



This document contains example responses for sections 2 through 7 of the STEG Small/PhD Research Grants proposal template. It is shared alongside the template instructions as a guide for applicants. The examples illustrate how to respond to each section in a detailed and well-structured way, but there is no perfect answer, nor is any single methodology preferred, and applicants should not aim to replicate these responses.

## 2. METHODOLOGY

Please describe the methodology you will use to address the research question in greater detail here. Methodologies should be rigorous and appropriate for answering the question to be asked. Please explain how the methods will also be well-suited for informing the larger question of structural transformation and economic growth.

The proposal does not need to include a fully specified model or detailed mathematical structure of the analysis, but it should communicate the key elements of the proposed methods. These key elements depend on the methods proposed. For example, in a quantitative modelling project, a submission might indicate key model mechanisms and discuss the ways in which the model will be taken to data. Projects that will rely more on empirical analysis should describe the data, discuss measurement issues, causal identification, and other methodological issues.

### *Example 1*

*We use a dynamic, general-equilibrium model to evaluate the quantitative impact on deforestation of trade policy and other economic forces, such as agricultural productivity and population growth, across the world and over time. The model incorporates many countries, three broad sectors—agriculture, manufacturing, and services—and disaggregate activities within agriculture. There is also a market and, hence, a price for new land. New land is supplied by a firm that employs labour to transform forests into land. Landowners purchase new land and rent their land holdings to other sectors in the economy. Lastly, there are frictions to the reallocation of land between uses and of labour between sectors.*

*The equilibrium in our model is shaped by three mechanisms: (i) structural change determines the size of the agricultural sector and the demand for land; (ii) comparative advantage determines relative prices between countries and industries and, therefore, distributes pressures on land use across countries; and (iii) land accumulation and conversion decisions are forward looking and subject to adjustment costs, which means that future shocks (such as population growth) can generate current deforestation, but also that the adjustment of forest area is slow.*

*To document empirical patterns and to quantify the model, we combine standard data on trade and production with data on global forest area from FAO-FRA (Forest Resource Assessment). The latter is the key reference for the policy analysis on global deforestation. In addition, to account for heterogeneity in the density of forests and agricultural productivity within countries, we plan to incorporate data from Hansen et al. (2013) and the FAO-GAEZ project into our quantitative analysis, which will allow us to bring heterogeneity within countries. We will calibrate demand and supply shifters and trade costs based on standard methods in the spatial economics and trade literature. New to our work is the supply side of land production—which converts forests into agricultural land. To calibrate the parameters of the land production sector, we will exploit observed variations in deforestation in response to agricultural demand shocks. Specifically, we will estimate the reduced-form impact of agricultural exports on deforestation, instrumenting agricultural exports using a shift-share design that captures the different exposure of countries to foreign food demand. We will then search for model parameters that replicate the reduced-form coefficients.*

*Equipped with the calibrated model, we will study a series of counterfactual scenarios to understand how trade openness, agricultural productivity growth, and population growth affect deforestation. Our analytical results and preliminary simulations suggest that reductions in export costs, when it takes place for a single country, increase deforestation in that country; whereas multilateral reductions in export costs tend to reduce deforestation because they trigger reallocation of activity away from agriculture (i.e., structural change). In this preliminary quantification of the model, we use data from WIOD, which provides production, trade, and input-output data. The WIOD has been extensively used for the quantification of global trade models, but it has limited coverage of low- and middle-income countries in which large forest areas are located and deforestation has accelerated. We plan to use GTAP database which has a similar format but significantly larger coverage.*



*Example 2*

*Our methodology comprises of two approaches designed around two massive flood events that occurred in 2012 and 2020 in Nigeria.*

*1. Panel Approach*

*Context: In 2012, excessive rainfall caused widespread flooding across much of Nigeria. The flood caused an estimated \$16.9 billion in damages and killed 431 people (Unah, 2017). This large flood shock provides an ideal context for analysing long-term impacts of weather-related disasters on structural transformation. We will leverage high-quality georeferenced household panel data between 2010 and 2019 from the Living Standards Measurement Survey – Integrated Survey on Agriculture (LSMS-ISA) and geospatial information to estimate how the 2012 flood affected labour market diversification.*

*Methodology: The empirical strategy involves comparing labour market outcomes for flooded and non-flooded units, using multiple estimates of flood exposure including self-reported flood shock and satellite imagery to provide a nuanced measure of flood vulnerability and reduce measurement error common in climate impact research (Michler et al., 2021). We will use the four waves of the Nigeria LSMS to test for baseline balance and for short-term and medium-term (around 6 years) impacts of flood shocks. Data on agricultural losses and other damages of the 2012 flood in the 2012-13 survey round will allow us to explore wealth losses as a mechanism. We will estimate a panel fixed effects model to overcome endogeneity due to time-invariant heterogeneity and include region by year fixed effects to control for common changes over time across broad geographies. We will restrict the sample to areas within some distance of flood realizations to increase comparability of the control group. We may also apply matching and weighting techniques to ensure baseline balance across groups. We will cluster standard errors at district level and compute Conley standard errors to account for spatial and temporal correlation.*

