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Abstract

This paper examines whether agricultural growth through public expenditure, ODA or investment will improve significantly the prospects of achieving MDG 1 of halving poverty in Asia and the Pacific Region. As more than a few countries in this Region recorded impressive economic growth in the early years of the present decade, the case for the widely used poverty threshold of US$1.25 per day (at 2005 PPP) for assessing progress towards MDG1 is not so compelling now. Accordingly, the present assessment uses two poverty thresholds: US$2 per day and US$1.25 per day (both at 2005 PPP). Our analysis, based on country panel data, confirms robustly that increases in public agricultural expenditure, agricultural ODA, agricultural investment, or fertiliser use (as a proxy for technology), accelerate agricultural and GDP growth. Consequently, the headcount and depth of poverty indices are reduced substantially. Our simulation results show that, for halving the headcount index at US$2 per day, Asia and the Pacific region as a whole would need in 2007-13 a 56% increase in annual agricultural ODA, a 28% increase in agricultural expenditure, a 23% increase in fertiliser use or a 24% increase in agricultural investment. Aggregation of the simulation results for various groups reveals that countries in low income group, with a low level of macro governance or institutional quality, or with low ease of doing business would need larger increase in agricultural ODA, expenditure or investment to halve poverty. Although the share of agriculture in GDP has declined, our analysis reinforces the case for channelling a substantially larger flow of resources not just for accelerating growth but also for achieving the more ambitious MDG1. A policy dilemma, however, is the trade-off between institutional quality and resource transfers. National governments and donors must reflect deeply on triggers for institutional reforms and mechanisms that would ensure larger outlays for agriculture and their allocation between rural infrastructure and sustainable technologies.

Key Words: Millennium Development Goal, Poverty, Agriculture, ODA, Investment, Public Expenditure, Asia, Panel Data, Simulations
JEL Codes: C31, C33, H53, I32

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Role of Agriculture in Achieving MDG 1 in Asia and the Pacific Region

1. Introduction

Although the share of agriculture in GDP has steadily declined, recent studies confirm the continuing important of role of agriculture in overall economic growth acceleration and reduction in poverty. In fact, it has been demonstrated that agriculture has a key role in improving the prospects of achieving MDG1 in Asia and the Pacific Region (Imai et al., 2010, Gaiha et al. 2006). Using a cross- country panel data for developing countries, Imai et al. (2010) showed that (lagged) agricultural value added per capita positively impacts GDP per capita and then GDP per capita significantly reduces the poverty head- count ratio, based on US$1.25 (2005 PPP) a day international poverty line.[1] However, it is unclear what factors determine agricultural value added in their model. This paper takes a deeper look at this by focusing on the effects of agricultural ODA, public agricultural expenditure/used synonymously with agricultural expenditure, fertiliser use (as a proxy for technology), and agricultural investment on agricultural value added, and then on poverty. As several countries recorded impressive growth rates in earlier years of this decade, and many countries are on track to achieving MDG 1, it is appropriate to assess progress on the more ambitious US$2 dollars a day (2005 PPP) poverty criterion. This paper employs a system of equations (or three stage least squares (3SLS)) to an unbalanced country panel data, mainly to allow for unobservable country-specific effects and to take account of the endogeneity of some key explanatory variables, such as agricultural value added and agricultural ODA.

[1] See Chen and Ravallion (2008) and Ravallion et al. (2008) for detailed discussion of the new international poverty line. See also Deaton (2010) for a review of this poverty line and its implications for poverty in the developing world. For an elaboration in the Indian context, see Gaiha and Kulkarni (2010).

The rest of the paper is organised as follows. The next Section describes briefly the data sources and the variables used in the regression analyses; Section 3 discusses the econometric specifications, followed by the econometric results in Section 4; trends in poverty are reviewed in section 5, followed by the simulation results in Section 5. The final section offers concluding remarks.

2. Data

Our poverty estimates are the new World Bank head-count estimates, based on the poverty line of US $1.25 per day and US$2 per day, adjusted by PPP (purchasing power parity) in 2005 (Chen and Ravallion, 2008). While the poverty estimates on US$1.08 per day in 1993 PPP were widely used in the studies of MDG1, the new poverty estimates cover a larger number of countries and are assumed to be more reliable (ibid., 2008). These estimates are taken from the World Bank's website *Povcal Net* [2] and the World Development Indicator (WDI) 2010. They cover 21 countries[3] in Asia and the Pacific region over the period 1980 to 2006. This is an unbalanced panel data set where the data availability ranges from only one year for Papua New Guinea or Bhutan to 9 years for China, depending on the availability of national household survey data (see Table 4).

The variables used in the regression analyses are listed in Appendix 1 with their data sources. Most of the variables are in logarithm to facilitate computation of elasticity estimates. While Imai et al. (2010) considered the effects of trade and capital openness, and credit on GDP per capita, we do not include these variables in the model, as combining them with short

[2] The data are available from http://iresearch.worldbank.org/PovcalNet/povcalSvy.html (accessed on 23 December 2010).

[3] They are China, Papua New Guinea, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, Timor-Leste, Vietnam, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka, Kazakhstan, Kyrgyz Republic, Tajikistan, Uzbekistan and Iran, Islamic Rep.

or not-so-recent series on some key variables-especially agricultural ODA and agricultural investment- is difficult in regression analysis. Institutional data were taken from the World Bank's World Governance Indicators. The data cover 1998, 2000, 2002, 2003, 2004, 2005 and 2006. The methodology used for constructing the institutional indicators is discussed in Kaufmann et al. (2008).[4]

3. Econometric Specifications

Different specifications are used to capture unobservable country –specific effects and to allow for endogeneity of some key variables (e.g. agricultural value added, public expenditure in agriculture and ODA in agriculture). These are discussed below.

Case 1

The following system of equations is estimated by 3SLS to identify direct and indirect determinants of poverty in a country using panel data.

$$[\text{log GDP pc}]_{it} = \alpha_0 + \alpha_1 [\text{log Agri VA}]_{it-1} + D_i * \alpha_2 + e_{it} \quad (1)$$

where *i* denotes country and *t* denotes year (from 1980 to 2006), $[\text{log GDP pc}]_{it}$ is log of GDP per capita, and $[\text{log Agri VA}]_{it-1}$ is log of agricultural value added per agricultural worker in the previous year, t-1. Following Imai et al. (2010), we consider the effect of agricultural income in the previous period on GDP per capita. In this case, we take account of country fixed effects by including D_i, a vector consisting of country dummy variables in each equation[5]. However, because we do not have sufficient observations as our panel data are unbalanced, we cannot include year dummies. e_{it} (as well as ε_{it}, ϵ_{it}, and ζ_{it}) is an error term which is assumed to be i.i.d.

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[4] The full data are available from http://info.worldbank.org/governance/wgi/index.asp (accessed on 23 December 2010).

[5] These are unobservable country-specific effects (e.g. how welfarist a political regime) that are not captured by any of the right side variables used in the GDP equation.

$$[\text{log Agri VA}]_{it-1} = \beta_0 + \beta_1[\text{log Agri Expenditure}]_{it-1} + \beta_2[\text{log Agri ODA}]_{it-1} + D_i*\beta_3 + \epsilon_{it} \quad \textbf{(2)}$$

where agricultural value added is estimated by public expenditure on agriculture/agricultural expenditure and ODA in agriculture (or agricultural ODA)[6], both are normalised by rural population. $[\text{log Agri Expenditure}]_{it-1}$ (or log of lagged agricultural expenditure) is a predetermined and weakly exogenous variable and is used as an instrument for $[\text{log Agri VA}]_{it-1}$.

$$[\text{log Poverty}]_{it} = \gamma_0 + \gamma_1[\text{log GDP pc}]_{it} + \gamma_2[\text{log Gini Coef.}]_{it} + D_i*\gamma_2 + \varepsilon_{it} \quad \textbf{(3)}$$

where [log Poverty] is log of Poverty Head- Count Ratio (or Poverty Gap), based on the US$2 (or US$1.25) day a day poverty line in *t*, for country *i*. [log Gini Coef.] is log of Gini coefficient of income distribution. Here, poverty is premised as a function of the level of overall economic development measured by GDP per capita, and the degree of income inequality in a country. It is assumed that a higher inequality is associated with a higher level of poverty. While GDP is hypothesised to reduce poverty, inequality increases it.

$$[\text{log Agri ODA}]_{it-1} = \delta_0 + \delta_1[\text{log Agri ODA}]_{it-2} + \delta_2[\text{log Agri VA}]_{it-2} + D_i*\delta_3 + \zeta_{it} \quad \textbf{(4)}$$

[6] Note that estimates of agricultural ODA or the share of agricultural ODA in total ODA are available only for 2003-5 (either as an average or for an earlier year). We cannot match these with poverty in the earlier half of 2000-2009 due to gaps in poverty estimates. We were thus forced to estimate agricultural ODA from total ODA by assuming that the share of the former in the latter is same for the entire period 1980-2006. This is likely to bias downward the (positive) coefficient estimate of agricultural ODA, as the share of agricultural ODA is likely to be lower in recent years. Hence a cautious interpretation of the effect of agricultural ODA is necessary.

$[\log \text{Agri ODA}]_{it-1}$ is estimated by its lag and $[\log \text{Agri VA}]_{it-2}$ to take account of a likely two-way causality between agricultural value added and agricultural ODA. $[\log \text{Poverty}]_{it}$ is either Poverty Headcount Ratio (or Poverty Gap) for US2$ (or US1.25) a day poverty line.

Case 2 and Case 3

Case 2 is same as Case 1 except that log Agri Expenditure (first lagged) is dropped from equation (2) on the presumption that a part of agricultural ODA is used for public expenditure in agriculture. For lack of data, however, it is difficult to measure the overlap between them[7]. Hence, we use only log of Agri ODA (first lagged) in Case 2, or only log of Agri Expenditure (first lagged) in Case 3, in order to identify the effect of each factor on agricultural value added. In Case 3, equation (4) for log Agri ODA_{it-2} is dropped. Country fixed effects, or D_i, are included in these cases.

Case 4

In another specification, we have replaced $[\log \text{Agri Expenditure}]_{it-1}$ by $[\log \text{Fertiliser}]_{it-1}$ in equation (2) in Case 3. Agricultural ODA is not inserted in this case as its coefficient estimate turned out to be non-significant.

$$\mathbf{[\log \text{Agri VA}]_{it-1} = \beta_0 + \beta_1[\log \text{Fertiliser}]_{it-1} + D_i*\beta_3 + \epsilon_{it} \quad (2)'}$$

where $[\log \text{Fertiliser Use}]_{it-1}$ is log of Fertilizers Consumption (Kg per Ha of Arable land).

Case 5

$$\mathbf{[\log \text{GDP pc}]_{it} = \alpha_0 + \alpha_1 [\log \text{Agri VA}]_{it-1} + e'_{it} \quad (1)'}$$

[7] In Cambodia, for example, fluctuations in public expenditure on agriculture fluctuate with ODA.

$$[\text{log Agri VA}]_{it-1} = \beta_0 + \beta_1[\text{log Agri Investment}]_{it-1} + \epsilon'_{it} \quad (2)'$$

$$[\text{log Poverty}]_{it} = \gamma_0 + \gamma_1 [\text{log GDP pc}]_{it} + \gamma_2[\text{log Gini Coef.}]_{it} + \varepsilon'_{it} \quad (3)'$$

In Case 5, we replace fertiliser by log of lagged investment in agriculture per rural population. Agricultural ODA is not included in equation (2)' as the coefficient estimate is not significant. Here, due to the small number of observations on agricultural investment ([log Agri Investment]$_{it}$), we cannot include country or year dummies. Also, as the data on agricultural investment are highly limited, we should interpret the results with caution.[8]

4. Econometric Results

This section discusses econometric results based on the models discussed in the previous section. Table 1 and Table 2 give econometric results of Cases 1, 2, and 3 for log of poverty head- count ratio and log of poverty gap, respectively. Elasticity estimates based on Table 1 are given in Table 3. Table 4 summarises poverty estimates for each country and region.

