



NOPOOR POLICY BRIEF



nopoor

Enhancing Knowledge for
Renewed Policies against Poverty

NOPOOR POLICY BRIEF NR.22: INNOVATION ADOPTION AND LIQUIDITY CONSTRAINTS IN THE PRESENCE OF GRASSROOTS EXTENSION AGENTS: EVIDENCE FROM THE PERUVIAN HIGHLANDS

DATE: May 2017

AUTHOR(S):

Jean-Philippe Platteau, Centre of Research for Economic Development (CRED), University of Namur, Belgium; jean-philippe.platteau@unamur.be

This policy brief is aimed at identifying the constraints to innovation adoption in agricultural production in developing economics. It focuses on the effect of a program aimed at activating a market for technical innovations in the region of Highlands in Peru. The authors find that innovations, who were supplied by local extension agents, were widely adopted and that liquidity constraints played only a limited role. These are important findings at a time when population growth and greater prosperity mean the world's food production will need to double over the next three or four decades while growth of food production is seriously impeded in developing countries owing to a lack of yield increase.

INTRODUCTION

Almost all recent increases in the world's cereal output came from rich countries, and much of this was a result of increased acreage, a possibility almost foreclosed in developing countries (FAO, 2009). On the other hand, since poverty in the latter tends to be concentrated in rural areas, and non-agricultural opportunities in rural, and peri-urban areas are limited, poverty alleviation necessitates a significant increase in the incomes drawn from land-related activities.

In conditions of acute land pressure and/or poor soil fertility, such an increase will not be possible unless technical progress takes place on a large scale. The empirical literature shows that a wide variety of factors may influence technology adoption in developing areas. Whereas in some cases **information problems and lack of education** act as a significant barrier; in other cases **credit constraints, consumption risks, poor learning effects** due to low density of social networks, **problems of access to, and timely delivery of modern inputs**, as well as all the constraints associated with **poor infrastructure, or ill-adaptation of technical innovations on offer**, turn out to be the most decisive hurdles (see Foster and Rosenzweig, 2010, for a recent survey that puts emphasis on learning effects, and on risk, credit and scale constraints).

This study exploits the intervention of a Peruvian NGO (Non-Governmental Organisation), “Soluciones Practicas”, aimed at training local extension agents who would then be able to disseminate information and distribute modern inputs to potential users of the Peruvian Highlands. All the targeted population received the same information, training about input use and access to input distribution. It is thus possible to compare households with similar access to the supply of the innovations but differing in initial wealth.

Information about extension agents or innovation suppliers, and its articulation with key characteristics of would-be adopters, constitute another innovative feature of this work. It is the first systematic attempt to examine the role of supply factors, including their interaction with demand factors, in the adoption of innovations.

EVIDENCE AND ANALYSIS

Under a program aimed at activating a market for technical innovations in conditions of highly imperfect credit and insurance markets, cattle herders from a remote and poor area in the Peruvian Highlands were offered a range of new techniques. Diffusion has been helped by extension agents residing in the communities so that these herders were reasonably well informed about techniques appropriate to their local environment.

Eleven innovations aimed at improving either the health of the cowherds (veterinary services) or the productivity of the pastures (agricultural services) have been actively propagated by the extension agents: (1) hygienic measures to be applied during milking operations; (2) double cow milking per day (instead of one); (3) multiple ploughing; (4) use of organic fertilisers; (5) use of lime to reduce acidity of the land; (6) improved seeds for pasture cultivation; (7) vaccination of cows according to a fixed calendar; (8) use of ensilage; (9) use of hay bundles; (10) supplementary nutriment with vitamins; (11) precocious weaning (to put the new-born calves on an improved diet).

After checking for the possible role of wealth-dependent profitability, one key remaining constraint on innovation adoption is lack of liquidity. However, the liquidity constraint has a limited effect for the three following reasons:

- (i) innovations may be cheap in the sense that they do not embody (costly) monetary inputs;
- (ii) innovations may be divisible;
- (iii) the extension agents may provide seller credit to help users finance the purchase of these inputs.