*2. Cross-sectional Approach*

*Context: In September 2020, excessive rainfall caused one of the worst floods in Nigeria in several decades. It is estimated to have destroyed a quarter of national rice output and affected over 100,000 farmers (NIHSA, 2021). In addition to impacts on agriculture, the floods devastated infrastructure, houses, and assets, causing substantial losses in livelihoods. Due to the magnitude of the catastrophe, coupled with the pandemic and economic recession in Nigeria, recovery has been sluggish. This is expected to reinforce the negative impacts of the floods, with adverse consequences for local labour markets and psychological wellbeing in the medium-term.*

*Methodology: We will conduct household surveys in areas with high predicted ex-ante risk in exposure to the 2020 flood in Nigeria to collect information on flood impacts and damages, agricultural production, and non-farm labour supply and income activities. Crucially to fill a gap in the evidence base, we will also measure psychological outcomes including aspirations, self-efficacy, cognitive function, and mental health. Identification for this approach leverages exogenous variation in flood realizations across localities with the same ex-ante risk. Nigeria's Annual Flood Outlook (AFO) publishes flood risk forecasts based on sophisticated flood risk models calibrated with data from hydrogeological measurements, weather stations, and global climate patterns (NIHSA, 2021). We will randomly sample communities from the highly probable areas that were predicted to flood and did as our treatment locations, and from the set of geographically adjacent highly probable areas where flooding did not occur. We will restrict the analysis to districts in Kaduna, Jigawa, and Kano states. Districts in the same flood forecast scale are generally considered to face similar flood risks but whether an actual flood event occurs or not is attributed to random factors (NIHSA, 2021). We will collect administrative data from before the flooding to test for balance and parallel pre-trends. This quasiexperimental variation in flood realizations will be supplemented with a cross-randomised priming intervention prompting respondents to think about the recent floods, to better identify psychological impacts of flooding which we will then analyse as a mechanism for any labour market responses. During fieldwork, we will collaborate with the Nigeria team of Busara Center for Behavioral Economics particularly around measuring psychological outcomes, leveraging their experience in northern Nigeria. We will also receive support from local researchers from the Institute for Development Research and Training (IDR&T) and Department of Economics both at Ahmadu Bello University, Zaria. The University will host us during the research stay, oversee the fieldwork, and provide facilities for training enumerators.*



*Example 3*

*I will investigate the outlined hypotheses by combining a field experiment in Lagos, Nigeria, and a structural model centered around firms' abilities to delay or withhold employees' salaries. My experiment is designed to quantify the effect of a higher certainty of contractual salary payment at the extensive (job choice) margin and to assess the productivity implications of being owed salary at the intensive margin (choice of effort and separation rate). This will allow me to identify key parameters of the structural model I am developing; the degree of selection at the extensive margin, the change in productivity when being owed salary, and separation rates when employees are owed (not owed) salary payments. Using these empirically identified moments, I can investigate firms' equilibrium behaviour with respect to the decision of paying employees. I can also estimate aggregate productivity implications arising from firms having the option not pay their workers. Finally, I will be able to conduct counterfactual productivity analyses, for example if firms were provided with a mechanism to credibly signal their commitment to pay workers' salaries, or if the institutional environment would allow workers to retrieve an outstanding salary balance after leaving a firm.*

*For the experiment, I will create real data entry tasks and recruit workers for these tasks. The data entry tasks allow me to precisely quantify workers' productivity in terms of pace and quality. The workers will be recruited in two stages. Initially, I will advertise the employment opportunities for the data entry tasks across Lagos. These job ads will contain no information beyond salary range and the type of job, which is common practice for job ads in Lagos. In the second stage, interested jobseekers who respond to the job ads will receive a job offer. Their offer will include more information about the task, a randomized salary (within the salary range included in the job ad) and information specific to the treatment arm they will be randomized into. The experimental design has three treatment arms, which I describe below. Immediately after receiving the job information and offer, a different enumerator will follow up with a random sample of jobseekers. Disguised as a survey about their interaction with the recruitment agent, the enumerator will ask questions about the interaction with the recruitment agent, the job offer and people's perception about the job offer. This will allow me to verify if job-seekers belief about the payment uncertainty is manipulated by the different treatment arms.*