The results on poverty head-counts, based on US2$ a day for Cases 1, 2 and 3, are given in the first part of Table 1. The second column of Case 1 shows that (the first lags of) agricultural expenditure and agricultural ODA positively and significantly affect (the first lag of) agricultural value added. In the fourth column, we observe that the coefficient estimates of second lags of agricultural ODA and agricultural value added are positive and significant for agricultural ODA. That is, agricultural ODA and agricultural value added are positively associated with each other over time. Poverty head-counts are negatively associated with log

[8] Agricultural investment estimates are available only for 1980-1992 for a limited number of countries. Hence we have regressed agricultural investment on total capital formation and agricultural expenditure during 1980-1992. Based on the regression results, we obtained out-of-sample predictions of agricultural investment in 1993-2006.Admittedly, this procedure has its limitations (e.g. the relationship between agricultural investment and total investment may have changed in more recent years). But, given the lack of data, there was little we could do to improve upon this approximation. This, of course, has the merit that it uses all time series data relevant for determining agricultural investment..

GDP per capita, which is positively affected by (lagged) agricultural value added (as in the first and third columns). Poverty is positively associated with the Gini, but the coefficient estimate is not significant. An implication of the results in Case 1 is that (i) agricultural ODA indirectly reduces poverty after taking account of its endogeneity; and (ii) public expenditure in agricultural also indirectly reduces poverty (i.e. through their positive effects on agricultural value added and GDP).

Table 1 Results of 3SLS for GDP, Agricultural value added, & poverty (poverty headcount ratio based on US$2 a day (2005PPP))

	Case 1 With county Fixed Effects With agricultural expenditure & ODA Without Institution				**Case 2 With county Fixed Effects With agricultural ODA Without Institution**				**Case 3 With county Fixed Effects With agricultural expenditure Without Institution**		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	2.137				1.783				2.582		
	(16.94)**				(18.11)**				(17.52)**		
log Agri ODA(-1)		**0.096**				**0.163**					
		(1.87)†				**(2.83)****					
log Agri Expenditure (-1)		**0.158**								**0.181**	
		(4.31)**								**(4.66)****	
log Agri Investment (-1)											
log GDP pc			-0.599				-0.772				-0.751
			(6.61)**				(6.36)**				(6.49)**
log Gini Coef.			0.361				0.673				0.717
			(1.38)				(1.92)†				(2.11)*
log Agri ODA(-2)				0.721				0.571			
				(6.26)**				(7.69)**			
log Agri VA(-2)				0.784				0.784			
				(2.26)*				(3.37)**			
Constant	-6.253	8.275	6.643	-18.93	-4.277	6.848	6.583	-17.52	-8.737	7.809	6.32
	(8.85)	(14.38)	(10.41)	(8.77)	(7.75)	(15.22)	(6.21)	(12.75)	(10.60)	(16.29)	(8.74)
Observations	50	50	50	50	80	80	80	80	54	54	54

Notes: Absolute value of z statistics in parentheses. † significant at 10%. * significant at 5%; ** significant at 1%. The results of country dummies are omitted.

Table 1 Results of 3SLS for GDP, Agricultural value added, & poverty (poverty headcount ratio based on US$2 a day (2005PPP)) (Cont.)

	Case 4 With county Fixed Effects With fertiliser use Without Institution			**Case 5 Without county Fixed Effects With agricultural investment Without Institution**		
	Eq.(1)	**Eq.(2)**	**Eq.(3)**	**Eq.(1)**	**Eq.(2)**	**Eq.(3)**
	log GDP pc	log Agri VA(-1)	log Poverty	log GDP pc	log Agri VA(-1)	log Poverty
log Agri VA(-1)	1.747			0.855		
	(10.63)**			(9.00)**		
log Agri ODA(-1)						
log Agri Expenditure (-1)						
log Fertiliser Use(-1)		**0.243**				
		(8.53)**				
log Agri Investment (-1)					**0.243**	
					(3.05)**	
log GDP pc			-0.676			-1.681
			(3.62)**			(5.42)**
log Gini Coef.			0.511			1.48
			(1.31)			(1.61)
Constant	-4.074	2.247	6.583	1.196	1.937	9.539
	(4.43)	(5.70)	(6.68)	(1.94)	(1.30)	(3.96)
Observations	84	84	84	26	26	26

Notes: Absolute value of z statistics in parentheses. † significant at 10%. * significant at 5%; ** significant at 1%. The results of country dummies are omitted in Case 4.

Table 2 Results of 3SLS for GDP, Agricultural value added, & poverty (poverty gap based on US$2 a day (2005PPP))

	Case 1 With county Fixed Effects With agricultural expenditure & ODA Without Institution				**Case 2 With county Fixed Effects With agricultural ODA Without Institution**				**Case 3 With county Fixed Effects With agricultural expenditure Without Institution**		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	2.137				1.783				2.582		
	(16.93)**				(18.11)**				(17.52)**		
log Agri ODA(-1)		**0.097**				**0.164**					
		(1.88)				**(2.86)****					
log Agri Expenditure (-1)		**0.157**								**0.181**	
		(4.27)**								**(4.66)****	
log GDP pc			-0.952				-1.139				-1.156
			(6.14)**				(7.97)**				(6.18)**
log Gini Coef.			0.793				1.073				1.295
			(1.74)†				(2.61)**				(2.36)*
log Agri ODA(-2)				0.728				0.575			
				(6.23)**				(7.76)**			
log Agri VA(-2)				0.789				0.78			
				(2.27)*				(3.35)**			
Constant	-6.251	8.266	6.363	-19.033	-4.277	6.861	6.487	-17.538	-8.737	7.809	5.836
	(8.85)	(14.35)	(5.76)	(8.79)	(7.74)	(15.26)	(5.22)	(12.76)	(10.60)	(16.29)	(4.97)
Observations	50	50	50	50	80	80	80	80	54	54	54

Notes: Absolute value of z statistics in parentheses. † significant at 10%. * significant at 5%; ** significant at 1%. The results of country dummies are omitted.

Table 2 Results of 3SLS for GDP, Agricultural value added, & poverty (poverty gap based on US$2 a day (2005PPP)) (Cont.)

	Case 4 With county Fixed Effects With fertiliser use Without Institution			**Case 5 Without county Fixed Effects With agricultural investment Without Institution**		
	Eq.(1)	**Eq.(2)**	**Eq.(3)**	**Eq.(1)**	**Eq.(2)**	**Eq.(3)**
	log GDP pc	log Agri VA(-1)	log Poverty	log GDP pc	log Agri VA(-1)	log Poverty
log Agri VA(-1)	1.747			0.855		
	(10.63)**			(9.00)**		
log Agri ODA(-1)						
log Agri Expenditure (-1)						
log Fertiliser Use(-1)		**0.243**				
		(8.53)**				
log Agri Investment (-1)					**0.243**	
					(3.05)**	
log GDP pc			-1.087			-2.219
			(4.77)**			(6.13)**
log Gini Coef.			1.116			1.829
			(2.34)*			(1.82)†
Constant	-4.074	2.247	6.05	1.196	1.937	10.819
	(4.43)	(5.70)	(5.03)	(1.94)	(1.30)	(3.89)
Observations	84	84	84	26	26	26

Notes: Absolute value of z statistics in parentheses. † significant at 10%.* significant at 5%; ** significant at 1%. The results of country dummies are omitted in Case 4.

Table 3 Elasticity Estimates of Poverty Head Count Ratio

(a) Elasticity Estimates of Poverty Headcount Ratio based on US$2 a day poverty line

		∂log Poverty / ∂log GDP pc	∂log GDP pc / ∂log Agri VA(-1)	∂log Agri VA(-1) / ∂log Agri ODA(-1)	∂log Agri ODA(-1) / ∂log Agri ODA(-2)	∂log Agri VA(-1) / ∂log Fertiliser Use(-1)	∂log Agri VA(-1) / ∂log Agri Expenditure (-1)	∂log Agri VA(-1) / ∂log Agri Investment (-1)
Case 1 in Table 1 (without institution, with country fixed effects)								
∂log Poverty / ∂log Agricultural ODA(-2)	**-0.092**	**-0.599**	**2.137**	**0.096**	**0.751**			
∂log Poverty / ∂log Agri Expenditure (-1)	**-0.202**	**-0.599**	**2.137**				**0.158**	
Case 2 in Table 1 (without institution, without country fixed effects)								
∂log Poverty / ∂log Agricultural ODA(-2)	**-0.128**	**-0.772**	**1.783**	**0.163**	**0.571**			
Case 3 in Table 1 (without institution, without country fixed effects)								
∂log Poverty / ∂log Agri Expenditure (-1)	**-0.351**	**-0.751**	**2.582**				**0.181**	
Case 4 in Table 1 (without institution, without country fixed effects)								
∂log Poverty / ∂log Fertiliser Use(-1)	**-0.287**	**-0.676**	**1.747**			**0.243**		
Case 5 in Table 1 (without institution, without country fixed effects)								
∂log Poverty / ∂log Agri Investment (-1)	**-0.349**	**-1.681**	**0.855**					**0.243**

(b) Elasticity Estimates of Poverty Headcount Ratio based on US$1.25 a day poverty line

		∂log Poverty / ∂log GDP pc	∂log GDP pc / ∂log Agri VA(-1)	∂log Agri VA(-1) / ∂log Agri ODA(-1)	∂log Agri ODA(-1) / ∂log Agri ODA(-2)	∂log Agri VA(-1) / ∂log Fertiliser Use(-1)	∂log Agri VA(-1) / ∂log Agri Expenditure (-1)	∂log Agri VA(-1) / ∂log Agri Investment (-1)
Case 1 in Appendix 2a (without institution, with country fixed effects)								
∂log Poverty / ∂log Agricultural ODA(-2)	**-0.179**	**-1.282**	**2.136**	**0.086**	**0.762**			
∂log Poverty / ∂log Agri Expenditure (-1)	**-0.449**	**-1.282**	**2.136**				**0.164**	
Case 2 in Appendix 2a (without institution, without country fixed effects)								
∂log Poverty / ∂log Agricultural ODA(-2)	**-0.177**	**-1.068**	**1.782**	**0.159**	**0.586**			
Case 3 in Appendix 2a (without institution, without country fixed effects)								
∂log Poverty / ∂log Agri Expenditure (-1)	**-0.759**	**-1.601**	**2.577**				**0.184**	
Case 4 in Appendix 2b (without institution, without country fixed effects)								
∂log Poverty / ∂log Fertiliser Use(-1)	**-0.624**	**-1.473**	**1.744**			**0.243**		
Case 5 in Appendix 2b (without institution, without country fixed effects)z								
∂log Poverty / ∂log Agri Investment (-1)	**-0.464**	**-2.235**	**0.855**					**0.243**

The magnitude of the effects of each factor is presented as a combination of elasticity estimates in Table 3. If the coefficient estimates of agricultural ODA are compared across Cases 1 and 2 in Table 1, it is found that the estimate is larger in Case 2. This could be because sample sizes are different (Case 2 covers a larger number of observations (80) than Case 1 (50)) and the former does not include country fixed effects. .

The elasticity of poverty with respect to the second lag of agricultural ODA after taking account of the first order autocorrelation by equation (4) is -0.092 in Case 1 and -0.128 in Case 2, as shown in Table 3. In Case 1 (or Case 2), a 1% increase in annual agricultural ODA on average reduces poverty by 0.092% (or 0.128%), given the baseline poverty at US$2 a day in 2006 (e.g. 48.4% in Vietnam in 2006) That is, assuming that the response of agricultural ODA in Vietnam is at the estimated level and other factors are not changed, a 1 % increase in annual agricultural ODA tends to reduce the poverty head- count at US$2 a day by 0.044% (=48.4% *0.092) (or 0.062%=48.4%*0.128) in two years. If agricultural ODA is doubled or increased by 100%, the poverty head- count will decrease by 4.4% (or 6.2%), that is, reduces from 48.4% to 44.0% (or 42.2%) in two years time, as agricultural ODA is second lagged in equation (4). As the effect of agricultural ODA on poverty is cumulative over the years, the long- term effect of an increase in agricultural ODA (e.g. from 2006 to 2015) on poverty can be substantial, as illustrated by our simulations later.

In Case 3 of Table 1, the coefficient estimate of agricultural expenditure on agricultural value added is 0.181, as opposed to 0.158 in Case 1. The final elasticity of poverty with respect to the first lag of agricultural expenditure in Case 3 is 0.351, which is larger than 0.202 in Case 1, given the larger coefficient estimate of lagged agricultural value added in the

GDP equation (2.582) in Case 3. Poverty elasticity with respect to agricultural expenditure is larger than that of agricultural ODA.[9]

In Case 4 of Table 1, we find a positive and significant coefficient estimate (0.243) of fertiliser use, leading to the poverty elasticity with respect to this input of 0.287 in Table 3. When agricultural investment is used instead in equation (2) in Case 5, its coefficient estimate is significant and positive (0.243). The corresponding poverty elasticity is -0.349. This result, though plausible, cannot be accepted at face value, given the extrapolation of investment. Besides, the small sample (26) precluded use of country dummies.

