Poverty Impacts of Freer Trade and Agricultural Policy Adjustments in an Opening Economy: the Case of Colombia

RESEARCH PROPOSAL

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Abstract

We aim to contribute to the assessment of the poverty and inequality impacts on the rural sector arising from further trade liberalization and agricultural policy adjustments in Colombia. For this we plan to use a standard static CGE model specialized in the agricultural sector, jointly (sequentially) with an econometric microsimulation model that allows for effective job relocation.
1. Main research questions and core research objectives

The main objective of this proposal is to enhance Colombian capability to perform technically sound and informed analysis on rural poverty impacts arising from freer trade and changing agricultural policy. We do believe that an important avenue in this respect is the integrated use of CGE modeling and microsimulation techniques, given that they allow for taking into account first and second round (price and quantity) effects and household responses to them in a rather detailed manner. The results from the study will be of great relevance for our understanding of the potential impact of current trade and policy developments on the Colombian rural sector and for improving policy making and policy design.

The main research questions we pose can be summarized as follows:

- What may be the effects on poverty and inequality in rural areas, stemming from further trade liberalization? Mainly related to the recently negotiated (and pending from approval) Free Trade Agreement with the United States, the Association Agreement under negotiation with the European Union, and the Free Trade Agreement under negotiation with Canada.

- To what extent can we expect that sectoral policies aimed at enhancing farmer’s capability to adapt to the new trade environment or to help them cruise through the transition period, will have the intended effect of alleviating adjustment costs or enhance their potential to take advantage of new income opportunities?

- What may be the potential effects on poverty and inequality of the new set of sectoral policies in rural areas?

- Are there any alternative sectoral policy measures that may help alleviate adjustment and transition costs in a more efficient way?

Our core research objectives are:

- Estimate the potential impact of the above mentioned FTAs on goods’ relative prices, production quantum, trade flows, and real factor returns, with emphasis on the agricultural sector.

- Identify the main winners and losers, in terms of goods, within the agricultural sector.

- Identify the main transmission channels of the impact of further trade liberalization to rural households’ income generation and poverty status, by household type, taking into account labor types.
• Identify the main transmission channels of the impact of sectoral policies on rural households’ income generation and poverty status and document alternative policy measures.

2. **Scientific contribution of the research including a short list of key references in the literature and knowledge gaps**

There is a growing literature examining, either ex ante or ex post, the impact of trade liberalization on poverty and income distribution. Among it, there is a sizeable number of studies in some way focused on the agricultural or the rural sector. A survey of recent work in this area is done by Hertel (2006). Hertel reviews empirical work on the poverty effects of agricultural trade liberalization. Bautista and Thomas (1997) study the effects of alternative trade policy adjustments on equity with an emphasis on the rural sector. Lofgren (1999) analyses the impact on poverty of trade reform in Morocco, grouping households in such a way so as to identify the rural poor and the activities from which they derive their income. Gulati and Narayanan (2002) study the poverty effects of rice trade liberalization in Asia.

As this brief review implies, it is relatively uncommon to attempt to, concurrently to trade policy changes, assess the expected impact of policy measures aimed at alleviating the potential negative effects of trade liberalization or at enhancing farmers’ capabilities for grasping the potential benefits arising from it. It is in this area where this research proposal makes its more important contribution.

To the best of our knowledge, there are no studies on poverty impacts arising from trade policy or sectoral policy changes that focus on the rural sector in the case of Colombia. Bussolo and Lay (2003) use an integrated CGE microsimulation approach to study the poverty impact of the Colombian unilateral trade liberalization process at the beginning of the 1990s. However, the model they use has relatively little agricultural detail and their work concentrates on trade liberalization alone. Pardo et al (2005) use a variation of the GTAPinGAMS multiregion static CGE model, jointly with a microsimulation model similar to the one used by Bussolo and Lay (2003) –based upon Robilliard et al (2002). They study the poverty impact of the FTA between the Andean countries and the U.S., but no agricultural detail is used in the model and no sectoral policy changes are taken into account. Maldonado et al (2007) estimate impacts from trade liberalization and compensatory policies on “family agriculture” income. They do so in a partial equilibrium setting, assuming that only goods price changes affect households income generation, and no link is made to changes in poverty.

Other work in this area has focused on the economic evaluation of the impact of the FTA with the U.S. without consideration of poverty and income distribution impacts beyond what may be inferred from standard CGE modeling. Examples of these are Martín and Ramírez (2005), National Planning Department (2003), Botero (2005), and Argüello and Valenzuela (2005).
In the context of our country, the contribution of this research is of great importance. It would provide partial answers to pressing questions from the social, sectoral, and trade policy standpoints as well as from the development practitioner’s viewpoint. Furthermore, it would make a significant contribution in terms of capacity building for analyzing poverty and income distribution issues in our country, especially regarding the rural sector, where a sizeable proportion of the poor concentrates.

