DR-CAFTA and Migration in Central America

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The Dominican-Republic and Central American Free Trade Agreement (DR-CAFTA) was formalized in the context of growing international emigration and receipt of remittances in Central American countries, as well as transitions in its internal demographics. What affect will DR-CAFTA have on emigration rates? Will emigration decrease or increase in response to trade reforms? How will these changes affect rural development for Central American countries?

This article offers an intra-regional perspective on the impacts of trade reforms on rural economies and migration upon the five Central American countries included in DR-CAFTA.[1] Potential migration and welfare impacts of agricultural provisions in DR-CAFTA for the regions and individual countries depend on international market integration, diversification of economic strategies, and government policies. We employ regional economy-wide modeling techniques, building upon Taylor, et al. (1999) and Taylor and Adelman (1996). The consequences for rural production, incomes and migration will depend upon the extent to which influences of trade integration are transmitted to different rural household populations, as well as the ability of households to adjust to changing market conditions, both positive and negative, by altering their income activities at home or through migration. Product mixes, technologies, and labor markets are critical in shaping outcomes of trade policy reforms.

1. Trade Integration and Migration: Lessons from NAFTA

In 1986, the United States Immigration Reform and Control Act (IRCA) established a commission to search for mutually beneficial policies that could accelerate economic

[1] At time of this stud data was not available for the Dominican Republic and it was not included in this study.

growth and eventually reduce unwanted immigration. The final report concluded that "expanded trade between the sending countries and the United States is the single most important remedy" for unwanted migration (CSIMCED, 1990). NAFTA, while only partially motivated by immigration concerns, was expected to have far-reaching impacts on migration flows. In the long run, NAFTA was expected to stimulate employment in Mexico's manufacturing and agricultural export sectors, offering local alternatives to migration, by opening up new export markets. The assumption underlying these reports is that trade and migration are substitutes. Some models predicted that employment in Mexico would rise by 2% because of foreign investment (Martin 2004).

However, the Commission also concluded that the same policies that accelerate economic growth, including privatization, land reform, and freer trade may also temporarily increase migration pressures, because of the displacements and disruptions that accompany development. Skeptics of trade agreements among countries at vastly different levels of development argue that poor member countries will be targets of "big business" and suffer environmental damage and a decrease in agricultural output, especially of traditional crops such as maize. NAFTA could displace rural workers as production shifts from importables (e.g., maize) to exportables (e.g., *maquiladora* industries) and labor markets adjust to new market realities. Displacement of workers was also expected to result from a dismantling of agrarian policies and a phase-out of price supports for eleven agricultural field crops as well as from a reduction in credit subsidies offered by the Mexican National Agricultural Bank (BANRURAL; Yunez and Barceinas 2004). Studies using macro-level or aggregate computable general equilibrium (CGE) models highlighted potential negative impacts of the North American Free Trade

Agreement (NAFTA) on the rural Mexican economy. They predicted that a reduction in the government support price of corn mandated by NAFTA would decrease rural employment and wages and also stimulate a sharp increase in rural out-migration. Predicted increases in migration ranged as high as 700,000 to 800,000 people, with the majority bound for the United States (Levy and van Wijnbergen; Cornelius and Martin). The overall impact could be a greater propensity to migrate internally or internationally, especially to the United States. The fact that trade and migration may be complements in the short run may create a short-run versus long-run dilemma for countries concerned about migration (Martin, 1993).

To date, however, it appears that the predicted surge in migration above the historical trend has not materialized. Mexico-to-U.S. migration has continued its upward trend, but it does not appear to have increased to the extent predicted by most models. A nationally representative sample of rural Mexican households collected retrospective migration histories between 1980 and 2002. With this information it is possible to reconstruct migration histories and, thus, evaluate trends and impacts of immigration policies between 1980 and 2002. Data reveal that there has been a consistent upward trend in migration during these periods, with no obvious breaks with the onset of NAFTA in 1994. A dynamic econometric model tested for the effect of NAFTA and found a small and insignificant effect. NAFTA may have a small negative effect on male migration and a positive effect on migration to US farm jobs, but there is no clear and overwhelming effect of NAFTA either decreasing or increasing migration (Boucher, Taylor, Yunez-Naude, 2007; Richter and Taylor, 2008). Furthermore, NAFTA might

have a gendered impact by releasing migration pressures for women in the *maquiladoras* sector (Richter and Taylor, 2008).

Corn production was predicted to decrease with the increase in imports of basic grains and corn with the introduction of NAFTA. Paradoxically, perhaps, in 2001 maize output in Mexico reached a new record high (INEGI, 2001) and average annual corn production between 1995 to 2001 was 18.3 million tons, which is approximately what it was before NAFTA (Papademetriou, 2004). Two factors explain the divergence between the predictions of CGE models and recent migration and rural employment trends: the high degree of diversification in Mexico's small-farm economy and endogenous local input and output prices, which tend to buffer rural micro-economies from agricultural policy shocks (Taylor, Yúnez-Naude and Dyer, 1999). Furthermore, Mexico's agricultural GDP grew even as the trade deficit in agricultural goods increased, which can be attributed to growth in labor-intensive fruit and vegetables produced in the northern and western states (Papademetriou, 2004).

