Is Rural Contribution to Aggregate Poverty Reduction Substantial? New Evidence

Katsushi S. Imai [1], Gordon Abekah-Nkrumah [2]

and Purnima Purohit [3]

[1] Economics, School of Social Sciences,The University of Manchester, UK
Katsushi.Imai@manchester.ac.uk
(Corresponding Author)

[2] IDPM, School of Environment, Education and Development, The University of Manchester, UK
gordon.abekah-nkrumah@manchester.ac.uk

[3] IDPM, School of Environment, Education and Development, The University of Manchester, UK
purnima.purohit@manchester.ac.uk

Brooks World Poverty Institute
Creating knowledge. Informing policy. Ending poverty.

www.bwpi.manchester.ac.uk

Abstract

Using the recent estimates of rural, urban and aggregate poverty rates for 31 developing countries, the present study statistically examines the extent to which the rural sector contributes to aggregate poverty reduction. After adjusting for the effect of rural-urban migration, our results suggest that the rural sector makes a substantial contribution to aggregate poverty reduction across all five regions, consistent with earlier studies arguing for the importance of rural sector growth in poverty reduction. Recent studies giving greater priority to urbanisation-especially small and secondary towns-are thus mistaken.

Keywords

Acknowledgements

I. Introduction

Although economic growth contributes to the reduction of poverty, the mechanism by which an improvement in general economic performance promotes poverty reduction remains a key policy challenge (Agenor, 2004). Over the last two decades, rural regions of most of the developing world have witnessed a decline in the rural poverty rate, often larger in percentage points than the decline in urban poverty. The evidence in the poverty literature, in-terms of explaining the dramatic reduction in rural poverty rates is mixed. A section of this literature claims that, agricultural growth in developing countries, has been pro-poor and that it constitutes an important instrument for poverty reduction. This claim is based on earlier (Ravallion and Datt, 1996; Thorbeck and Jung, 1996; Khan, 1999) and more recent (Ravallion and Chen, 2007; Suryahdi et al., 2009; Loayza and Raddatz, 2009; de Janvry and Sadoulet, 2010) evidence, suggesting that, unskilled labour-intensive and agricultural related activities have higher poverty-reducing capacity compared to skilled, capital-intensive and industry related activities. For instance, Ravallion and Chen (2007) argues that agricultural growth has been far more important in explaining the dramatic reduction in rural poverty rate in China compared to the secondary and tertiary sector. In a similar fashion, Suryahdi et al., (2009), suggest that agricultural growth is correlated with poverty decline in rural areas in Indonesia.

It is important though, to note that there are countries such as Brazil and Bolivia, where substantial agricultural growth (concentrated in a dynamic oriented sector of very large farms) did not result in a decline in rural poverty. In addition, there are studies that have argued that rural poverty reduction has been aided directly by rural to urban migration and not necessarily improvement in rural incomes (e.g. Dang et al., 2014; Ravallion and Chen, 2007, *The Global Monitoring Report 2013*). These studies suggest that it would be incorrect and mechanical to assume that most progress in poverty decline came from the contribution of rural areas (i.e. improvement in rural incomes). Indeed, the possibility exists that reduction in rural poverty could be due to domestic migration of the poor as opposed to genuine decline in poverty among non-migrants who stay in rural areas. This is because higher urban incomes provide incentives for rural-urban migration of the poor.

