to the situation over here! These variations suggest that field remains fairly important for productivity among all three regions; but only in Kerala is field an important factor in predicting collaboration.

Nonetheless, our main task was to understand the influence of field in models of productivity, so we did a variety of tests (some shown in the tables below and some just

for our own learning curve). We aggregated back to the full sample and then regressed collaboration and total publication against six dummy field variables – Agriculture, Biology/ Bio-Technology, Geology, Chemistry/Physics, Engineering/ IT, using Social Sciences as the reference group. The results: only Agriculture was found to be associated with collaboration (Table 2, column 2, line 1) and only Chemistry/Physics and Biology/Bio-technology were found to be associated with total productivity (Table 2, column 1, lines 2 and 4). Of course, these models do not show too much, since they have a very low R^2 of .014 and .023 respectively (Table 2, line 6). When field dummies were included in our original partial model regressing total productivity on collaboration frequency with dummy variables for region and sector, Biology/Bio-Technology and Chemistry/Physics were found to be very slightly associated (Table 3, column 1, lines 2 and 4), while collaboration frequency, region and sector were strongly associated. When we then ran a full model of region and background variables that included marital status, professional meetings attended and professional involvement (held office in a professional association), Biology/Bio-Technology and Chemistry/Physics were no longer associated with productivity (Table 3, column 2, lines 2 and 4). Region, sector, the background variables and our one collaboration variable were significant, though (Table 3, line 6).[1]

Given the sampling disparities among fields, plus the significant variation in total productivity by field in the three regions, we decided to disaggregate the sample by region and field again. We proceeded to regress our productivity measure against the collaboration and background measures, and the results did confirm the study's core

[1] Kerala was positively associated and Kenya was negatively associated with productivity. Productivity was associated with academic departments as well.

findings on the association of collaboration and productivity. The following is a review of our findings represented in Table 4.[2] However, one thing should be stressed: Our full model, which includes collaboration and background indicators, did not predict total publications for most fields in any region. Table 4 reflects only those models that were significant. When disaggregating, some models were based on small n's. We worry about the generalizability of these results. But even so they are generally consistent with the findings in the aggregated data analysis.

Table 4 (column 1 and 2, lines 3 and 7) demonstrates (for Kerala) that having a doctoral degree and attending professional meetings were strongly associated with total publications in Biology/ Bio-technology and Geology. This echoes the results in the original Table 2 column 4, lines 2 and 4. Table 4 (column 3, lines 7 and 8) also shows that in Engineering & Information Technologies, attending meetings and working in a research institute (highly significant) was associated with greater productivity. Interestingly (but not highly significant) women in engineering published more (Table 4, column 3, line 2).[3] This is one we want to explore in much greater detail—but in the current paper it would just raise side issues. In geology, Malayali scientists who attended more professional meetings, were educated in a developed nation, and held a doctoral degree tended to publish at a greater rate (Table 4, column 2, lines 3, 5 and 7).

Table 4 (column 4 and 5, lines1 and 8) demonstrates that for Kenyans, collaborating more (highly significant) and working in a university department were

[2] Our full model, which includes collaboration and background indicators, did not predict total publications for all fields in the three regions. Table 6 reflects only those models that were significant. When disaggregating, some models were based on small N. We caution the generalizability of these significant results, even so in some cases they are consistent with the findings in the aggregated data analysis.

[3] The STS literature on gender suggests that women are underrepresented in the field of Engineering. This interesting finding reflects the Kerala Model of development, which has vigorously promoted female education for the better part of the last half century.

associated with total publications in Agriculture and Biology/ Bio-technology. This echoes the general findings in our original Table 2, column 5, line 5 and Table 3, column 3, line 5, that Kenyans in academic settings and those who collaborate more, tend to produce more. Kenyan Biologists who were male and held an office in a professional association also tended to produce more (Table 4 column 5, lines 2 and 6), while Kenyans in Agriculture who had a doctoral degree tended to produce more (Table 4, column 4, line 3).