The studies reveal several key factors of NAFTA's effect on migration. First, migration trends set in place pre-NAFTA are difficult to reverse. Study after study reveal that migration networks are one the key determinats of migration and in this sense migration is a self-perpetuating process (Massey et al., 1998; Richter and Taylor, 2008). Second, increases in GDP may spur labor movement from rural to urban areas. As economies transition from producing basic grains into more export intensive crops or higher levels of agricultural productivity, the share of agricultural workers will naturally decline and the population will move into urban areas. Furthermore, increases in GDP may also increase migration, since indiviudals that could no longer afford to migrate now

have the money to migrate. In a study of rural Mexican migration an increase in Mexican GDP increased the propensity to migrate (Richter and Taylor, 2008). Finally, agriculutral reforms, espeically in property rights, encourage land transactions and rentals which increse the transition into the urban sector from the rural sector (Papademetriou, 2004). The lessons from the post-NAFTA years suggests that NAFTA has neither been the fuel to increase the flow of migrants from Mexico inot the US, but it also has not been a detterant to the continuing trend of migration.

2. Migration, Agricultural Production, and Trade Policies Trends in Central America

With the lessons learned from NAFTA, it is imperative to evaluate migration and remittances trends, agricultural production, and trade policies of Central American countries in order to understand the potential impact of DR-CAFTA on migration, both internally and internationally. Central American countries have a relatively long history of sending migrants abroad. The United States is far and away the most important destination for international migrants from Central America. Only Nicaragua sends more migrants to a Central American country (Costa Rica, where an estimated 226,374 Nicaraguans reside; see Migration News, October 2006). Although political factors played a critical role in instigating international migration from Central America during the 1980s, economic factors appear to be instrumental in perpetuating these migration flows. Between 2000 and 2006 the total number of Central America-born persons in the United States increased approximately 10 million to over 13 million (Table 1). In 2006 the total number of immigrants from Central America was approximately 13 million (See Table 1). The largest number of immigrants is from El Salvador, which has had a sharp

increase over the past six years (from 765,000 to 1,091,000). The next highest volume of immigrants is from Guatemala and Honduras, with the largest growth rate of immigrants over the time period from Honduras (See Table 1). Mexico is a top ten destination country for migrants in each of the Central American countries; however, in the majority of cases, it is an intermediate destination for those bound for the United States.

Table 2 presents information on the percentage of the emigration population in each Central American country. The largest percentage of emigrants is from El Salvador, 16%. In 2005 there were 1,158,701 emigrants from El Salvador, and only 1,121,000 of these were located in the US. Therefore, more than 35,000 emigrants were located in other countries, which could include Costa Rica, Guatemala, or Mexico. Nicaragua also has a large percentage of its population as emigrants, 12.5%, while Costa Rica has the smallest percentage, 2.9%.

The large flow of emigrants also means that Central Americans receive a large volume of remittances. In 2004 remittances increased 17% over its 2003 amount for the Central American region. The largest volume of remittances is sent to El Salvador, and in terms of the percentage of GDP it is only 18% of its GDP (Table 3). Remittances make up 25.6% of GDP for Honduras. The lowest percentage is for Costa Rica, at only 2.3 percent. The majority of remittances are sent from the United States, however a substantial proportion may be sent from other Latin American Countries (Agunias, 2006). For instance, one-third of remittances sent to Nicaragua could come from Costa Rica. Furthermore, the Inter-America Development Bank estimated that almost 5% of remittances in Latin American countries were sent from other Latin American countries (Agunias, 2006). Besides comprising a substantial percentage of GDP, remittances are

also a large percentage of foreign direct investment (FDI) and overseas development assistance (ODA). Table 3 reveals that for the majority of Central American countries remittances are more than a 100% of FDI and ODA. Only in Costa Rica are remittances a small percentage of FDI. The staggering numbers on remittances have prompted many to consider remittances as a panacea to economic development issues. While remittances have been found to increase income levels, there is still much debate about its impact on long run trends to decrease poverty levels.

What it is missing from the previous story of migration and remittances is the demographic transition that is occurring within each of the country's border. Central America is transitioning from having primarily rural populations into having larger and larger populations living and working in urban areas. In the late 1970's a large percentage of the population in all Central American countries worked in agriculture or lived in the rural sector (Figures 1 and 2). The largest percentage was in Guatemala and Honduras where more than 50% of the population worked in agriculture and lived in rural areas. Over the past three decades the trend for all countries was a sharp decrease for all countries especially in Costa Rica. In 2004 only 39% lived in rural areas, from 53% in 1979. In 2004, Guatemala and Honduras still had a large percentage of the population in rural areas and the potential for internal migration over the next few decades is large.

Even though Central American countries have experienced demographic transitions in the rural and urban sectors, there have been relatively minimal changes in the agricultural share of total GDP over the same time period. Costa Rica, Dominican Republic, and El Salvador have experienced slight decreases in agricultural share of GDP, but the percentage share of agriculture in GDP still remains high. Guatemala

(22.8%), Honduras (14.6%) and Nicaragua (18.0%) have the highest percentage of agricultural GDP. Even with slight decreases in the percentage of GDP there were increases in agricultural per capita production. Per capita agricultural GDP for El Salvador and Guatemala did not grow at the same level as other Central American countries over the same time period.

Differences in the structure of agricultural production among Central American countries will determine the success of trade liberalization and its differential impacts within the region. Traditional export crops, including coffee, bananas and sugar cane, are an essential source of revenue for all the five Central American countries included in CAFTA. Table 5 reports total net trade value. All countries import more than they export, but the agricultural net trade value is positive for the majority of countries. El Salvador and the Dominican Republic import more agricultural goods than they export, while Costa Rica had the largest growth in agricultural trade value.

Costa Rica and Guatemala have been models of agricultural export diversification. Costa Rica's principal exports continue to be bananas, coffee, sugar and beef, but in 2001 the share of non-traditional exports reached 85 percent of export earnings (up from 75 percent in 1997). Costa Rica has diversified agricultural exports into citrus fruit, melon, sugar and beef, but now is dependent on imports of rice, beans, and corn (See EIU country profile report). Furthermore, the share of acreage in traditional crops (beans, rice, corn and sorghum) has decreased from 0.36 in 1990 to 0.19 in 2001. Agricultural production in Guatemala has predominately been in coffee, but sugar production has become an important cash crop, but recent exports include Cardamom and other non-

traditional crops. This diversification of export crops has increased Guatemala's imports of basic grains, such as wheat and rice (See EIU country profile report).

