

The Impact of Agricultural Aid on Agricultural Sector Growth

Ozgur Kaya, Ilker Kaya and Lewell Gunter

Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Dallas, TX, February 2-6, 2008

Copyright 2008 by Kaya, Kaya and Gunter. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Ozgur Kaya is a graduate research assistant in the Agricultural and Applied Economics Department, Ilker Kaya is a graduate research assistant in Economics Department, and Lewell Gunter is a professor in the Agricultural and Applied Economics Department at the University of Georgia. Dept. Ag. and Applied Economics, Conner Hall, University of Georgia, Athens, GA 30602. oz@uga.edu, ilker@uga.edu, lgunter@agecon.uga.edu

Introduction

The Millennium Development Goals, which were originally developed by OECD, were adopted by 192 United Nations Members in 2000 for the purpose of meeting the needs of the World's poorest and reduce poverty. One of the reasons development assistance flows from donor countries to low income developing countries is to achieve these Millennium Development Goals. Recently, aid effectiveness discussions have been at the center of attention because a common concern in aid donor countries is whether the aid given for developmental assistance purposes is effective or not (Burnside, Dollar, Easterly). This concern casts doubt on the efficiency of foreign aid which usually leads the donor countries to what is termed "aid fatigueness". Previous literature on aid effectiveness only used aggregate aid to address these concerns. Our study deviates from this literature by dividing foreign aid into its components to assess the impact of agricultural foreign aid on agricultural output in low income developing countries.

What kind of growth is good for the poor?

Even though there are polar views on the effects of economic growth on development and poverty reduction, it is argued that economic growth benefits the poor on average (Dollar and Kraay, 2002). Although the majority of early development strategies relied on urban bias and industrialization as the main source for economic growth and development during 1960s and 1970s (Schiff and Valdez, 1998; Timmer, 1988), agriculture has been considered to have an active role in the development process since the prominent article by Johnston and Mellor (1961). A significant number of

researchers (Irz and Roe; Kanwar; Kogel and Furnkranz-Prskawetz; Rangarajan; Ravallion and Datt; Thirtle *et al.*; Timmer; Stern; Wichmann) suggest that agricultural growth promotes poverty reduction, hence the agricultural sector is an “engine of growth” at the early stages of development.

Research relating economic growth to poverty reduction has found that general GDP growth has had less impact on poverty reduction than growth in the agricultural sector, partly because of the high level of poverty in rural areas of developing countries [CGIAR, 2000; Ravallion and Datt ,1996; Timmer ,1997]. In most of the developing countries, the agricultural sector is the major source for employment (up to 81%), income (more than 50% of primary income on average) and export earnings (30% to 50%) but its share in GDP (from 3.5% to 36%) is not as high as its share in those economic activities and people who depend on agriculture for their livelihood live in poverty. The average percentages of the world’s poor that live in rural areas vary from 62 % to 90% (FAO, 2004; Thirtle et al., 2001; Lucas and Timmer, 2005). The regions which are affected from poverty most are South Asia, East Asia and Sub-Saharan Africa and they contain 90% of the world’s poor. Thus growth in the agricultural sector would be more pro-poor in the rural areas of developing countries than growth in the nonagricultural sector since agricultural growth is considered to have direct (Johnston and Mellor 1961) and indirect/roundabout linkages (Timmer, 2002) to the growth process and it can be used as the “engine of growth” for “agricultural-demand-led-industrialization” (Adelman, 1984).

Foreign Aid for Agricultural Growth

Foreign aid can be simply defined as economic assistance provided to a country by another country or organization. It can be given for economic, political or humanitarian purposes and can be classified as loans and grants, bilateral and multilateral aid or tied and untied aid. Two prominent areas of concern in recent economic development literature are the effectiveness of foreign aid and the impact of different types of aid on poverty in developing countries.

In aid effectiveness studies, some authors supply evidence for the positive effect of foreign aid on economic growth contingent on some political, structural and/or institutional conditions (Burnside and Dollar, 2000; Dalgaard and Hansen 2001; Chatterjee and Turnovsky, 2005, 2007). Others are more cautious about concluding that foreign aid will spur economic growth (Boone, 1996; Easterly, 1999; Easterly, Levine and Rodman, 2003). More recent analysis considers the differences in types of foreign assistance and addresses the possibility that different types of assistance have different economic impacts (Chatterjee, Sakoulis and Turnovsky, 2003; Chatterjee, Giuliano, Kaya, 2007).