For Ghanaian scientists in Agriculture, Biology/Bio-Technology and Chemistry/Physics, factors that predict publication vary. Table 4 (column 6, lines 4, 5 and 6) demonstrates for Ghanaian agricultural researchers, being married, having been educated in a developed country and holding an office in a professional association were all strongly associated with total publications. (This reflects the original findings in Table 2 column 6, lines 1 and 3 and Table 3 columns 5 and 6, lines 1, 3, 8 and 10.) For Ghanaian Biology and Bio-Technology, being female, having a doctoral degree and working in an academic department were all strongly associated with more total publications (Table 4, column 7, lines 2, 3 and 8). (This reflects the original Tables 2 and 3, column 6, line 2.) For Ghanaian Chemists and Physicists, being married was the only factor that was associated with more total publications (Table 4, column 8, line 4). This last finding though was based on a small sample of 15 researchers in that field, so it is not a very big deal. In any event, these field analysis do illuminate things, but do not undermine the basic findings in the original manuscript.

REVIEWER
TABLE 1

DISTRIBUTION OF FIELD BY REGION

	KERALA	KENYA	GHANA	Total
1 Agriculture	54	146	82	282
	18%	46.%	28%	31%
2 Chemistry & Physics	44	12	30	86
	14%	4%	10%	9%
3 Geology	25	21	21	67
	8%	7%	7%	7%
4 Biology & Bio-tech	100	88	67	255
	33%	28%	23%	28%
5 Engineering & IT	57	30	58	145
	19%	10%	20%	16%
6 Social Sciences	19	17	38	74
	6%	5%	13%	8%
7. N	299	314	296	909
	100.0%	100.0%	100.0%	100.0%

REVIEWER TABLE 2

REGRESSION OF PUBLICATION AND COLLABORATION ON FIELD

	Total Publication		Collaboration	
1. Agriculture	0.040		0.106	*
2. Chemistry/Physics	0.134	**	-0.049	
3. Geology	0.029		0.007	
4. Biology/Bio-Technology	0.169	**	0.038	
5. Engineering/ IT	0.046		0.004	
6. R^2	0.023		0.014	
7. N	793		872	

Notes: Total Publication variable is expressed as a logarithmic transformation.
***, **, * significant at the .01, .05, .1 levels respectively.

REVIEWER TABLE 3

REGRESSION OF TOTAL PUBLICATION ON FIELD, SECTOR, REGION AND COLLABORATION

1. Agriculture	0.079			
2. Chemistry/Physics	0.100	*	0.037	
3. Geology	0.012			
4. Biology/Bio-Technology	0.123	*	0.039	
5. Engineering/ IT	0.035			
6. Collaboration	0.220	***	0.125	***
7. Research Institute	-0.122	***	-0.022	
8. Kerala	0.202	***	0.095	**
9. Kenya	-0.240	***	-0.118	***
10. Doctoral Degree			0.285	***
11. Married			0.110	***
12. Number of Professional meetings attended			0.107	***
13. Held office in a Professional Association.			0.133	***
10. R^2	0.151		0.260	
11. N	764		711	

Notes: Dependent variable is expressed as a logarithmic transformation.
***, **, * significant at the .01, .05, .1 levels respectively.

REVIEWER TABLE 4

REGRESSION OF PUBLICATIONS ON COLLABORATION AND BACKGROUND FACTORS

	KERALA						KENYA				GHANA					
TOTAL PUBLICATIONS	Bio/ Bio-tech		Geology		Engr/ IT		Agriculture		Bio/ Bio-tech		Agriculture		Bio/Bio-tech		Chem/Phys	
1. Number of collaborations	0.125		0.044		-0.118		0.382	***	0.346	***	-0.03		0.028		-0.009	
2. Male	-0.08		0.288		-0.246	*	0.006		0.194	*	-0.054		-0.235	**	0.249	
3. Doctoral Degree	0.212	**	0.44	**	0.274		0.185	**	0.112		-0.132		0.45	***	0.321	
4. Married	0.191				0.047		0.069		-0.129		0.366	***	0.161		0.565	**
5. Degree received from developed country	0.104		0.469	**	-0.151		0.106		0.097		0.506	***	0.081		0.419	
6. Held office in professional association	0.112		0.073		0.043		-0.034		0.256	**	0.228	**	0.127		0.01	
7. Professional meetings attended	0.23	***	0.582	**	0.356	**	0.027		-0.003		0.186		0.123		0.072	
8. Research institute	0.173		-0.15		0.416	***	-0.401	***	-0.247	*	-0.15		-0.391	***	-0.079	
9. R^2	0.231		0.505		0.247		0.44		0.414		0.536		0.745		0.857	
10. N	90		22		55		112		69		57		36		15	

Notes: Dependent variable is expressed as a logarithmic transformation.
***, **, * significant at the .01, .05, .1 levels respectively.