

Growth
Research
Programme

An interim review of research outputs

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Introduction

Since 2012, the DfID-ESRC Growth Research Programme (DEGRP) has supported 43 projects on topics in agriculture, finance, innovation and China-Africa relations, across three calls.

While the projects are varied, they each tackle a component of a larger cohesive question; how to build and sustain economic growth within Low-Income Countries (LICs). Individually, and taken together as a portfolio, the projects funded under this research programme have pushed the boundaries of academic research in a variety of directions and provided (directly or indirectly) useful insights into development and growth.

This assessment comes at an early stage in the research cycle. Few projects have completed their fieldwork phase and even fewer have yet produced all the outputs that may be expected from the projects. In particular, most of the outputs currently available have been produced by call 1 projects, which skews the available material towards projects funded under the agriculture stream. Further, the five projects in the China-Africa stream will not complete field work until 2018-19; hence these are not in a position to be reviewed here. A full picture of the outputs produced under the DEGRP will take a few more years to emerge, as will a coherent mapping of the DEGRP's effects on policy and academic knowledge.

However, available academic outputs, supplemented by intermediate outputs -- including blog posts, presentations and website material -- give a good idea of the status and trajectory of the research portfolio.

Even with a subset of the projects, the breadth of the DEGRP-funded research is clear. This breadth is apparent in the geographies and contexts studied, methodologies, research questions, findings, and pathways of influence. The largest number of projects focus on sub-Saharan Africa, but many have also been implemented in China, Nepal, Bangladesh and elsewhere. Methodologies include randomised controlled trials (RCTs), quantitative analyses of observational data, qualitative analysis, case studies, economic modelling and database creation.

The research topics and findings are highly varied, but three cross-cutting points of synthesis emerge from the collected portfolio.

1. **Capability of individual actors**

Perhaps it is a truism, but the capability of individual actors (e.g. entrepreneurs, workers, consumers, firms, farms and financial institutions) to operate effectively promotes individual and aggregate economic success. This holds in any economic context, but the abilities and capabilities of decision-makers matter even more in the conditions that characterise many developing countries. Decision-makers must contend with risk and uncertainty, limited information, and other constraints. The DEGRP studies find that individual actors and firms are highly innovative, but they may lack the capacity to assimilate externally produced innovations. For instance, farmers may benefit from a range of information and other support, and individuals may improve their business and investment choices through financial literacy campaigns. Increasing the capacity and information available to decision-makers seems consistently important.

2. Structural and policy environment matters

A closely related point is that development patterns depend on the wider structural and policy environment. Across the portfolio, studies show that the policy environment matters deeply for growth. Some forms of innovation fail to take off because of a lack of support from policy-makers or because of challenging structural conditions. Markets by themselves may not be sufficient to drive innovation: weaknesses or missing links in supply and value chains hinder innovation. All too frequently, underdeveloped markets, poor infrastructure and a lack of property rights impede agricultural growth and transformation. In the area of financial development, a common finding is that weak regulatory capacity leads to unintended side effects of government regulation, which may be part of the reason that large segments of society are left financially excluded.

3. Aggregate outcomes are also key

Although specific development projects may matter for development, and individual income gains are the foundation for economic growth, the DEGRP studies show that the converse is also true: aggregate outcomes matter for individual incentives and choices. Specifically, economic growth and development shape the choices of individual actors and groups and thus influence the pathways of development. In particular, macro-scale attributes of the economy matter for whether and when growth is pro-poor. In this theme, researchers find that innovation tends to have positive effects on individual- and firm-level outcomes – although benefits and costs may be unequally shared. Similarly, considerable evidence shows that agricultural sector transformation leads to out-migration – another example of aggregate forces driving individual choices. Similarly, macroeconomic volatility can produce unequal growth and heterogeneous impacts on different individuals and groups.

These three points of synthesis emerge from the portfolio of studies, as broad implications. But the DEGRP studies have also led to sharper and more precise policy implications. The policy impact of the DEGRP research has taken many forms. Some of the research projects focus explicitly on producing papers to be published in peer-reviewed journals, while others are more directly focused on impacting policy through other approaches; e.g. policy workshops, working papers, and presentations aimed at policy-makers in government and decision-makers in the private sector and civil society. All the projects which have been reviewed directly or indirectly produce policy recommendations under these three clusters: to improve individual actors to engage in growth-promoting activities; to produce a conducive environment to growth; and to support pro-poor growth.