The results in Table 1 corroborate robustly that (i) agriculture is important not just for economic growth but also for poverty reduction[10]; and (ii) increases in agricultural ODA, expenditure, investment and fertiliser (as a proxy for technology) tend to reduce poverty. So both national governments and donors have important roles in accelerating agricultural growth and poverty reduction.

In Table 2, the corresponding results for poverty gap or depth of poverty are given. The results for equations (1), (2) and (4) are almost identical. The only difference is that the

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[9] We should not, however, straightforwardly conclude that agricultural ODA is more effective than agricultural expenditure, as the estimates of agricultural ODA are extrapolated.

[10] In an important new contribution, Christiansen et al. (2010) offer a decomposition of agriculture's contribution to poverty reduction, based on a cross-country analysis. Among other things, this helps understand why despite a fall in agriculture's share in GDP, it has a vital role in reducing extreme poverty. Arguing that the relative contribution of a sector to poverty reduction depends on four factors: its direct growth component, its indirect growth component, the participation of the poor in the growth of this sector, and the size of this sector in the overall economy, they demonstrate that growth in agriculture is especially beneficial for the poorest. A 1 per cent increase in agricultural value added per capita reduces total $1-day poverty gap squared by at least 5 times than a 1 per cent increase in GDP per capita outside agriculture, despite being substantially smaller than the non-agricultural sector. When it comes to $1-day head-count poverty, agriculture is up to 3.2 times better at reducing poverty than non-agriculture, when accounting for differences in sector size, with the advantage diminishing as countries become richer (and inequality increases). Across poverty measures, the poverty reducing potential of non-agriculture reduces substantially when extractive industries contribute a sizeable share of GDP.

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magnitude of coefficient estimates of log GDP per capita and log Gini coefficient in the poverty equation is larger in absolute terms in Table 2 than in Table 1. This suggests greater sensitivity of the poverty gap to these variables, drawing attention to how poverty responds depends on how it is measured. So the conclusion from Table 2 is that investment, public expenditure and ODA in agricultural reduce the depth of poverty.

Precisely the same models are applied to the poverty head-count ratio and poverty gap on the US$1.25 a day poverty line. The econometric results are reported in Appendices 2a, 2b, 3a and 3b. The results of equations (1), (2) and (4) are essentially identical to the earlier cases. The coefficient estimates in the poverty equation in Appendices 2a, 2b, 3a and 3b are generally higher than those in Table 1 and Table 2, implying greater sensitiveness of poverty indices at the lower poverty line.

Table 3 contains elasticity estimates of poverty head-count ratio with respect to each factor, namely, agricultural ODA, agricultural expenditure, fertiliser use and agricultural investment. These elasticities suggest that the degree of poverty reduction can be large when agricultural investment, expenditure or ODA are substantially higher. As discussed above, the first row of panel (a) (or (b)) of Table 3 shows that, if agricultural ODA in a year is doubled or is increased by 100%, the poverty head-count ratio based on US$2 a day (or US$1.25 a day) will decrease by 9.2% (or by 17.9%) from the original level in two years. The results in Case 1 of panel (a) for the US$2 a day poverty head-count ratio (or in (b) for the US1.25 a day poverty) suggest that a 100% increase in agricultural expenditure is on average associated with 20.2% (or 44.9%) reduction of poverty. Panel (a) (or (b)) shows that an increase in fertiliser use by 10% on average results in a 2.9% (or 6.2%) of reduction in the head-count ratio at US$2 a day (or US1.25 a day).

The impact of increase in agricultural investment is substantial. Case 5 of panel (a) (or panel (b)) shows that a 100% increase in agricultural investment is associated with a 35% (or 36%) reduction in poverty[11].

5. Trends in Poverty

Table 4 summarises trends in poverty head-count ratio and poverty gap based on US$1.25 and US$2 poverty lines (2005PPP) for *all* those countries in Asia and the Pacific Region for which such estimates exist. There is a group of countries where poverty has declined dramatically over the years, such as China, Indonesia, Thailand, Vietnam, and Pakistan while there is another comprising Bangladesh, Lao PDR and Nepal, where poverty rates have remained high *despite* moderate reduction in recent years. The introduction of the new poverty lines by the World Bank (Chen and Ravallion, 2008; Ravallion et al., 2008) has changed the public perception of poverty reduction in India. That is, India has experienced only a moderate poverty reduction over the years, which could thus be placed between these two groups. The poverty head-count at US$1.25 a day reduced from 55.5% in 1983 to 41.6% in 2005. In contrast, the poverty head-count in Central Asia has been either fluctuating or stable at low numbers.

Table 4: Poverty Estimates for Countries in Asia and the Pacific Region in 2013-15

	Year	**Poverty Headcount (US$1.25 a day)**	Poverty Gap (US$1.25 a day)	**Poverty Headcount (US$2.00 a day)**	Poverty Gap (US$2.00 a day)	**MDG 1 (US$1.25 a day)**	**MDG 1 (US$2.00 a day)**
East Asia							
China	1981	**83.8**	39.1	**97.8**	59.3		
	1984	**69.4**	25.6	**92.9**	47.3		
	1987	**54.0**	18.5	**83.6**	38.2		
	1990	**60.2**	20.7	**84.6**	40.8		

[11] Figures within brackets refer to poverty on US $1.25 per day criterion unless stated otherwise.

	1993	**53.7**	17.6	**78.6**	36.6		
	1996	**36.4**	10.7	**65.0**	26.3		
	1999	**35.6**	11.1	**61.4**	25.6		
	2002	**28.4**	8.7	**51.1**	20.6		
	2005	**15.9**	4.0	**36.3**	12.2		
	2013-2015	**-**	-	**-**	-	**30.1**	**42.3**
Mongolia	1995	**18.8**	4.6	**43.5**	14.4		
	1998	**34.2**	10.7	**68.3**	26.3		
	2002	**15.5**	3.6	**38.9**	12.3		
	2005	**22.4**	6.2	**49.1**	17.2		
	2013-2015	**-**	-	**-**	-	**9.4**	**21.8**
The Pacific							
Papua New Guinea	1996	**35.8**	12.3	**57.4**	25.5		
	2013-2015	**-**	-	**-**	-	**17.9**	**28.7**
East Asia							
Cambodia	1994	**48.6**	13.8	**77.9**	33.3		
	2004	**40.2**	11.3	**68.2**	28.0		
	2007	**25.8**	6.1	**57.8**	20.1		
	2013-2015	**-**	-	**-**	-	**24.3**	**38.9**
Indonesia	1984	**62.8**	21.4	**-**	-		
	1987	**68.2**	23.1	**-**	-		
	1990	**54.3**	15.6	**-**	-		
	1993	**54.4**	15.7	**-**	-		
	1996	**43.4**	11.4	**-**	-		
	1999	**47.7**	12.5	**-**	-		
	2002	**29.3**	6.0	**-**	-		
	2005	**21.4**	4.6	**53.8**	17.3		
	2007	**29.4**	7.1	**60.0**	21.8		
	2013-2015	**-**	-	**-**	-	**27.1**	**30.0**
Lao PDR	1992	**55.7**	16.2	**84.8**	37.6		
	1997	**49.3**	14.9	**79.9**	34.4		
	2002	**44.0**	12.1	**76.9**	31.1		
	2013-2015	**-**	-	**-**	-	**27.8**	**42.4**
Malaysia	1984	**3.2**	0.7	**12.3**	3.2		
	1987	**2.4**	0.4	**11.9**	2.8		
	1989	**1.9**	0.3	**11.1**	2.5		
	1992	**1.6**	0.1	**11.2**	2.4		
	1995	**2.1**	0.3	**11.0**	2.5		
	1997	**0.5**	0.1	**6.8**	1.3		
	2004	**2.0**	0.5	**7.8**	1.4		
	2013-2015	**-**	-	**-**	-	**0.9**	**5.6**
Philippines	1985	**34.9**	10.3	**61.9**	25.0		
	1988	**30.5**	8.2	**56.9**	21.9		
	1991	**30.7**	8.6	**55.4**	21.8		
	1994	**28.1**	7.6	**52.6**	20.2		
	1997	**21.6**	5.3	**43.8**	15.8		
	2000	**22.5**	5.5	**44.8**	16.3		
	2003	**22.0**	5.5	**43.8**	16.0		
	2006	**22.6**	5.5	**45.0**	16.4		
	2013-2015	**-**	-	**-**	-	**15.3**	**28.0**
Thailand	1981	**21.9**	5.5	**44.1**	16.0		
	1988	**17.2**	3.4	**41.0**	12.9		
	1992	**5.5**	0.4	**25.6**	6.2		
	1996	**2.0**	0.5	**17.5**	3.6		

	1998	**2.0**	0.5	**16.7**	3.0		
	1999	**2.0**	0.5	**20.0**	4.1		
	2000	**2.0**	0.5	**20.7**	4.3		
	2002	**2.0**	0.5	**15.1**	2.8		
	2004	**2.0**	0.5	**11.5**	2.0		
	2013-2015	**-**	-	**-**	-	**5.7**	**16.6**
Timor-Leste	2001	**52.9**	19.1	**77.5**	37.1		
	2007	**37.2**	8.7	**72.8**	27.0		
	2013-2015	**-**	-	**-**	-	**26.5**	**38.7**
Vietnam	1993	**63.7**	23.6	**85.7**	43.6		
	1998	**49.7**	15.1	**78.3**	34.2		
	2002	**40.1**	11.2	**68.7**	28.0		
	2004	**24.2**	5.1	**52.5**	17.9		
	2006	**21.5**	4.6	**48.4**	16.2		
	2013-2015	**-**	-	**-**	-	**31.9**	**42.9**
South Asia							
Bangladesh	1983	**47.4**	12.7	**-**	-		
	1986	**43.0**	10.2	**81.7**	31.0		
	1988	**52.5**	14.6	**-**	-		
	1992	**66.8**	21.1	**92.5**	44.3		
	1996	**59.4**	17.9	**87.5**	39.9		
	2000	**57.8**	17.3	**85.4**	38.8		
	2005	**49.6**	13.1	**81.3**	33.8		
	2013-2015	**-**	-	**-**	-	**29.8**	**44.5**
Bhutan	2003	**26.2**	7.0	**49.5**	18.8		
	2013-2015	**-**	-	**-**	-	**13.1**	**24.7**
India	1983	**55.5**	17.2	**84.8**	38.2		
	1988	**53.6**	15.8	**83.8**	36.7		
	1994	**49.4**	13.6	**81.7**	35.3		
	2004	**41.6**	10.8	**75.6**	30.4		
	2013-2015	**-**	-	**-**	-	**26.1**	**41.5**
Nepal	1985	**78.1**	31.3	**93.4**	52.4		
	1996	**68.4**	26.7	**88.1**	46.8		
	2004	**55.1**	19.7	**77.6**	37.8		
	2013-2015	**-**	-	**-**	-	**36.9**	**45.5**
Pakistan	1987	**66.5**	23.9	**89.2**	45.2		
	1991	**64.7**	23.2	**88.2**	44.2		
	1993	**23.9**	4.2	**63.8**	19.7		
	1997	**48.1**	11.7	**83.3**	33.2		
	1998	**29.1**	6.3	**66.5**	22.5		
	2002	**35.9**	7.9	**73.9**	26.5		
	2005	**22.6**	4.4	**60.3**	18.7		
	2013-2015	**-**	-	**-**	-	**32.6**	**44.2**
Sri Lanka	1985	**20.0**	4.3	**51.7**	16.1		
	1991	**15.0**	2.7	**49.5**	14.0		
	1996	**16.3**	3.0	**46.7**	13.7		
	2002	**14.0**	2.6	**39.7**	11.9		
	2013-2015	**-**	-	**-**	-	**7.9**	**24.9**
Central Asia							
Kazakhstan	1988	**2.0**	0.5	**2.0**	0.5		
	1993	**4.2**	0.5	**17.6**	4.3		
	1996	**5.0**	0.9	**18.8**	4.9		
	2001	**2.0**	0.5	**8.5**	1.4		
	2002	**5.2**	0.9	**21.5**	5.4		

