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Ibanez, AM, et al (2013) The Economic and Social Consequences of Armed Conflict in Colombia: Evidence for Designing Effective Policies in Conflict and Post-Conflict Regions.
ESRC End of Award Report, RES-167-25-0593. Swindon: ESRC.



ESRC End of Award Report

For awards ending on or after 1 November 2009

This End of Award Report should be completed and submitted using the **grant reference** as the email subject, to reportsofficer@esrc.ac.uk on or before the due date.

The final instalment of the grant will not be paid until an End of Award Report is completed in full and accepted by ESRC.

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Please refer to the Guidance notes when completing this End of Award Report.

Grant Reference	RES-167-25-0593		
Grant Title	The Economic and Social Consequences of Armed Conflict in Colombia: Evidence for Designing Effective Policies in Conflict and Post-Conflict Regions.		
Grant Start Date	15 th October, 2010	Total Amount	£257,685.76
Grant End Date	14 th October, 2012	Expended:	Paid to date: £214,149.77
Grant holding Institution	Universidad de los Andes		
Grant Holder	Doctor Ana María Ibáñez		
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Co-Investigators (as per project application):		Institution	
Doctor Adriana Camacho		Universidad de los Andes	
Doctor Daniel Mejía		Universidad de los Andes	
Doctor Catherine Rodríguez		Universidad de los Andes	

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I. Non-technical summary

Please provide below a project summary written in non-technical language. The summary may be used by us to publicise your work and should explain the aims and findings of the project. *[Max 250 words]*

The incidence of internal conflict has intensified after the end of the Second World War. Although research has concentrated on the aggregated consequences of civil war, microeconomic research on the impacts of conflict and the channels through which armed conflict affects households is scarce. Colombia, a country that has endured a civil conflict for more than 40 years, provides an interesting opportunity to understand the microeconomic impacts of conflict. The objective of this project is to contribute to the existent knowledge on the microeconomic consequences of armed conflict on firms, agricultural households and population's health. Through the development of theoretical microeconomic based models and the use of unique panel data sets we are able to identify the specific channels through which conflict may influence the outcomes of the above mentioned areas of interest. Our results show, firstly, that violence increases the probability of plant exit and that it depends on the type of actor perpetrating the attacks and the level of polarization of conflict. Secondly, that armed conflict changes household's decisions related to use of land and investment in the land plot. This modifications cause a reduction in income impinging their welfare. Finally, we find that glyphosate spraying increases, both the probability of having dermatological problems and having an abortion, but we do not find any effect on respiratory problems.

2. Project overview

a) Objectives

Please state the aims and objectives of your project as outlined in your proposal to us. *[Max 200 words]*

The specific objectives of the study funded by DFID are threefold. The first is to understand the effect that armed conflict has had on entrepreneurial decisions in the manufacturing sector. In particular, how violence affects the exiting of plants, differing the impact by characteristics of plants, type of armed actor and the conflict's level of polarization. The second objective is to explore the effects that armed conflict has had on agricultural production. We disaggregate the impact between direct impacts (conflict-induced shocks) and indirect impacts (armed group presence). We focus on decisions related to allocation of land for production and investment in the land plot. The third aim is to estimate the impact on health outcomes caused by the aerial spraying of herbicides to destroy illicit crops. In particular, we estimate the causal effect of aerial spraying on three outcomes: dermatological problems, respiratory problems and abortion.

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b) Project Changes

Please describe any changes made to the original aims and objectives, and confirm that these were agreed with us. Please also detail any changes to the grant holder's institutional affiliation, project staffing or funding. *[Max 200 words]*

We asked, and were granted by the DFID, a reallocation of part of the budget from the national and international seminar to the publication of the book. The reason behind these modifications was that in the original proposal, the book will only present the findings of the three projects directly funded by the DFID. However, we decided to widen the focus of the book beyond our research and invite four more authors to participate. By inviting them, we will have a book with eight interesting chapters examining different dimensions on the economic consequences of conflicts. The reallocation was intended to fund the additional costs of having more chapters. Currently, we have finished the chapters and the book is being revised by the editor and we hope to publish it in 2013.

c) Methodology

Please describe the methodology that you employed in the project. Please also note any ethical issues that arose during the course of the work, the effects of this and any action taken. *[Max 500 words]*

1. Impact on manufacturing sector

The article uses two unique panel data. The first data set corresponds to a panel of plants that includes information of plant variables such as investment, employment and product. The second data set is a panel of municipalities that includes violence variables and deterrence measures of the government. Using a statistical (fixed effect) estimation methodology at the plant level and controlling for the possible endogeneity of armed conflict through the use of antinarcotics operations and laboratories dismantle as instrumental variables; the article estimates a causal effect of violence over the probability that a firm exits the market. We do not report any ethical issues for this part of the project.