Overall, the projects under the DEGRP have pushed the boundaries of the academic field in a number of ways, demonstrating the importance of bringing multiple methods to bear on important research questions. The projects have also produced a number of applicable insights for policy-makers. Given that the DEGRP is in a relatively early stage, it can be hoped that this pattern will continue.

Summary of projects and contexts

As noted, the projects funded to date span four broad areas (agriculture, innovation, finance and China-Africa) and have been commissioned under three separate calls: call 1 opened in mid-2012 and was completed in early 2016; call 2 began in early 2015 and is close to completion; and call 3 opened in early 2016, and is still some distance from finishing. This review only covers projects with available outcomes, which means primarily call 1 projects and, to a lesser degree, some call 2 projects. These two calls, and especially call 1, were dominated by projects in the agriculture portfolio, with the finance and innovation portfolios following chronologically.

The agricultural portfolio breaks down into a number of overlapping sub-categories.⁵ One group of projects explore how farmers are able to assimilate information, as studied by Bulte et al. (Wageningen University), Dorward et al. (University of Reading), Subramanian et al. (University of Glasgow), Udry et al. (Innovations for Poverty Action), and Macours et al. (Paris School of Economics). Another sub-topic looks at risk, insurance and input use, with projects by Verschoor et al. (University of East Anglia), Marr et al. (University of Greenwich), Van Ittersum et al. (Wageningen University), Udry et al. and Macours et al. A third group of projects look at the challenges of irrigation – Woodhouse et al. (University of Manchester), Harrison et al. (University of Sussex), and Meinzen-Dick et al. (International Food Policy Research Institute).

While these three sub-sectors predominantly focus on supply-side issues, others explore how demand is affected by marketing and value chains, namely Depetris Chauvin et al. (African Center for Economic Transformation), Revoredo-Giha et al. (Scotland's Rural College) and du Toit et al. (University of the Western Cape). A final two sub-categories are the effect of property rights on agricultural and welfare outcomes, as studied by Liu et al. (University of Houston) and Grobovsek et al. (University of Edinburgh), and the long-term change in the agricultural sector, studied by Brockington et al. (University of Manchester), Ghimire et al. (University of Michigan), and Djurfeldt et al. (Lund University). The vast majority of these projects are situated in sub-Saharan Africa, with only three of the 19 projects situated wholly elsewhere (Subramanian et al. in India, Liu et al. in China, and Ghimire et al. in Nepal).

The finance portfolio is smaller by comparison, with only four projects at or close to completion with accessible outputs. These projects tackle three primary issues. The first is the relationship between output volatility, capital flow volatility, and income inequality, as studied by Agénor et al. (University of Manchester). A second sub-topic examines the linkages between financial development, financial stability and inclusive growth. These papers emphasise the ways in which financial development is affected by prudential regulation and institutions, tackled by both Andrianova et al. (University of Leicester) and Agénor et al. The final sub-topic looks at the factors driving and limiting financial inclusion, with projects by Brown et al. (Cardiff University) and Griffith-Jones et al. (Overseas Development Institute). All four of these projects are focused on sub-Saharan Africa.

The fourth topic, China-Africa, is not discussed here as none of the projects are at a suitable stage for analysis.

⁵ This review will refer to projects by their principal investigators (as per the DEGRP website).

Summary of methodologies

The projects are heterogeneous in aim and context and draw on a range of research methodologies.

Randomised Controlled Trials (RCTs), viewed many as the ‘Gold Standard’ of research techniques, at least for some purposes, are utilised by a number of projects. By their nature, these projects concentrate on micro-level analysis. In the DEGRP portfolio, these projects are concentrated in the agriculture stream. For example, Udry et al.’s ‘Disseminating Innovative Resources and Technologies to Smallholders’ (DIRTS) project implements an RCT with treatment arms focusing on smartphone-based extension services, weather-indexed insurance, and improved-yield input packages. Subramanian et al. are running a similar set of RCTs exploring the effect of agricultural extension services provided through tele-centres and e-government. Several other studies implement RCTs as part of their research, though due to the length of implementation and analysis, results are yet to be published.