	2003	**3.1**	0.5	**17.2**	3.9		
	2007	**2.0**	0.5	**2.0**	0.5		
	2013-15					**2.1**	**8.8**
Kyrgyz Republic	1988	**2.0**	0.5	**2.0**	0.5		
	1993	**18.6**	8.6	**30.1**	14.6		
	1998	**31.8**	9.0	**60.8**	23.3		
	1999		3.5	**41.8**	13.0		
	2002	**34.0**	8.8	**66.7**	24.9		
	2004	**21.8**	4.4	**51.9**	16.8		
	2007	**3.4**	0.5	**27.5**	5.2		
	2013-15					**9.3**	**15.0**
Tajikistan	1999	**44.5**	13.7	**78.5**	32.3		
	2003	**36.3**	10.3	**68.8**	26.7		
	2004	**21.5**	5.1	**50.8**	16.8		
	2013-15					**22.3**	**39.3**
Uzbekistan	1988	**2.0**	0.5	**2.0**	0.5		
	1998	**32.1**	13.9	**53.6**	25.0		
	2002	**42.3**	12.4	**75.6**	30.6		
	2003	**46.3**	15.0	**76.7**	33.2		
	2013-15					**16.1**	**26.8**
Iran, Islamic Rep.	1986	**4.2**	0.9	**13.8**	3.9		
	1990	**3.9**	1.0	**13.1**	3.7		
	1994	**2.0**	0.5	**8.2**	1.8		
	1998	**2.0**	0.5	**8.3**	1.8		
	2005	**2.0**	0.5	**8.0**	1.8		
	2013-2015					**1.9**	**6.6**

However, when we consider poverty head-count ratios at US$2 a day, a substantial share of the population is classified as poor even in the countries which experienced a dramatic poverty reduction at US$1.25 a day. For example, the poverty head-counts at US$2 a day were 36.3% in China in 2005, 60% in Indonesia in 2007, 45% in Philippines in 2006, and 48.4% in Vietnam in 2006. In Bangladesh, 81% of the population were below the US$2 a day poverty line in 2005. This reinforces our case for assessing progress in reducing moderate poverty (as opposed to extreme poverty), as its incidence is high in many countries in this Region including middle income ones.

In a recent and influential contribution, Easterley (2009) debunks the MDGs as unfair to low income countries-especially Sub-Saharan Africa. He emphasises in the context of MDG1, for example, that a halving of the headcount index in 2015 is much harder for this region (and more

generally for low income countries) as rate of reduction of poverty is typically slow at high (initial) levels of poverty (or., equivalently at (initially) low per capita income). A risk therefore is that the success achieved in poverty reduction in these countries is impressive but fell short of the reduction stipulated, leading to the pessimistic but ill-informed conclusion that Sub-Saharan Africa will fail miserably in achieving this and other MDGs12. There are two issues: one is empirical and the other policy- related. (i) As our evidence summarised below suggests that there is little difference in poverty reduction rates between low income and middle income countries in Asia and the Pacific Region over the periods, 1990-2006, and 1996-2006, raising doubts about *the iron law* of lower rates of poverty reduction at (initially) high poverty rates13.A graphical illustration is given in Figs. 1 a-d. These illustrate the relationships between *initial* poverty head-count ratio either in 1990 or 1996 at $1.25 or $2 a day and the rate of subsequent poverty reduction. In contrast to Easterley (2009), there is no clear cut pattern for Asia and the Pacific Region corroborating that the rate of poverty reduction is lower at high levels of *initial* poverty, as a few countries with high *initial* poverty head-count ratios experienced a significant reduction in 1990-2006 or 1996-2006. (ii) A related issue is (and corroborated by our subsequent econometric analysis) that much depends on whether agriculture's potentially large contribution to poverty is realised. So the assertion by Easterley (2009) is mistaken.

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[12] See, for example, the verdict of the UN World Summit Declaration, 2005, "Africa ….is the only continent not on track to meet any of the goals of the Millennium Declaration by 2015" (cited in Easterley, 2009).

[13] The head-count index at $1.25 per day reduced in low income countries by 40.5 per cent in low income countries over the period 1990-2006, as compared with about the same reduction (39.9 per cent) in middle income countries. Over the more recent period (1996-2006), however, the reduction was substantially greater in low income countries (39.1 per cent, relative to 22.4 per cent). A mixed pattern is revealed by poverty at $2 per day. In low income countries, the reduction over the period 1990-2006 was lower (17.0 per cent, compared with 30.6 per cent). However, over the more recent period, the reduction in low income countries was slightly larger (23.1 per cent, compared with 20.0 per cent). However, as none of the values are significant (-.04, -1.07, 0.92, and -0.21), these differences are statistically not significant.

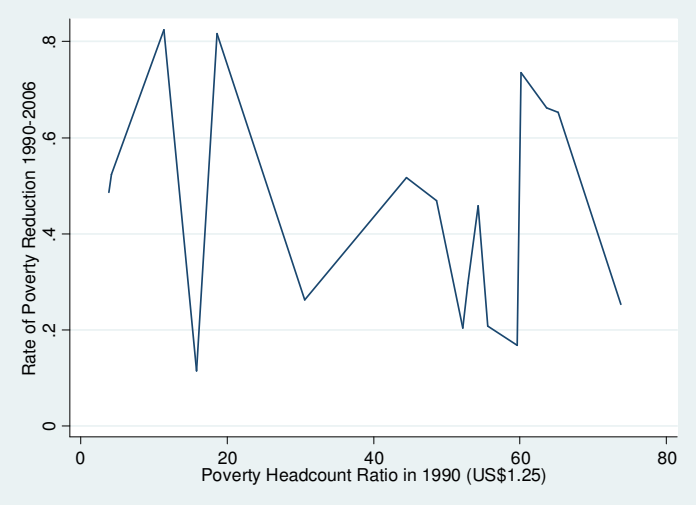

Figure 1-a. Relationship between initial poverty head count ratio (US$1.25 a day, 1990) and poverty reduction in 1990-2006

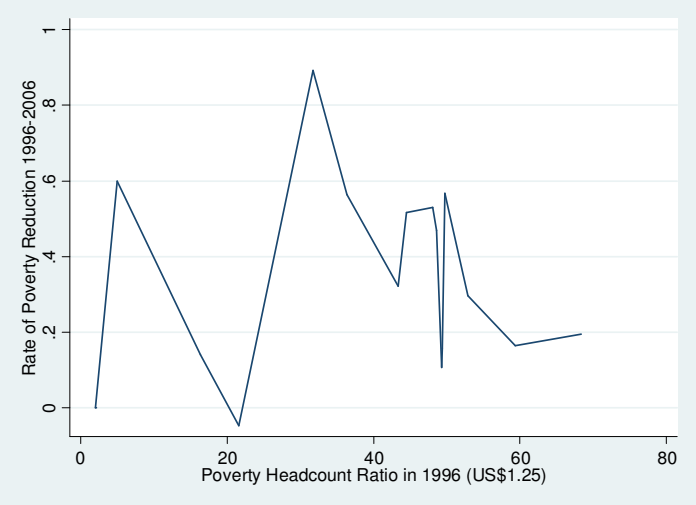

Figure 1-b. Relationship between initial poverty head count ratio (US$1.25 a day, 1996) and poverty reduction in 1996-2006

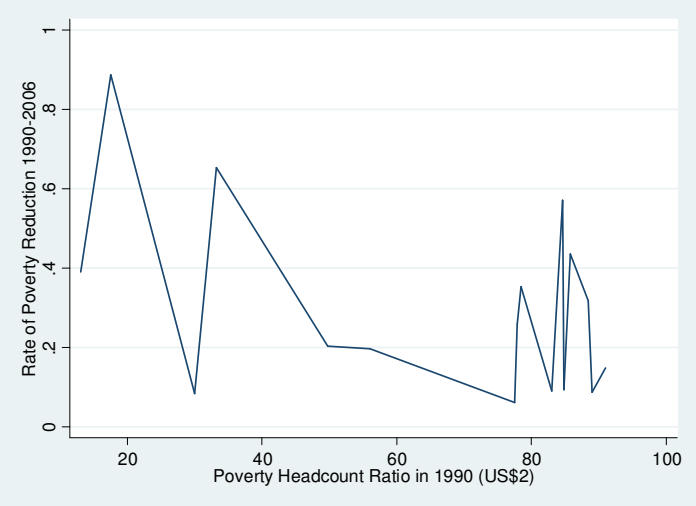

Figure 1-c. Relationship between initial poverty head count ratio (US$2 a day, 1990) and poverty reduction in 1990-2006

Figure 1-d. Relationship between initial poverty head count ratio (US$2 a day, 1996) and poverty reduction in 1996-2006

6. Simulation Results

Tables 5 and 6, respectively, give simulation results for MDG 1 at US$2 a day and US$1.25 a day, using elasticity estimates in Table 3. The simulation results at US$2 a day head-count ratios are given in Table 5 and those at US$1.25 a day ratios are reported in Table 6. Table 7 gives the simulation results, aggregated for a few categories, for example, the income group

of a country, governance quality, trade openness, and ease of doing business, in order to check how required agricultural ODA, expenditure or investment differ across them.

Table 5 (or 6) reports simulations based on econometric estimates in Table 1, consisting of two sub-tables: the first is for simulations for Case 1, Case 2 and Case 3, the second is for Case 4 and Case 5.

In each case, we first compute expected poverty in 2015, based on the assumption that predetermined variables, such as agricultural ODA, expenditure and investment follow the historical trend in 1980-2006.[14] If expected poverty in 2015 is less than 50% of poverty level based on US$2 a day in 1990 (or MDG1), it is inferred that the country is on track to achieving MDG1. In each case, MDG1 is compared with the expected poverty in 2015, and the necessary increase in agricultural ODA (or agricultural expenditure, fertiliser use or agricultural investment) in the period 2007-13 from the level of each variable in 2006 (baseline year) is calculated by the elasticity estimates in Table 3.

[14] Each variable (e.g. Agricultural ODA) is regressed on time trends using the fixed effects panel data model for 1980-2006 and predicted values are obtained for 2013 or 2014, assuming that the time trend is unchanged.

Table 5: Simulation Results for Head Count Ratios (US$ 2 a day) for Countries in Asia and the Pacific Region in 2013-15 (Baseline year 2006)

	MDG 1	Based on Case 1 in Table 1 (with Agricultural ODA and Expenditure, No Institution)					Based on Case 2 in Table 1(with Agricultural ODA, No Institution)			Based on Case 3 in Table 1(with Expenditure, No Institution)		
	(US$2.00 a day)	Expected Poverty in 2015	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)	Expected Poverty in 2015	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	Expected Poverty in 2015	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)
East Asia												
China	**42.3**	***30.8*** [*1]	0%	(0%)	0%	(0%)	***24.7***	0%	(0%)	***24.6***	0%	(0%)
The Pacific												
Papua New Guinea	**28.7**	**58.6**	161%	(14%)	74%	(8%)	**59.0**	118%	(11%)	**58.9**	43%	(5%)
South East Asia												
Cambodia	**38.9**	**71.1**	128%	(12%)	58%	(7%)	**64.5**	73%	(8%)	**74.3**	37%	(4%)
Indonesia	**30.0**	**55.9**	134%	(12%)	61%	(7%)	**55.0**	93%	(9%)	**54.9**	34%	(4%)
Lao PDR	**42.4**	**65.0**	82%	(9%)	38%	(5%)	**52.9**	28%	(3%)	**62.2**	19%	(2%)
Malaysia	**5.6**	**17.5**	333%	(21%)	152%	(13%)	**6.0**	9%	(1%)	**12.6**	52%	(6%)
Philippines	**28.0**	**43.4**	86%	(9%)	39%	(5%)	**41.6**	54%	(6%)	**41.8**	20%	(3%)
Thailand	**16.6**	**17.1**	4%	(1%)	2%	(0%)	***15.9***	0%	(0%)	**15.5**	0%	(0%)
Timor-Leste	**38.7**	**90.8**	208%	(16%)	95%	(10%)	**99.0**	173%	(14%)	**100.0**	64%	(7%)
Vietnam	**42.9**	**57.5**	53%	(6%)	24%	(3%)	**45.2**	6%	(1%)	**55.9**	12%	(2%)
South Asia												
Bangladesh	**44.5**	**64.1**	68%	(7%)	31%	(4%)	**59.3**	37%	(5%)	**60.0**	14%	(2%)
Bhutan	**24.7**	**42.3**	110%	(11%)	50%	(6%)	**38.3**	61%	(7%)	**38.9**	23%	(3%)
India	**41.5**	**51.6**	38%	(5%)	17%	(2%)	**45.2**	10%	(1%)	**45.9**	4%	(1%)
Nepal	**45.5**	**72.9**	93%	(9%)	43%	(5%)	**69.4**	59%	(7%)	**69.8**	22%	(3%)
Pakistan	**44.2**	**62.6**	64%	(7%)	29%	(4%)	**59.0**	37%	(5%)	**59.2**	14%	(2%)
Sri Lanka	**24.9**	**32.8**	49%	(6%)	22%	(3%)	**29.8**	22%	(3%)	**30.2**	9%	(1%)
Central Asia												
Kazakhstan	**8.8**	**25.3**	291%	(19%)	133%	(12%)	**7.1**	0%	(0%)	**19.0**	47%	(6%)