There is empirical evidence suggesting that, a one percent gross domestic product (GDP) growth, that originated in agriculture, was more effective for poverty reduction than growth that originated in other non-farm sectors of the economy (Christiaensen et al. 2011; de Janvry and Sadoulet, 2010; Imai and Gaiha, 2014). Other studies also point to the role of migration out of agriculture into rural off-farm activities and secondary towns in promoting more inclusive growth and faster poverty reduction (e.g. Christiaensen and Toda, 2013; Szirmir, 2012). Further, it is claimed that as countries grow and develop through structural transformation, non-agriculture usually takes over as the engine of growth, with agriculture maintaining its superior poverty reducing powers only for the bottommost poor. The policy advice, therefore, is to move investment to off-farm activities and secondary town, to better exploit their growth potential (Christiaensen and Toda, 2013). de Janvry and Sadoulet (2010) examined the proposition that rural growth serve as an effective instrument for poverty reduction after accounting for the assumed contribution of migration. A key finding of the study is that the contribution of the rural sector to aggregate poverty reduction is largely driven by agricultural growth, and responsible for about half of the poverty reduction in their sample. In addition, the study highlighted the importance of using agriculture, specifically market-oriented smallholder farming, to help rural households move out of poverty, given the heterogeneity of rural populations. The de Janvry and Sadoulet (2010) analysis is based on two countries, China and India, in addition to aggregate estimates for selected developing regions.

Following from de Janvry and Sadoulet (2010) and the findings of prior studies (Ravallion and Chen, 2007; Suryahdi et al., 2009; de Janvry and Sadoulet, 2010; Imai and Gaiha, 2014; Gaiha, 2014), we hypothesise that there is a causal chain running from investment to agricultural growth, to overall growth and to poverty reduction in rural areas and non-rural areas. Successful development of the off-farm sector tends to be as a result of a spillover effect of farm growth, where agriculture is dominant in the economy as a share of output or employment. Econometrically, it is complicated to extract the impact of sectoral investment on growth and poverty, since most investment in infrastructure, health, and education has strong intersectoral spillovers (de Janvry and Sadoulet, 2010).

We emphasize the importance of 'agriculture-first' investment strategy as agricultural growth can have not only strong direct poverty reduction effects but also indirectly through strong growth linkages to the rest of the economy. Growth in the agriculture sector is an important base as it could also channelize contribution of migration to poverty reduction. Recent literature pointing to the desirability of internal migration, that investment in the rural sector helps potential migrants to invest in education before migrating, anticipating that human capital will be needed or better rewarded in the urban area or other non-farm business (Kochar, 2004; Lall et al, 2006).

Our analysis builds on de Janvry and Sadoulet (2010) by covering a larger number of developing countries. It attempts to disentangle empirically, the sectoral contribution of rising incomes in rural areas to overall poverty reduction, after adjusting for the effect of migration out of rural areas. We demonstrate that rural sector growth, as opposed to growth via rural-urban migration, has been the primary source of poverty reduction in many developing countries

In summary, the present study extends the literature on the contribution of the rural sector to aggregate poverty change in two significant ways. Firstly, it covers a reasonably large number of developing countries – both low and middle income countries (see Table 1)- to examine whether rural sector growth has a higher capacity in reducing poverty, after accounting for potential contribution of migration. Country-level decomposition analysis is important as aggregate regional experience may differ from individual country level experiences. It is, for example, possible for a poor country to be trapped into poverty even when the region, in aggregate terms, has enjoyed a positive contribution of the rural sector to poverty reduction (Dasgupta, 1997, 1998). Secondly, as compared to de Janvry and Sadoulet (2010), the present study makes use of more recent data to examine the hypothesis that the rural sector contributes to aggregate poverty reduction at the country level, independently of the contribution of rural-urban migration that may explain poverty reduction.

The rest of the paper is organised as follows. In section II, we discuss the methods (i.e. Source of data and estimation technique), followed by the presentation and discussion of the empirical results in Section III.. This is followed by concluding observations in Section IV.

II.   Methodology

Data

Our analysis is based on data from the World Bank poverty database (PovCal.Net) and World Development Indicators (WDI). In the case of China, India and Indonesia, current rural and urban headcount poverty ratios, based on the $1.25 international poverty line (PL) for two periods, were downloaded from PovCal.net. Given that the current disaggregated poverty data (i.e. rural and urban based on $1.25 PL) in PovCal is restricted to only China, India and Indonesia, we used for the

remaining countries, rural and urban poverty estimates available in PovCal as well as World Development Indicators until 2011. Using the rural and urban headcount ratios, aggregate poverty for each period was computed as a weighted sum of the rural and urban poverty headcount ratios, using the respective rural and urban populations as weights. In addition, the share of rural population in each country for the two periods for which poverty data are available was gathered from the WDI database.