As is well known, the benefit of this approach is the high-level of internal validity; correctly implemented RCTs should avoid the confounding factors seen in observational studies. However, there are also drawbacks to this approach, the most salient of which are a limitation of scope, cost and sometimes limited external validity. These disadvantages mean that the additional use of other methodologies within projects and across DEGRP is a strong positive.

The dominant methodological approach within the DEGRP portfolio remains the application of standard econometric techniques on **non-experimental quantitative data**, primarily to identify causal effects in the data. For example, Ghimire et al. have attempted to determine the impact of agricultural technological capacity and out-migration in Nepal, using a panel dataset (the Chitwan Valley Family Study), while in the finance portfolio several papers use country-level panel data regression analysis to explore the impact of aspects of financial sector development on macroeconomic performance (for example, Agénor et al., Andrianova et al., Combes et al. (2016), Demetriades and Rousseau (2016), Fielding and Rewilak (2015) and Neanidis (2015)). Other projects, for example Van Ittersum et al., use (or plan to use) techniques which are more descriptive.

A third commonly used methodology, mostly in the agriculture portfolio, uses **qualitative instruments**. These techniques are normally used in conjunction with other methods, or to provide context for the quantitative findings of other analysis. For example, Depetris Chauvin et al. use qualitative research to accompany an economic modelling exercise (Depetris Chauvin et al., 2017). Djurfeldt et al.’s AFRINT III research project similarly uses a village-level qualitative instrument in conjunction with quantitative data collection. **Case studies** are a fourth common methodology, used in all three DEGRP topics. For example, financial inclusion is studied under Griffith-Jones et al. in Kenya (Mwega, 2014), Ethiopia (Zwedu, 2014) and elsewhere, Revoredo-Giha et al. look in depth at the dairy sector in Malawi, and Mackintosh et al. study the local pharmaceutical industry in Kenya and Tanzania.

A few papers use **calibrated economic models**. Depetris Chauvin et al. use case studies to build a partial equilibrium model of agricultural supply and value chains, before calibrating with data from several countries and exploring shocks. Grobovsek et al. create a dynamic general equilibrium model of how land market rigidities affect land rental and occupation choices; they then calibrate the model with data from Ethiopia and Uganda to explore how much of the agricultural productivity gap can be explained

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by these rigidities. The work by Agénor and colleagues on the transmission from aid volatility to growth and from macro-prudential regulation to growth is also based on calibrated analytical models.

Finally, some studies focus mainly on the creation of novel and interesting **datasets**. In innovation, Fu et al. have been working on DILIC (the Diffusion of Innovation in Low Income Countries), a dataset of innovation perceptions in multiple low income countries, while McMillan et al. have been collating a dataset of value added at the country level. In agriculture, Brockington et al. have been building a fascinating panel dataset (see Box 1), while Djurfeldt et al.'s AFRINT III is an ongoing project to build an agricultural longitudinal dataset.

Box 1. A Novel Tanzanian Panel Dataset

Brockington et al. have been building a new and innovative panel dataset in Tanzania to help identify whether economic growth in Tanzania since the 1990s has been pro-poor. To do this, they have been gathering cross-sectional data from a wide range of surveys carried out in the 1990s and early 2000s, and then returning to the study locations to find and re-survey participants. This study has benefited from Tanzania having an unusually rich collection of datasets with appropriate methodologies (random or stratified random samples, looking at measures of prosperity or assets). At the time of writing this study was still ongoing, with participants of the original surveys being re-surveyed in several locations. Despite the expected difficulties that will be faced, this is a fascinating endeavour, with the potential to lead to a compelling story of Tanzanian growth's effect on its poor.

Research questions and findings

We return to the three cross-cutting points of synthesis identified in the introduction; the capability of individual actors to operate effectively in the face of risk and uncertainty; how the wider structural and policy environment constrains individual actors; and the effects of aggregate growth on the outcomes and decisions of individuals, especially the poor. Not surprisingly, the research does not uncover simple transformative answers but each of these research clusters contains a number of findings which can both inform policy and academic thought around growth in LICs.