3. Policy relevance

As other Latin American countries, Colombia has undergone an ambitious process for opening up its economy during the last one and a half decades. The average tariff has gone from 39% in 1990 (Bussolo and Lay, 2005) to 12% in 2005 -16.5% for agriculture (WTO, 2006). However, protection for the agricultural sector has remained relatively high, as tariffs for an important number of agricultural products are determined through the Andean Price Band System (APBS) that ameliorates the impact of international prices. Even though it is meant as a price stabilization mechanism, the price band system confers an important degree of protection (Espinosa, 2005). The unweighted annual average tariff for the more than 150 agricultural tariff lines under the price band system in 2005 was 25%.

Although decreasing in importance, the Colombian agricultural sector still plays a significant role in the economy. It represented 11% of GDP (World Bank, WDI database) and 19% of total exports* (Colombian Ministry of Trade, Industry and Tourism) in 2007, and 26% of employment in 2005 (Guterman, 2007).

Regarding international trade, bilateral trade with the United States is of topmost importance. United States’ share in Colombian total imports in 2005-7 was 27% and 38% in total exports (Colombian Ministry of Trade, Industry and Tourism). The respective shares for agricultural trade are 39% and 35%. According to the USTR (2005), Colombia is the third largest destination for US agricultural exports in the Western Hemisphere –after Canada and Mexico.

Accordingly, liberalization of agricultural trade with the US in the context of the recently negotiated Free Trade Agreement is expected to have an important impact on the rural sector. Colombia is about to dismantle the APBS, phase off tariffs for most agricultural products, increase import quotas for others, and implement trade facilitation measures to ensure enhanced market access for US goods. These market access measures are complemented by Colombia’s forgiveness of a permanent safeguard system and an MFN-like clause that commits the country to extend to the US any more favorable treatment it may concede to a third party (Garay et al, 2006). On the other hand, impacts arising from the agreement on the export side are deemed to be modest since Colombia already enjoys preferential (mostly zero tariff) access to the US market through the Andean Trade Preferences and Drug Eradication Act (ATPDEA).

* Including agroindustry.
Trade with the European Union is important too. EU’s share in Colombian total imports and exports is about 13% and 14%, respectively, making it the third largest Colombian trade partner. Regarding agricultural trade, the EU is the second largest destination of Colombian exports, around 26%, and the fourth to fifth largest source of imports (about 6% of agricultural imports, a share similar to that of Canada). Even though negotiations for the Association Agreement are midway, it is expected that market access conceded by Colombia will be of similar characteristics to that granted to the US. Therefore, protection attained for the agricultural sector through the APBS is expected to vanish too.

Negotiations for an FTA with Canada are well advanced now. Canadian negotiators are looking for market access conditions that yield Canada some advantage over the US (during the implementation period). In this regard, it is plausible that the APBS will be dismantled too. Even though currently Canada is not one of the main Colombian trade partners (Canada’s share of Colombian total exports and imports is around 2% and 1%, respectively), it makes up for around 6% of Colombian agricultural imports (similar in magnitude to the UE).

All in all, as a result of the set of FTAs that will be analyzed in this research, about 64% of Colombian agricultural exports and 50% of agricultural imports will be liberalized. Adding up the agricultural trade that currently is under free trade conditions, it turns out that, upon implementation of these agreements, 83% of Colombian agricultural exports and 93% of agricultural imports will be liberalized upon completion of these FTAs.

Assessing the poverty impact of these agreements is also likely to be important. The agreements not only imply an adjustment of the overall economy, most likely they will force a significant realignment of the agricultural sector where a sizeable share of Colombian poor concentrates. Colombia shows relatively high and persistent poverty. The poverty head count has remained in the range in between 51% and 58% during the period 1996-2004 (Nuñez y Espinosa, 2005). The sharp increase in poverty that followed the crisis of the late 1990s led the government to establish a task force for envisioning a strategy for “eradicating” poverty and inequality. However, the report from the task force in which a number of policies are called for in order to reduce poverty, does not take into account the potential impact of the FTAs considered here.

As in other countries, poverty has been more widespread and intense in the rural sector. Along the period referred to above, rural poverty has been 25 percentage points above urban poverty as an average. Furthermore, evidence shows that rural poverty tends to concentrate among the population directly linked to the agricultural sector, especially small farm agriculture (CRECE, 2005). Therefore, it is reasonable to expect that trade liberalization will have an impact on rural poverty.

As adjustment costs in the agricultural sector can be expected to be of importance, the government has designed a policy package for “compensating the losers from the agreement” (according to official statements for the press and referring to the FTA with the US). The package, known as AIS (its acronym in Spanish for “Agriculture, Secured
Income”) has been publicized mainly as a subsidy system for compensating sectors and producers that are deemed to be negatively affected by the implementation of the FTA with the US. The program, launched through Law 1133 from 2007, has been allocated an annual budget of approximately US$217 million -the equivalent to about 35% of the 2007 total agricultural sector official budget, excluding debt servicing (Ministry of Agriculture, 2008).