El Salvador and Nicaragua have the smallest percentage of acreage in non-traditional crops and have been less successful in terms of overall agricultural performance (See EIU country profile report). El Salvador's economy has predominately been centered on coffee production, but has been transformed into one based in services-based economy. Even with low-growth in agricultural production the sector employs over a quarter of the labor force and meets approximately 70% of its domestic food needs. Four basic food crops are maize, beans, rice, and sorghum with the main exports of coffee and sugar. The agricultural sector is also the largest employer in Nicaragua, 40% of employment, where the majority is self-employed. Nicaragua has the smallest agricultural yields of all Central American countries, but is also trying to diversify production in cattle, milk, and non-traditional goods. In Nicaragua, productivity in basic food grains has not risen since the late 1970s, and domestic food production per capita is lower now than it was 25 years ago.

In Honduras, agriculture employs 60% of the workforce and accounts for over half of total export earnings, which come mostly from bananas and coffee, but since 1990s the development of non-traditional exports has diversified their export crops (See EIU country profile report). Honduras has been somewhat successful at diversifying its agricultural production, expanding into in melons, pineapples, mangos and other tropical fruits.

While agriculture is an important economic activity and employs a large percentage of the work force, households also participate in non-farm diversification.

Diversification in non-farm activities buffered many rural households in Mexico against changes to agricultural activities in NAFTA. This may also occur in Central America. For instance, 59% of rural income in Costa Rica is from non-farm income, 38% in El Salvador, 22% in Honduras, and 42% in Nicaragua (Reardon et al, 2001). Transitions from rural to urban sector and the evolving concept of what constitutes rural incomes in rural areas is an important factor in buffering changes in the economy as a result in DR-CAFTA.

The United States is the dominant trading partner for Central American countries in terms of both exports and imports (Tables 11 and 12). Nicaragua has the lowest percentage share of trade with the United States, approximately 28 percent for both imports and exports. For the remaining Central American countries, the average share of trade (imports and exports) with the United States is greater than 35%. More than 50 percent of El Salvador's exports go to the United States. The next four largest markets for Salvadoran exports are Guatemala, Honduras, and Costa Rica, which together account for 34.6 percent of the total. The United States also dominates on the import side (35.6 percent of all Salvadoran imports are from the United States), followed distantly by Guatemala (8.5 percent) and Mexico (9.8 percent) (See Table 10). The majority of countries trade with other Latin American countries, except for Costa Rica. Costa Rica's other top non-Latina American countries for its export is China (15.1%) and the Netherlands (4.9%), while it imports goods from China (6.4%) and Japan (5.6%).

Nicaragua has been committed to liberalizing trade with its Central American neighbors. In May 2000, it agreed to form a Central American customs union with El Salvador and Guatemala. However, a few months before signing, in December 1999,

Nicaragua imposed a 35 percent tariff on all imports from Honduras. Costa Rica has also been committed to trade liberalization, but agricultural products such as milk, poultry, rice and sugar enjoy a high rate of protection.

Changes in trade protection, especially in the agricultural sector, bought on by DR-CAFTA will take place in the context of a rural population that is already going through dynamic changes due to internal and international migration, receipt of remittances, and continued diversification of agricultural production and income sources. CAFTA was signed on 4 May 28, 2004 and has been approved by all signatory countries except for Costa Rica. The U.S. Congress approved CAFTA in 2005, followed by El Salvador, Honduras, Nicaragua, and Guatemala in 2006. Dominican Republic approved the agreement in 2007 and CAFTA is now referred to as DR-CAFTA.

3. A Micro Economy-wide Modeling Approach

Modern economic research on migration often is traced to Lewis' (1954) seminal work on economic development with unlimited supplies of labor, in which labor demand in the modern (urban) sector drives migration out of rural areas. Neoclassical economic models posit that migration is driven by wage differences created by the interaction between labor demand and supply in sending and receiving areas (Ranis and Fei, 1992). This assumption is used to model international migration in virtually all CGE models of trade integration (e.g., Levy and Wijnberger, 1992; Robinson et al., 1991). In contrast, most microeconomic models of rural out-migration are grounded on Todaro's (1969) hypothesis that each potential migrant decides whether or not to move based on expected income, not wages. The new economics of labor migration (NELM; see Stark, 1991 and Stark and Bloom,

1985), however, shifts the analytical focus from individuals to households and larger social groups.

Migrant households are part of larger economies, such as communities, regions, and nations. Economic interactions within these economies project migration's impacts beyond the households that send migrants and receive remittances. For example, if a household with migrants uses remittances to finance a new project in the village, it may demand labor from another (non-migrant) village household. Without migration, the investment project might not have taken place, and the linkage with the non-migrant household might not have materialized. Investing may not be limited to the migrant household. If some kind of local credit market (formal or informal) exists, savings may be channeled from the migrant to non-migrant households.

Imperfections in rural commodity and factor markets may affect migration impacts, negatively in some cases and positively in others. Regional or national markets for goods or labor may have high transactions costs, which limit the possibilities for rural areas to benefit from regional trade integration, possibly intensifying migration pressures. However, they also create local market linkages that transmit migration's impacts—both positive and negative—to others in sending areas.