Kyrgyz Republic	**15.0**	**76.1**	628%	(28%)	287%	(19%)	**75.4**	447%	(24%)	**76.2**	165%	(14%)
Tajikistan	**39.3**	**99.3**	237%	(17%)	108%	(10%)	**52.4**	37%	(5%)	**100.0**	63%	(7%)
Uzbekistan	**26.8**	**45.7**	109%	(11%)	50%	(6%)	**42.1**	64%	(7%)	**40.1**	20%	(3%)
Iran, Islamic Rep.	**6.6**	**28.8**	525%	(26%)	239%	(17%)	**7.0**	7%	(1%)	**23.6**	106%	(10%)
Area Aggregate												
East Asia	**42.3**	***30.8 *1***	0%	(0%)	0%	(0%)	***24.7***	0%	(0%)	**24.6**	0%	(0%)
Pacific	**28.7**	**58.6**	161%	(14%)	74%	(8%)	**59.0**	118%	(11%)	**58.9**	43%	(5%)
South East Asia	**28.7**	**52.3**	128%	(12%)	58%	(7%)	**47.5**	73%	(8%)	**52.2**	33%	(4%)
South Asia	**36.2**	**54.4**	78%	(8%)	36%	(4%)	**50.2**	43%	(5%)	**50.7**	16%	(2%)
Central Asia	**19.3**	**55.0**	287%	(19%)	131%	(12%)	**36.8**	101%	(10%)	**51.8**	69%	(7%)
Asia & the Pacific	**30.0**	**53.9**	118%	(11%)	54%	(6%)	**45.2**	56%	(6%)	**50.6**	28%	(4%)

Note: *1 Italics denotes that the the country or the region achieves MDG1 based on US2$ a day of income poverty.

Table 5: Simulation Results for Head Count Ratios (US$ 2 a day) for Countries in Asia and the Pacific Region in 2013-15 (Baseline 2006) (Cont.)

	MDG 1	Based on Case 4 in Table 1(with Fertiliser Use, No Institution)			Based on Case 5 in Table 1 (With Agricultural Investment, No Institution)		
	(US$2.00 a day)	Expected Poverty in 2015	Necessary Increase in Fertiliser Use for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Fertiliser Use (2007-13)	Expected Poverty in 2015	Necessary Increase in Agricultural Investment for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Investment (2007-13)
East Asia							
China	**42.3**	***27.1***	0%	(0%)	**-**	-	-
The Pacific							
Papua New Guinea	**28.7**	**58.8**	52%	(6%)	**77.5**	70%	(8%)
South East Asia							
Cambodia	**38.9**	**50.1**	14%	(2%)	**97.3**	61%	(7%)
Indonesia	**30.0**	**55.5**	42%	(5%)	***16.6***	0%	(0%)
Lao PDR	**42.4**	**55.9**	16%	(2%)	**67.4**	24%	(3%)
Malaysia	**5.6**	**7.0**	13%	(2%)	***1.8*** [*1]	0%	(0%)
Philippines	**28.0**	**42.6**	26%	(3%)	**24.3**	0%	(0%)
Thailand	**16.6**	***16.1***	0%	(0%)	***6.5***	0%	(0%)
Timor-Leste	**38.7**	**94.7**	72%	(8%)	**100.0**	65%	(7%)
Vietnam	**42.9**	**47.3**	5%	(1%)	**52.0**	9%	(1%)
South Asia							
Bangladesh	**44.5**	**61.9**	20%	(3%)	**62.7**	17%	(2%)
Bhutan	**24.7**	**40.7**	32%	(4%)	***24.3***	0%	(0%)
India	**41.5**	**48.6**	8%	(1%)	***32.7***	0%	(0%)
Nepal	**45.5**	**71.3**	28%	(4%)	**100.0**	49%	(6%)
Pakistan	**44.2**	**60.9**	19%	(2%)	***38.8***	0%	(0%)
Sri Lanka	**24.9**	**31.4**	13%	(2%)	***18.1***	0%	(0%)
Central Asia							

Kazakhstan	**8.8**	**7.9**	0%	(0%)	***4.8***	0%	(0%)
Kyrgyz Republic	**15.0**	**33.9**	62%	(7%)	**100.0**	231%	(17%)
Tajikistan	**39.3**	**56.3**	22%	(3%)	**100.0**	63%	(7%)
Uzbekistan	**26.8**	**41.3**	27%	(3%)	***25.2***	0%	(0%)
Iran, Islamic Rep.	**6.6**	**7.2**	5%	(1%)	**7.5**	6%	(1%)
Area Aggregate							
East Asia	**42.3**	***27.1***	0%	(0%)	**-**	-	-
Pacific	**28.7**	**58.8**	52%	(6%)	**77.5**	70%	(8%)
South East Asia	**28.7**	**46.2**	30%	(4%)	**52.0**	24%	(3%)
South Asia	**36.2**	**52.5**	22%	(3%)	**46.1**	11%	(2%)
Central Asia	**19.3**	**29.3**	26%	(3%)	**47.5**	60%	(7%)
Asia & the Pacific	**30.0**	**43.6**	23%	(3%)	**50.3**	24%	(3%)

Note: *1 Italics denotes that the country or the region achieves MDG1 based on US2$ a day of income poverty

While the necessary increase in factors associated with growth in agriculture varies considerably for different countries, depending on the current level of poverty or the share of agriculture in GDP, our simulations confirm that increases in agricultural ODA, agricultural expenditure, fertiliser use and agricultural investment are important in achieving MDG1[15] As the results are voluminous, our remarks are selective.

Let us first consider the simulation results for poverty at US$ 2 per day.

The first row of Table 5 indicates that China does not need any increase in these factors. However, Asia and the Pacific Region as a whole would need (based on Cases 2-5 where one of each factor is included as an explanatory variable in the agricultural value added equation) a 56% increase in annual agricultural ODA in 2007-13 (or an annual growth rate of 6% in 2007-2013, Case 2), a 28% increase in agricultural expenditure in 2007-13 (or an annual growth rate of 4% in 2007-2013, Case 3), a 23% increase in fertiliser use (or an annual growth rate of 3% in 2007-2013, Case 4), or a 24% increase in agricultural investment in 2007-13 (or an annual growth rate of 3% in 2007-2013, Case 5)[16].

Comparison across different categories suggests that increases in fertiliser use or agricultural investment (followed by increase in agricultural expenditure) seem relatively effective ways for poverty reduction[17].

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[15] Note that the simulation results are essentially back-of-envelope calculations. A cautious interpretation of the simulation results is necessary, since (i) estimates of agricultural ODA and agricultural investment are extrapolated; (ii) the impact of each factor on poverty differs across different countries, but the same elasticity is applied for different countries; and (iii) simulations are carried out under the assumption of 'other factors being unchanged'. But these limitations are imposed by patchy data on key variables.

[16] In all cases, the base level for agricultural ODA, public expenditure in agriculture and agricultural investment corresponds to 2006. Note also that, while each of these factors -agricultural expenditure, investment and ODA is considered separately, there are overlaps and complementarities among them that need a detailed investigation. This is not feasible with the data at our disposal. Also, as variation in use of fertiliser may be due to public expenditure on agriculture (e.g. through fertiliser subsidy), its contribution is subsumed in that of agricultural expenditure.

[17] The caveat in footnote 13 is to be borne in mind. The ranking is not meant to be *precise* but *suggestive*.

The results of regional aggregation at the bottom of Table 5, subject to the caveat that numbers vary depending on the availability of data, show that South Asia (or South East Asia) would need only a 5% (or 8%) increase in annual growth rate of agricultural ODA, 2% (or 4%) increase in annual growth rate of agricultural expenditure, 3% (or 4%) increase in annual growth rate of fertiliser, or 2% (or 3%) increase in annual agricultural investment in 2007-13[18]. The Pacific or Central Asia would need larger increase in one of these factors[19].

Here we discuss only the cases for a few countries. For example, in India, relatively small increases in these factors would enable the country to achieve MDG1 at US$2 a day. Case 2 (or Case 3; Case 4) suggests that a 10% (or 4%; 8%) increases in agricultural ODA (or agricultural expenditure; fertiliser use) in 2007-13 (compared with the level in 2006) would enable the country to achieve the MDG. In Case 5, India would not need any increase in agricultural investment to achieve this goal. In 2007-13, Vietnam would need a 6% (or 12%; 5%; 9%) increase in agricultural ODA (or agricultural expenditure; fertiliser use; agricultural investment) for achieving MDG1, as shown in Cases 2 (or Case 3; Case 4; Case 5)[20]. The figures vary considerably among countries, but increases in agricultural investment or agricultural expenditure seem to have a substantial impact on the feasibility of achieving MDG1. Lao PDR, Cambodia and Bangladesh would need much higher agricultural ODA, agricultural investment, fertiliser or agricultural investment to achieve MDG1. For example, as shown in Case 5, the necessary investment increases in agriculture in 2007-13 (in the sequence of the three countries listed) are 24%, 61%, and 17%, respectively.

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[18] Note that figures within parentheses refer to South East Asia.
[19] Note, for example, that the Pacific is represented by Papua New Guinea which is not a typical country for this sub-region.
[20] Note that the requirements of these variables are much higher in Case 1, as the effects of ODA are jointly estimated with those of agricultural expenditure. When only one of these variables is used, the coefficient estimate is likely to be biased upward, implying lower requirements. On the other hand, joint estimation runs the risk of imprecise estimates because of collinearity between them.

Table 6: Simulation Results for Head Count Ratios (US$ 1.25 a day) for Countries in Asia and the Pacific Region in 2013-15 (Baseline: 2006)

	MDG 1	Based on Case 1 in Appendix 2a (with Agricultural ODA and Expenditure, No Institution)					Based on Case 2 in Appendix 2a (with Agricultural ODA, No Institution)			Based on Case 3 in Appendix 2a (with Expenditure, No Institution)		
	(US$1.25 a day)	Expected Poverty in 2015	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)	Expected Poverty in 2015	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	Expected Poverty in 2015	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)
East Asia												
China	**30.1**	***7.8*** [*1]	0%	(0%)	0%	(0%)	***10.2***	0%	(0%)	***4.9***	0%	(0%)
The Pacific												
Papua New Guinea	**17.9**	**37.4**	87%	(9%)	35%	(4%)	**37.2**	87%	(9%)	**37.8**	21%	(3%)
South East Asia												
Cambodia	**24.3**	**45.2**	68%	(7%)	27%	(3%)	**33.7**	31%	(4%)	**49.6**	20%	(3%)
Indonesia	**27.1**	**23.4**	0%	(0%)	0%	(0%)	**24.5**	0%	(0%)	**22.6**	0%	(0%)
Lao PDR	**27.8**	**31.7**	11%	(2%)	4%	(1%)	**28.0**	1%	(0%)	**29.0**	1%	(0%)
Malaysia	**0.9**	**2.2**	115%	(11%)	46%	(5%)	**1.1**	18%	(2%)	**1.1**	4%	(1%)
Philippines	**15.3**	**19.3**	21%	(3%)	8%	(1%)	**20.2**	26%	(3%)	**17.9**	3%	(0%)
Thailand	**5.7**	**1.9**	0%	(0%)	0%	(0%)	***2.1***	0%	(0%)	**1.8**	0%	(0%)
Timor-Leste	**26.5**	**75.6**	148%	(13%)	59%	(7%)	**58.4**	97%	(10%)	**93.9**	48%	(6%)
Vietnam	**31.9**	**27.5**	0%	(0%)	0%	(0%)	**22.0**	0%	(0%)	**25.9**	0%	(0%)
South Asia												
Bangladesh	**29.8**	**29.3**	0%	(0%)	0%	(0%)	**31.9**	6%	(1%)	**25.4**	0%	(0%)
Bhutan	**13.1**	**16.5**	21%	(3%)	8%	(1%)	**14.8**	10%	(1%)	**15.7**	4%	(1%)
India	**26.1**	**18.7**	0%	(0%)	0%	(0%)	**22.0**	0%	(0%)	**14.7**	0%	(0%)
Nepal	**36.9**	**46.5**	21%	(3%)	8%	(1%)	**49.5**	28%	(3%)	**42.4**	3%	(0%)
Pakistan	**32.6**	**27.7**	0%	(0%)	0%	(0%)	**30.5**	0%	(0%)	**24.6**	0%	(0%)
Sri Lanka	**7.9**	**7.8**	0%	(0%)	0%	(0%)	**8.6**	7%	(1%)	**6.6**	0%	(0%)
Central Asia												
Kazakhstan	**2.1**	**4.2**	80%	(8%)	32%	(4%)	**1.9**	0%	(0%)	**2.3**	2%	(0%)
Kyrgyz Republic	**9.3**	**45.0**	306%	(20%)	122%	(11%)	**43.1**	293%	(20%)	**45.2**	73%	(8%)
Tajikistan	**22.3**	**80.4**	207%	(16%)	83%	(9%)	**24.2**	7%	(1%)	**93.8**	60%	(7%)
Uzbekistan	**16.1**	**15.0**	0%	(0%)	0%	(0%)	**22.1**	30%	(4%)	**11.4**	0%	(0%)