The capacity of individual actors to operate effectively in the face of risk, uncertainty, low and incomplete levels of knowledge

A number of projects in each sub-topic tackle whether individual actors (namely individuals, firms, farms and financial institutions) are capable of using the information and options available to them, and indeed whether the information is fit for purpose. The answer to this question has important policy implications. If growth is stifled due to poor individual decision-making, then appropriate policy recommendations are to provide education and information, for example through extension services. In contrast, if decision-making is demonstrated to be of a broadly good quality, the policy priorities lie elsewhere – most likely in addressing structural constraints on well-behaving agents (see the next section).

The findings of DEGRP studies in this area are mixed. In the innovation stream, in particular, several projects find that innovation is pervasive among individual actors despite contrary perceptions. In contrast, several papers in the agriculture stream – based on the evaluation of interventions that aim to support farmer decision-making -- question whether farmers optimise according to rational decision rules. The finance stream is less focused on individual actors as a whole (most projects take a macroeconomic perspective), but nonetheless projects demonstrate poor financial literacy among individuals. Together, this evidence suggests highly capable individual actors sourcing and designing new innovations, but nonetheless needing further support in accessing their available options.

An important finding across several projects in the innovation stream is that innovation is, despite common perceptions to the contrary, ubiquitous in LICs. Projects have found evidence of active innovation across countries and sectors, across the formal and informal sectors, and across the agriculture, industrial, and services sectors. Much of this innovation is locally sourced, and the innovation tends to increase productivity, income, and the supply of basic needs. Fu et al.'s DILIC survey suggests, for example, that firms in Ghana undertake innovation activities in both technological and non-technological fields within both the formal and informal sector. These innovations are typically incremental in nature. Many innovations are demand-driven, based on learning, adoption and adaptation. Most draw on appropriate technologies and processes (Fu et al., 2014). Similarly, strong locally-driven innovation has been demonstrated in pharmaceuticals (Mackintosh et al., 2016), irrigation (Beckman et al., 2014) and elsewhere. The core implication from these studies is that actors are certainly able and willing to innovate. External factors, rather than internal constraints, seem to hold people back.

In contrast, many of the projects in the agriculture portfolio are premised on the idea that there are profitable technologies which are not taken up by farmers at sufficiently high levels, suggesting the

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presence of substantial psychological, informational or cognitive barriers. Several projects utilise RCTs to test methods to overcome these barriers, for example through improving farmer knowledge of appropriate available technologies (Bulte et al. and Subramanian), improving take-up of insurance in high-risk environments (Udry et al.), and improving take-up of high-quality inputs (Marr et al.). Preliminary results from Bulte et al. show that extension services do produce positive effects on farmer knowledge.

Further, Verschoor et al. directly explore psychological barriers to risk through a 'lab-in-the-field' approach, focusing primarily on the relationship between risk aversion and the growing of profitable cash crops. Typically, they find that while there is no relationship between these factors, risk-averse farmers do tend to refrain from using fertiliser, a purchased input with negative returns in some seasons. In the finance stream, Andrianova et al. and Sayinzoga et al. (2015) find that financial literacy training is successful in building individual capabilities, and leads to higher savings behaviour and a greater chance of starting an income-generating activity. These projects together suggest that farmers do not always access the profitable technologies that are available to them. It should be noted, however, that the studies do not always provide clear rejection of an alternative explanation – namely, that supposedly profitable technologies may not deliver profits under farm conditions.

How does the wider structural and policy environment support or constrain individual behaviours?

Several projects tackle the flip side of the previous section; whether potentially growth-generating actions by individual households and firms are constrained by the wider structural and policy environment. Most projects answer this question with a strong affirmative, detailing the numerous ways in which individual actors are constrained from engaging in growth-generating activities. This holds across all three research themes.