Micro economy-wide models occupy a middle ground between household-farm models and aggregate (national) CGE models for policy analysis. Like household-farm models, they are rooted in the micro economy and constructed "from the bottom up," using household-farm survey data. However, they integrate models of household-farm activity into a local (e.g., village or regional) general-equilibrium framework. This

makes it possible to capture complex linkages and general-equilibrium feedbacks among household-farms that shape the effects of exogenous shocks on local economies.

Microeconomic models focusing on households, firms, or household-firms (Singh, Squire and Strauss, 1986), including those in imperfect market environments (de Janvry, et al., 1991), overlook local general-equilibrium effects. Our small or "micro" economy-wide modeling uses an adaptation of village-wide modeling techniques presented in Taylor et al. (1999) and Taylor and Adelman (1996). It blends microeconomic analysis with economy-wide modeling, offering an alternative to both micro (household, firm, and household-farm) and aggregate CGE models.

If all goods and factors are tradable (that is, all prices are given to the local economy by outside markets), or if supplies of all goods and services are perfectly elastic (as in a Social Accounting Matrix (SAM) multiplier model), there is no indirect, general-equilibrium effects of the exogenous shock through endogenous local prices. In this case, a series of microeconomic models of households and firms (or, in the case of perfectly elastic supplies, a SAM multiplier model) may be sufficient to estimate local production, marketed-surplus, and income effects of the policy change. However, if some goods (e.g., labor, output) are non-tradable and supplies are not perfectly elastic, there may be indirect general equilibrium effects. Market linkages resulting from endogenous prices then alter the effects of policy reforms in small economies.

Micro economy-wide models are flexible and may include a large variety of economic variables. Production activity mixes, factors, and household groups reflect both the structure of the local economy and the researcher's interest. Production activities purchase factor inputs explicitly or, in the case of family inputs, implicitly, from inside or

outside the local economy and generate value-added. The technological relationship between factor inputs and outputs in each sector is nonlinear, increasing with quantity of factor inputs but at a decreasing rate, as described by sector-specific production functions. Prices of factors, for which there are markets, can also be observed. Endogenous family-factor prices and value-added are estimated econometrically from time use information and the difference between gross value of production and the cost of all purchased inputs.

In addition to the endogenous accounts summarized above, economy-wide models may contain a diversity of exogenous accounts, including the rest of the world. The rest of the world typically includes the rest of the country and the world abroad. With few exceptions, the relevant rest of the world abroad for rural residents of Mexico and Central America is the United States, with which migration connections typically are strong.

For either a household or an entire local economy, when the supply of a particular factor exceeds demand, summed across all production activities, one of two things can happen, depending upon access to markets for the factor. The first possibility is that excess supply of the factor is marketed outside the household or local economy, at existing factor prices (e.g., fixed wages). This includes internal and international labor migration. The second possibility is that the market for the factor is imperfect, for which two scenarios are possible. The first is that individual households do not have access to factor markets and thus are constrained to be self-sufficient in the factor. This case corresponds to missing markets at the household level elucidated by Strauss (1986) and de Janvry, et al. (1991). The second scenario is that households have access to local factor markets that are isolated from regional or national markets by high transaction costs. In addition to markets for factors, markets for goods must also clear, either through interactions of supply and demand at the

household or local level, or else by using outside markets to sell excess supply or satisfy excess demand for goods. The market-clearing conditions determine equilibrium quantities and prices (for each nontradable) or marketed surplus (for each tradable). A trade equation constrains the value of local "imports" or purchases of goods and services from the outside world to equal total "exports" or sales to outside markets minus net borrowing. The trade equation represents the redundant equation in these models.

A Stylized DR-CAFTA Model

The economy-wide model used in the DR-CAFTA trade policy experiments below is a conglomerate of separate economy-wide models for Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua.[2] The building blocks of our economy-wide model are micro models of firms and households engaged in a variety of economic activities that are of intrinsic policy interest and that may be influenced directly or indirectly by policy changes (Detailed model information, code and results are available from authors upon request).

The DR-CAFTA model was designed to explore micro economy-wide impacts of specific market and policy changes in a diversity of rural economic contexts characteristic of Central America. It is essentially a hybrid, stylized model, selectively drawing elements from several small-economy (village, village-town) and country models that have been estimated for rural Mexico and Central America over the past decade (These include Taylor, Yúnez-Naude and Dyer 1999; Taylor, Zabin and Eckhoff, 1999; Taylor, Yúnez-Naude and Hampton, 1999; and Becerril, et al., 1996 and 1997). Although this is a stylized model, all parameters were derived from past models; most were estimated using original survey data and current information on local agricultural production.

[2] At the time of the study data from Dominican Republic was not available.

The elements of the model include differing mixes of production sectors for each of the five countries (Table 4). Each country model highlights the major export crops as well as the major import and staple crops. It also includes livestock, other agricultural production, and nonfarm production. In light of our focus on rural economies and migration, urban economies are represented in a highly aggregated form (industry and services). Each activity produces output with inputs of labor and capital, assuming a Cobb-Douglas production technology. Consumption demands are modeled using a linear expenditure system (LES) approach. Although more complicated functional forms are possible we have found that the results of our policy experiments using similar models are robust to the specification of functional forms (Taylor, Yunez and Hampton, 1999). This is not surprising, inasmuch as the model is always calibrated at the same point given by the survey data, and most policy experiments involve marginal changes in exogenous variables. The base models solve for local equilibrium prices and quantities of all goods and factors. The trade policy experiments are then run on this base.

The model also includes separate rural and urban labor markets and country-specific wages and capital rental rates. They also include rural and urban household groups, which obtain income from production activities in the sector to which they supply factors and spend this income on locally produced goods and imports. Households also obtain income from international migrant remittances. A remittance function relates numbers of international migrants to remittance income from abroad.