Estimation Technique

The method used to estimate the contribution of the rural sector to aggregate poverty reduction follows standard decomposition of aggregate poverty into sectoral changes with a component on population migration from rural to urban areas, as used in de Janvry and Sadoulet, (2010). The essence of capturing the migration component is to ensure that reported contribution of the rural sector to aggregate poverty reduction is not contaminated by migration from rural to urban areas. In this computation, a first step is identifying the poor and non-poor who migrate from rural areas to urban centres. Given, however, that such data are not available, we follow de Janvry and Sadoulet, (2010) and perform a three-case simulation to identify possible share (*S*) of the rural sector contribution in aggregate poverty reduction (see Table 1). In Case 1, we assume that only the non-poor migrate from rural areas. Thus, the selection into migration by the non-poor, serves to increase the rural poverty rate, thereby making the reduction in rural poverty among non-migrants higher than the observed decline in poverty. The contribution values computed under this assumption constitute an upper bound. Case1 can be computed as shown in equation1 below.

$$S^{Case\ 1} = \frac{RP_t*RS_t - RP_{t-1}*RS_{t-1}}{AP_t - AP_{t-1}} \qquad (1)$$

where *RP* is the rural poverty rate, *RS*, the rural share of the population, *AP*, the aggregate poverty rate, with *t* and *t-1* denoting the first and second period for which *RP*, *RS* and *AP* are observed.

In the second case, we assume that the migration rate for the poor and non-poor are the same (i.e. migration is poverty neutral). The implication of this assumption is that the reduction in the poverty rate of non-migrants will equal the observed reduction in the rural poverty rate. This can be computed as shown in Equation 2.

$$S^{Case\ 2} = \frac{RP_t*RS_t - RP_{t-1}*RS_{t-1} - RP_{t-1}*(RS_t - RS_{t-1})}{AP_t - AP_{t-1}} \qquad (2)$$

The third case assumes that only the poor migrate. Given that the migration of the poor is likely to lead to a reduction in rural poverty, the genuine contribution of the rural sector to aggregate poverty reduction will be beyond the reduction in rural poverty arising from migration of the poor. Thus the "only poor" migration case constitutes the lower bound for the contribution of the rural sector to aggregate poverty reduction. Case 3 is computed as in Equation 3 below.[1]

$$S^{Case\ 3} = \frac{RP_t*RS_t - RP_{t-1}*RS_{t-1} - (RS_t - RS_{t-1})}{AP_t - AP_{t-1}} \qquad (3)$$

---

[1] Illustrative examples for equations (1)-(3) are given in Appendix 1.

III.   Findings

In this section, we discuss results of the sectoral decomposition to assess the contribution of the rural economy to poverty reduction in a sample of 31 developing countries from six sub-regions (Eastern Europe and Central Asia, South Asia, East Asia and the Pacific, Middle East and North Africa, Latin America and the Caribbean and Sub-Saharan Africa). The results (see Table 1) suggest that for the period under consideration, rural and urban poverty (except Guatemala) reduced in all the sample countries. Aggregate poverty also reduced in all the countries, with Honduras (0.2%) and Azerbaijan (33%) recording the lowest and the highest reduction in aggregate poverty, respectively. Besides Azerbaijan, other countries; Indonesia (27%), China (26%), Ukraine (25%), Ghana (25%) Bangladesh (24%) and Mexico (22%) also recorded equally substantial drops in aggregate poverty. On a sub-regional basis, Azerbaijan (33%) from Eastern Europe and Central Asia (EECA), Bangladesh (24%) from South Asia, Indonesia (27%) from East Asia and the Pacific (EAP), Morocco (7%) from Middle East and North Africa (MENA), Mexico (22%) from Latin America and the Caribbean (LAC) and Ghana (25%) from Sub-Saharan Africa (SSA) had the highest reduction in aggregate poverty reduction.