A central finding is that, for two innovations that are costly and indivisible, extension agents have helped mitigate and even cancel the disadvantage of low income but only when they work and reside in the same community as the (poor) adopters. In other words, for these innovations, the liquidity constraint binds when the operating extension agent comes from another community (so that trust is not sufficient to justify a credit risk).

This finding therefore confirms a basic intuition on which the technology diffusion program rested from the very start: **extension work should be performed by motivated agents native from, and permanently residing in the user community.** On the other hand, the most important innovation that causes a liquidity problem (precocious weaning), irrespective of the extension agents' location, is largely indivisible, and it embodies costly inputs that are widely acquired outside the network of these agents.

Distribution of income has not changed much under the impact of the program and, if anything, distribution of productive assets has become more equal. The results therefore evoke the relatively egalitarian process underlying the Green Revolution as it has taken place in Asian agriculture, in particular. **In Peru, a central role has been played by extension agents recruited from the user communities themselves, and acting as private business operators rather than as salaried staff (or volunteers) of private or public organisations.**

Finally, innovation adoption is significantly influenced by education yet not for all innovations. Those for which education plays a perceptible role tend to require a lot of individual care and good management ability: multiple ploughing, application of organic fertilizers and lime, use of improved seeds and supplementary nutrients, and precocious weaning. It is noticeable that vaccination of the animals does not figure out in the list. This is because the operation involved, which takes place at a few discrete times, is the entire responsibility of the extension agent in charge. Herders just have to take their animals to him.

POLICY IMPLICATIONS

Extension agents appear to have played two critical roles. First, they have spread knowledge about available innovations and distributed the associated inputs. Their second function is the provision of credit to adopters, which is of much interest since the wealth or liquidity constraint possibly facing the latter can thus be mitigated.

Two specific features of the extension program in the study area go a long way toward explaining its success. **First, extension agents have been chosen by the local communities from their own ranks** and a significant number of them operate in their native community. **Second, they operate on a business basis** (they sell their services at freely set prices) rather than being state employees or volunteers of private organisations. These two characteristics ensure a high quality of the services provided. Some recent experiences unfolding in Africa (in Kenya, for example) seem to be inspired by the same principles and to show promising results: extension effort enables smallholders to benefit from recent innovations adapted to their specific micro-climatic environment.

This particular mode of operation of the extension agents has **helped promote equality of access to available innovations through supply of basic information and modern inputs, and through provision of seller credit to poor adopters for the most critical innovation.** Such a conclusion goes against the rather pessimistic assessment of the economic impact of agricultural extension that emerges from much of the past literature (see the review by Birkhaeuser et al., 1991). It is noteworthy, however, that pessimistic conclusions have been reached on the basis of ill-conceived extension programs.

The policy implication for donor agencies is clear: extension work is better promoted by locally recruited agents who reside in the target communities and, moreover, these agents should be let free to operate on a business basis. Direct intervention in their mode of operation is ill-suited, and the central role of the government or the donors consists of providing training to extension workers so that they become autonomous agents in a market-based environment. This does not preclude governments to grant subsidies for some critical innovations.

RESEARCH PARAMETERS

Although the study does not follow an experimental approach and does not use randomisation, it exploits the intervention of a NGO aimed at increasing the use of agricultural modern inputs in the Peruvian Highlands. The key feature of the intervention is that all inhabitants concerned by the intervention received the same access to information and distribution of innovations through the extension agents. It was thus possible to identify the impact of different initial wealth levels on the innovation adoption behaviour of otherwise similar farmers.

An important characteristic of the data collected is that they provide information about a rather large number of innovations on offer under the program. This allows to differentiate the effect of the wealth constraint according to innovations and to explain differential effects in terms of their specific characteristics, in particular the costliness of embodied inputs and the degree of their divisibility (about which we have rough information). A priori, if the liquidity explanation holds, one expects that costly and indivisible innovations are disproportionately adopted by richer households.

Moreover, detailed information has been gathered about extension agents or innovation suppliers, which permits analysis of how the characteristics of the agents interact with those of would-be adopters. This constitutes another original feature of the study, which allows to test whether physical or economic proximity between the adopters and the extension agents encourages adoption of costly innovations among poorer households. This can theoretically happen if the agents grant seller credit for purchases of costly inputs.

