

The Diffusion of Innovation in Low Income Countries (DILIC): Outcomes updated to October 2014

DILIC Papers and Conference Presentations

Drivers of Export Upgrading (Shujin Zhu and Xiaolan Fu)

This paper analyses the determinants of export upgrading using a cross-country panel dataset over the 1992 - 2006 period. The results suggest that the export sophistication of countries is enhanced by capital deepening, engagement in knowledge creation, transfers via investment in education and R&D and foreign direct investment and imports. Institutional quality also facilitates the export upgrading of countries. The effect of natural resources on the structural upgrading of exports appears to be complex and mixed and is dependent upon the type of resources involved. The effects of these determinants vary between low, middle, and high income country groups.

Paper published in World Development (2013) 51: 221-233. [DOI:10.1016/j.worlddev.2013.05.017].

The diffusion of innovation in low-income countries – Survey Report (Xiaolan Fu, George Owusu Essegbey, Jun Hou, Pierre Mohnen, Giacomo Zanella)

The DILIC Survey Report summarizes and analyses the findings from the DILIC innovation survey, in which more than 500 formal and informal firms in Ghana were surveyed. The Survey collected detailed information on the nature of innovation, the barriers to innovation creation and diffusion, and the channels of innovation diffusion within and to low-income countries.

Key results from the survey have been presented in various conferences:

- Conference on the diffusion of innovation in low-income countries in Accra (Nov 2014 – Xiaolan Fu, Jun Hou, Giacomo Zanella)
- Frontiers in Development Studies Seminar Series at the International Poverty Reduction Centre in China (June 2014 - Xiaolan Fu)
- Symposium on new structural economics and the development in Africa at Peking University (June 2014 - Xiaolan Fu)
- Keynote speech at the Human Welfare Conference in Oxford (June 2014 – Xiaolan Fu)
- Africa Innovation Summit held in Cape Verde (June 2014 - Xiaolan Fu)
- OECD and World Bank Joint Symposium on Inclusive Innovation (March 2014 - Xiaolan Fu)
- UNCTAD Multi Year Inter-governmental Expert Meeting on Building Productive Capabilities for Sustainable Development (February 2014 - Xiaolan Fu)

The creation and diffusion of innovation in developing countries: A systematic literature review (Giacomo Zanella, Xiaolan Fu, Pierre Mohnen, Marc Ventresca)

In this study we reviewed the research in the diffusion of innovation in the private sectors (industry and services) in developing countries. In particular, we collected evidence on what are the barriers to

innovation creation and diffusion, the channels of innovation diffusion within developing countries, and the channels of diffusion of external innovation to developing countries. We found that innovation in developing countries is about creation or adoption of new ideas and technologies; but the capacity for innovation is embedded in and constituted by dynamics between geographical, socio-economic, political and legal subsystems. We contextualize the findings from the review in the current theoretical framework of diffusion of innovations, and we emphasize how the institutional context typical of developing countries impacts the diffusion itself.

Paper published as TMCD Working paper ([WP062](#)) and currently under “Revise and Resubmit”.

Innovation and firms’ growth in low-income countries (Xiaolan Fu and Giacomo Zanella)

Despite the high profile of the issues in current policy formulations in low-income countries (LICs), there is little empirical evidence on innovativeness and firm performance in formal and informal establishments and under severe institutional and resource constraints. This paper aims to fill this gap in the literature analysing data from a unique innovation survey of 500 manufacturing firms in Ghana. We found that both R&D based innovations and learning based innovation significantly affect the innovation outcomes, proving the former to have a greater contribution, mainly in informal establishments. In turn, product and management innovations seem to have the largest effect on firm performance. We also found that market, knowledge and resources constraints change firms’ behaviours toward innovation activities and severely reduce the impact innovations have on firms’ growth.

Paper accepted and to be presented at the Development Studies Association (DSA) 2014 Annual conference in London (UK).

Trade and productivity growth in Ghana: does Sino-Africa trade make a difference? (Xiaolan Fu, Jun Hou, Pierre Mohnen)

The current study attempts to investigate whether China-Africa integration through trade is more beneficial as regard to its impact on productivity performance by recipient countries. The empirical analysis relies on a unique dataset that comprises firm-level productivity and sectorial-level trade flow indicators. The findings suggest that African economies benefit more from economic integration with China, in regard to productivity improvement. Importing Chinese products, which are closer technologically to domestic production, has significant positive impact on improving firm TFP. Similarly, exporting to China, compared to other countries, also enhances the production capacity.

Paper accepted and to be presented at the Development Studies Association (DSA) 2014 Annual conference in London (UK).