Given that our interest lies in examining the contribution of the rural sector to aggregate poverty reduction, we next look at the contribution of the rural economy to aggregate poverty reduction in general, and specifically, those countries recording the highest reduction per region. Overall, the results suggest that the rural economy, after adjusting for migration, contributed substantially to poverty reduction during the period under consideration in almost all the countries. For example, after adjusting for rural- urban migration involving only non-poor rural residents, the results show that the lowest contribution of the rural economy to poverty reduction occurred in Cameroon (34.52%) and the highest in Guatemala (209%). Using a lower bound assumption (i.e. only the poor migrated from rural areas to urban centres), the lowest percentage contribution of the rural economy to aggregate poverty reduction occurred in Cameroon (-2%) with the highest occurring in Rwanda (90%). Even where one assumes that rural-urban migration in the sample countries is poverty neutral, the rural economy continues to make a substantial contribution to aggregate poverty reduction (i.e. a low of 13% in Cameroon and a high of 111% in Guatemala). It is important to note that even though the rural sector in Guatemala makes the highest contribution to aggregate poverty reduction among the sampled countries, it has the second lowest reduction in aggregate poverty not only in LAC but also among the list of sampled countries. The relatively large contribution of the rural sector to modest reduction in poverty in Guatemala may be related to its large rural population (over 50%) engaged in agriculture, which invariably accounts for about 22% of its GDP, more than half of total export earnings and employing over 50% of the countries labour force (IFAD, 2012).

In EECA, the rural sector's contribution to aggregate poverty reduction is between 23% in Albania to 79% in Moldova. Most importantly, in Azerbaijan where the highest reduction in aggregate poverty in EECA occurred, the rural sector's contribution to aggregate reduction in poverty was between 32% and 36%. In South Asia, the highest drop in aggregate poverty came from Bangladesh, where the rural economy contributed between 58% and 88% to the aggregate poverty reduction. Even where a neutral migration assumption is used, the contribution of the rural sector remains high at 70%. With respect to EAP, Indonesia recorded the highest aggregate poverty reduction with estimated contribution between 50% and 65% of the total from the rural sector. Besides Indonesia, China and LAO PDR, the other two countries from EAP, recorded substantial contributions from the rural sector to aggregate poverty reduction. In MENA, Morocco had the highest aggregate poverty change, with the rural sector contributing between 49% and 79% to the change. In LAC, Mexico records the largest aggregate poverty reduction (22%), with the rural economy contributing between 24% and 35%. The most interesting aspect of the LAC story is that the highest contribution of the rural sector to

aggregate poverty reduction occurred in Guatemala, which recorded the second lowest reduction in aggregate poverty. The reverse of the Guatemalan case is Mexico that recorded the highest reduction in aggregate poverty in LAC. Finally, Ghana recorded the highest reduction in aggregate poverty (25%) in SSA with rural contribution, ranging from 36% to 78%.