Although there is a vast literature on foreign aid's effect on economic growth, a very limited number of studies tried to address the relationship between foreign assistance given to the agricultural sector for the purpose of agricultural growth (Dewbre, Thompson and Dewbre, 2007). The study by Norton, Ortiz and Pardey (1992) can be cited here too even though they used a total aid variable to look at its effect on agricultural growth. Because of the impact of agricultural growth on poverty reduction, our study of the effectiveness of development assistance is focused on the impact of

agricultural oriented assistance on the growth of agricultural sectors of developing countries.

Data and methods

This study will employ a cross-section time-series econometric model to analyze the impact of agricultural aid on agriculture in developing countries. Since there may be country specific unobserved heterogeneity which does not change across time with this model, we employed fixed effects regression models to correct for omitted variable bias. We will assess the impact of aid on agricultural output. We employ annual data from 1974 through 2005 for developing countries that are aid recipients. Variables related to cross-country differences are incorporated in the model to control for their impacts on the dependant variables.

We use agriculture value added as the dependent variable. Data on this variable are from World Bank's World Development Indicators 2007 (WDI).

The explanatory variable we are interested in most in this study is foreign assistance given to the agricultural sector for rural development purpose. Data on foreign assistance are available from the FAO Statistical Database of Food and Agriculture Organization of the United Nations.

The control variables for our analysis include GDP per capita, fertilizer consumption, irrigated land, land under cereal production, livestock production index, rural population, sum of exports and imports of goods and services measured as a share of gross domestic product, agricultural machinery(tractors) and crop production index. Data on these variables are from World Bank's World Development Indicators 2007. To

control for the differences in country sizes, all inputs and outputs were measured on a per hectare basis to achieve comparability (Norton, Ortiz and Pardey, 1992; Dewbre, Thompson and Dewbre, 2007).

To measure the effect of explanatory variables on agricultural output growth, it is important to identify a mechanism through which these variables can affect agricultural output growth. Our dependent variable, agriculture value added, can be defined as a function of revenue minus cost where revenue and cost are determined by the quantity of output, input and their prices respectively.

We include trade dependence (imports plus exports as a percentage of GDP) as international exposure could increase urban bias and per capita GDP as a proxy for income. Fertilizer consumption, agricultural machinery (tractors) and irrigated land are included to control for the differences in the agricultural sector. Since agriculture value added includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production, land under cereal production, livestock production index and crop production index are used to control for production in those areas. Finally, rural population is used as a proxy for employment in the agricultural sector.

The following empirical model is specified and estimated

$$Agvalueadded_{it} = \beta_0 + \beta_1 Agrasst_{it} + \beta_2 X_{it} + v_{it}$$

Agvalueadded corresponds to agriculture value added, *Agrasst* shows foreign assistance given to agricultural sector for rural development purpose, X_{it} is the set of controls, including variables that are considered standard determinants of agricultural growth in the literature.

Results

Our analysis will estimate the impacts of agricultural assistance and country specific economic characteristics on the growth of agricultural output in developing countries. The results from the estimations are presented in Table 1. The results indicate a positive and statistically significant relationship between growth in the agricultural output and agricultural assistance for rural development. All other signs for the explanatory variables are as expected.

IV. Conclusion

Growth in the agricultural sector is considered to be more pro-poor than the growth in the nonagricultural sector for developing countries. For this reason, the primary objective of our study is to assess the impact of agricultural foreign aid on agricultural output in developing countries. We found that there is a positive and statistically significant relationship between growth in the agricultural output and agricultural assistance for rural development so foreign assistance given for developmental purposes can achieve its goal if aid is targeted for the agricultural sector of the developing countries.