Simultaneously, a general agricultural law was submitted by the government to congress. The legislation provides for reviewing the overall set of agricultural laws in such a way to rationalize them and ensure that private entrepreneurship takes a central role in shaping the development of the agricultural sector. Also, an export-oriented program has been launched, targeting a set of products with current or potential foreign market demand, as defined by the government, for channeling credit for working capital and new investments.

As follows from the above, the agricultural, and rural, Colombian sector is about to be shocked from various sources. It is worrisome that, to the best of our knowledge, there is lack of sufficient, well-documented, and analytically sound research exploring the likely impact of these immediate changes. This is true of the economic impact on the agricultural sector and more so of the poverty dimension of these shocks.

Relevance of the research proposed here for policy analysis and for informing policy making is undeniable. Results from the CGE analysis should prove valuable for ex-ante assessing the likely economic impact of freer trade and a changing sectoral policy environment. Likewise, results from the CGE cum microsimulation model, should prove valuable for assessing the poverty impact of trade and certain sectoral policy changes.

Furthermore, the development of these analytical tools will enable us to provide a means for, within certain limits, monitor the impact of policy implementation and inform the policy making process as it comes along. This is so as the Sectoral Policy Direction of the Ministry of Agriculture and the National Planning Department’s Rural Sustainable Development Unit have shown their interest in the project and manifested their willingness to interact with the project team for assembling the necessary data, and discussing modeling issues and results. Also, the National Administrative Department of Statistics will interact with the team leader for data preparation purposes, as the Department gets ready to assess a new methodology for collecting and estimating agricultural production data and for updating the national accounts base year.

4. Methodology

Several approaches are currently used for modeling the potential impact of trade and policy changes on poverty and income distribution within a combined CGE-microsimulation framework. These are classified according to the way the CGE and the micro model or data are linked together: top-down; bottom-up; both top-down and bottom-up; layered; fully integrated; representative, extended representative, or real household data.
The surveys by Bourguignon, Pereira, and Stern (2002), and Davies (2004) highlight the main characteristics, applications, and advantages and disadvantages of these approaches.

For this research, we plan to build a sector-focused (agriculture) static CGE for simulating the impact on relative prices and macro variables, arising from both trade and sectoral policy changes. Trade policy shocks comprise the implementation of the recently signed FTA between Colombia and the United States as well as implementation of the Association Agreement and FTA currently under negotiation with the European Union and Canada, respectively. Even though the agreements may include trade facilitation measures, we do not attempt to model them. Simulations will be limited to tariff dismantling and import quotas (which will be implemented by means of tariff equivalents). Simulation of sectoral policy changes comprises two sets of policy instruments. First, a subset of the currently implemented measures. Second, different likely scenarios for implementation of projected measures.

The above differentiation between policy instruments respond to the fact that AIS has already entered into force. In spite of the fact that implementation of the FTA with the US has stalled due to political and political economy reasons, the Colombian government started implementation of AIS in 2007 and it is under way in 2008. As a consequence, two sets of instruments operate currently. The biggest one, comprising almost 94% of total resources devoted to the whole program, is aimed at enhancing competitiveness -it is the so-called competitiveness support component (APC, from its acronym in Spanish). The second one, for which slightly more than 5% of total AIS resources are allocated, is devoted to provide support for specific sub-sectors -this is the sectoral economic support component (AES, from its acronym in Spanish).

The APC component is overwhelmingly devoted to subsidized credit for different purposes (general category credit), ranging from land preparation to primary transformation of goods. Differentially subsidized interest rates apply according to the size of the agricultural exploitation, the lowest being directed toward small farmers. Another policy instrument belonging to the APC component is the rural capitalization incentive (ICR, for its Spanish acronym). The ICR provides a credit rebate for farmers making new investments. Qualifying investments range from land preparation to machinery and equipment acquisition, and includes planting, maintenance, and renovation of certain perennials. The rebate varies in size according to the type of farmer, reaching 40% for small farmers and 20% for medium size and big farms. The APC component comprises also competitive funds for irrigation projects and applied research, as well as funds for technical assistance, venture capital, and animal health.

The AES component comprises subsidized credit, under the general category and the ICR category, for a set of products including rice, barley, red beans, corn, sorghum, soy, and wheat. It is basically a fund within AIS, devoted to specific crops (those deemed to be the losers from the FTA with the US), that, in some cases, provides more favorable conditions (like a 30% credit rebate for medium size and large farms under the ICR program versus 20% under the usual ICR).
Therefore, the first set of policy instruments to be simulated is, in turn, a subset of instruments under both the APC and AES components of AIS while the second set, expected to be direct cash transfers, will be implemented under scenarios agreed with the Ministry of Agriculture and the National Planning Department.