IV. Concluding Observations

The results of the study support prior claims that rural poverty reduction in several developing countries is driven by agricultural growth. This also emphasises the point that growth of the rural economy is a major factor in aggregate poverty reduction. Given that in most developing countries, especially in regions such as SSA, where a larger proportion of the rural population is in agriculture, modernising agriculture and enhancing agricultural value addition may lead to broad-based growth, and substantial contribution to aggregate poverty reduction. Indeed, accelerating growth of the rural economy through an agriculture first strategy is not only important for rural poverty reduction but also for aggregate growth and poverty reduction. For example, land reform and trade and price liberalisation in Vietnam; rising farm and rural non-farm earnings and lower rice prices resulting from new technologies in Bangladesh; as well as economic reforms and resulting boom in coffee production in Uganda have all resulted in substantial growth in agriculture and reduction in the rural poverty rate. It is however important to caution that modernising agriculture may not mean the adoption of a capital-intensive technologies. As emphasised by Loayza and Raddatz, (2009), the poverty reducing capacity of a sector is related to its intensity in the employment of unskilled labour. Given that in developing countries, literacy levels are generally low in rural areas, they are likely to have a higher share of unskilled labour. Hence the employment of unskilled labour becomes a channel for improving rural incomes and therefore rural poverty reduction. Thus, modernising agriculture through a capital-intensive approach may mean limited capacity to improve rural incomes and poverty reduction. The present study thus strengthens prior claims, especially the de Janvry and Sadoulet's argument, given our larger sample (31 countries, as compared with 2 countries and developing regions in the latter). It is essential for policy-makers to devote a lot more attention to the rural economy, where agriculture in most cases constitutes the main economic activity. As already indicated, improving agriculture may not only have direct linkages to poverty reduction through agriculture, but also for non-agriculture that will benefit both the rural and urban poor.

In brief, the overemphatic case for urbanisation as key to elimination of extreme poverty is lop-sided or simply mistaken.

References

Agénor, Pierre Richard (2004), 'Macroeconomic Adjustment and the Poor: Analytical Issues and Cross Country Evidence', *Journal of Economic Surveys,* 18 (3), 351-408.

Christiaensen, Luc, Demery, Lionel, and Kuhl, Jesper (2011), 'The (Evolving) Role of Agriculture in Poverty Reduction—An Empirical Perspective', *Journal of Development Economics,* 96 (2), 239-54.

Christiaensen, Luc and Todo, Yasuyuki (2013), 'Poverty Reduction during the Rural–Urban Transformation–the Role of the Missing Middle (in press)', *World Development.*

Dang, Hai-Anh, Lanjouw, Peter, Luoto, Jill, McKenzie, David (2014). 'Using repeated cross-sections to explore movements into and out of poverty Original Research Article', *Journal of Development Economics*, 107, 112-128.

Dasgupta, Partha (1997), 'Nutritional status, the capacity for work, and poverty traps', *Journal of Econometrics,* 77 (1), 5-37.

--- (1998), 'The Economics of Poverty in Poor Countries', *The Scandinavian journal of economics,* 100 (1), 41-68.

de Janvry, Alain and Sadoulet, Elisabeth (2010), 'Agricultural Growth and Poverty Reduction: Additional Evidence', *The World Bank Research Observer,* 25 (1), 1-20.

Gaiha, R., (2014) *A Concept Paper on Global Rural Poverty Project*, SSD, IFAD.

IFAD (2012), Enabling Poor Rural People to Overcome Poverty in Guatemala. http://www.ruralpovertyportal.org [Online] [Accessed 3rd May 2014]

Imai, K. S. and Gaiha, R. (2014) 'Dynamic and Long-term Linkages among Growth, Inequality and Poverty in Developing Countries' , BWPI working papers, WP 198/2014, The University of Manchester.

Khan, Haider, (1999). Sectoral growth and poverty alleviation: a multiplier

decomposition technique applied to South Africa. *World Development* 27 (3), 521–530.

Kochar, Anjini (2004), 'Urban Influences on Rural Schooling in India', *Journal of Development Economics,* 74 (1), 113-36.

Lall, Somik V., Selod, Harris, and Shalizi, Zmarak (2006), 'Rural-Urban Migration in Developing Countries: A survey of Theoretical Predictions and Empirical Findings ', *World Bank Policy Research,* Working Paper 3915 (Working Paper 3915).

Loayza, Norman V., and Claudio Raddatz. (2010) The composition of growth matters

for poverty alleviation. *Journal of Development Economics.* 93 (1): 137-151.