References:

- Adelman, I. "Beyond export-led growth." *World Development*, Vol. **12**, (1984) pp. 937-949.
- Alesina, A. and D. Dollar "Who Gives Foreign Aid to Whom and Why?" *Journal of Economic Growth*, Vol. **5**, (2000) pp. 33-63.
- Alesina, A. and B. Weder "Do Corrupt Governments Receive Less Foreign Aid?" *American Economic Review*, Vol. **92**, (2002) pp. 1126-1137.
- Boone, P. "Politics and the Effectiveness of Foreign Aid." *European Economic Review*, Vol. **40**, (1996) pp. 289-329.
- Burnside, C. and D. Dollar "Aid, Policies, and Growth." *American Economic Review*, Vol. **90**, (2000) pp. 847-868.
- Burnside, C. and D. Dollar "Aid, Policies, and Growth: Reply." *American Economic Review*, Vol. **94**, (2004) pp. 781-784.
- Burnside, C. and D. Dollar "Aid, Policies, and Growth: Revisiting the Evidence": The World Bank, Policy Research Working Paper Series: 3251, (2004).
- Byerlee, D., X. Diao and C. Jackson "Agriculture, Rural Development and Pro-poor Growth: Country Experiences in the Post-Reform Era." *Prepared as part of the Operationalizing Pro-Poor Growth research program. Processed. World Bank, Washington, DC*, (2005).
- Chatterjee, S., P. Giuliano and I. Kaya "Where Has All the Money Gone? Foreign Aid and the Quest for Growth." (2007).
- Chatterjee, S., G. Sakoulis and S.J. Turnovsky "Unilateral Capital Transfers, Public Investment, and Economic Growth." *European Economic Review*, Vol. **47**, (2003)

- pp. 1077-1103.
- Chatterjee, S. and S.J. Turnovsky "Financing Public Investment through Foreign Aid: Consequences for Economic Growth and Welfare." *Review of International Economics*, Vol. **13**, (2005) pp. 20-44.
- Chatterjee, S. and S.J. Turnovsky "Foreign Aid and Economic Growth: The Role of Flexible Labor Supply." *Journal of Development Economics*, forthcoming, (2007).
- Clements, B., S. Gupta, A. Pivovarsky and E.R. Tiongson "Foreign Aid: Grants versus Loans." *Finance & Development*, Vol. **41**, (2004) pp. 46-49.
- Dalgaard, C.-J. and H. Hansen "On Aid, Growth and Good Policies." *Journal of Development Studies*, Vol. **37**, (2001) pp. 17-41.
- David, D. and A. Kraay "Growth is Good for the Poor." *Journal of Economic Growth*, Vol. **7**, (2002) pp. 195–225.
- Dewbre, J., W. Thompson and J. Dewbre "Consistency or Conflict in OECD Agricultural Trade and Aid Policies." *American Journal of Agricultural Economics*, Vol. **89**, (2007) pp. 1161-1167.
- Dorward, A., J. Kydd, J. Morrison and I. Urey "A Policy Agenda for Pro-Poor Agricultural Growth." *World Development*, Vol. **32**, (2004) pp. 73-89.
- Easterly, W. "The Ghost of Financing Gap: Testing the Growth Model Used in the International Financial Institutions." *Journal of Development Economics*, Vol. **60**, (1999) pp. 423-438.
- Easterly, W. *The elusive quest for growth: Economists' adventures and misadventures in the tropics*, Cambridge and London:

MIT Press, 2001).

Easterly, W. "Can Foreign Aid Buy Growth?" *Journal of Economic Perspectives*, Vol. **17**, (2003) pp. 23-48.

Easterly, W., R. Levine and D. Roodman "New Data, New doubts: A Comment on Burnside and Dollar's 'Aid, Policies, and Growth' (2000)": National Bureau of Economic Research, Inc, NBER Working Papers: 9846, 2003).

Easterly, W., R. Levine and D. Roodman "Aid, Policies, and Growth: Comment." *American Economic Review*, Vol. **94**, (2004) pp. 774-780.

FAO Statistical Database of Food and Agriculture Organization of the United Nations. Internet site: <http://faostat.fao.org> (Accessed December 18, 2007).

Feeny, S. and B. Ouattara "What Type of Economic Growth Does Foreign Aid Support?"

Fürnkranz-Prskawetz, A. and T. Kögel "Agricultural Productivity Growth and Escape from the Malthusian Trap." (2000).

Gardner, B.L. "Causes of rural economic development." *Agricultural Economics*, Vol. **32**, (2005) pp. 21-41.

Gupta, S., B.J. Clements, A. Pivovarsky and E.R. Tiongson "Foreign Aid and Revenue Response: Does the Composition of Aid Matter?" International Monetary Fund, IMF Working Papers: 03/176, 2003).

Irz, X. and T. Roe "Seeds of growth? Agricultural productivity and the transitional dynamics of the Ramsey model." *European Review of Agricultural Economics*, Vol. **32**, (2005) pp. 143-165.