*Treatment Arm 1*

*In the first treatment arm, jobseekers will be informed that they work for a local Nigerian data entry firm. They will be informed that salary payments will be on a weekly basis. This will mimic the decision to work for a normal Nigerian firm.*

*Treatment Arm 2*

*In the second treatment arm, jobseekers will receive the same information as in treatment arm. Jobseekers will additionally be told that the firm cooperates with an external escrow agency guaranteeing employees' salary payments. Jobseekers will also have an opportunity to speak to previous employees to inform themselves about the reliability of salary payments. This signals certainty about salary payments. Survey results from my previous data collection indicate that workers see this mechanism as a credible signal.*

*Treatment Arm 3*

*In the third treatment arm, jobseekers will receive the same information as in treatment arm. Jobseekers will additionally be informed that there will be a probability each week that they may not receive the scheduled salary payments due to cash constraints and the outstanding balance will be added to the payment in the following week.*

*Following the estimation strategy of Hedblom et al. (2022), I can estimate the following. First, in treatment arm 3, I will estimate the impact of being withheld salary payments on productivity and separation rates by randomly delaying salary payments for workers. I can monitor productivity for the data entry tasks and estimate the impact of salary withholding. Moreover, as workers can quit the job any time, I can estimate the impact of being withheld salary payments on separation rates. Since workers are informed in the job offer that salary withholding might occur, there is no deception and delaying salary payments is ethically justifiable (I have consulted with my institution's IRB on this). The fact that jobseekers are informed about the possibility of delayed payments, however, implies that workers' behavioural responses must be interpreted as a lower bound because of potential anticipation. Second, work conditions are identical between treatment arms 1, 2 and 3 except for certainty about salary payments, allowing me to isolate this channel for worker selection. Given that treatment arm 2 will convey certainty about the reliable payment of salaries, the design allows me to estimate how jobseekers value this certainty and how it affects their employment decisions. Treatment arm 1 and 3 will be the control groups. Treatment arm 1 will mimic a normal Nigerian firm and treatment arm 3 will be a counterfactual with clearly defined salary uncertainty. I can estimate the impact of higher certainty about salary payments on job acceptance rates and worker characteristics. I hypothesize, holding salary constant, that jobseekers are more likely to accept a job offer in treatment arm 2, and that those workers will be more productive on average. I hypothesize that this is the case because jobseekers with better outside options (selfemployment or other jobs) would be willing to accept this jobs offer. This implies there would be selection on payment certainty. I can additionally compare the acceptance rates of job offers between treatment arm 1 and 3, which allows me to estimate jobseekers' beliefs on the reliability of salary payments for common Nigerian firms.*



*Example 4*

*The analysis will articulate two tools: a theoretical model on the rationale of women participating in exchange labour groups, and a data collection in villages of the Kagera region to test the predictions of the model.*

*Understanding the rationale for participating in exchange labour groups is not straightforward. The free-rider problem of team production reduces participants' incentives to exert effort, and promises to return a favour must be credible. One way to overcome these problems and allow members to capture the returns to scale a group can provide is mutual monitoring and repeated interaction. Members promise to cooperate, a deviation is punished by a reversion to the static Nash equilibrium (MacLeod, 1984). Indeed, Landeo and Spier (2015) confirm in the lab that repeated interaction can increase the performance of teams. Moreover, the combination of repeated interaction and the supervision of co-workers can provide benefits to employers who hire labour groups instead of individual workers. First, it may reduce the moral hazard problem caused by the employer's inability to perfectly measure a worker's performance (Che and Yoo, 2001). Second, the problem of asymmetric information (adverse selection) due to the employer's inability to distinguish high from low-quality workers can be solved by the group members itself. Group members have coopted and observed their partners for a while, thus should know their quality. Because of the cost of working with someone who is inefficient, continued group membership serves as a positive signal in the sense of Spence (1973). Therefore, exchange groups increase the chances that women have access to wage work and employers to reduce the costs associated with information asymmetries. A theoretical model should confirm these intuitions and allow us to generate additional predictions.*

*The intuition would suggest that the stronger a group's linkages, the more positive the signal associated with membership. A first step is therefore to empirically assess whether women who participate in more structured groups have better labour opportunities. This can be done at the extensive margin (comparing women participating and not participating) and at the intensive margin. The intensity of the ties in the group can be objectively assessed by the group's duration, whether they have a pre-established schedule of exchanges and the frequency of exchanges. All this theoretically increases the performance of a group and thus the benefits of membership. Labour market performance will be assessed by the wage level and by the number of days employed.*