Several projects in the innovation portfolio detail how structural constraints, in particular those resulting from poor policy, act to block innovation. First, a key finding across projects is that low attention is paid to certain forms of innovation, in particular that taking place in the informal sector and in agriculture (Fu et al., 2014). This kind of innovation is unglamorous compared with high-tech innovations in information technology or other frontier fields, but it is nevertheless important for developing countries. Mackintosh et al. (2016) similarly find that domestic innovation in pharmaceuticals, which has the potential to lead to low cost vital medications, is undermined by poor market structures and a lack of external recognition of local suppliers. Fu et al. (2014) find the ability to assimilate external sources of innovation is constrained by ineffective infrastructure and a lack of investment, with universities and research institutions in Ghana playing a limited role in technology transfer. Finally, several projects find that women in particular are often excluded culturally from innovating (for example Woodruff et al.). Further projects, including some still in the pipeline (e.g. McMillan et al.) can be expected to demonstrate these constraints further.

In agriculture, the story is similar. Supply and value chains are shown to be underdeveloped, limiting the potential for innovation and growth in farms. Dorward et al. demonstrate these as particular checks on a potentially vibrant source of innovation, while Depetris Chauvin specifically models the effect of limited downstream competition on farmers' prices (this study finds that an increase in competition could have a large effect in some contexts). Revoredo-Giha's case study analysis of dairying in Malawi demonstrates a host of structural constraints, including poor transport and electrical infrastructure, and a lack of consumer demand, which are holding back the sector. A lack of property rights is another identified constraint; Liu et al. (2017) find that giving farmers leasing rights to their land in China

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increased productivity and the appropriateness of crop choices. In a similar vein, Grobovsek et al. calculate that much of the agricultural productivity gap can be explained by misallocation due to insecure land rights.

In finance, several key constraints are highlighted. A common theme is a variant of the ‘institutional weakness’ diagnosis, in which financial reform measures have unintended side effects due to thin markets and weak institutions. For example, Demetriades and Rousseau use Andrianova et al.’s database to find that in countries with weak regulations and banking supervision, pro-market financial reforms (for example, interest rate liberalisation and privatisation) can have negative effects on growth. In addition, several papers under Brown et al. and Griffith-Jones et al. demonstrate the financial exclusion of large segments of the population in LICs.

The effects of economic growth on the outcomes of individuals

The third point of synthesis is that growth has important consequences for the decisions of individual actors and of the poor. Rather than looking at the causes of growth, these studies point to the importance of growth itself for altering the choices and constraints of individuals, firms, and other decision-makers. A number of studies show the transformational impacts of growth – and the potentially disruptive effects of volatile growth. These studies also point to a role for supporting individual agents to smooth these effects.

The common growth path of a structural change from an agricultural to a manufacturing or service-based economy inherently results in disruption to livelihoods and social norms, with migration from rural to urban areas a common result. Ghimire et al.’s study on agricultural productivity and out-migration in Nepal is predicated on the idea that increased agricultural productivity decreases labour requirements on farms, leading to out-migration from rural areas. Grobovsek et al.’s dynamic equilibrium model, built to explain the effect of increased land transferability on productivity show similar results, with a predicted out-migration of the least productive farmers (Gottlieb and Grobovsek, 2016). A further understanding of the heterogeneous long-term effects of growth can be expected from Brockington et al.’s project.

A number of projects in the finance stream evaluate the link between economic growth, financial development, and inequality. Agénor finds that growth and equality may be hindered by volatile aid flows, focusing in particular on the impact of aid-financed subsidies to education, which become

Box 2. How does aid affect growth?

Two papers under the finance stream tackle (directly and indirectly) the effect of aid on financial growth and inequality, producing an interesting combination of results. Focusing on education (though the model could be extended), Agénor unpacks a mechanism in which due to uncertainty around the net return to skills, resulting from the impact of aid-driven public subsidies, agents may be dissuaded from investing in human capital. If access to education is skewed away from low-income individuals, then these will be particularly effected, exacerbating income inequality (Agénor et al., 2016). Chauvet et al. (2016) find that aid can actually prevent economic volatility from feeding into increased inequality. The mechanism for this is not clear, though one feasible option would be the mechanism identified by Agénor working in the opposite direction under conditions of low aid volatility.

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unpredictable as a result of volatility in aid. Chauvet et al. (2016) similarly find that economic volatility can exacerbate income inequality, though interestingly they find that this can be mitigated through aid. A more optimistic finding is from Rewilak (2013), using a 50-year panel on 100 countries over 50 years to argue that the relationship between average income and the income of the lowest quartile is positive and significant.