Ravallion, Martin, and Chen, Shaohua, (2007). 'China's (uneven) progress against poverty Original Research Article', *Journal of Development Economics*, 82(1), 1-42.

Ravallion, Martin, Datt, Gaurav, (1996). How important to India's poor is the sectoral

composition of economic growth? *The World Bank Economic Review* 10 (1), 1–25.

Suryahadi, Asep, Suryadarma, Daniel, Sumarto, Sudarno, (2009). The effects of

location and sectoral components of economic growth on poverty: Evidence from Indonesia. *Journal of Development Economics* 89 (1), 109–117.

Szirmai, Adam (2012), 'Industrialisation as an Engine of Growth in Developing Countries, 1950–2005', *Structural Change and Economic Dynamics,* 23 (4), 406-20.

Thorbecke, Eric, Jung, Hong-Sang, (1996). A multiplier decomposition method to

analyze poverty alleviation. *Journal of Development Economics* 48 (2), 279–300.

World Bank (2013) *The Global Development Report 2013*, Washington DC.

Table 1: Contribution of Rural Sector to Aggregate Poverty Reduction

Country	Period (t)		Rural Poverty Rate (RPR)		Urban Poverty Rate (UPR)		Aggregate Poverty Rate (APR)		Change APR	Share of Rural in Population (SRP)		Contribution of Rural Sector to Aggregate Poverty Reduction (%)		
	t-1	t	RPR (t-1)	RPR (t)	UPR (t-1)	UPR (t)	APR (t-1)	APR (t)		SRP (t-1)	SRP (t)	Migration of Non Poor	Neutral Migration	Poor Migration
Eastern Europe and Central Asia														
Albania	2002	2008	0.296	0.146	0.195	0.101	0.2518	0.1234	-0.128	0.5623	0.4989	72.94	58.30	23.48
Azerbaijan	2001	2008	0.425	0.185	0.557	0.148	0.4931	0.1654	-0.328	0.4841	0.4700	36.25	34.42	31.95
Moldova	2009	2010	0.363	0.303	0.126	0.104	0.2536	0.2096	-0.044	0.5382	0.5306	78.67	72.44	61.50
Montenegro	2006	2008	0.176	0.089	0.074	0.024	0.1124	0.0482	-0.064	0.3762	0.3726	51.52	50.53	45.93
Serbia	2004	2007	0.202	0.098	0.104	0.043	0.1489	0.0677	-0.081	0.4586	0.4493	59.83	57.52	48.38
Tajikistan	2003	2007	0.738	0.55	0.688	0.494	0.7248	0.5352	-0.190	0.7355	0.7354	72.95	72.93	72.92
Ukraine	2002	2008	0.351	0.047	0.247	0.02	0.2809	0.0286	-0.252	0.3260	0.3167	39.44	38.16	35.78
South Asia														
Bangladesh	1992	2010	0.587	0.3516	0.427	0.2128	0.5541	0.3129	-0.241	0.7944	0.7211	88.21	70.37	57.82
India	1993	2009	0.5246	0.3428	0.4077	0.2893	0.4940	0.3264	-0.168	0.7077	0.6907	80.25	74.94	70.13
Pakistan	2002	2006	0.393	0.27	0.227	0.131	0.3371	0.2217	-0.115	0.6632	0.6524	73.22	69.52	63.81
East Asia and the Pacific														
China	1996	2009	0.4948	0.2057	0.0887	0.0064	0.3651	0.1103	-0.255	0.6806	0.5748	85.75	65.21	44.24
Indonesia	1996	2011	0.4675	0.1497	0.376	0.174	0.4338	0.1620	-0.272	0.5327	0.4931	64.46	57.67	49.92
Lao PDR	1992	2008	0.487	0.317	0.331	0.174	0.4617	0.2729	-0.189	0.8379	0.6917	99.99	62.29	22.58
Middle East and North Africa														
Morocco	2001	2007	0.251	0.145	0.076	0.048	0.1571	0.0910	-0.066	0.4634	0.4435	78.71	71.14	48.58
Yemen, Rep.	1998	2005	0.425	0.401	0.323	0.207	0.3992	0.3449	-0.054	0.7474	0.7106	60.07	31.37	-7.46
Latin America and the Caribbean														
Costa Rica	2004	2007	0.388	0.212	0.256	0.175	0.3073	0.1888	-0.118	0.3883	0.3730	60.42	55.43	47.54
Ecuador	1999	2008	0.751	0.597	0.364	0.226	0.5196	0.3538	-0.166	0.4021	0.3444	58.10	31.98	23.32
Guatemala *	2000	2006	0.745	0.705	0.271*	0.3 *	0.531	0.5122	-0.019	0.5487	0.5240	208.60 *	110.95 *	77.52