Iran, Islamic Rep.	**1.9**	**6.3**	184%	(15%)	74%	(8%)	**1.7**	0%	(0%)	**4.2**	23%	(3%)
Area Aggregate												
East Asia	**30.1**	***7.8 *1***	0%	(0%)	0%	(0%)	***10.2***	0%	(0%)	**4.9**	0%	(0%)
Pacific	**17.9**	**37.4**	87%	(9%)	35%	(4%)	**37.2**	87%	(9%)	**37.8**	21%	(3%)
South East Asia	**19.9**	**28.4**	34%	(4%)	13%	(2%)	**23.8**	15%	(2%)	**30.2**	10%	(1%)
South Asia	**24.4**	**24.4**	0%	(0%)	0%	(0%)	**26.2**	6%	(1%)	**21.6**	0%	(0%)
Central Asia	**10.3**	**30.2**	153%	(13%)	61%	(7%)	**18.6**	64%	(7%)	**31.4**	38%	(5%)
Asia & the Pacific	**19.3**	**28.1**	32%	(4%)	13%	(2%)	**23.2**	16%	(2%)	**27.2**	8%	(1%)

Note: *1 Italics denotes that the country or the region achieves MDG1 based on US$1.25 a day of income poverty.

Table 6: Simulation Results for Head Count Ratios (US$ 1.25 a day) for Countries in Asia and the Pacific Region in 2013-15 (Baseline: 2006) (Cont.)

	MDG 1	**Based on Case 4 in Appendix 2b (with Fertiliser Use, No Institution)**			**Based on Case 5 in Appendix 2b (With Agricultural Investment, No Institution)**		
	(US$1.25 a day)	**Expected Poverty in 2015**	Necessary Increase in Fertiliser Use for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Fertiliser Use (2007-13)	**Expected Poverty in 2015**	Necessary Increase in Agricultural Investment for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Investment (2007-13)
East Asia							
China	**30.1**	***5.7***	0%	(0%)	**1.4** *1	0%	-
The Pacific							
Papua New Guinea	**17.9**	**37.7**	25%	(3%)	**31.3**	23%	(3%)
South East Asia							
Cambodia	**24.3**	**19.5**	0%	(0%)	**52.1**	35%	(4%)
Indonesia	**27.1**	**23.6**	0%	(0%)	***6.2***	0%	(0%)
Lao PDR	**27.8**	**22.2**	0%	(0%)	**39.4**	13%	(2%)
Malaysia	**0.9**	**1.6**	18%	(2%)	***0.3***	0%	(0%)
Philippines	**15.3**	**18.4**	5%	(1%)	**7.6**	0%	(0%)
Thailand	**5.7**	***2.0***	0%	(0%)	***1.4***	0%	(0%)
Timor-Leste	**26.5**	**71.5**	39%	(5%)	**100.0**	85%	(9%)

Vietnam	**31.9**	**18.2**	0%	(0%)	**24.0**	0%	(0%)
South Asia							
Bangladesh	**29.8**	**26.6**	0%	(0%)	**38.3**	9%	(1%)
Bhutan	**13.1**	**11.8**	0%	(0%)	***7.2***	0%	(0%)
India	**26.1**	**16.2**	0%	(0%)	***15.2***	0%	(0%)
Nepal	**36.9**	**44.1**	4%	(1%)	**100.0**	53%	(6%)
Pakistan	**32.6**	**26.5**	0%	(0%)	***19.7***	0%	(0%)
Sri Lanka	**7.9**	**6.9**	0%	(0%)	***6.0***	0%	(0%)
Central Asia							
Kazakhstan	**2.1**	**1.5**	0%	(0%)	***1.2***	0%	(0%)
Kyrgyz Republic	**9.3**	**9.6**	1%	(0%)	**70.7**	203%	(16%)
Tajikistan	**22.3**	**21.7**	0%	(0%)	**190.1**	231%	(17%)
Uzbekistan	**16.1**	**13.7**	0%	(0%)	***10.6***	0%	(0%)
Iran, Islamic Rep.	**1.9**	**1.3**	0%	(0%)	**1.8**	0%	(0%)
Area Aggregate							
East Asia	**30.1**	***5.7***	0%	(0%)	**1.4 *1**	0%	-
Pacific	**17.9**	**37.7**	25%	(3%)	**31.3**	23%	(3%)
South East Asia	**19.9**	**22.1**	3%	(0%)	**28.9**	14%	(2%)
South Asia	**24.4**	**22.0**	0%	(0%)	**31.1**	8%	(1%)
Central Asia	**10.3**	**9.6**	0%	(0%)	**54.9**	133%	(12%)
Asia & the Pacific	**19.3**	**19.1**	0%	(0%)	**36.2**	24%	(3%)

Note: *1 Italics denotes that the country or the region achieves MDG1 based on US$1.25 a day of income poverty.

Table7: Simulation Results for Head Count Ratios by Country Classifications (Baseline 2006)

	MDG 1	Based on Case 1 (with Agricultural ODA and Expenditure, No Institution)					Based on Case 2 (with Agricultural ODA, No Institution)			Based on Case 3 (with Expenditure, No Institution)		
		Expected Poverty in 2015	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)	**Expected Poverty in 2015**	Necessary Increase in Agricultural ODA for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural ODA (2007-13)	**Expected Poverty in 2015**	Necessary Increase in Agricultural Expenditure for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Expenditure (2007-13)
US$2 a day Poverty Head Count Ratio (2005 PPP)	**$2.00**											
By Income Group												
Low Income Countries	**37.6**	74.8	206%	(14%)	94%	(8%)	**62.3**	114%	(9%)	**73.8**	53%	(5%)
Middle Income Countries	**27.4**	45.0	144%	(11%)	66%	(6%)	**38.3**	44%	(4%)	**41.4**	30%	(3%)
Among Top 30 Countries in Aggregate Governance or not												
Low Governance	**35.6**	66.7	183%	(12%)	84%	(7%)	**54.2**	81%	(7%)	**62.2**	45%	(5%)
High Governance	**23.2**	38.3	179%	(13%)	82%	(8%)	**33.1**	37%	(4%)	**35.3**	37%	(4%)
Trade Openness												
Low Openness (< Trade share 50%)	**38.8**	58.8	84%	(9%)	39%	(5%)	**55.0**	50%	(6%)	**55.0**	18%	(2%)
Middle Openness (50-100%)	**28.4**	51.0	167%	(12%)	76%	(7%)	**35.4**	31%	(4%)	**46.1**	36%	(4%)
High Openness (>=100%)	**20.0**	42.1	255%	(14%)	116%	(9%)	**35.6**	116%	(7%)	**40.1**	57%	(5%)
World Bank Business Index (Regulatory Environment: 1=most business-friendly regulations)												
Low (>150)	**40.6**	77.9	145%	(12%)	66%	(7%)	**76.0**	101%	(9%)	**81.1**	42%	(5%)
Middle Low (100-150)	**33.1**	59.1	160%	(12%)	73%	(7%)	**48.1**	49%	(5%)	**56.4**	36%	(4%)

Middle High (50-100)	**31.3**	41.4	115%	(9%)	52%	(5%)	**25.7**	2%	(0%)	**33.2**	20%	(2%)
High (<50)	**12.4**	36.9	322%	(17%)	147%	(11%)	**32.4**	152%	(9%)	**34.8**	72%	(7%)
US$1.25 a day Poverty Head Count Ratio (2005 PPP)	**$1.25**											
By Income Group												
Low Income Countries	**25.1**	46.4	102%	(8%)	41%	(4%)	**35.1**	61%	(5%)	**47.6**	26%	(3%)
Middle Income Countries	**17.0**	20.3	44%	(4%)	17%	(2%)	**18.5**	18	(2%)	**19.0**	7%	(1%)
Among Top 30 Countries in Aggregate Governance or not												
Low Governance	**24.1**	39.1	79%	(6%)	31%	(3%)	**29.6**	41%	(4%)	**37.5**	19%	(2%)
High Governance	**12.9**	14.6	59%	(5%)	23%	(3%)	**14.7**	8%	(1%)	**13.4**	10%	(1%)
Trade Openness												
Low Openness (< Trade share 50%)	**28.1**	26.8	3%	(0%)	1%	(0%)	**30.1**	11%	(1%)	**23.5**	0%	(0%)
Middle Openness (50-100%)	**16.1**	26.4	66%	(6%)	26%	(3%)	**15.9**	9%	(1%)	**24.9**	12%	(2%)
High Openness (>=100%)	**12.0**	19.2	105%	(8%)	42%	(4%)	**17.1**	78%	(5%)	**18.5**	19%	(2%)
World Bank Business Index (Regulatory Environment: 1=most business-friendly regulations)												
Low (>150)	**27.2**	53.7	79%	(7%)	32%	(4%)	**43.2**	49%	(5%)	**61.5**	24%	(3%)
Middle Low (100-150)	**22.0**	31.3	56%	(5%)	22%	(2%)	**24.9**	12%	(2%)	**31.1**	12%	(1%)
Middle High (50-100)	**21.4**	15.9	27%	(3%)	11%	(1%)	**11.4**	0%	(0%)	**11.0**	1%	(0%)
High (<50)	**5.3**	16.4	140%	(10%)	56%	(6%)	**15.4**	104%	(7%)	**16.0**	26%	(3%)

Table7: Simulation Results for Head Count Ratios by Country Classifications (Baseline: 2006) (Cont.)