Rural households in each country allocate labor to different crop and noncrop production activities and to migration so as to maximize total income. This implies an optimum at which marginal value products are equal across production and migration

activities—for migration, the marginal effect of migration on remittances. In this prototype model, internal migration is estimated directly, by changes in rural and urban labor demands, and internal migrant remittances are ignored. In real life, changes in urban incomes are shared with rural households through remittances.

Many different market-closure scenarios are possible. For labor markets, we can assume either a fixed country wage (perfectly elastic labor supply) or an endogenous wage (fixed labor supply). The second scenario is the one chosen for the experiment. This wage corresponds to country labor markets in which the total supply of labor available for production or migration is fixed. Labor-market clearing conditions determine country-specific equilibrium wages, which also affect international migration.

Product markets, like labor markets, can be characterized either by endogenous or exogenous prices. Exogenous prices assume that countries are price-takers in international markets. The farmgate price is the international price minus the export or import tariff. Prices for goods are endogenous if policies or transaction costs isolate producers and consumers from outside markets. An import quota, if binding, results in a country-specific equilibrium price for the protected good. If trade liberalization results in disbanding import quotas, the country price becomes endogenous. However, high transaction costs within countries, which may be endemic to rural markets, may isolate groups of producers and households from this world price (de Janvry, Fafchamps and Sadoulet, 1991; Taylor, Yúnez-Naude and Dyer, 2000). However, lack of access to regional and national staple markets imposes a self-sufficiency constraint on farmers, which can adversely affect supply response in other crop and noncrop activities. Our experiments, below, illustrate the effect of such a constraint.

Parameterizing the DR-CAFTA Model

The most critical parameters needed for the household component of our model are value-added shares, which link household incomes to production; expenditure shares, which shape household demand linkages inside and outside the rural economy; and migrant remittance function parameters, which relate migration to remittance receipts. Factor value-added shares and household budget shares by commodity were obtained from a variety of sources, including village surveys in El Salvador and Mexico and SAMs for Central American countries and Mexico. Production values and wages were obtained from the Central American agricultural report by CEPAL (2002, 2003). Imports and exports for agricultural commodities were obtained from the Food and Agriculture Organization FAOSTAT agricultural database (http://apps.fao.org/page/collections?subset=agriculture). Nonagricultural totals are from the World Bank 2001 World Development Report. Labor force and employment information is from the International Labor Office and other sources. International migrant remittances are from the International Monetary Fund, and numbers of Central Americans in the United States were obtained from the US Decennial Population Census.

The DR-CAFTA model was programmed using the General Algebraic Modeling System (GAMS). Changes in activity, factor and household incomes reverberate through economies like ripples in a pond. Production technologies, expenditure patterns and the distribution of value added across households determine the size and direction of these ripples. Large budget shares for locally produced goods create a potential for income changes to stimulate local production activities. For nontradables, local prices transmit changes in demand to production activities. For tradables, prices are determined in markets outside the local economy. Thus, local demand does not affect production, but it does

determine the size of the net surplus available to outside markets. The structure of our model permits us to explore the impacts of a variety of trade and market shocks on production, incomes, migration and trade in alternative market contexts.

4. Trade Integration Experiments

Without attempting to predict specific the outcomes of DR-CAFTA negotiations or exchange-rate influences of market integration, we used the DR-CAFTA model to explore likely impacts of selected DR-CAFTA-related price changes on employment, wages and migration. The potential number of policy experiments that can be carried out with this model is large. In this paper, we simulate three price shocks: a 10 percent increase in coffee export prices, a 10 percent decrease in maize prices, and a 10 percent increase in livestock prices. The impact of trade reforms on commodity prices, of course, may be either positive or negative, depending upon the degree of protection enjoyed by the commodity prior to reforms. The signs of these price changes are arbitrary, but they reflect our a-priori expectations of price effects of regional integration. In general, the impacts of price changes in this model are more or less symmetric. These particular experiments were chosen to illustrate how sensitive labor-market outcomes are to the specific commodity prices affected by policy reforms as well as to differences in production structures and expenditure patterns across Central American countries. Coffee and Maize are relatively labor-intensive activities, in contrast to livestock production. Coffee and livestock are export activities, while maize is a major import in the region. The model makes it possible to explore the likely directions of impacts of policy or market shocks once the impact of trade reforms on import or export prices is known.

In each of our experiments, we assume that country wages are endogenous, determined by the interplay of labor supply and demand and migration. Country labor

supplies are assumed to be equal to total labor forces, but mobile across sectors. Labor demand includes demand by country production activities (determined by conditions for profit maximization). Migration is determined by equating marginal remittances to the marginal product of labor in country production activities (or country wages). In this way, the model does not assume wage convergence across countries, which we believe would be an unrealistic assumption in light of the striking wage between the countries. The sensitivity of any or all of these assumptions can be explored by changing closure conditions in the model.

Results of Decrease in Maize Prices

Our first experiment explores the economy-wide impacts of a 10 percent decrease in corn prices. The results mirror findings from Mexico that staple-price decreases have a minimal effect on migration. Lower staple prices adversely affect staple producers. They also benefit consumers. Our experiments only explore the first (adverse) affects, although we could easily extend the model to examine positive real income effects of staple price changes. In response to the staple price change, maize production falls significantly in all countries (the average estimated supply elasticity is on the order of 1.8). The change in production depresses wages but by a negligible amount in Costa Rica and Guatemala (see Table 12). Nicaragua has the largest impact, but this may reflect the higher percentage of crops that are traditional in that country. It is noteworthy that even in countries where many farmers grow maize; the labor market effects of the maize price decline are small. Labor is shifted among agricultural activities (output of other crops increases slightly) as well as between sectors, implying some rural-urban migration (see Table 12). The total impacts on migration range from almost no impact in Costa Rica to 745.6 in Nicaragua and 169.58 in El Salvador. Given the size of the El

Salvador-born population in the United States (more than 817,000 according to the 2000 US population census), this represents a miniscule change in migration in response to maize prices.