Additionally, we plan to build a microsimulation model that, fed with some results from the CGE model, will let us estimate the impact of the above mentioned shocks on poverty and inequality with an emphasis on the rural sector. This model keeps track of changes in wages and labor demands and implements a particular way of modeling effective labor relocation within occupational groups.

*On the CGE model*

Regarding the CGE model, we plan to follow the standard neoclassical CGE structure with equations that describe producers’ production and input decisions, households’ behavior, government demands, import demands, market clearing conditions for commodities and factor markets, and numerous macroeconomic variables and price indices. Demand and supply equations for private-sector agents are derived from the solutions to optimization problems, where agents are assumed to be price-takers and markets are assumed to be competitive. Trade flows with relevant partners will be included (basically the U.S., the European Union, and Canada, as a group, and the Rest of the World).

Indeed, we will start from the Standard CGE model developed by Lofgren, Harris, and Robinson (2002) at IFPRI. This model has the basic desired characteristics we want, plus the potential inclusion of household consumption of non-marketed commodities, transaction costs, and activities generating multiple commodities and vice versa. All these are attractive features for a more realistic modeling of poverty impacts, especially for rural areas. Not the least, a well developed GAMS code is available for implementing the model, allowing us to concentrate on adjusting the model to fit our particular needs.

The basic structure of the model, as well as some of the main work that needs to be done in its adjustment, can be summarized as follows†. Technology is modeled at the top alternatively by a CES or a Leontieff function of value added and aggregate intermediate input. Value added is a CES function of primary factors (labor, capital, and land) and the aggregate intermediate input is a Leontieff function of disaggregated intermediate inputs. Each activity can produce more than one commodity following fixed yield coefficients. Also a commodity can be produced by more than one activity.

There are several institutions in the model. Households get income from factors and transfers from other institutions (government, foreign countries/regions, and other households). Consumption income is the residual after paying taxes, savings, and transfers to other institutions, and is spent according to LES demand functions derived from a Stone-Geary utility function. Commodities may be marketed or consumed directly by the household-producer, valued at producer prices.

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† Model overview is based on Lofgren et al (2002).
Enterprises may receive factor income and transfers from other institutions. This income may be allocated between direct taxes, savings, and transfers to other institutions. The government collects taxes and gets transfers from other institutions and expends this income on purchasing commodities, and transfers to other institutions. Government consumption is fixed in real terms while transfers to domestic institutions are CPI-indexed, and savings is a residual. Foreign savings is the difference between foreign currency spending and receipts. The treatment for trade with the rest of the world depends upon the closure rule that is used.

As for factor markets we have the following. Factor returns may vary across activities. This applies not only to specific factors but also for mobile ones. This is so to accommodate the potential influence arising from exogenous causes, such as environmental risk and so forth. There are three alternative closure rules for factor markets: one in which supplies are inelastic and returns clear the market, one in which there is elastic supply and the employment level clears the market, and one in which there are segmented markets and activities are forced to fully employ their specific factor.

Regarding commodity markets, domestic output may be sold in the market or consumed at home. Marketed outputs are imperfectly substitutable under a CES function. Activity-specific commodity prices clear the implicit market for each disaggregated commodity. Aggregated domestic output is allocated between domestic consumption and export through a CET function. Export demands and supplies are infinitely elastic. Domestic demand comes from households and government consumption, investment, intermediate inputs, and transaction inputs. Aggregate imported commodities and domestic output are imperfect substitutes in demand (using a CES function).

As for the tax system, household direct taxes are defined as fixed shares of household income. The rest of taxes are at fixed ad valorem rates, as are tariff rates. The treatment of taxes varies according to the closure rule at use. For flexible government savings, direct taxes are at fixed rates. For fixed government savings, direct tax rates may be either uniformly increased by a certain, endogenous, amount of points for selected institutions or endogenously scaled for selected institutions. In any of the three alternatives government consumption is fixed.

The main adjustments and/or specifications required by the model to fit our needs are listed below.

For the relevant agricultural subsectors, activities will be split to reflect farm sizes or technologies. This is needed to be able to take into account differences in policy instruments implementation as referred to above. In a similar vein, some commodity groupings will be split to accommodate for the fact that some commodities within the grouping are tradable and others are not.

Similarly, household types in the rural sector will be defined so as to better reflect their livelihood strategies. This will be done on the basis of a typology constructed from the
household survey used for implementing the microsimulation model. At the least, rural households will be divided among those that own land and those that do not, according to their place of residence (rural dispersed or small rural towns).