2. Impact on agricultural production

We use seven different sources of data: (i) ELCA: A household survey that collects detailed information on agricultural production, the occurrence of violent shocks, historic presence of armed groups, and the governance structure they impose upon the population. This unique data set allows us to examine to separate the impact of conflict through shocks and presence of non-state actors. Impact on health outcomes. (ii) National Government, (iii) IGAC: Government's geographic institution, (iv) SIMCI: Integrated System of Illicit Crop Monitoring, (v) INVIAS: National Road Institute, (vi) IDEAM: Institute of Hydrology, Meteorology and Environmental Studies and, (vii) Municipal Panel from the Economic Development Research Centre (CEDE). We estimate the correlations between armed conflict and the household's productive decisions using Ordinary Least Squares and Probit methodologies. To measure the direct impact of violence we use conflict-induced shocks, and for the indirect impact we use years of armed group presence. We do not report any ethical issues for this part of the project.

3. Impact on health outcomes

In this paper, we use a large administrative panel data set that contains individual health records, together with very precise information on the day and municipality of all aerial spraying events occurring in Colombia between 2003 and 2007. Our main objective is to

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disentangle the causal effect of aerial spraying of herbicides on a broad range of health outcomes. The identification strategy relies on the fact that we observe individuals in our sample more than once, allowing us to compare the evolution of glyphosate-related diagnoses under different levels of exposure to aerial spraying campaigns over time. Our data covers more than 50 million observations and 8 million individuals, as well as the number of square kilometers daily sprayed over a period of five years. We estimate individual fixed effects regressions for dermatological, respiratory diagnoses and abortions. The individual fixed effects specification allows us to compare the increase in the probability of having a health problem related to the aerial spraying of herbicides for the same individual, exposed to different levels of aerial spraying at different moments in time. It is important to highlight that given the nature of our data, we are unable to capture long-term effects that might translate into lower life expectancy, quality of life or productivity. We report that we have to follow very strict policies of confidentiality for the use of this data.

d) Project Findings

Please summarise the findings of the project, referring where appropriate to outputs recorded on the ESRC website. Any future research plans should also be identified. [*Max 500 words*]

1. Impact on manufacturing sector

The results show that the average violence increases the probability of plant exit in 5.06 percentage points. Moreover, we find that this effect differs according to plants characteristics. Specifically, smaller firms in terms of workers and capital used are more likely to exit when civil conflict increases. Results show that violence also has a differential effect according to the firms' age, suggesting that younger firms are affected the most. These results are summarized in the UNU-WIDER working paper 2010-94 and in the forthcoming article in the Journal of Conflict Resolution. Additionally in a follow up paper, we also check whether the characteristic of conflict affect in a different way the exit of firms. Specifically we look at the type of armed actor perpetrating the attacks and the level of polarization of conflict in the municipality where the plant operates.

2. Impact on agricultural production

We find that the effects of conflict go beyond the direct impacts. Because the control and presence of armed groups causes fear and uncertainty, households modify their production decisions. Households living in communities with a large incidence of violence allocate 19.3 percentage point less to permanent crops, 13.7 percentage points more to seasonal crops and 14.6 percentage points more to pastures. The presence of armed groups in the communities is not related to the decision of land use for permanent crops, yet we find a strong association with seasonal crops and pastures. Households living in communities in which armed groups have established presence for four and six years are associated with a higher percentage of land allocated to pastures: 7.7 and 7.3 percentage points, respectively. During armed conflict, households produce low-return crops and invest less on their land plot, thereby generating lower income. Thus, post conflict public policies must go beyond reconstruction and restitution of assets. Policies should also create favorable conditions to reduce uncertainty, improve the rule of law and strengthen trust towards state institutions.

3. Impact on agricultural production

The results show that, on average, a one square kilometer increase in the area sprayed with glyphosate increases by 0.2 percentage points the probability of having a dermatological

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problem during the following 15 days. Although the medical literature has argued that exposure to glyphosate causes respiratory problems, we do not find any evidence of this effect in our estimations. Regarding abortions, our results indicate that exposure to glyphosate between the three (3) months before conception and the five (5) months after conception, has a positive and significant impact on the probability of occurrence of an abortion. The results from our preferred specification indicate that an increase of one standard deviation in the area sprayed in the municipality of residence increases the probability of an abortion by about 0.025 of a standard deviation.

e) Contributions to wider ESRC initiatives (eg Research Programmes or Networks)

If your project was part of a wider ESRC initiative, please describe your contributions to the initiative's objectives and activities and note any effect on your project resulting from participation. [Max. 200 words]