Policy and academic implications

The DEGRP projects so far have different objectives and are likely to exert leverage at different points in policy debates. Some projects are much more academically focused than others and are likely to lead to 3* or 4* rated academic papers on the government's Research Excellence Framework scale, with a high likelihood of being published in top peer-reviewed journals. Other projects are not focused in this direction but are more likely to function as resources for other researchers, with policy briefs pointing to applicable policy recommendations. All the projects should, directly through policy briefs or indirectly through pushing academic understanding, produce knowledge and tools supporting policy-making. Further policy implications will continue to emerge as research under the DEGRP comes to fruition, but a set of direct and implied policy recommendations can be gleaned from the results so far.

As per the last section, the first category of policy recommendations relates to the need to support individual actors to overcome psychological, informational and cognitive barriers to growth-promoting behaviours. In particular, findings from several agricultural projects provide impetus for supporting farmers with extension services, encouragement in using insurance and new input technologies, and support for communal irrigation infrastructure creation. Similarly, Sayinzoga et al.'s findings suggest an important role for financial literacy campaigns.

The second category of recommendations revolves around providing a supportive environment in which individual actors can engage in growth-promoting activities. This includes supporting and encouraging informal sources of innovation, encouraging the assimilation of foreign innovation through investment in infrastructure, and supporting the functionality of supply and value chains. Examples of agriculture-specific recommendations are to improve property rights and to promote competition in markets for agricultural produce. In finance, building regulatory capacity is a priority to address institutional weakness, and to protect individuals from volatility in financial markets. Increasing financial inclusion is also an important recommendation.

The third category relates to ensuring that economic growth is pro-poor, and protecting individuals during periods of structural change and turbulent growth. Projects by Ghimire et al. and Grobovsek et al. have demonstrated the demographic upheavals that can be expected (and are being seen) in countries undergoing structural change. These shifts call for planning and preparation. In finance, Agénor and Chauvet's research demonstrates the importance of developing a smoothing mechanism for aid flows to prevent negative knock-on effects on growth and inequality.

Conclusions and outstanding questions

Even at this early stage, the DEGRP covers a wide canvas and, as this review suggests, has generated some important research and policy insights. But breadth is, in some respects, inevitably traded off against depth, so that several important questions have perhaps not been tackled with as much rigour as might have been hoped. Some of these areas and questions may be answered under projects in calls 2 and 3, several of which are yet to produce results, but at this stage, several core research priorities can be identified.

First, in the agricultural portfolio, there remains a need for more projects that are situated in the literature on economic growth and structural transformation. Few projects under the DEGRP attempt to model the links between agricultural and non-agricultural productivity, or the relationship between agricultural sector changes and aggregate growth. This is a significant omission, given a growing body of cutting-edge literature which does just this. Instead, most projects focus on micro studies and more local effects. Macroeconomic modelling has shown promise in understanding the underlying drivers of structural change, although large-scale computational models (e.g. the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) produced by the International Food Policy Research Institute (IFPRI)) have significant limitations. Further theoretical research, plus an empirical counterpart, has the potential to drive impactful policy-relevant insights.

Second, in the area of finance, several interesting questions remain, although several of these appear to be anticipated in calls 2 and 3. Methodologically, given the limits and extensive history of aggregate cross-country analysis, it may be worth using microeconomic and administrative data, including that generated from lab-in-field experiments and RCTs. Thematically, pressing questions include how to build equity-based and insurance-based micro-finance contracts (rather than traditional debt-focused contracts) to support risk-sharing; how to transfer lessons on macro-prudential regulation into a low-income setting; what the regulatory requirements are for new regional banks, in an environment of greater securitisation; and how do changes in the nature of African financial sectors (in particular the development of mobile money and e-commerce) change the nature of the monetary transmission mechanism and the role of banks?

Finally, pressing questions in the innovation stream cross-cut the other two (for example how to create equity and insurance based micro-finance). However, more focused research questions are evident in this area. For example, an engagement with the literature on the benefits of promoting local innovation and production (for example through infant industry trade policies) could generate useful policy insights.

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