Labor types will be defined on the basis of information basically coming from the household survey used for the microsimulation model. The main types we envision defining include, in the case of agricultural activities, family labor, wage laborers, land owners (small farms), technical assistants, and administrators; and, in the case of rural non-agricultural activities, unskilled and skilled workers. For the urban sector we may use four labor types: informal skilled, informal unskilled, formal skilled, and informal unskilled.

As we plan to run short term simulations, capital will be specific. Also, as the Colombian SAM does not isolates land, we plan to do our best to include it as a production factor. We will consider several alternatives for modeling labor markets. One possibility to be evaluated is to have exogenous wage differentials within the agricultural sector. This option allows capturing well known wage differences according to crop type or region/crop combinations (for instance, for crops grown in the northern part of the country it is customary to pay lower wages as daily working hours are shorter to accommodate climate conditions). Another possibility is having employment levels clearing some rural labor markets (as may be the case of family labor).

An important modification to the model has to do with taxes. As the Lofgren et al model does not have a value added tax (but a tax on value added) there is need to amend it. There are two possibilities for this. One is to use the approach proposed by Go et al (2005). They amend the Lofgren et al model to have a VAT with rebates for intermediate consumption and investment. The other possibility is to use the approach followed by Wang et al (2008). They use out of the model calculations to have the model’s tax on value added reflect desired levels of the value added tax on particular commodities.

Adjustment of the model in this regard is needed as we want to use a tax replacement mechanism, allowing the government to compensate for revenue lost due to tariff elimination. The mechanism mainly considers using the VAT or direct taxes, or a combination of both, for compensating government income losses and for financing sectoral policy outlays.

As the model is a single economy one, modeling bilateral trade liberalization requires further adjustments. In particular it will be required to split the Rest of the World account in two sets of regions: liberalizing ones (US, EU, and Canada) and the rest. Not only imports and exports from and to these two sets of regions must be split but also two-way income transfers and savings. Since liberalizing regions’ economies are not represented in the model, we can only simulate tariff phase off on the Colombian side. Even though this is limiting for the analysis, it should be of lesser consideration as Colombia already has preferential access to the US market (via the ATPDEA) and the European market (via the SGP plus). This approach is not uncommon in the literature (see for instance Sanchez and Vos, 2006; and Wong et al, 2008).
Also, sufficient detail must be built into the model to allow for the required representation of the main policy instruments to be simulated (as described above).

As is obvious, a fair amount of work will be needed to extend the Colombian SAM (briefly described in the section on data requirements and sources) to the sectoral detail level that we need. Indeed, the very definition of the appropriate level of disaggregation for the agricultural sector will require its own work and analysis, as commodity and activity detail must be significant for appraising the effects of trade and sectoral policy changes to be implemented. As using an overall detailed SAM is unpractical and unwise (due to computing and analytical considerations), we expect to follow the “flexible aggregation” approach advocated by Reinert and Roland-Host (1997). This way, the base SAM, which is estimated for as many sectors as possible, is aggregated into fewer broad activities for those sectors that do not bear importantly for the issues under study, while full (or near full) detail is kept for those of relevance. The same principle applies for the corresponding set of exogenous parameter estimates.

The idea of estimating a sectorally detailed SAM to the extent it is possible is intuitive. Trade measures (especially tariff, countervailing measures, and the like) are generally targeted at the product (tariff line) level. The same applies to some of the sectoral policy measures currently or prospectively applied, as in the case of subsidized credit for rice. For simulation purposes, since we aim to study the whole agricultural sector, some activity and sectoral aggregation will be needed (provided we can estimate a highly disaggregated SAM for the agricultural sector). As Bloningen et al (1997) argue, an adequate detail in the sector under scrutiny allows appraising important upstream and downstream relationships that are not discernible otherwise.

On the microsimulation model

Regarding the microsimulation model, we plan to partly follow Ferreira-Filho and Horridge (2004). These authors use a (GTAP-embedded) CGE model with regional detail linked to an econometric microsimulation model of Brazilian households. The procedure includes an iterative process for assuring the CGE and the household models converge. While we will attempt to use these authors’ approach for building and using the household model, we do not plan to replicate their iterative procedure. The main reason for this being that we want to keep things as simple as possible as a first step.

There are a number of advantages in following this type of approach (Savard, 2003). First, we can accommodate a large number of households without the difficulties inherent to incorporating them directly into the CGE model. Second, discrete-choice or integer behavior can be incorporated much more easily into the household model than into the CGE model, and they may be important for modeling the rural sector. However, while there is no need to assure consistency between household data used in the microsimulation model and SAM data when there is looping, we will need to assure it from the beginning. The reason is that without looping there is no guarantee that results from the two models will converge. While using a top-down approach without feedback,
as we propose doing, there will not be convergence in any strict sense, having consistency between the macro and the micro data assures us that changes in “macro” variables (prices and quantities mainly), in the aggregate, have the “right” impact on households.