*A specific data collection is being designed in collaboration with EDI, our local partner. The forecasted sample consists of 200 women in 10 villages and could be adjusted upwards depending on the obtained funding. We first identify villages with women's groups and select an equal number of women participating and not participant to groups. An initial face-to-face interview is conducted just before the agricultural season in January 2023; further data collection is done via phone interviews over 8 weeks, which will cover the period where groups are more likely to be hired (before harvesting takes place). This strategy will allow us to obtain data on work activities of much better quality than standard economic activities questionnaires, which use retrospective questions on a longer recall period (De Nicola and Giné, 2014; Arthi et al., 2018).*

*It is clear that our empirical strategy has strong limitations when it comes to causally identify the effect of exchanging labour in groups on market employability. However, at the intensive margin, we will compare employability of women who all participate in groups conditional on their observed characteristics, which reduces endogeneity biases. A stronger approach would be to run a field experiment. However, in order to do so, we would need to find ways of inducing women to participate in groups and a prerequisite is therefore a good understanding on what the groups do or do not provide. We believe that, given the scarcity of research on the topic, a first assessment combining theoretical and empirical evidence are already very informative to highlight the potential of informal working groups for fostering structural transformation in rural areas of SSA.*



Example 5

To estimate the energy consumption spillover effect of the opening of a foreign-invested firm on local firms, we will employ a dynamic DiD (event study) methodology. The regression equation for the event study is specified as follows:

$$YY_{isdr,t} = \beta(\text{Foreign\_Firm}_d * \text{Time}_{dt}) + \mathbf{X}\mathbf{X}_{isdr,t}' \boldsymbol{\gamma} + \Phi_i + \Phi_d + \Phi_{st} + \text{Trend}_{rt} + \varepsilon_{isdr,t} \dots \dots (1)$$

where  $Y_{isdr,t}$  represents the different outcome variables related to energy use, such as the value of electricity consumed, fuel and lubricant usage, and value of wood and charcoal used for energy by firm  $i$ , in sector or industry  $s$ , in district (woreda)  $d$ , in region  $r$ , and at time  $t$ . While higher electricity energy source consumption denotes increased usage of green energy sources (renewable), higher fuel, wood, and charcoal consumption represents increased use of dirty (non-renewable) energy sources.  $\mathbf{X}$  denotes a vector of exogenous covariates such as firm age, total number of employees, total capital input, material inputs, total revenue, export, import, etc.  $\Phi_i$ ,  $\Phi_d$ , and  $\Phi_{st}$  denote the firm, district and sector-by-year fixed effects. The firm fixed effect captures all time-invariant firm specific factors, the district specific factor represents time-invariant district (woreda) specific factors such as the quality of institutions, and sector-by-year fixed effects control for contemporaneous (calendar-year contemporaneous) shocks in the same sector (industry) for the treated and control districts.  $\text{Trend}_{rt}$  and  $\varepsilon_{isdr,t}$  denote the region-specific time trend and stochastic error term, respectively. Finally,  $\text{Foreign\_Firm}_d$  is a dummy variable that takes the value of 1 if a foreign-invested firm operates in district  $d$ , and zero otherwise. The variable  $\text{Time}_{dt}$  denotes the year and is normalized so that the year in which the foreign-invested firm starts operation is set to zero. Our coefficient of interest is  $\beta$ , which captures the treatment effect of the presence of foreign-invested firm on the energy usage of host-country firms.

We will also examine the role of industrial policy, particularly subsidy provision, in influencing the different energy sources' usage by local firms. One approach to analyse the impact of industrial policy is by including an interaction term of the treatment dummy with the subsidy measure in the equation mentioned above. To investigate the heterogeneous effects of advanced, emerging, and least developing foreign firms, we will estimate separate regressions of equation (1) by categorizing these groups based on the source country of the foreign firms. While the firm-level information is extracted from the comprehensive Ethiopian manufacturing enterprise census survey panel data, the list of licensed foreign-invested manufacturing industries, containing details such as the permit date, investment status, industry type, location, and operational status of the plants, will be obtained from administrative data provided by the Ethiopian Investment Commission.



### 3. POLICY RELEVANCE AND COUNTRY FOCUS

Please explain the potential policy implications of your project. How will it help inform and improve policy in specific low- or middle-income countries, particularly those in sub-Saharan Africa? If the country which is the primary focus of the project is not a sub-Saharan economy, please outline how the project might nevertheless be relevant for the structural transformation of low-income countries (LICs) in sub-Saharan Africa and for which country(ies) in particular. Please also describe any activities that might be undertaken as part of the project that would facilitate the take-up of the project's research findings into policy in specific countries.