Results of Increase in Coffee Prices

The immediate impact of higher export prices is on producers of the affected export crops. In this experiment, the higher coffee price stimulates coffee production and labor demand, but the magnitudes of these impacts vary across countries. Because the production technology for coffee is similar across countries in the model, the supply response does not vary much: it has an elasticity of 0.59 to 0.77 (Table 13). Increased demand for labor in coffee production puts some upward pressure on country wages. Resulting wage increases reflect the structure of country labor markets and production, especially the relative importance of the coffee sector. They range from only .001 in Guatemala to 0.39 percent in Nicaragua. Higher wages, in turn, transmit the policy impact from coffee to other production sectors as well as migration. By the time the impacts of the coffee price change are fully transmitted through country economies, rural labor demand increases (by 0.02 to 3.74 percent), and urban labor demand falls (by 0.004 to 1.13 percent). The increased coffee price dampens international migration pressures to a varying extent across countries, notably in Nicaragua and El Salvador. There is little impact in Costa Rica and Guatemala, possibly because this country already is already heavily invested in coffee. Despite the importance of coffee exports in some Central American countries, the total income effects of the 10 percent increase in coffee price are not large in most cases. They range from almost no impact in Guatemala to around 0.82 percent in Nicaragua. This reflects production and labor market adjustments to the price change within countries (which dampen production in competing sectors), but more

importantly, the high degree of diversification in even the largest coffee-exporting countries.

Results of Increase in Livestock Prices

In contrast to coffee and maize, livestock is not a labor-intensive production activity. Not surprisingly, the labor market and migration impacts of changes in livestock prices are minimal, except for in Nicaragua (Table 14). Wages barely change in any of the five countries, there is little effect on the inter-sector distribution of labor, and international migration falls by a maximum of 272.39 migrants (Nicaragua). In Costa Rica, there is virtually no change in wages, labor demand, or international migration. Nicaragua appears to be the only country that is appreciably affected by the price change.

Results of Impacts of Price Changes versus Currency Devaluations

Our findings suggest that price changes associated with trade policy reforms are not likely to have a striking effect on international (or internal) migration. Nevertheless, if DR-CAFTA promotes macroeconomic stability in member countries, it may discourage migration by stabilizing exchange rates. Currency devaluations stimulate international migration directly, by increasing the rate of returns to households from sending migrants to the U.S. They also may stimulate migration indirectly, by affecting expectations about future economic well being in complex ways.

Table 15 compares the international migration effects of the 10-percent commodity price changes of the previous experiments and a 10-percent currency devaluation. While the impacts of the price changes on migration are generally small, the currency devaluations have a marked impact on the number of extra-regional migrants. The change in international migration is more than 20,000 in most cases, reaching a high of more than 81,000 in El

Salvador. The impact is small quantitatively in Costa Rica, which is not a major migrant-sender and is in fact a destination for many Nicaraguan migrants.

5. Evidence from Other Micro-Economic Modeling

Yúnez-Naude and Taylor (2006) also conducted experiments on the effects of DR-CAFTA on migration rates.[3] They used detailed household survey data to construct micro economy modeling similar to the previous study, but the detailed data allowed them to differentiate households into distinct types of producers (Basic Grains, Small Commercial, Medium Commercial, and Large Commercial Producers) and model both internal and international migration. The authors investigate three possible ways that DR-CAFTA could affect emigration in rural areas of Central America. First, the agreement could decrease the price of importable crops that are produced by rural households, such as corn. Second, DR-CAFTA may create new markets for exportable crops. Third, an increase in jobs for exports in the manufacturing sector may increase the incentive to migrate into urban areas from rural areas. To evaluate the effects of DR-CAFTA on migration an economy-wide modeling approach is needed.

The first simulations (See Table 16) were similar to the present study, in that they reduced the price for basic grains and increased the price for agricultural exports. However, they incorporate various stages of DR-CAFTA's agreement. The high case mimics the long run effect of DR-CAFTA, the elimination of all tariffs on basic goods. The intermediate case simulates the scenario where tariffs are eliminated for products targeted in the first year of DR-CAFTA and quotes are lifted for products with special safeguards. Finally, the low case is similar to the intermediate case, but does account for products that have special safeguards.

[3] See http://www.iadb.org/regions/re2/cafta/res_pubsC.cfm for reports on each country. Reports are currently not available on Dominican Republic and Costa Rica.

Table 16 summarizes the results. For all countries there is an increase in emigration, the largest increase was in El Salvador (0.35-7.64%) with small amounts in Honduras (0.03-0.3%). In general the increase in emigration is less than the reduction in the price of basic grains, which illustrates the diversification strategies of households.

The second simulation (See Table 17) the authors conducted was to increase the price of agricultural exports, both traditional and non-traditional. For the majority of cases an increase in the price of agricultural exports decreases emigration rates. But once again the decrease in emigration is less than the increase in price of the exportable agricultural goods. Both these cases illustrate the diversification of income sources at the household level, but also that forces that propel households (or individuals) to emigrate are already in place.