The household database keeps relevant household and individual’s information such as number of adults, number of children (below an age threshold), sample weights, occupational status, gender, relationship to household head, employment status, age, type of activity, and income (from different sources). While income may be affected by high wages or long working hours, there is need to decompose these two effects. Hence, it is convenient to have a measure of the quantity of working hours. Missing or unreported income is relatively frequent in the data for several reasons (unwillingness to report it, no personal income is received but there is actual income generated for the family, seasonal lay-off, sickness leave, etc.). In these cases, income will be assigned by means of a multiple regression using binary dummy variables.

Having done so, wages/income can be scaled by a common factor in order for the wage/income total in the household database (including the effect of sample weights) to fit total annual wages/income in the SAM for each labor type. Any data reconciliation issue between the household database and the SAM must be addressed at this point. Workers can be allowed to move between sectors but not between occupations (since the skill level may vary considerably). The definition of occupations may take into account a mix of the occupational position reported in the survey data used to construct the database and the income level. A suitable number of occupational groups will be defined and they will have some correlation with the labor and household types in the SAM. Since unemployed in the base period may get employment afterwards, and they have to be taken into account anyway, a similar procedure to the one before (for assigning income to people that works but do not report income) is used for allowing allocating them to an occupational group.

After shocking the CGE model, new wages and changes in labor demand are fed into the household model. Under the assumption that no one gets hired or fired, these changes are accommodated by workers employed in the base period simply by working more or less hours (the wage is updated with the total wage bill change in each occupation and activity). To consider wage and employment adjustments that incorporate workers mobility within their respective occupational group, i.e. “effective” job relocation according to changes in labor demands, Ferreira-Filho and Horridge (2004) follow what they call the “quantum weights method”. By this means sample weights for each worker are modified to mimic the change in employment.

The basic idea is simple. The above mentioned measure of the quantity of working hours (JobScore, which is set at 1 in the original database), is used to split the household into two households in such a way so as to replicate the change in the simulated JobScore. This is accommodated by dividing the sample household weight to yield the desired result (the simulated value for JobScore). The two households share the same characteristics, but one has, say, one working adult with a given sample weight (resulting
from the division above) and the other an unemployed adult with another sample weight (the complement of the former). Hence, the inconvenience is that the number of records in the database is increased. In general, a new record is created for each worker with JobScore < 1 and for each unemployed within an occupational group for which demand increases.

In the cases in which employment increases (JobScore > 1), no new record is created. The surplus labor time (simulated JobScore minus 1 times the sample weight) and the surplus wages (simulated JobScore minus 1 times the sample weight times the wage), are preserved for further distribution to previously unemployed. Once these totals are found per occupational group, newly created surplus jobs can be distributed to unemployed. For this, all records are screened and surplus jobs are allocated to all records belonging to unemployed. The allocation is done on a proportional basis, so all unemployed get a proportional share (according to their modified sample share) of the surplus jobs. This procedure implies a further splitting of records.

The procedure, then, preserves total employment and total earnings and implies no difficulty arising from the increasing number of records. This is so because it is known how much income has been taken away from over-worked employees of a given occupation. Therefore, new workers are assigned an average of the wages that are paid to their occupation in expanding activities. Income or poverty measures are not affected by the activity to which a newly employed person is assigned. A random process is used to effectively assign new workers to expanding activities.

After these procedures are done, data can be grouped back to the original household level (by adding the split records), so poverty and income distribution measures can be constructed on a household or an individual base.

A note on linking the two models

The main features for linking the two models have been presented above. Care should be exercised to assure that the wage/income total in the household database (including the effect of sample weights) fits total annual wages/income in the SAM. On the other hand, the structure of total consumption for each household must be taken into account for adjusting the impact of wage/income changes on welfare, as prices of commodities consumed have also changed (as done in Bussolo and Lay, 2005).

The CGE is used to simulate the impact of trade and sectoral policy changes on prices, activities, and occupations. Then, the household model is updated by introducing new wages and labor demands for the workers in the database and the procedures described above are followed to get the desired results.

5. Data requirements and sources
We will start from the basic 2005 Colombian SAM (although there is the possibility that a 2006 SAM will be build jointly with the National Planning Department). It has 59 activities and 59 commodities, 14 of them belonging to the agricultural or agro-industrial sectors. It also, distinguishes between 6 types of labor, two for the rural sector and four for the urban sector. The rural labor division corresponds to educational level (unskilled, skilled). A set of seven taxes directly affecting agricultural activities is included in the SAM. Rural households are broken down by income quintile.