	MDG 1	Based on Case 4 (with Fertiliser Use, No Institution)			Based on Case 5 (With Agricultural Investment, No Institutions)		
		Expected Poverty in 2015	Necessary Increase in Fertiliser Use for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Fertiliser Use (2007-13)	**Expected Poverty in 2015**	Necessary Increase in Agricultural Investment for Achieving MDG1 (2007-13)	(%) Required Rate of Annual Growth of Agricultural Investment (2007-13)
US$2 a day Poverty Head Count Ratio (2005 PPP)	**US$2**						
By Income Group							
Low Income Countries	**37.6**	**54.9**	27%	(3%)	**87.9**	74%	(7%)
Middle Income Countries	**27.4**	**39.1**	21%	(3%)	**32.9**	11%	(1%)
Among Top 30 Countries in Aggregate Governance or not							
Low Governance	**35.6**	**50.7**	24%	(3%)	**68.3**	48%	(5%)
High Governance	**23.2**	**34.3**	20%	(3%)	**25.6**	9%	(1%)
Trade Openness							
Low Openness (< Trade share 50%)	**38.8**	**56.6**	24%	(3%)	**46.0**	11%	(1%)
Middle Openness (50-100%)	**28.4**	**35.5**	14%	(2%)	**43.0**	19%	(2%)
High Openness (>=100%)	**20.0**	**26.1**	20%	(2%)	**52.8**	60%	(5%)
World Bank Business Index (Regulatory Environment: 1=most business-friendly regulations)							
Low (>150)	**40.6**	**75.3**	44%	(5%)	**83.7**	44%	(5%)
Middle Low (100-150)	**33.1**	**48.1**	22%	(3%)	**51.8**	22%	(3%)
Middle High (50-100)	**31.3**	**27.4**	2%	(0%)	**28.4**	4%	(1%)
High (<50)	**12.4**	**19.0**	25%	(3%)	**53.3**	77%	(6%)
US$1.25 a day Poverty Head Count Ratio (2005 PPP)	**US$1.25**						
By Income Group							

Low Income Countries	**25.1**	**24.0**	1%	(0%)	**81.8**	91%	(8%)
Middle Income Countries	**17.0**	**17.1**	6%	(1%)	**16.6**	7%	(1%)
Among Top 30 Countries in Aggregate Governance or not							
Low Governance	**24.1**	**23.4**	4%	(0%)	**58.8**	52%	(5%)
High Governance	**12.9**	**13.3**	2%	(0%)	**8.5**	26%	(2%)
Trade Openness							
Low Openness (< Trade share 50%)	**28.1**	**25.1**	1%	(0%)	**31.7**	10%	(1%)
Middle Openness (50-100%)	**16.1**	**12.1**	1%	(0%)	**38.2**	31%	(3%)
High Openness (>=100%)	**12.0**	**7.9**	5%	(1%)	**24.1**	51%	(4%)
World Bank Business Index (Regulatory Environment: 1=most business-friendly regulations)							
Low (>150)	**27.2**	**46.9**	19%	(2%)	**69.7**	49%	(5%)
Middle Low (100-150)	**22.0**	**19.8**	0%	(0%)	**46.8**	36%	(3%)
Middle High (50-100)	**21.4**	**8.5**	0%	(0%)	**12.6**	0%	(0%)
High (<50)	**5.3**	**4.4**	6%	(1%)	**24.1**	68%	(5%)

There is considerable variation *within* Central Asia. For example, in Case 5, agricultural investment needs to increase by 231% in 2007-13 for Kyrgyz Republic, 63% in Tajikistan, and 0% in Kazakhstan or Uzbekistan to achieve MDG1.

In Table 6, we have repeated the simulation exercises based on the elasticity estimates in the second panel of Table 3 which draws upon econometric estimations for the US$1.25 a day poverty in Appendices 2a and 2b. As the overall results in Table 6 are not much different from those in Table 5, we highlight only a few illustrations here.

We note from the first row of Table 6 that China does not need any increase in agricultural investment or expenditure to achieve MDG1 based on US$1.25 a day. This is not surprising given the finding that it does not require any increase in these variables for achieving MDG1 on US$2 per day. Asia and the Pacific Region as a whole would need much less investment or expenditure for US$1.25 poverty than for the US$2 poverty. Our results indicate that the increases required are: only 16% increase in agricultural ODA in 2007-13 (or annual growth rate of 2% in 2007-2013, Case 2 of Table 6), 8% increase in l agricultural expenditure in 2007-13 (or annual growth rate of 1% in 2007-2013, Case 3), 0% or no increase in fertiliser use in 2007-13 (Case 4) or 24% increase in agricultural investment in 2007-13 (or annual growth rate of 3% in 2007-2013, Case 5)[21].

Simulation results suggest that the overall pattern *across* countries in Table 6 is not much different from that in Table 5, but necessary agricultural expenditure or investment for each country is substantially lower in Table 6 than in Table 5. Many countries in East Asia (or China), South East Asia (e.g. Indonesia, Thailand, Vietnam), in South Asia (Bangladesh, Bhutan, India, Pakistan, Sri Lanka) and in Central Asia (e.g. Uzbekistan) would need only a

[21] Note that it is not implied that within this Region there are no disparities in use of fertiliser. Some of the poorest countries (e. g Lao PDR and Cambodia) use a fraction of fertilisers used in Vietnam, China and India.

small, or no increase in agricultural ODA, agricultural expenditure, fertiliser use or agricultural investment. The countries which would need a substantial increase in one of these factors to achieve MDG1 based on US$1.25 a day include Papua New Guinea, Cambodia, Timor-Leste, Kyrgyz Republic and Tajikistan.

In Table 7 all the above simulation results are aggregated for specific categories, namely, (i) whether a country is in the low income or middle income group; (ii) whether a country is among the top 30 countries in the developing world in terms of aggregate governance or institutional quality; (iii) whether the trade share (or the share of imports and exports in GDP) is low (below 50%), middle (50-100%) or high (above 100%), and (iv) whether the World Bank Ease of Doing Business Index (Regulatory Environment: 1=most business-friendly regulations or the highest among all the countries in the world) is low (above 150), middle low (100-150), middle high (50-100) or high (below 50) to check how the necessary agricultural ODA, expenditure or investment differ across these categories. These aggregations are carried out for both US$2 a day poverty and US$1.25 a day poverty.[22]

As expected, low income countries would need higher increase in agricultural ODA (206% or 114% increase in 2007-13 for US$2; 102% or 61% increase in 2007-13 for US$1.25 in Cases 1 and 2) than middle income group countries (144% or 66% increase in 2007-13 for US$2; 44% or 18% increase in 2007-13 for US$1.25 in Cases 1 and 2)[23]. Similarly, the necessary increase in agricultural investment in 2007-13 is substantially higher for low income countries (74% for US$2 and 91% for US$1.25) than for high income countries (11% for US$2 and 7% for US$1.25). That is, the income group is closely associated with required increase in agricultural ODA or investment. In other words, for the purpose of poverty

[22] Appendices 4-a and 4-b summarise key indices and variables used for estimations and simulations in the baseline year, 2006.

[23] Recall that Cases 1 and 2 differ in as much as whether their effects are estimated jointly or singly. Given the overlap between the two variables, more precise estimates are ruled out.

reduction in terms of both US$1.25 and US$2 a day, donors should mainly concentrate the ODA in agriculture of low income countries, rather than middle income countries. On the issue of governance, low governance countries would need more agricultural ODA, agricultural investment, fertiliser or agricultural investment to achieve MDG1 on both US$2 a day and US$ 1.25 a day. In particular, the requirement for increasing agricultural investment seems demanding for low governance countries. A policy dilemma that must be confronted is whether "triggers" for institutional reform could partly compensate for higher transfers of resources to agriculture in low governance countries.

By contrast, trade openness is not amenable to easy generalisation, partly because some of the poorest countries are highly trade dependent (Cambodia, for example) and more affluent ones too (China, for example). The countries with low trade openness would need *higher* levels of increase in agricultural ODA, agricultural expenditure, or fertiliser use, but *lower* levels of increase in agricultural investment. While a higher degree of trade openness is generally associated with economic growth and poverty reduction, it may also lead to the neglect of agriculture –essentially an empirical observation without going into the why. Our results imply that, even if a country is open to the rest of the world, a substantial agricultural investment is needed for poverty reduction for MDG1 at both US$1.25 and US$2 a day.

Finally, the last panel of Table 7 shows the relationship between ease of doing business index and necessary increases in each factor (ODA in agriculture, public expenditure in agriculture and investment) in achieving MDG1. It is found that countries with less business friendly regulatory environment would need larger increases in agricultural ODA, agricultural expenditure, fertiliser use and agricultural investment. As in the case of governance or institutional quality, the policy dilemma is whether efforts should be directed to improving the business environment and/or ensuring greater transfer of resources to agriculture.

7. Concluding Observations

This paper has examined whether accelerated growth of agriculture, through agricultural expenditure, ODA or investment, makes a difference to the prospects of achieving MDG1 (using both US$1.25 and US$2 per day poverty) in Asia and the Pacific Region. Our analysis confirmed robustly that increases in agricultural expenditure, agricultural ODA, agricultural investment, or fertiliser use would accelerate agricultural and GDP growth and, consequently, improve the prospects of achieving the more ambitious MDG1 (on US$2 per day). That this more ambitious goal is appropriate, given the rapid growth in many countries in this Region in the early years of the present decade, is unlikely to be disputed.

Our simulation results show that Asia and the Pacific Region as a whole would need a 56% increase in agricultural ODA in 2007-13 for achieving MDG 1 (US$2 poverty) (or a 16% increase for US$1.25 poverty), a 28% increase in agricultural expenditure for US$2 poverty (or an 8% increase for US$1.25 poverty), a 23% increase in fertiliser use (or no increase for US$1.25 poverty), or a 24% increase in agricultural investment for US$2 and US$1.25 poverty ratios (but with varying sub-regional requirements). Comparison across different categories suggests that increase in fertiliser use or agricultural investment is relatively effective ways for poverty reduction.[24]

Many countries in East Asia (or China), South East Asia (e.g. Indonesia, Lao PDR, Thailand, Vietnam), in South Asia (Bangladesh, Bhutan, India, Pakistan, Sri Lanka) and in Central Asia (e.g. Uzbekistan) would need only small or no increase of agricultural ODA, agricultural expenditure, fertiliser use or agricultural investment to achieve MDG1 for US$1.25 a day, while these countries, except China, would need a substantially higher

[24] As emphasised earlier, data limitations precluded investigation of complementarities among ODA, public expenditure and investment. That there are strong synergies among them is indisputable. In the absence of precise estimates, our resource requirements must be treated as the first order of approximations.

agricultural investment or expenditure to achieve MDG 1 at US$2 a day. On the other hand, countries like Papua New Guinea, Cambodia, Timor-Leste, Kyrgyz Republic and Tajikistan would need to increase substantially agricultural ODA, agricultural expenditure, or agricultural investment to achieve MDG1 not only for poverty at US$2 a day but also for poverty at US$1.25 a day.

Aggregation of the simulation results for individual countries into various categories reveals that low income countries with low level of governance or institutional quality, or with low ease of doing business would need larger increase in agricultural ODA, expenditure or investment to achieve MDG1 at both US$2 and US$1.25 per day. These results raise two *related* but *distinct* policy *dilemmas*: one is the trade-off between real resource transfer to agriculture and institutional reform, and another is a similar trade-off between resource transfers and business environment. Our earlier work discussed "triggers" for institutional reform (e.g. right to information, protection of property right). While some examples of how well these "triggers" work exist, policy makers and donors need to reflect on more cost-effective and encompassing triggers as institutional reform is not merely a by-product of growth or a causal factor. Indeed, arguments abound suggesting that institutional reform and growth may occur simultaneously, making it harder to pinpoint areas of intervention.

Another important insight that our analysis yields is that not just national governments but also donors need to commit larger resources to agriculture -especially in many of the poorest countries. Mechanisms that would ensure larger budgetary outlays and donor funds for agriculture and their allocation between rural infrastructure and sustainable technology call for deep scrutiny.

In conclusion, while the challenge of reducing the scourge of poverty is a daunting one, the resource requirements for accelerated agricultural growth and institutional reforms delineated here could be the basis of a comprehensive and workable policy agenda.

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Appendix 1 A list of Variables

log Poverty: log of Poverty Head Count Ratio based on the US$2 day a day poverty line in *t*, 1980-2006, for the country *i* [25](WDI 2010, Povcal Net).

log Poverty Gap: log of Poverty Gap based on the US$2 day a day poverty line (WDI 2010, Povcal Net).

log GDP pc: log of GDP per capita.

log Agri VA(-1): log of agricultural value added per agricultural worker in the precious period, t-1 (WDI).

log Fertiliser Use(-1): log of Fertilizers Consumption (Kg per Ha of Arable land) (WDI).

log Agri Expenditure (-1): log of agricultural expenditure per rural population (Statistics of Public Expenditure for Economic Development (SPEED), IFPRI). [26] Also used synonymously with public expenditure in agriculture.

log Agri ODA(-1): log of ODA to agriculture per rural population (World Bank (2007, pp.322-323), WDI).

log Agri Investment (-1): log of investment in the agricultural sector per rural population (the investment data from Harvard University's Centre for International Development).

log Gini Coef.: log of Gini coefficient (Povcal Net).

[25] Subscripts *t* and *i* are omitted below.
[26] SPEED data are available from http://www.ifpri.org/book-39/ourwork/programs/priorities-public-investment/speed-database (accessed on 23 December 2010).