Honduras	2003	2004	0.776	0.757	0.627	0.614	0.7054	0.6883	-0.017	0.5263	0.5199	86.88	57.87	49.49
Mexico	1996	2004	0.807	0.574	0.615	0.411	0.6656	0.4501	-0.215	0.2636	0.2401	34.77	25.96	23.85
Paraguay	2001	2004	0.627	0.442	0.397	0.344	0.4983	0.3853	-0.113	0.4404	0.4216	79.47	69.04	62.83
Sub-Saharan Africa														
Cameroon	1996	2007	0.596	0.55	0.414	0.122	0.5174	0.3372	-0.180	0.5683	0.5027	34.52	12.83	-1.88
Ghana	1992	2006	0.636	0.392	0.277	0.108	0.4999	0.2545	-0.245	0.6208	0.5160	78.49	51.32	35.78
Malawi	1998	2004	0.665	0.559	0.549	0.254	0.6487	0.5134	-0.135	0.8593	0.8503	71.00	66.61	64.40
Mali	2001	2010	0.648	0.506	0.241	0.189	0.5313	0.3973	-0.134	0.7132	0.6572	96.76	69.69	54.98
Mozambique	1996	2003	0.713	0.553	0.62	0.515	0.6881	0.5417	-0.146	0.7320	0.7036	90.78	76.93	71.35
Nigeria *	2004	2010	0.734	0.69	0.522*	0.512 *	0.6385	0.6028	-0.036	0.5493	0.5100	143.78 *	62.90	33.59
Rwanda *	2006	2011	0.642	0.487	0.232*	0.221*	0.5699	0.4361	-0.134	0.8221	0.8088	100.09 *	93.72	90.17
Senegal	2001	2011	0.651	0.571	0.412	0.331	0.5542	0.4689	-0.085	0.5950	0.5744	69.55	53.84	45.42
Togo	2006	2011	0.751	0.734	0.372	0.346	0.6159	0.5865	-0.029	0.6435	0.6198	96.30	35.86	15.81
Uganda	2002	2009	0.427	0.272	0.144	0.091	0.3915	0.2453	-0.146	0.8745	0.8522	96.84	90.33	81.60

Notes: 1. Based on Data from PovCal.Net (Downloaded from http://povcal.net. Note) and WDI Database in 2011.
2. In case of Guatemala, Nigeria and Rwanda (denoted as *), contribution of rural sector to aggregate poverty reduction exceeds 100%. This is due to the fact that urban poverty increased in Guatemala and only marginally decreased in Nigeria and Rwanda.

Appendix 1. Illustrative Examples of three scenarios

To provide an intuition for the three scenarios, the illustrative examples are given below. In all the three cases, the aggregate population is assumed to be 20 in t-1 and t. The rural population share changed from 50% to 40%, while the rural poverty rate changed from 50% to 25% from t-1 to t. The urban population share increased from 50% to 60%, while rural poverty share changed from 50% to 25% from t-1 to t, while the urban poverty rate decreased from 30% to 17% in all the cases. The population change is caused only by rural-to-urban migration corresponding to 2 people.