#### Example 1

*This project has three direct policy implications. First, the issue of land acquisition for infrastructure construction is as widespread as is the lack of public infrastructure in sub-Saharan Africa. For example, the World Bank (WB) ESS5 recognizes that “project related land acquisition and restrictions on land use can have adverse impacts on communities and persons” and advises borrowers to “avoid involuntary resettlement or, when unavoidable, minimize involuntary resettlement by exploring project design alternatives.” Yet, little work exists on the impact of these guidelines, and how they interact with market frictions prevalent in developing countries. Thus, this project will provide insights on both the mechanisms leading to land acquisition frictions, and the welfare costs of these frictions. In turns, these findings could fuel the discussion on appropriate land acquisition rules and guidelines to account for local factors.*

*Second, this project aims to quantify the economic impacts of Kampala's infrastructure improvements, with a focus on KIIDP2 and KCRRP. As such, it will provide a valuable complement to internal estimates and evaluations made by KCCA, the World Bank and the African Development Bank, which use different methodologies. It has been agreed with KCCA that one outcome of this project will be a policy note, which may be used as reference for future infrastructure works in city. Such a document may be the basis of future collaboration testing the implementation of different land acquisition mechanisms. In addition, I have been continuously engaging with the International Growth Center (IGC) country team, to ensure that the results of this study may be effectively disseminated.*

*Third, one component of this project is to measure the impact of road paving on air pollution, which is a first order problem in fast growing sub-Saharan cities. I am collaborating with Airqo, a local start-up working on improving measurement and knowledge of air pollution in African cities, to link changes in local air pollution with road improvements.*

#### Example 2

*Our study focuses on rural Tanzania, a lower-middle income economy since 2020. Rural Tanzania has a poverty rate of 31.3% (World Bank, 2019). The area under study thus belongs to the most impoverished ones in the world. While structural transformation requires a virtuous circle between growth in urban areas that progressively absorb labour force from rural areas, Tanzania fails to substantially reduce poverty despite sustained growth in the last decade. Structural transformation of rural areas thus needs to be promoted to guarantee inclusive growth.*

*The Kagera region, where our study takes place, is isolated and has a low market access to urban centres. It therefore shares distinctive features of other impoverished areas of Sub-Saharan Africa. The analysis of the structural transformation of the agricultural labour market does not lead to immediate policy implications. However, in the longer-run, that should be the case. If we observe, as expected, that the participation to labour exchange groups is associated to a greater participation in the labour market, we will develop a research project by which the causality is established, for instance with a randomized experiment. Then, we would be able to reach the policy implication that facilitating labour exchange groups will empower women and foster marketization of labour.*



Example 3

*Despite being Africa's largest economy and one of the world's major oil-rich countries, 69% of Nigerians live below \$1 per day, and most of Nigeria's population primarily earn living from agriculture (National Bureau of Statistics, 2020). The Nigerian government has committed to promoting agriculture to achieve food security, employment generation, and structural transformation. Rainfall is a significant driver of agricultural productivity and incomes in Nigeria (Amare et al., 2021), but the frequency of extreme weather events has intensified in recent years, disrupting agricultural production, infrastructure, and livelihoods (NIHSA, 2021). A potential implication of the increase in extreme weather events (notably floods) is that as agricultural production becomes riskier, off-farm employment and rural-urban migration may become more appealing to more households, promoting structural transformation. On the other hand, flood shocks deplete household assets and may prevent the accumulation of capital needed for households to move out of agriculture. Flood shocks may also impose psychological burdens on individuals preventing them from seeking out or taking advantage of opportunities to engage in higher-productivity activities. Whether and how households respond to flood shocks by changing their agricultural production and livelihood decisions is thus an open question of interest to policymakers.*

*While there are several estimates of the macroeconomic effects of past flood events in Nigeria (Unah, 2017), the micro-level impact on labour market outcomes is unknown, and the potential contribution of psychological mechanisms is under-explored. Studying the labour market impacts of flood disasters and their economic and psychological mechanisms will help inform government disaster management responses and policies to ensure economic resilience and sustained growth in the face of climate change. Results may also provide insights on responses to weather-related disasters in other low-income areas characterized by high reliance on household agriculture and limited adoption of formal insurance. This research will involve active collaboration with local stakeholders and policymakers. We have already established contacts with the Director General of the Nigeria Hydrological Services Agency (NIHSA) and officials at the Nigeria Emergency Management Agency (NEMA). We will hold meetings with staff of the Ministry of Humanitarian Affairs, Disaster Management and Social Development in Abuja to inform our research design and obtain administrative data. Policy Briefs will be presented to and shared with relevant policymakers.*