For getting to an agriculturally specialized SAM, we need to work with a variety of sources. These include the following, among others:

- Ministry of Agriculture data on area planted and harvested, yields, and output, as well as agricultural output value data.
- Data from the National Agricultural Survey (ENA by its Spanish acronym), run until recently by the National Administrative Department of Statistics (DANE) and currently by the Corporacion Colombia Internacional.
- Data from the National Agricultural Performance Survey (ENDA by its Spanish acronym) run from 2008 by the DANE.
- Several studies commissioned by the Ministry of Agriculture to the DANE, among them production censuses carried out for some products.
- Living Standards Measurement Surveys (ECVs by their Spanish acronym) for the years 1997 and 2003 (and, possibly 2007).
- Continual Household Survey, focused on labor markets, run by the DANE.
- Annual Manufacturing Survey, run by the DANE.
- Data from several private organizations of farmers.

Construction of the household database may require using several sources too. The basic ones are:

- Living Standards Measurement Surveys (ECVs by their Spanish acronym) for the years 1997 and 2003 (and possibly 2007).
- Continuous Household Survey; and
- Either a recent nutrition and health survey (2004) or a relatively old National Survey on Households’ Income and Expenditures (1994/95), if the one collected in 2007 will not become available in a reasonable time.

6. **Dissemination strategy:**

Our dissemination strategy follows the usual outlets. Once the research is completed we will prepare a PEP Working Paper for posting at PEP’s web site. Also, we will submit our research results for presentation in relevant international conferences, not only for dissemination purposes but also for getting feedback on our work. Submission of a paper to an international journal is another of the avenues we consider for dissemination.
Since the mere construction of the agriculturally detailed SAM is novel for Colombia and constitutes a research result in itself, we plan to hold a couple of seminars for discussing its relevance and presenting results coming from multiplier analysis. These seminars will be aimed at private sector and government officials, and at sectoral researchers. Results from the whole research project will also be presented in a national seminar to be host at the Universidad del Rosario.

Material arising from the research process will be useful for teaching purposes. Presentations and workshops will be held in the context of regular seminars for undergraduates and graduates at the Faculty of Economics of the Universidad del Rosario.

Besides, as mentioned before, if the project gets funded we have committed in a consultation process starting from data preparation and going through the modeling stages and results discussion, with government officials from the Ministry of Agriculture’s Sectoral Policy Direction, the National Planning Department’s Rural Sustainable Development Unit, and the National Administrative Department of Statistics’ Regulation, Planning, Standardization, and Normalization Direction and Synthesis and National Accounts Direction.

As several instances of consultation with farmer’s private organizations are planned for data preparation, we intend to have consultation rounds with them also on policy instruments to be modeled and their impact on production activities. The same holds for discussing results from the project. An audience that we also aim to target consists of officials at the MIDAS Program, one of the main components of USAID’s intervention in Colombia in the framework of the Plan Colombia (the joint US-Colombian initiative for eradicating illicit drugs). This program focuses on developing investment ventures for sustainable agricultural development and has an agricultural policy advising unit that works closely with the Colombian government.

7. Short list of key references


Botero, J. (2005) Estimación del impacto sobre el empleo de los tratados de libre comercio en Colombia; análisis de equilibrio general computable, CEPAL, Serie Estudios y Perspectivas, No. 8


Martin, C. and J. Ramirez (2005) Impacto económico de un acuerdo parcial de libre comercio entre Colombia y Estados Unidos, CEPAL, Serie Estudios y Perspectivas, No. 7


National Planning Department (2003) Efectos de un acuerdo bilateral de libre comercio con Estados Unidos, Dirección de Estudios Económicos, Documento 229, Junio


8. **List of team members’ prior training and experience in the issues and techniques involved.**

Ricardo Argüello, male, 51, is a PhD candidate in Regional Science from Cornell University with specialization in international trade and economic integration. He also holds an MSc in agricultural economics from the same university. He has received training in CGE modeling in the City and Regional Planning Department at Cornell as well as from Purdue University in the framework of an agreement between the GTAP and Cornell’s Department of Applied Economics and Management. He has worked on international trade and economic integration issues for the Andean Community and the Colombian government and on rural poverty and structural change in the agricultural sector for the Colombian government. He was part of a team led by Sara Wong, working on a PEP project for estimating the impact of trade and fiscal policies on Ecuador’s poverty. Ricardo has some experience using GAMS and CGE modeling.

Nohora Forero, female, 24, economist from Universidad del Rosario and MSc in economics from the same university. Nohora has experience in estimating microeconometric models for social and social policy analysis, with emphasis on poverty and income distribution in Colombia. In this context, she is knowledgeable of the Colombian Living Standards Measurement Surveys and of standard techniques for measuring and analyzing poverty and income distribution. She also teaches courses at the undergraduate level.

Juan Diego Misas, male, 33, is an anthropologist from Universidad de los Andes, MSc candidate in economics from Universidad del Rosario, with emphasis in microeconomics. He has worked as research assistant in the Faculty of Economics at the Royal Holloway University (London University) for studying civil conflicts. Juan Diego has made data analysis using Living Standards Measurement Surveys and the World Values Survey for analyzing the incidence of shocks on household expenditures. He is experienced in using data management and econometric software.