Innovation under resources, capabilities and institutional constraints: The role of open innovation in low income countries (Xiaolan Fu and Giacomo Zanella)

Many firms in developed countries have started to implement open innovation (OI) as a necessary organisational adaption to changes in the environment, therefore a large volume of external technology and knowledge acquisition and exploitation takes place. We deploy this exploration - exploitation dichotomy as a theoretical framework to understand the openness of innovation as a

response to constraints in firms in low - income countries (LICs), where local and foreign sources of knowledge and technology may have different impact and users. To explore this phenomenon, we capture OI with two dimensions, breadth (range of external sources) and depth (importance of sources), and in turn each dimension into local and foreign OI breadth and OI depth. Using a system of equations, we find that OI depth and OI breadth positively affect the innovation performance but at a decreasing rate. Once we decompose the OI components, the local OI depth contributes for most of the effect of OI depth, while both local and foreign OI breadth are significant components. Both depth and breadth of OI are positively associated with constraints, suggesting firms are forced to open the innovation activities in response of knowledge, resources and skills constraints. We conclude discussing the policy implications of our findings.

Paper presented at the Academy of Innovation and Entrepreneurship 2013 Annual conference “Innovation and Entrepreneurship for Inclusive and Sustainable Development” in Oxford (UK) and at the Development Studies Association (DSA) 2014 Annual conference in London (UK).

Innovation under the radar in low income countries (LICs): Evidence from Ghana (Xiaolan Fu and Giacomo Zanella)

In developed countries innovation is often associated with patents and research and development (R&D) departments. Would this view of the world imply that in low-income countries (LICs), where skills and capital constraints are prevalent, firms are hardly innovative? In this study we investigate the nature of innovations in the private sector in Ghana and argue that this is not the case. The analysis focuses on three sectors of the industry relevant for the local economy: food processing, textile, and firms supplying construction businesses. To capture how the characteristics and constraints typical of informal settlements can shape the nature of innovation and the way innovation is adopted or created, half of the firms sampled in the food and textile sectors are from the informal sector. We surveyed a total of ten innovative firms in which we carried out 32 in-depth interviews among managers from different divisions and workers. We observed innovation activities in broad sense, not only in production process and improved products, but also often seen in new or improved management and marketing practices. However most of the innovations are incremental and not ground breaking. Regardless of industries, a pattern emerged on the drivers of innovation for formal and informal firms. Innovation for formal firms is primarily aimed to market expansion and ultimately increase the profits. Informal firms, instead, seem to innovate to survive with the aspiration of consolidating the business and move to a formal status. Therefore, innovation activities seem to assume great importance for consolidating and expanding formal firms, and developing informal establishments.

Paper presented at the OXFAM Lunch Seminar, UNU-WIDER Development Conference 2013 “Learning to Compete: Industrial Development and Policy in Africa” in Helsinki (Finland), the Academy of Innovation and Entrepreneurship 2013 Annual conference “Innovation and Entrepreneurship for Inclusive and Sustainable Development” in Oxford (UK), and the Development Studies Association (DSA) 2013 Annual conference in Birmingham (UK).

Multi-dimensional Complementarities and the Growth Impact of Direct Investment from China on Host Countries (Xiaolan Fu)

This paper examines the growth impact of developing country outward direct investment (OFDI) on the economic growth in host developing countries using a cross country panel dataset of Chinese OFDI over the 2003-2010 period. It finds that the growth effect of Chinese OFDI is determined by the multi-dimensional complementarities between the particular FDI flow, which is host country-specific, and the host economies. Overall Chinese OFDI appears to have a positive and significant impact on their long-run economic growth in host economies despite a negative association with short-run growth as Chinese OFDI seeks a variety of objectives in addition to a high growth market. Chinese OFDI appears to have contributed positively to the economic growth not only in Africa but also in Europe and North America. However, its contribution in Asia and Latin America is insignificant. Although the illustration of Chinese OFDI being mainly resource-seeking is exaggerating and misleading, Chinese OFDI in resource-rich country cannot avoid the resource curse either.

Paper published as TMCD Working paper ([WP050](#)).

Complementarity between In-house R&D and Technology Purchasing: Evidence from Chinese Manufacturing Firms (Jun Hou & Pierre Mohnen)

In order to catch up with the current technological frontier, firms, especially in developing countries, try to acquire technological advancement through internal R&D efforts, as well as through external technology-sourcing activities. This study tests whether these two sources of technology acquisition are complements or substitutes for each other in small- and medium-sized Chinese manufacturing firms. The evidence that we present shows some signs of complementarity between the two sources of knowledge in reaching a higher unconditional intensity of product innovation for firms with 100–300 employees and, in general, a significant degree of substitutability between them in achieving higher levels of labour productivity.

Paper published in Oxford Development Studies 41(3), 343-371.

Complementarity between internal knowledge creation and external knowledge sourcing in developing countries (Jun Hou and Pierre Mohnen)

In developing countries, innovation is to a large extent a matter of adoption of advanced technologies but also of conducting own R&D to be able to better assimilate existing technologies. This paper, based on firm level data from 24 developing countries, examines the roles of internal R&D efforts (MAKE) and external technology sourcing (BUY) in fostering productivity in manufacturing firms. Is MAKE a substitute for BUY or are the two strategies complementary as evidenced in some developed countries? Our empirical investigation highlights the critical role of external technology acquisition in manufacturing industries in low-income countries and exhibits signs of complementarity only in middle-income countries.