While changes in the prices of basic and exportable agricultural goods will affect emigration rates, an increase in demand for urban labor will also alter rates of emigration. The third simulation the authors conduct is to evaluate the impact of an increase in 10% of the urban wage and in the urban sector and afterwards in increase of 10% of international emigration. There are three key results (See Table 18). The increase in the urban salary increases internal emigration: 4.8% in El Salvador, 4.2% in Guatemala, 0.8% in Honduras, and 0.9% in Nicaragua. Second, rural emigration has a positive effect on rural incomes. Second, the decrease in agricultural activities is offset by remittances which bolster income levels of households. The largest changes are for small producers in El Salvador and basic grain producers in Honduras, 8.6% and 7.2%. Finally, in the short run, emigration competes with local agricultural production and with decreases in the production of basic grains, livestock and non-farm activities for all types of producers.

Remittances should only bolster consumption (income levels) and not productive activities if markets are prefect. However, as was shown in the previous case, in the short run emigration decreases productive activities. In the long emigration may increase economic activities as households purchase more capital and inputs via remittances. The dynamic effect of remittances is estimated by using the previously estimated model and allowing remittances from the new increase in emigrants to alter the liquidity that households have to purchase capital and inputs. Results are reported in Table 19. If households were not liquidity constrained remittances will not affect productive activities, but results indicate that the majority of households increase production of basic grains, livestock, non-traditional crops, and non-agricultural activities. The majority of increases in productive activities are larger for small producers than for other producers.

6. Conclusions and Policy Discussion

Wage differences across regions, in general, tend to stimulate migration. However, there are other influences on migration, as well. The structure of local commodity and factor markets, the mixture of production activities, and access to migrant labor markets, including migration costs and risks, play critical roles in shaping migration. High transaction costs in rural commodity markets may limit the transmission of prices and dampen the responses of rural producers and households to new market opportunities created by trade reforms. The emigration of workers from the rural and agricultural sectors of the economy is a development process that all countries go through. Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua are in the process of a demographic transformation, but at the same time these countries are implementing reforms that could accelerate the process of emigration from rural areas into the urban sector or other countries.

Changes to agricultural sector imply that rural households will have to make different production decisions and strategies to secure income. One effect of the application of DR-CAFTA is the reduction of prices for basic food crops. A result could be a decrease of food production, but if households are well diversified there may be no impact—as was seen in NAFTA. Facing changes in prices of basic goods, households may choose to emigrate or allocate some labor to emigrant labor markets. In order to study and evaluate the effects of DR-CAFTA, this work (and cited work) applies a general equilibrium model.

Simulations using our economy-wide DR-CAFTA model suggest that there will be differences in impacts of regional integration on migration across countries; however, these impacts are likely to be small in most cases. We find small negative impacts of agro-export prices on internal and international migration. That is, higher prices for exports tend to reduce migration pressures, but only by a small amount in most cases. More strikingly, reductions in import prices for staples have a positive but almost miniscule effect on migration. These results were also found in simulations conducted by Yunez-Naude and Taylor (2006). DR-CAFTA policy reforms will change many commodity prices simultaneously, possibly magnifying the impacts reported above. Migration effects may offset one other; for example, lower corn prices stimulate migration while higher agro-export prices tend to do the opposite. Moreover, rural market imperfections may dampen migration responses by inhibiting the transmission of world prices through rural markets.

The most important effect of regional trade integration on migration may not directly involve changes in commodity prices, but rather, how trade reforms affect macroeconomic stability in the North American region. Our findings suggest that migration is more sensitive to changes in the exchange rate than to changes in commodity prices. If DR-CAFTA helps

promote stability in exchange rates in member countries, as arguably has been the case in NAFTA, it may reduce migration pressures over time.

A final experiment cited was to increase the salary in the urban sector (Yunez-Naude and Taylor, 2006), which could occur if DR-CAFTA increases demand for labor in manufacturing sector. DR-CAFTA could promote rural emigration and increases in remittances that households receive in the rural sector. The positive effect of emigration in the long run can compensate for the decreases in labor and production in the rural sector in the short run. When evaluating effects of emigration one needs to have a dynamic approach. Remittances will increase the liquidity of households, which could increase investment in local activities.

A general conclusion of the study suggests that governments should not direct policies to maintain households in the agricultural sector. Households have the ability to adjust to changes in the commercial sector, with a diversification of incomes sources, and buffer themselves against changes in the rural economy. Emigration trends, both internally and internationally, will not decrease with DR-CAFTA or with promoting agricultural policies. These demographic transitions are an economic development process all countries have experienced. The immediate impacts of emigration on rural areas are a decrease in labor and productive activities; however emigration can have long run effects on rural development via remittances. Policies should instead focus on helping households compete in the new economy and take advantage of the changes that are occurring in the rural economies.

One way that governments can help households is to increase the economic potential of remittances. There are many ways governments can accomplish this task. First, governments need to continue to impress on banks to decrease transaction costs of sending

remittances. Cost of sending remittances can be 20% of the value of money sent, thus, decreasing the total amount received by households. In 2002 it costs an estimated $4 billion dollars to send remittances to Latin America. To decrease transaction costs of sending remittances banks need to have reliable communications methods, but also decreased costs to enter into areas where receipt of remittances is high. Investment in roads, telecommunications, and other types of infrastructure can lower costs to banks and thus increase the amount of remittances sent to households. Furthermore, if households had access to financial services they may choose to save remittances formally. In a study of rural households in Oaxaca, Mexico 5% of households mentioned lack of confidence in the financial sector for a reason why they choose not to save formally.[4] Governments can help increase confidence in the financial sector by regulating banks, credit unions, and other financial institutions. In 2005, Mexico implemented the Le*y de Ahorro y Crédito Popular* (Population Credit and Savings Law) to regulate semi-formal financial institutions that reach the rural sector. This law attempts to promote confidence among rural households to save and participate in these financial institutions. Central American governments should seek ways in which to bolster the rural financial sector, which should both decrease the costs of remitting and increase the savings of remittances.