Example 4

*My proposed work will provide insights into climate change impacts, adaptation, and investment. Results from this research will highlight current successful ways to adapt to flooding and mitigate flood risk and areas of concern for future investment to reduce damages from flooding in urban areas. This project can inform how flood damages are distributed across different types of firms, providing insight to key areas of risk and opportunities for insurance, other products, or policies. By eliciting flood risk directly from firms, I can compare perceived and actual flood risk to better understand the market for risk in this setting. By identifying key barriers to investment in flood mitigation technologies, the research will identify constraints to flood mitigation and opportunities for innovation. The setting of Dakar allows me to directly inform policy in sub-Saharan Africa, but the challenges faced here are not unique to Dakar as many cities, like Accra, experience urban flooding. With increasing disaster risk from climate change (Caretta et al. 2022, Rentschler et al. 2023), my research will provide key insight to government institutions, funding agencies, donors, and researchers to better inform investment projects and efforts to increase individual adoption of various flooding mitigation strategies.*



**4. RELEVANCE TO STEG RESEARCH AGENDA, RESEARCH THEMES, AND CROSS-CUTTING ISSUES**

How does the project relate to structural transformation? Justify how the proposed research fits one or more of the STEG research themes or explain how the research otherwise relates to the STEG Research Strategy. (N.B. the themes are not exhaustive. Other areas of interest may not fit cleanly into any theme but are nonetheless centrally relevant to structural transformation and STEG.) Please also explain how the proposed research addresses STEG's cross-cutting issues.

Example 1

*The project will contribute primarily to research theme 4 (Trade and Spatial Frictions), which focuses on the role of trade and economic integration to structural transformation. By evaluating the interactions between structural transformation, global trade and deforestation, our project is directly related to this overall theme.*

*Our project will also be part of research theme 3 (Agricultural Productivity and Sectoral Gaps), which focuses on the causes and consequences of agricultural productivity, particularly in developing countries. One of our goals is to evaluate the impact of 4 agricultural productivity growth on deforestation in a global context. Our framework will allow us to engage in evaluating the “Borlaug Hypothesis” and the costs and benefits of agricultural productivity gains in the presence of environmental concerns.*

*Finally, we believe that this project will contribute, though to a smaller extent, to the research theme 0 (Data, Measurement, and Conceptual Framing). Part of the goal of this research theme is to make data and documentation accessible to researchers within and beyond the STEG program. To the best of our knowledge, we are the first to harmonize and clean different global datasets for the analysis of deforestation, which will demand substantial processing of high-resolution data to geographic levels that are amenable to regression analysis and structural modelling suitable for quantitative analysis. We plan to make these data resources available to researchers by the end of our project.*

*In terms of the cross-cutting themes, our project will be an integral part of the Climate Change and the Environment. Specifically, we will contribute to the understanding of the links between structural change and climate change, by examining how the reallocation of factors between agricultural and non-agriculture sectors affect deforestation.*

Example 2

*This project fits into three of the STEG research themes. The part of the project aiming to constitute a dataset of land transaction prices in Kampala directly fits into Theme 0: Data, Measurement, and Conceptual Framing because of as part of the project I aim to constitute a dataset of land transaction prices in Kampala. This key piece of data, used in a whole range of economic analyses, including hedonic regressions, is not consistently available for Kampala and would complement the government database of government assessed land prices. More generally, this project studies one key friction in the provision of transportation infrastructures, and as such is directly related to Theme 4: Trade and Spatial Frictions and Theme 5: Political Economy and Public Investment. As emphasized in the STEG Research Strategy 2021-2025, spending on infrastructure [...] always reflects some underlying political realities. In this project, I acknowledge the role of political realities but aims to disentangle it from land acquisition-related realities, and shed light on the magnitude of the later, compared to the former, which I will treat as residual deviations from optimal road allocation. Finally, this project addresses two of STEG's cross-cutting issues. First, it studies how spatially heterogeneous land acquisition frictions may have distributional impacts with respects to the resulting location of infrastructures. Second, it takes seriously both the air pollution and flooding hazards associated with suboptimal road and drainage infrastructure and will include both component in the welfare analysis.*



Example 3

*This project relates to the Barrett et al. (2021) STEG Pathfinding Paper, highlighting the “missing linkages” between structural transformation, agriculture, and climate in contemporary development research. By examining the relationship between weather-related disasters and labour reallocation in primarily agricultural areas, our research addresses one such linkage, looking at a severe productivity and wealth shock which might serve to both push some households out of agriculture while trapping others. This project relates to STEG research themes labour, home production and structural transformation at the level of households (theme 3) and agricultural productivity and sectoral gaps (theme 4). It is related to theme 3 because of our focus on estimating local labour market responses to shocks, covering time allocation, agricultural production, and income decisions of households. It is related to theme 4 because we build on the general equilibrium model developed by Liu et al. (2022) linking sectoral labour reallocation and structural transformation during climate change, and through our analysis of how agricultural productivity shocks – exacerbating sectoral gaps – may affect structural change. In addition, the project falls under the STEG cross-cutting issue of climate change and the environment.*



**5. DETAILED WORKPLAN**

Please provide a detailed workplan (including a Gantt chart or similar and a list/table of milestones) for the project, showing expected activities, with their length and sequencing; this workplan should illustrate the feasibility of completing the project within the allotted time. This should also show the time commitment of each investigator (in number of days).