Paper published as TMCD Working paper ([WP054](#)) and currently under-review.

Transaction costs, information technologies, and the choice of marketplace among farmers in Northern Ghana (Giacomo Zanella, CS Srinivasan, Bhavani Shankar)

Using a transactions costs framework, we examine the impact of information and communication technologies (mobile phones and radios) use on market participation in developing country

agricultural markets using a novel transaction-level data set of Ghanaian farmers. Our analysis of the choice of markets by farmers suggests that market information from a broader range of markets may not always induce farmers to sell in more distant markets; instead farmers may use broader market information to enhance their bargaining power in closer markets. Finally, we find weak evidence on the impact of using mobile phones in attracting farm gate buyers.

Forthcoming in the Journal of Development Studies.

Information sources, ICTs and price information in rural agricultural markets (Giacomo Zanella, CS Srinivasan)

The spread and rapid uptake of mobile telephony in Sub-Saharan Africa has highlighted the potential role of Information Communication Technologies in improving market participation and welfare outcomes for farm producers in agricultural produce markets. This article explores the influence of different sources of information and transmission technologies on the quantum and reliability of market information flowing to farm producers, based on a survey of farm households in northern Ghana. Our results suggest that the principal role of radio broadcasts and mobile telephony is in providing a broader knowledge of markets by enhancing the quantum of market information flowing to farm producers. They do not, however, appear to have a significant impact on the quality/reliability of price information obtained by farmers for making marketing decisions. Information sources appear to be the chief determinant of the reliability of price information, with price information obtained from extension agents being the most credible. Our results provide some useful insights for the design and implementation of Market Information Systems aimed at encouraging market participation by rural farm producers in agricultural markets.

Paper published as TMCD Working paper ([WP051](#)) and forthcoming in the European Journal of Development Research.

Create or buy? - what is more efficient way of innovate, between In-house innovation and innovation outsourcing, in Tunisia (Jieun Choi)

Current PhD chapter.

Productivity convergence and exporting (Jieun Choi)

Current PhD chapter.

DILIC Project in the News

- ['UK Foreign Aid Turns to Research'](#), Nature, April 2014
- ['Secrecy among Kenyan firms may be impeding innovation'](#), SciDev.Net, April 2014
- 'Innovation takes Centre Stage' on Africa Business, pp.93-96, April 2014
- ['All together now'](#) on Research: News, Analysis, Funding, Data, 10 March 2014
- ['Africa's Firms Revealed As Innovative but Unsupported'](#) on SciDev.Net, 26 February 2014
- ['Top tips for building policy for innovation'](#) on SciDev.Net, 6 February 2014

DILIC Project Impact and Knowledge Exchange Activities

DILIC Panel at the DSA Conference

A Panel on “Innovation and industrialisation in low-income countries” has been organized at the Development Studies Association (DSA) Conference in 2013 (Birmingham, UK) and 2014 (London, UK). The Panel included both contributions from the DILIC Project and external speakers.

DILIC Panel at the AIE Conference

DILIC contributions were part of a Special Panel Session on “Innovation in Low Income Countries” at the Academy of Innovation and Entrepreneurship 2013 Annual conference “Innovation and Entrepreneurship for Inclusive and Sustainable Development” in Oxford (UK).

DILIC Workshop in Ghana

A workshop to introduce the DILIC project to local academics and policy makers was co-organized with Science and Technology Policy Research Institute (CSIR-STEPRI) in Accra on March 2013. The workshop was attended by more than 40 Ghanaian academics, researchers, policymakers and entrepreneurs. Inputs and comments from the audience informed the design of the research framework.

DILIC Results Dissemination Conference

On November 2014, the results from the DILIC survey will be presented and disseminated in a conference in Accra (Ghana). The survey collected detailed information on more than 500 Ghanaian formal and informal firms. The event, co-hosted with the Science and Technology Policy Research Institute, will be endorsed by the Ghanaian government and it is expected to be attended by around hundred participants amongst policymakers, academics, and practitioners.

DILIC Training Course

This two-day training course will be held in November in Accra (Ghana). Co-organized with the Science and Technology Policy Research Institute, it aims to provide the state of the art knowledge on the determinants and impact of technology transfer in and to the low income countries, including insights on designing and administrating innovation surveys. Fifty participants from West Africa will attend the event, including a mix of policy makers, academics, and doctoral students. Each participant will receive a scholarship to meet the costs of participation.

Impact video

A multimedia video is produced to disseminate research findings of DILIC Project. The target audiences are a range of stakeholders, including policy makers, practitioners, research institutes and the private sector. The video is in the process of postproduction and will soon be uploaded to our web site and YouTube channels.