At least two undergraduate economics students will participate in the project as research assistants.

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* As of the time of preparation of the first version of this proposal both, Nohora Forero and Juan Misas were working for the Faculty of Economics of the Universidad del Rosario and committed to work on this project. Currently, Mr. Misas has left to pursue a PhD degree and Ms. Forero has plans to undertake advanced studies abroad, starting from September 2008. In case the proposal gets funding from PEP, the team leader commits to recruiting young researchers of at least similar characteristics, qualifications, and experience, who fulfill the residence requirement.
9. **Expected capacity building**

The Faculty of Economics at the Universidad del Rosario has made an ambitious effort to strengthen applied research and outreach. In this context it has developed a number of research projects in the social policy and international economics areas, including an assessment of the potential redistributive capacity of the general social security health system in Colombia, an assessment of the redistributive impact of social programs in Bogotá, an evaluation of market access in the Western Hemisphere and its implications for Andean countries, an assessment of the potential impact of the proposed Association Agreement between the Andean Community and the European Union, an analysis of rural poverty in Colombia, and a competitiveness assessment of the Colombian agricultural and forestry sectors. Recently, it has finished a PEP project related to fiscal adjustments and its impact on income distribution and poverty in Colombia, led by Manuel Ramirez, and a PEP project related to trade liberalization and fiscal policies in Ecuador, led by Sara Wong at Ecuador’s ESPOL (the report is under PEP review).

Social policy is one of the main research areas we aim to develop. It has been identified as a key research area after a careful analysis of our country’s needs and of the domestic and regional supply side. There is lack of economically and technically sound analysis in several dimensions of this area in Colombia. Enhancing our capability for doing CGE and microsimulation analysis is one of the ways in which we aim to tackle this deficiency. While we gained some experience through our previous PEP and other projects, having the possibility of developing the one proposed here, with the help of the PEP Network, would allow us to deepen our expertise and develop new analytic tools. It would also facilitate contributing to the study of a topic of great importance and actuality for our country, while helping us not only in strengthening existing but limited capabilities but also in forming new, young, researchers in the area that will help us build a stronger and more competent research team in the near future.

Besides the technical dimension, this research will enable us to get better knowledge on the functioning of the Colombian agricultural sector and its linkages with the rest of the economy, as well, as on the dynamics of income generation and distribution in the rural sector. Obviously, this entails a good deal of knowledge deepening in the theories and applied literature on these topics, as well as on the simulation techniques that we plan on using.

As a research and teaching institution, formation of young researchers is one of our top priorities. For this reason we intend to assure that the youngest members of our research team get to work together with more senior members. The same applies to research assistants that we will recruit from our best undergraduates. Ricardo Argüello will support the overall development of the research in his role as director of the project. Diego Misas will work together with Ricardo Argüello in the CGE modeling. Nohora Forero and Ricardo Argüello will work on the microsimulation model. Two to three research, undergraduate, assistants, as needed, will collaborate in the building of the SAM and the household database. They will be jointly guided and supervised by the members of the team.
10. Any ethical, social, gender or environmental issues or risks which should be noted.

At this stage of the proposal, and considering the available information, we do not foresee any ethical, social, gender or environmental issues or risks that should be noted or mentioned.

11. List of past, current or pending projects in related areas involving team members

Ricardo Argüello:


- Analysis of the Incremental Effects from a Trade Accord with the European Union: Opportunities for the Andean Community. Financed by European Union Technical Trade Assistance to the Andean Community Secretariat. Status: finished.


- Colombian Agriculture and the Free Trade Agreement with the United States. With ten other consultants. Financed by Colombian Ministry of Agriculture. Status: finished

Nohora Forero:

• Potential Redistributive Capacity of the General Social Security Health System in Colombia (with Olga Lucia Acosta, Claudio Karl, and Juan Diego Misas). Financed by Fundacion Corona, 2006

• Fiscal Adjustment, Income Distribution and Poverty in Colombia: Value added tax reforms and Public Transfers (research assistant), Finished.

Juan Diego Misas:

• Values, Institutions, and Social Capital in Colombia, research assistant, Universidad del Rosario

• Potential Redistributive Capacity of the General Social Security Health System in Colombia (with Olga Lucia Acosta, Claudio Karl, and Nohora Forero). Financed by Fundacion Corona, 2006 (Finished)

• Assessment of the Redistributive Impact from Subsidies Granted by the Bogotá Municipality, (with Manuel Ramirez, Olga Lucia Acosta, Jose Guerra, Andres Zambrano y Luis Fernando Gamboa), Financed by Bogota’s Planning Department, 2006 (Finished)