N.A

3. Early and anticipated impacts

a) Summary of Impacts to date

Please summarise any impacts of the project to date, referring where appropriate to associated outputs recorded on the Research Outcomes System (ROS). This should include both scientific impacts (relevant to the academic community) and economic and societal impacts (relevant to broader society). The impact can be relevant to any organisation, community or individual. [Max. 400 words]

- To our knowledge the paper on Entrepreneurship and Conflict is the first one to address this question for the case of Colombia. Its novelty is translated into a publication in the Journal of Conflict Resolution which is one the top journal in political science and international relations with an impact factor of 2.237. (<http://jcr.sagepub.com/content/early/2012/12/14/0022002712464848.full>)
- Our research on agricultural production makes a great contribution to the existing literature on this topic, as it disaggregates the effect of violence in the direct and indirect impacts. Most of the literature only focuses on the former. We have an academic working paper in English and a chapter in Spanish. The latter is aimed to be apt for a wide range of readers. It has already been published as Documento CEDE (http://economia.uniandes.edu.co/investigaciones_y_publicaciones/CEDE/Publicaciones/documentos_cede/2012/Conflicto_armado_en_Colombia_y_produccion_agricola_aprenden_los_pequenos_productores_a_vivir_en_medio_del_conflicto) and will be part of the book that will be published next year.
- To our knowledge the paper on Health and Aerial Spraying is first one to address this question for the case of Colombia.
- We also disseminated our work through different channels
 - I. Presenting the results in national and international conferences such as: the Colombian Economic Meetings, CEDE Seminars (2010), HiCN-Berlin (2011), HiCN-

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- Marseilles (2012) and, 3rd Congress of Colombian Economy (2012). The DFID funded the conflict sessions during the Congress. The agenda and presentations of the Congress, including the conflict session can be seen in http://economia.uniandes.edu.co/Facultad/eventos_y_noticias/eventos/2012/Congreso_de_Economia_Colombiana/Congreso_2012. Attendees: 890, Streaming: 890 visits.
2. Funded by this grant, we organized an international research seminar at Cartagena focused on the economic and social consequences of conflict. During the seminar we presented our results as well as the ones of six additional guests, and had Stergios Skaperdas as keynote speaker.
 3. The forthcoming book on the costs of conflict in Colombia and the perspectives for post-conflict period, sponsored by this same grant, is being reviewed by the editor.
 4. We set up External Advising Committees for the three topics where we discussed our results with experts on each topic and debated the policy recommendations stated. The members of the meetings were affiliated to the Colombian National Association of entrepreneurs (ANDI), Ministry of Agriculture and Rural Development, Ministry of Defense and Ministry of Planning.
 - 5.

b) Anticipated/Potential Future Impacts

Please outline any anticipated or potential impacts (scientific or economic and societal) that you believe your project might have in future. *[Max. 200 words]*

We have two versions of each of our three papers: one is an academic paper in English and the other one a chapter written in Spanish. We plan to publish in a peer reviewed journal the results of the former. The latter will be part of a book that will be published next year by the Economics Department from Universidad de los Andes, which will explore the social and economic consequences of armed conflict in Colombia. We expect that this will allow further visibility of our results and their relevance for Colombian society, as well as generate an impact on the design of public policy during the post-conflict period regarding firms, agricultural producers and war against drugs.

You will be asked to complete an ESRC Impact Report 12 months after the end date of your award. The Impact Report will ask for details of any impacts that have arisen since the completion of the End of Award Report.

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4. Declarations

Please ensure that sections A, B and C below are completed and signed by the appropriate individuals. The End of Award Report will not be accepted unless all sections are signed. Please note hard copies are **not** required; electronic signatures are accepted and should be used.

A: To be completed by Grant Holder

Please read the following statements. Tick **one** statement under ii) and iii), then sign with an electronic signature at the end of the section (this should be an image of your actual signature).

i) The Project

This Report is an accurate overview of the project, its findings and impacts. All co-investigators named in the proposal to ESRC or appointed subsequently have seen and approved the Report.	<input checked="" type="checkbox"/>
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ii) Submissions to the Research Outcomes System (ROS)

Output and impact information has been submitted to the Research Outcomes System. Details of any future outputs and impacts will be submitted as soon as they become available.	<input checked="" type="checkbox"/>
or This grant has not yet produced any outputs or impacts. Details of any future outputs and impacts will be submitted to the Research Outcomes System as soon as they become available.	<input type="checkbox"/>

iii) Submission of Data

Data arising from this grant have been offered for deposit with the UK Data Service.	<input type="checkbox"/>
or Data that were anticipated in the grant proposal have not been produced and the UK Data Service has been notified.	<input type="checkbox"/>
or No datasets were proposed or produced from this grant.	<input checked="" type="checkbox"/>