If you are conducting fieldwork, what measures will you take to ensure the safety of respondents and staff? What are your contingency plans in the case of restricted travel? What other potential disruptions have you considered?

**Example 1**

*The intended period for our project is 12 months. The STEG Small Research Grant application call states that the outcome of the grant application will be announced within three months' call deadlines. With this in mind, we have outlined the detailed work plan of major tasks (in order of their priorities), timeline, duration, and time commitment of investigators on each major task in the following table.*

**Table 1: Detailed work plan**

<b>s.n</b>	<b>Major tasks</b>	<b>Time</b>	<b>Duration</b>	<b>Time commitment by investigators</b>
1	Reviewing the relevant literature	1 February – 31 March 2024	2 months	Each investigator, 15 days each
2	Data collection, entry, cleaning, and validation	1 April – 30 June 2024	3 months	2 junior investigators, 30 days each
3	Descriptive and econometric analysis	1 July – 30 September 2024	3 months	2 junior investigators, 20 days each
4	Writing and revising the results	1 October – 31 December 2024	3 months	Each investigator, 20 days each
5	Finalize research outputs, including the report and the journal articles for publications	1 January 2025 – 31 January 2025	1 month	Each investigator, 15 days each
6	Presenting project outputs at CSAE in UK, and ATW in Australia (or AEC in Africa)	As per the conference schedule		Two investigators will present the findings in the different conferences



Example 2

As mentioned earlier in this proposal, we have already developed a preliminary version of the model with a simple calibration, but we plan to calibrate/estimate the model significantly more thoroughly. This major task will require two steps:

1) *Cleaning & Harmonizing New Data.* On one front, we will bring in production and trade information from GTAP database to cover a larger set of countries. On another front, we will add data on forest areas and agricultural productivities within countries.

2) *Calibration & Estimation.* Armed with the richer dataset from Step #1, we plan to use a combination of calibration and estimation to quantify our model more accurately. Our idea is based on matching reduced-form estimates based on observed data using our model-generated data.

From September onwards, each PI and Co-PI will spend an average of at least 2 days per week on the project. Our expectation is therefore that we should be able to deliver a final draft of the paper by the end of the Spring of 2023. The timeline is as follows:

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Harmonization of cross-country data	X	X							
Harmonization of within country data		X	X	X					
Quantification with new cross-country-data		X	X						
Quantification with new within country data			X	X	X	X			
Analysis of Counterfactuals						X	X		
Completion of draft						X	X	X	



Example 3

ACTIVITY	INVESTIGATOR*				2022				2023														
	XX	XY	YZ	ZZ	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N				
1 Theoretical model definition	1	1	4																				
2 Setting up the survey instruments	10	7	2																				
3 Request of Research clearance to COSTECH	1	2		X																			
4 Baseline listing and training of enumerators	7	7		X																			
5 Baseline (face-to-face) survey data collection	7	7		X																			
6 Weekly follow-up surveys (by phone) data collection	2	4		X																			
7 Data gathering, cleaning and anonymization	2			X																			
8 Data analysis	15	5	2																				
9 Writing of research paper	10	10	4																				

\*The column « Investigator » reports the time commitment of each investigator (in number of days) for each of the activities.



**6. EXPECTED OUTPUTS**

Please indicate the outputs (e.g. academic papers, events, policy briefs, data sets) you expect to produce and a timeline for making these outputs available to other researchers.

**Example 1**

*The outputs for this project will include: 1) code for cleaning and analysis of LSMS data under panel approach; 2) cleaned analysis data from the household surveys under cross sectional approach; 3) presentations of research results at university seminars and academic conferences; 4) at least one working paper containing the analysis using the two approaches; 5) publication in a peer-reviewed journal; and 6) policy brief for policymakers. We will present results at university seminars on an ongoing basis as the research progresses and will submit the research for consideration at relevant academic conferences starting in the Spring of 2023. Data and code will be posted once papers are published in an academic journal. We will aim to have a paper ready to submit to a journal by December 2023. Working papers will be posted on the principal investigator's website when available and/or through STEG/CEPR; at least one should be posted by December 2023. Policy brief will be shared with stakeholders in Nigeria by January 2024.*