In Case 1, the two migrants are both non-poor (and remained non-poor at t, emphasised as yellow bands). Among all the poverty reduction (by 4 people out of 20, or 20% of the total population, emphasised by blue bands), 75% (3 people out of 4) are assumed to be attributed to "the rural contribution". In other words, the aggregate poverty reduced from 40% to 20% and out of 20% reduction, 15% is attributed to the rural sector. Hence as de Janvry and Sadoulet (2010) described, "(i)n this decomposition, the "rural contribution" is the decline in aggregate poverty that is due to the decline in poverty of the population of non-migrants that remain rural" (p.12). This forms the upper band by definition.

In Case 2, among the two migrants, 1 is poor and 1 is non-poor, reflecting the rural poverty rate, 50% at t-1. In this case, among all the poverty reduction (by 4 people), 50% (2 out of 4) are assumed to be attributed to "the rural contribution". This is because one of the poor migrants actually migrated from rural to urban areas and thus the rural contribution to poverty reduction is reduced accordingly. In Case 3, both two migrants are non-poor and thus among all the poverty reduction (by 4 people), only 25% (1 out of 4) is assumed to be attributed to "the rural contribution". This is the lower band where the rural poverty reduction is caused by the migration of 2 poor people moving from rural to urban areas between t-1 and t and the actual rural contribution to the aggregate poverty is assumed to only minimal.

These are rough estimations by assuming that there is no natural population increase (or the population change in rural or urban areas is same) and that all the change in the rural-urban population ratio is caused by (net) migration from rural areas to urban areas. Therefore, the rural contributions to poverty reduction in Table 1 should be considered to be only rough estimates.

	Case 1						Case 2						Case 3					
	Only Non-Poor Migrate						**Neutral Migration**						**Only Poor Migrate**					
	t-1			t			t-1			t			t-1			T		
	Rural	Urban	Aggregate	Rural	Urban	Aggregate	Rural	Urban	Aggregate	Rural	Urban	Aggregate	Rural	Urban	Aggregate	Rural	Urban	Aggregate
	0	0			0		0	0			0		0	0		0	0	
0= non-poor *	0	0			0		0	0		0	0		0	0		0	0	
1 = poor	0	0		0	0		0	0		0	0		0	0		0	0	
	0	0		0	0		0	0		0	0		0	0		0	0	
	0	0		0	0		0	0		0	0		0	0		0	0	
	1	0		0	0		1	0			0		1	0			0	
	1	0		0	0		1	0		0	0		1	0			0	
	1	1		0	0		1	1		0	0		1	1		0	0	
	1	1		1	1		1	1		1	0		1	1		1	0	
	1	1		1	1		1	1		1	1		1	1		1	0	
(net) rural-				0						0						1		
urban migrants				0						1						1		
Population	10	10	20	8	12	20	10	10	20	8	12	20	10	10	20	8	12	20
Poor	5	3	8	2	2	4	5	3	8	2	2	4	5	3	8	2	2	4
Non-Poor	5	7	12	6	10	16	5	7	12	6	10	16	5	7	12	6	10	16
Population Share	50%	50%		40%	60%		50%	50%		40%	60%		50%	50%		40%	60%	
Poverty Rate	50%	30%		25%	17%		50%	30%		25%	17%		50%	30%		25%	17%	
Aggregate Poverty Rate			40%			20%			40%			20%			40%			20%

Rural Contribution (Numerator)	-15%		-10%		-5%	
Aggregate Poverty Reduction (Denominator)	-20%		-20%		-20%	
Rural Contribution to Poverty Reduction	**75%**		**50%**		**25%**	

Notes: 1. 0 stands for non-poor and 1 stands for poor.
2. Migrants are indicated by yellow bands. Those who changed the poverty status in rural (urban) areas are emphasised by blue (red) bands.