Drawing lessons from the failure of a past program of the central government of Peru (“Servicio Nacional de Sanidad Agraria”) and other similar experiences (including its own earlier programs), **the NGO “Soluciones Practicas” adopted a market-based participatory approach, meaning that:**

1. The NGO offered to twenty communities of the selected area to participate in a project of agricultural extension. All of them accepted.
2. Each community had to supply a list of potential candidates to be trained as extension agents. Were allowed to be included in the list only permanent residents, selected through a democratic election process during a community assembly. A total of 69 candidates were submitted to the NGO.
3. From this list, the NGO selected 42 people to be trained as extension agents (60 percent), called ‘promotores’. Besides satisfying a number of criteria decided by the NGO (minimum age, minimum education, probity, etc.) and unknown to the communities, the trainees had to commit that, after their training, they would return to their native community in order to carry out their extension activities on a business basis.

FURTHER READINGS

Birkhaeuser, D., R.E. Evenson, and G. Feder, 1991. “The Economic Impact of Agricultural Extension: A Review”, *Economic Development and Cultural Change*, Vol. 39, N° 3, pp. 607-650.

Bonjean, I., J.-P. Platteau, and V. Verardi, 2016, “Innovation Adoption and Liquidity Constraints in the Presence of Grassroots Extension Agents: Evidence from the Peruvian Highlands”, [NoPoor Working Paper#4](#).

Foster, A., and M.R. Rosenzweig, 2010. “Microeconomics of Technology Adoption”. *Annual Review of Economics*, Vol. 2.

PROJECT IDENTITY

PROJECT NAME	NOPOOR – Enhancing Knowledge for Renewed Policies against Poverty
COORDINATOR	Xavier Oudin, Scientific coordinator, IRD-DIAL, Paris, France oudin@dial.prd.fr
CONSORTIUM	CDD The Ghana Center for Democratic Development – Accra, Ghana CDE Centre for Development Economics – Delhi, India CNRS (India Unit) Centre de Sciences Humaines – New Delhi, India CRES Consortium pour la Recherche Économique et Sociale – Dakar, Senegal GIGA German Institute of Global and Area Studies – Hamburg, Germany GRADE Grupo de Análisis para el Desarrollo – Lima, Peru IfW Kiel Institute for the World Economy – Kiel, Germany IRD Institut de Recherche pour le Développement – Paris, France ITESM Instituto Tecnológico y de Estudios Superiores de Monterrey – Monterrey, Mexico LISER Luxemburg Institute of Socio-Economic Research – Esch-sur-Alzette, Luxemburg OIKODROM - The Vienna Institute for Urban Sustainability – Vienna, Austria UA-CEE Université d'Antananarivo – Antananarivo, Madagascar UAM Universidad Autónoma de Madrid – Madrid, Spain UCHILE Universidad de Chile – Santiago de Chile, Chile UCT–SALDRU University of Cape Town – Cape Town, South Africa UFRJ Universidade Federal do Rio de Janeiro – Rio de Janeiro, Brazil UNAMUR Université de Namur – Namur, Belgium UOXF-CSAE University of Oxford, Centre for the Study of African Economies – Oxford, United Kingdom VASS Vietnamese Academy of Social Sciences – Hanoi, Vietnam
FUNDING SCHEME	FP7 Framework Programme for Research of the European Union –SSH.2011.4.1-1: Tackling poverty in a development context, Collaborative project/Specific International Cooperation Action. Grant Agreement No. 290752
DURATION	April 2012 – September 2017, (66 months)
BUDGET	EU contribution: 8 000 000 €
WEBSITE	http://www.nopoor.eu/
FOR MORE INFORMATION	Jean-Philippe Platteau, researcher, Centre of Research for Economic Development (CRED), University of Namur Delia Visan, Manager, IRD-DIAL, Paris, France, delia.visan@ird.fr Tel: +33 1 53 24 14 66 Contact email address: info@nopoor.eu
EDITORIAL TEAM	Edgar Aragon, Laura Valadez (ITESM) Heidi Dumreicher (OIKODROM) Xavier Oudin (IRD) The views expressed in this paper are those of the authors and do not necessarily represent the views of the European Commission.