**Example 2**

*The outputs will be constituted of one data set and one research paper. The dataset will be collected starting in January 2023 and will be made available to us in June 2023. It will be released to other researchers upon publication of our research paper by January 2025 at the latest. Presentations of the research to a scientific audience will be done.*

**Example 3**

*I will write my job market paper on this project. I plan to have a first draft in May 2025 and a working paper in autumn 2025. I aim for a publication in a top economic journal. I will give multiple presentations of this project. Additionally, this study will lead to a dataset on workers' employment choices, their productivity, probability to leave the firm, and experimental variation in owed salary balances, which I will make publicly available.*



**7. CONTRIBUTIONS TO EXPANDING THE FIELD**

Please indicate any ways in which your research project will contribute to expanding the field of structural transformation and economic growth in terms of size and scope, or in relation to the diversity of researchers working on these topics.

**Example 1**

*This project will be one of the first papers quantifying the productivity implications of firms frequently not paying employees' salaries bothy at the micro level for firms, and the macro level for the Nigerian economy. In doing so, this project will disentangle multiple mechanisms for both the occurrence of salary non-disbursement and the ensuing implications for workers and firms. Hence, this project will illustrate a new perspective how low-income countries' institutions can hamper structural transformation, and so contribute to expanding the field of structural transformation.*

**Example 2**

*My research project will contribute to expanding the field of structural transformation and economic growth by formally modelling the role of land acquisition frictions in affecting planners' ability to build drainage or transportation infrastructures needed to unlock the economic growth potential of fast-growing cities in Sub-Saharan Africa. Better accounting for market frictions prevalent in developing countries in quantitative structural models is a key step in improving the field's ability to rely on general equilibrium models to better understand the welfare consequences of a given policy or investment.*



Example 3

*This project contributes to the emerging literature on FDI and green energy consumption spillover for manufacturing firms in several ways. First, the project aims to test the two competing hypotheses (i.e., PHH versus HEH) in the case of Ethiopia, using a unique firm-level dataset. The case of Ethiopia is also unique since Ethiopia is currently one of Africa's fastest-growing countries where FDI industrialization comes from a range of countries, including least developing, emerging and developed countries. Since 1992, Ethiopia has consistently been among the largest FDI recipients in African countries, with capital stock from foreign investment rising rapidly in the 2010s and reaching nearly \$25 billion in 2019. The top five investing countries for Ethiopia between 1992 and 2020 are China (1005 companies), India (287), the US (202), Turkey (133) and Sudan (131), respectively (Policy Studies Institute, 2022). Since the top FDI source countries are of different income levels with varying levels of environmental regulations and institutional structure (and hence the motivation for outward FDI will differ), it is interesting to explore the environmental footprint of FDI from these source countries on Ethiopia's energy consumption and efficiency. Some recent studies suggest that the effect of FDI on energy consumption is heterogeneous across quantiles (Zhu et al., 2016), the stage of economic development (Adom and Amuakwa-Mensah, 2016), and the technology absorptive capacity (Adom et al., 2019) of the FDI host country. However, the empirical evidence is very limited in quantifying the heterogeneous impact of foreign firms that come from developed, emerging, and developing countries (LDCs) on the energy consumption of domestic firms of the least developed countries, like Ethiopia. We consider this to be an important gap in the literature.*

*Second, the effect of FDI on energy consumption behaviour also varies based on differences in energy endowment, institution, and preferential policy. This partially accounts for the inconsistencies observed in the FDI-energy use nexus in previous studies (Bu et al., 2019). While industrial policy is a contested issue (Altenburg 2010), especially for low-income countries, it is interesting to examine the role of such policies in mitigating or facilitating green technology spillover (useful for a cleaner environment) to domestic enterprises. In this context, this project explores the moderating role of industrial subsidy on the FDI-energy consumption nexuses.*

*Third, to investigate the causal effect of the presence of foreign-invested firms on the energy consumption behaviour of local firms, the study utilises a unique longitudinal enterprise panel survey data from Ethiopia and the dynamic difference-in-differences (DiD) econometric methodology, also known as the event study. Unlike the traditional binary DiD treatment, the dynamic DiD approach establishes a continuous treatment variable for the variations in the treatment intensity by exploiting both spatial and time variations of the presence of foreign firms. Following Abebe et al. (2021), districts, where foreign-invested firms begin operations, are considered the treated group, while districts, where foreign firms have obtained licenses but do not operate in that location, serve as the control group. The availability of detailed ownership information from different groups of countries and industrial policy instrument measures allows us to explore the heterogeneous effect on energy consumption and to study the mechanisms by which foreign firms can contribute to the environmental sustainability of local firms.*