Appendix 2-a. Results of 3SLS for GDP, Agricultural value added, & poverty (poverty headcount ratio based on US$1.25 a day (2005PPP))

	Case 1				**Case 2**				**Case 3**		
	With county Fixed Effects				**Without county Fixed Effects**				**Without county Fixed Effects**		
	With agricultural expenditure & ODA Without Institution				**With agricultural ODA Without Institution**				**With agricultural expenditure Without Institution**		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	2.136				1.782				2.577		
	(16.77)**				(17.98)**				(17.45)**		
log Agri ODA(-1)		**0.086**				**0.159**					
		(1.73)†				**(2.79)****					
log Agri Expenditure (-1)		**0.164**								**0.184**	
		(4.38)**								**(4.67)****	
log GDP pc			-1.282				-1.068				-1.601
			(5.83)**				(7.39)**				(6.34)**
log Gini Coef.			1.441				0.588				2.194
			(2.19)*				(1.40)				(2.97)**
log Agri ODA(-2)				0.762				0.586			
				(6.30)**				(7.82)**			
log Agri VA(-2)				0.637				0.727			
				(1.84)†				(3.11)**			
Constant	-6.248	8.261	6.44	-18.511	-4.27	6.821	8.08	-17.339	-8.714	7.845	5.732
	(8.76)	(14.34)	(4.05)	(8.57)	(7.68)	(15.30)	(6.37)	(12.63)	(10.54)	(16.13)	(3.60)
Observations	49	49	49	49	79	79	79	79	53	53	53

Notes: Absolute value of z statistics in parentheses
† significant at 10%. * significant at 5%; **
significant at 1%

Appendix 2-b. Results of 3SLS for GDP, Agricultural value added, & poverty (poverty headcount ratio based on US$1.25 a day (2005PPP)) (cont.)

	Case 4 **Without county Fixed Effects** **With fertiliser use Without Institution**			**Case 5** **Without county Fixed Effects** **With agricultural investment Without Institution**		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	1.744			0.855		
	(10.50)**			(9.00)**		
log Agri ODA(-1)						
log Agri Expenditure (-1)						
log Fertiliser Use(-1)		**0.243**				
		(8.46)**				
log Agri Investment (-1)					**0.243**	
					(3.05)**	
log GDP pc			-1.473			-2.235
			(5.53)**			(6.63)**
log Gini Coef.			1.325			1.096
			(2.44)*			(1.39)
Constant	-4.056	2.246	7.917	1.196	1.937	13.759
	(4.36)	(5.66)	(5.77)	(1.94)	(1.30)	(5.45)
Observations	82	82	82	26	26	26

Notes: Absolute value of z statistics in parentheses

† significant at 10% * significant at 5%; ** significant at 1%

Appendix 3-a. Results of 3SLS for GDP, Agricultural value added, & poverty (poverty gap based on US$1.25 a day (2005PPP))

	Case 1 With county Fixed Effects With agricultural expenditure & ODA Without Institution				Case 2 Without county Fixed Effects With agricultural ODA Without Institution				Case 3 Without county Fixed Effects With agricultural expenditure Without Institution		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(4)** log Agri ODA(-1)	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	2.137				1.783				2.582		
	(16.93)**				(18.11)**				(17.52)**		
log Agri ODA(-1)		**0.097**				**0.166**					
		(1.88)				**(2.89)****					
log Agri Expenditure (-1)		**0.157**								**0.181**	
		(4.25)**								**(4.66)****	
log GDP pc			-1.304				-1.248				-1.596
			(4.96)**				(7.38)**				(5.35)**
log Gini Coef.			1.013				0.237				1.81
			(1.30)				(0.48)				(2.06)*
log Agri ODA(-2)				0.725				0.569			
				(6.02)**				(7.61)**			
log Agri VA(-2)				0.793				0.784			
				(2.28)*				(3.37)**			
Constant	-6.251	8.26	6.724	-19.027	-4.277	6.874	9.005	-17.507	-8.737	7.809	5.715
	(8.85)	(14.33)	(3.55)	(8.74)	(7.75)	(15.30)	(6.09)	(12.73)	(10.60)	(16.29)	(3.04)
Observations	50	50	50	50	80	80	80	80	54	54	54

Notes: Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%.

Appendix 3-b. Results of 3SLS for GDP, Agricultural value added, & poverty (poverty gap based on US$1.25 a day (2005PPP)) (cont.)

	Case 4 Without county Fixed Effects With fertiliser use Without Institution			Case 5 Without county Fixed Effects With agricultural investment Without Institution		
	Eq.(1) log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty	**Eq.(1)** log GDP pc	**Eq.(2)** log Agri VA(-1)	**Eq.(3)** log Poverty
log Agri VA(-1)	1.747			0.855		
	(10.63)**			(9.00)**		
log Agri ODA(-1)						
log Agri Expenditure (-1)						
log Fertiliser Use(-1)		**0.243**				
		(8.53)**				
log Agri Investment (-1)					**0.243**	
					(3.05)**	
log GDP pc			-1.769			-2.663
			(5.59)**			(7.17)**
log Gini Coef.			1.399			1.48
			(2.19)*			(1.85)
Constant	-4.074	2.247	8.077	1.196	1.937	13.931
	(4.43)	(5.70)	(5.01)	(1.94)	(1.30)	(5.06)
Observations	84	84	84	26	26	26

Notes: Absolute value of z statistics in parentheses. * significant at 5%; ** significant at 1%.

Appendix 4-a: Summary of Key Indices

	Business Index*1	Agricultural ODA (mil US$, 2004 price)	Total ODA (mil US$, 2005 price)	Agricultural Investment (mil US$, 1992 price)	Fertiliser Use (1000 Kg per Ha of Arable land)	Agricultural Expenditure (mil US$ 2005 price)	Gini Index 2002-	Trade Share	Agricultural Value Added (1000mil US$ 2000 price)	GDP (1000mil US$ 2000 price)	The World Bank's Income Group 0=Low Income 1=Lower Middle 2=Upper Middle
	2009	2006	2006	1992	2006	2006	2006	2006	2006	2006	2009
East Asia											
China	78	145.0	1248.6	.	55.9	138354.0	35.4	72.4	238.3	2457.0	1
The Pacific					0.0						
Papua New Guinea	.	11.0	275.9	.	0.0	76.4	50.9	.	0.0	0.0	1
South East Asia											
Cambodia	145	68.0	533.3	.	0.0	.	41.9	144.6	.	.	0
Indonesia	115	70.0	1317.6	178.0	4.1	7733.2	34.5	56.9	32.2	233.2	1
Lao PDR	169	47.0	350.1	.		.	32.6	78.2	1.2	2.7	0
Malaysia	23	2.0	238.8	.	1.6	.	37.9	217.0	1.0	132.9	2
Philippines	146	39.0	559.4	12.3	0.5	3366.0	44.0	94.0	15.6	106.6	1
Thailand	16	0.0	-207.7	.	1.8	9530.6	42.5	143.5	15.6	106.6	1
Timor-Leste	174	.	209.1	.		.	39.5	.	-	0.3	1
Vietnam	88	217.0	1843.9	.	2.0	.	37.8	150.3	-	0.3	1
South Asia											
Bangladesh	111	46.0	1224.0	.	1.5	2111.7	31.0	44.2	14.4	69.6	0
Bhutan	140	.	99.2	.		82.4	46.8	76.8	0.1	0.8	1
India	135	312.0	1383.0	2224.7	19.3	45442.5	32.5	48.8	141.5	773.1	1
Nepal	112	54.0	508.4	.	0.0	204.5	47.3	45.3	2.6	6.9	0
Pakistan	75	154.0	2137.9	289.2	3.8	4655.6	31.2	38.6	22.0	105.9	1
Sri Lanka	102	64.0	786.2	9.2	0.0	2008.8	41.1	74.8	3.3	22.8	1
Central Asia											
Kazakhstan	74	2.0	170.4	.	0.1	.	33.9	91.6	2.3	36.1	2
Kyrgyz Republic	47	.	310.6	.	0.0	.	.	115.7	0.6	1.8	0
Tajikistan	149	33.0	241.7	.	.	.	33.6	80.7	0.4	1.6	0
Uzbekistan	150	1.0	149.5	.	.	.	36.7	63.4	6.4	21.0	1
Iran, Islamic Rep.	131	1.0	115.8	46.3	1.9	.	38.3	75.2	20.0	151.8	2
Area Aggregate											
East Asia	**78.0**	**145.0**	**1248.6**	**.**	55.9	**138354.0**	**35.4**	**72.4**	**238.3**	**2457.0**	**.**
Pacific	**.**	**11.0**	**275.9**	**.**	0.0	**76.4**	**50.9**	**.**	**0.0**	**0.0**	**.**
South East Asia	**109.5**	**63.3**	**605.5**	**95.1**	1.7	**6876.6**	**38.8**	**126.4**	**13.1**	**83.2**	**.**
South Asia	**112.5**	**126.0**	**1023.1**	**841.0**	4.9	**9084.3**	**38.3**	**54.7**	**30.6**	**163.2**	**.**
Central Asia	**110.2**	**9.3**	**197.6**	**46.3**	0.7	**-**	**35.6**	**85.3**	**5.9**	**42.5**	**.**
Asia & the Pacific	**109.0**	**70.3**	**642.6**	**460.0**	5.8	**19415.1**	**38.5**	**90.1**	**28.7**	**211.6**	**.**

*1 The World Bank's 'ease of business index' from 1 to 183, with first place being the best where a high ranking means that the regulatory environment is conducive to business operation.

Appendix 4-b: Summary of Key Indices

	Voice & Accountability Index	Voice & Accountability Ranking among LDCs	Political Stability Index	Political Stability Ranking among LDCs	Rule of Law Index	Rule of Law Ranking among LDCs	Corruption Index	Corruption Ranking among LDCs	Aggregate Governance Index	Aggregate Governance Ranking among LDCs
	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
East Asia										
China	-1.7	74	-0.3	55	-0.5	74	-0.7	50	-0.8	32
The Pacific										
Papua New Guinea	.	.	.	.	.	.	.	.	.	.
South East Asia										
Cambodia	-0.9	22	-0.4	48	-1.1	22	-1.1	10	-0.9	27
Indonesia	-0.2	45	-1.1	23	-0.7	45	-0.7	42	-0.7	42
Lao PDR	-1.7	29	0.0	74	-1.0	29	-1.0	19	-0.9	24
Malaysia	-0.6	106	0.2	88	0.5	106	0.2	100	0.1	95
Philippines	-0.2	57	-1.4	16	-0.6	57	-0.8	35	-0.7	36
Thailand	-0.2	57	-1.4	16	-0.6	57	-0.8	35	-0.7	36
Timor-Leste	-0.1	11	-1.1	26	-1.3	11	-0.9	26	-0.9	28
Vietnam	-0.1	11	-1.1	26	-1.3	11	-0.9	26	-0.9	28
South Asia										
Bangladesh	-0.6	41	-1.4	13	-0.8	41	-1.1	13	-1.0	21
Bhutan	-0.9	103	0.7	104	0.5	103	0.9	111	0.3	99
India	0.4	95	-1.0	28	0.1	95	-0.4	75	-0.2	79
Nepal	-0.9	53	-2.1	3	-0.6	53	-0.7	50	-1.1	13
Pakistan	-1.1	33	-2.4	1	-0.9	33	-0.8	34	-1.3	6
Sri Lanka	-0.4	94	-2.0	8	0.1	94	-0.1	92	-0.6	50
Central Asia										
Kazakhstan	-1.1	40	0.4	95	-0.8	40	-0.9	27	-0.6	48
Kyrgyz Republic	-0.6	14	-1.1	24	-1.2	14	-1.1	10	-1.0	20
Tajikistan	-1.3	17	-0.9	31	-1.1	17	-0.9	32	-1.0	17
Uzbekistan	-1.9	22	-1.4	15	-1.1	22	-1.0	22	-1.3	5
Iran, Islamic Rep.	-1.5	38	-1.3	18	-0.8	38	-0.6	59	-1.1	14
Area Aggregate										
East Asia	**-1.7**	**73.5**	**-0.3**	**54.5**	**-0.5**	**73.5**	**-0.7**	**49.5**	**-0.8**	**32.0**
Pacific	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**	**.**
South East Asia	**-0.5**	**42.1**	**-0.8**	**39.6**	**-0.7**	**42.1**	**-0.8**	**36.4**	**-0.7**	**39.5**
South Asia	**-0.6**	**69.7**	**-1.4**	**26.1**	**-0.3**	**69.7**	**-0.4**	**62.3**	**-0.7**	**44.5**
Central Asia	**-1.3**	**25.9**	**-0.9**	**36.4**	**-1.0**	**25.9**	**-0.9**	**29.9**	**-1.0**	**20.8**
Asia & the Pacific	**-0.8**	**47.9**	**-1.0**	**35.5**	**-0.7**	**47.9**	**-0.7**	**43.2**	**-0.8**	**36.0**