Johnston, B.F. and J.W. Mellor "The Role of Agriculture in Economic Development." *The American Economic Review*, Vol. **51**, (1961) pp. 566-593.

- Kanwar, S. "Does the Dog Wag the Tail or the Tail the Dog? Cointegration of Indian Agriculture with Nonagriculture." *Journal of Policy Modeling*, Vol. **22**, (2000) pp. 533-556.
- Lucas, S. and P. Timmer "Connecting the Poor to Economic Growth: Eight Key questions." *Centre for Global Development*, (2005).
- Norton, G. and J. Ortiz "The impact of foreign assistance on agricultural growth." *Economic Development & Cultural Change*, Vol. **40**, (1992) pp. 775.
- Rangarajan, C. *Agricultural Growth and Industrial Performance in India*, Int Food Policy Res Inst IFPRI, 1982).
- Ravallion, M. and G. Datt "When is growth pro-poor." *Evidence from the Diverse Experiences of India's States. World Bank Policy Research Working Paper*, Vol. **2263**, (1999).
- Ravallion, M. and G. Datt "How Important to India's Poor Is the Sectoral Composition of Economic Growth?" *The World Bank Economic Review*, Vol. **10**, (2001) pp. 1-25.
- Schiff, M. and A. Valdez "Agriculture and Macroeconomy, Handbook of Agriculture Economics, Ed." *B. Gardner and G. Rausser*, (1998).
- Stern, N. "Growth theories, old and new, and the role of agriculture in economic development." *Economic and social development paper (FAO)*, (1996).
- Tavares, J. "Does foreign aid corrupt?" *Economics Letters*, Vol. **79**, (2003) pp. 99-106.
- Thirtle, C., X. Irz, L. Lin, V. McKenzie-Hill and S. Wiggins "Relationship between changes in agricultural productivity and the incidence of poverty in developing countries." *DFID Report*, (2001).
- Tiffin, R. and X. Irz "Is agriculture the engine of growth?" *Agricultural Economics*, Vol.

- 35, (2006) pp. 79-89.
- Timmer, C.P. "How well do the poor connect to economic growth": CAER Discussion Paper, 1997).
- Timmer, C.P. "Agriculture and Economic Development." *Handbook of Agricultural Economics*, Vol. 2, (2002) pp. 1487-1546.
- Timmer, C.P. "Agriculture and Pro-Poor Growth: An Asian Perspective." *Unpublished Manuscript, Center for Global Development, Washington DC*, (2005).
- Timmer, C.P. and R. Consulting Assistance on Economic *How Well Do the Poor Connect to the Growth Process?*, Harvard Institute for International Development, 1997).
- Wichmann, T. *Agricultural technical progress and the development of a dual economy*, Physica-Verlag, 1997).
- WorldBank "World Development Indicators (WDI) CD-ROM": Washington, DC, World Bank, 2007).

APPENDIX

Table 1.

Explanatory variables	Dependent variable Agricultural value added per ha
Agricultural assistance for rural development	0.408 (1.76)*
GDP per capita	0.085 (5.28)***
Land under cereal production, ha	0.002 (0.53)
Agricultural machinery tractors per ha	1.955 (2.84)***
Irrigated land of cropland	-0.567 (0.27)
Fertilizer consumption 100 grams per ha	0.276 (4.63)***
Rural population per ha	133.329 (8.44)***
Trade of GDP (openness)	-0.960 (2.40)**
Livestock production index 1999-2001	0.849 (2.51)**
Constant	-119.926 (1.96)**
Observations	1455
Number of ifscode	112
R-squared	0.63
Robust t statistics in parentheses	
* significant at 10%; ** significant at 5%; *** significant at 1%	

Table 2. List of Recipient Countries Included in Our Panel Data

Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bangladesh, Belize, Benin, Bhutan, Bolivia, Bosnia & Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Chad, Chile, China, Colombia, Congo-Dem. Rep., Congo-Rep., Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, Arab Rep., El Salvador, Eritrea, Estonia, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Honduras, Hungary, India, Indonesia, Iran, Islamic Rep., Jamaica, Jordan, Kazakhstan, Kenya, Korea, Rep., Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Senegal, Serbia & Montenegro, South Africa, Sri Lanka, St. Lucia, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Togo, Trinidad & Tobago, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen-Rep., Zambia, Zimbabwe,