Distributional and economy-wide effects of post-conflict policy in Colombia

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Main moments of the armed conflict in Colombia (Arias et al., 2017):

- **1948**: Assassination of a presidential candidate.
- **1960s**: Two left-wing groups emerged, the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army (ELN).
- **1980s**: Right-wing paramilitary groups emerged to fight these guerrillas.
**Context - Motivations**

**Rural areas** have been the most affected by the armed conflict in Colombia

- **Less intensive economic** activity
- Farmers concentrate their activities portfolio in **subsistence activities**
- **Negative** effect on **agricultural investment**

**The Peace Agreement (2016)**

- **6 points**
  - Point 1: Comprehensive rural reform
  - Point 4: Substitution of illicit crops
- The obstacles to rural development might be **removed**
- **Rural households** wellbeing could **improve**.
- Provision of **public goods** for **better security** and **income generation**.
Context - Motivations

Incidence of multidimensional poverty and the rural-urban gap 2010-2014

Source: National Planning Department (DNP)
Main research questions. Concerning the policies proposed from points 1 & 4 of the Peace Agreement:

- What are the expected impacts of these policies on rural and urban households’ income and how will they differ among them?

- What is the expected impact of the policies on rural labor demand for skilled and unskilled workers?

Research contribution

- The aim of this research is provide an ex-ante evaluation of the agricultural policy for the post-conflict (2017-2030)
Methodology

Social Accounting Matrix (SAM).

Agricultural production considering:
- 5 important crops
- Incidence of the Armed Conflict (Index) at the municipality level.
- Different size of farms: small, medium, and large
- Two types of households: rural and urban

CGE model

- PEP1-1 standard model
- Single-country, static
Data for the SAM

**Basic information required for building the macro-SAM (2014)**
- National accounts: matrixes of supply and utilization, and the general economic equilibrium matrix.

**Structure of the agricultural sector**
- Structure of costs for agricultural production: Agronet
- System of prices of agricultural commodities: SIPSA
- INCODER-IGAC: sizes of production units.

**Households’ income according to its sources & types (urban/rural)**
- The integrated household survey (GEIH-DANE).
- Income and Expenses survey (ENPH-DANE).
Share of Value Added for Crops by Conflict and Size

Source: With data of the agricultural census, 2014
Descriptive statistics

Some characteristics of agricultural production units

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production units with less than five hectares</td>
<td>75</td>
</tr>
<tr>
<td>Devoted to agricultural activities</td>
<td>76</td>
</tr>
<tr>
<td>Productive infrastructure</td>
<td>16</td>
</tr>
<tr>
<td>Apply for credit</td>
<td>10.7</td>
</tr>
<tr>
<td>Technical assistance</td>
<td>16.5</td>
</tr>
<tr>
<td>Machinery</td>
<td>16.4</td>
</tr>
<tr>
<td>Irrigation system</td>
<td>33.3</td>
</tr>
<tr>
<td>Plot of land for self-consumption</td>
<td>55.9</td>
</tr>
</tbody>
</table>

Source: With data of the agricultural census, 2014
CGE model

PEP1-1 standard model with the following extensions:

- Extended production function by considering fertilizers as substitutes for land in the production of crops.
- Endogenous unemployment modeled through a wage curve.
- Imperfect substitution between similar products produced by different activities.
- Assumption: the “pure” form of the small-country

The closure rules

- External balance: real exchange rate (e as numeraire), CAB fixed.
- Government balance: direct tax rate on household
- Savings-investment balance: household savings
- Capital and land are assumed fixed and specific for each sector.
- Labor is assumed perfectly mobile between sectors.
Simulated Scenario

<table>
<thead>
<tr>
<th>Shock</th>
<th>Description</th>
</tr>
</thead>
</table>
| TFP + TRO + SubCap + G | More technical assistance, construction of irrigation systems and tertiary roads → TFP increases by 4%.
|                | Subsidy on capital 5.8% + Subsidy to labor employed 12.5% (Fedesarrollo, 2017) |
|                | Rise of G by 1.7% (Fedesarrollo, 2017)                                       |
Simulations:

Shocks were introduced in the following equations and parameters:

1. Scale parameter $\varphi_j^{VA}$ in the CES value added equation:
   
   $$ VA_j = \varphi_j^{VA} \left( \sum_{i\in L} \delta_{i,j} \cdot LD_{i,j}^{-\rho_j^{VA}} + \delta_j^{KTFERT} \cdot KTFERT_j^{-\rho_j^{VA}} \right)^{\rho_j^{VA}} $$

2. Tax rate on type I worker compensation in industry $j$ (ttiw), in the equation that determines government’s revenue from payroll taxes on type I labor in industry $j$: 
   
   $$ TIW_{t_{i,j}} = ttiw_{i,j} \cdot W_{i,j} \cdot dist_{i,j} \cdot LD_{i,j} $$

3. Tax rate on the production of industry $j$ (ttip), of equation: 
   
   $$ TIP_j = ttip_j \cdot PP_j \cdot XST_j $$
Alternatives to finance ↑G

↑ Direct tax rate on urban and rural households (Direct).
↑ Direct tax rate on urban households only (Direct-urban).
↑ Indirect tax on commodities (Indirect).
↑ Tax rate on the financial sector (Tax-financ)
↑ Tax rate on the mining sector (Tax-min)
## Impact on macroeconomic indicators

<table>
<thead>
<tr>
<th>Variable</th>
<th>Benchmarka</th>
<th>Tax-Min*</th>
<th>Tax-financ*</th>
<th>Direct*</th>
<th>Indirect*</th>
<th>Direct-urban*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban-Household consumption</td>
<td>422.84</td>
<td>-0.18</td>
<td>-0.12</td>
<td>-0.07</td>
<td>-0.49</td>
<td>-0.20</td>
</tr>
<tr>
<td>Rural-Household consumption</td>
<td>40.76</td>
<td>0.37</td>
<td>1.12</td>
<td>-0.40</td>
<td>0.45</td>
<td>0.93</td>
</tr>
<tr>
<td>GDP at market prices</td>
<td>757.07</td>
<td>0.12</td>
<td>-0.08</td>
<td>0.17</td>
<td>-0.05</td>
<td>0.16</td>
</tr>
</tbody>
</table>

a Trillion Colombian pesos  
* % change w.r.t. base scenario
% changes in disposable income of households under different government’s financing options.

<table>
<thead>
<tr>
<th></th>
<th>Tax-Min</th>
<th>Tax-financ</th>
<th>Direct</th>
<th>Indirect</th>
<th>Direct-Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households – rural</td>
<td>1.12</td>
<td>2.40</td>
<td>-0.79</td>
<td>1.97</td>
<td>2.70</td>
</tr>
<tr>
<td>Households - urban</td>
<td>-0.01</td>
<td>-0.002</td>
<td>0.19</td>
<td>0.26</td>
<td>0.05</td>
</tr>
<tr>
<td>Impact on rural-urban gap</td>
<td></td>
<td></td>
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</tbody>
</table>
Change in the value added of industries that receive the shock
Changes in Income of households (%)
Sensitivity Analysis for TFP Changes

What is the effect of the policy on variables at the aggregate level due to possible changes in TPF?
Concluding Remarks

• The policy that was analyzed is effective in the goals it pursues. The package of activities proposed for it might have a positive impact on the agricultural production in the target zones; i.e., the municipalities that had been intensely affected by the armed conflict.

• The benefits of this set of policies may come at a cost.
  o The production in other sectors such as other industries and other primary goods may fall.
  o Depending on the mechanism to finance the implementation of the policy, rural income may even fall.
Key messages

➢ It’s essential that the way in which the policies in the peace agreement are funded is given careful consideration. The results of this study show that increasing the direct tax on the financial sector would reduce income inequality between rural and urban zones.

➢ The opportunity cost of the policy, can be mitigated if the effect on the productivity of factors introduced by this policy is stronger.
  - Provision of public goods that effectively increase productivity in the zones that are the target of the policy:
    - Infrastructure such as tertiary roads and irrigation systems.
    - The quality of technical assistance and sources of credit may be also key in these efforts.
Acknowledgement

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