While investing in infrastructure (roads and telecommunications) will decrease costs for financial institutions it should also decrease the costs to participate in new markets. In order for households to take advantage of remittances and changes in the export market, they need to have good information about new products. Households will alter production methods and adjust to new opportunities if the cost of information is low. Investing in these new opportunities may be possible with remittances.

[4] Survey conducted by author, please contact for information and full results.

Remittances, however, are not a panacea for economic development. Governments should be careful not to use remittances as a means to jump start growth in rural areas. Promoting the formalization of remittances that are already flowing into the area is different than promoting exportation of labor in order to increase remittances. Policies need to have a balance between promoting the use of remittances and evaluating imperfections in the market that may motivate emigration. Policies that improve imperfections in local markets, such as insurance and credit, will also increase the ability for households to invest in local economic activities, even households that do not receive remittances.

Governments should promote policies to create non-agricultural employment in rural areas. Households in Central America and in other developing countries are diversifying income sources and participating in non-agricultural activities. Policies that can help households facilitate the transition into non-agricultural activities will help adjustment to the changing rural economy.

Finally, we should not ignore the potential gendered effects of DR-CAFTA. If DR-CAFTA increases demand for manufacturing jobs, female internal emigration may increase more than male emigration. Or if DR-CAFTA decreases prices for agricultural goods, male labor activities may be affected more than female labor. Evaluating the gendered impacts of DR-CAFTA was beyond the scope of this study, but in the economic studies must pay attention to how policies and trade agreements may affect male and female emigration differently.

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Table 1: Stock of Foreign born Population by country of birth, 2000 to 2006 (in thousands)

	2000	2001	2002	2003	2004	2005	2006
Central America (total)	9,789	10,320	11,819	12,346	12,618	13,192	13,707
Costa Rica	77	68	66	68	50	52	89
Dominican Republic	692	633	652	719	631	695	81
El Salvador	765	829	868	1,019	955	1,121	1,091
Guatemala	327	311	407	441	522	546	560
Honduras	250	299	287	283	366	379	494
Nicaragua	245	250	208	184	145	181	176
Source: Migration Information Source http://www.migrationinformation.org/DataHub/countrydata/data.cfm							

Table 2: Population and Emigration trends

	Emigration (2005)	Emigration % of total Population (2005)	Top Five destination countries
Costa Rica	127,061	2.9	United States, Panama, Nicaragua, Spain
El Salvador	1,158,701	16.4	United States, Canada, Guatemala, Costa Rica
Honduras	414,955	5.8	United States, Nicaragua, El Salvador, Spain
Guatemala	685,713	5.4	United States, Mexico, Belize, Canada
Nicaragua	683,520	12.5	Costa Rica, United States, Canada, Panama
Source: Migration and Remittances Factbook, World Bank			

Table 3: Volume of Remittances to Central America and as a Percentage of GDP, FDI, ODA and Tourism

	Remittances (2006) US* $Million	% of GDP* (2006)	% of FDI** (2004)	% of ODA** (2004)	% of Tourism** (2004)
Costa Rica	513	2.3	55	7960	24
El Salvador	3,330	18.2	655	6620	756
Guatemala	3626	10.3	2145	3052	348
Honduras	2367	25.6	582	385	286
Nicaragua	656	12.2	310	127	432
Source: *Migration and Remittances Factbook, World Bank **Inter-American Development Bank, 2005 (as cited in Aguinas, 2006)					

Table 4: Agricultural share in Total GDP and Per Capital Agricultural GDP

	Share in Total GDP (%)					Per Capita Agricultural GDP of the Agricultural Population ($ constant 2000 prices)				
	1979-1981	1989-1991	1999-2001	2003	2004	1979-1981	1989-1991	1999-2001	2003	2004
Costa Rica	9.21	9.76	8.65	8.25	8.14	811	1119	1670	1800	1867
Dominican Republic	18.54	13.81	11.28	11.13	13.9	811	848	1486	1727	2263
El Salvador	14.71	13.35	9.83	9.15	9.53	583	535	629	632	674
Guatemala	25.07	25.75	22.80	22.31	22.8	743	678	768	775	804
Honduras	14.61	15.19	13.64	14.62	14.6	232	303	360	429	451
Nicaragua	17.04	16.24	18.07	18.63	18.0	465	404	673	769	783
Source: FAO Statistical Yearbook										

Table 5: Net Trade Value

	NET TOTAL TRADE VALUE					AGRICULTURAL NET TRADE VALUE				
	(US$ million)					(US$ million)				
	1979-1981	1989-1991	1999-2001	2003	2004	1979-1981	1989-1991	1999-2001	2003	2004
Costa Rica	-395	-373	-477	-1585	-1971	550	716	1230	1211	1323
Dominican Republic	-336	-1016	-5003	-4032	-4036	428	94	0	-157	-191
El Salvador	-67	-785	-1918	-2629	-2608	553	93	-141	-395	-457
Guatemala	-278	-560	-2373	-3999	-4870	769	602	792	463	455
Honduras	-137	-126	-1535	-1925	-2388	442	516	130	27	174
Nicaragua	-221	-361	-1222	-1274	-1274	321	95	76	96	211
Source: FAO Statistical Yearbook										

Table 6: 2004 Agricultural Production (1000 tones)

	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
Sugar Cane	3945	5547	5280	18000	5466	4027
Coffee	126	51	79	217	185	56
Beef, Veal & Buffalo Meat	69	79	27	63	64	75
Pigmeat	38	65	8	26	9	7
Chicken Meat	83	183	92	155	129	67
Potatoes	80	37	13	283	21	30
Cassava	295	91	18	16	18	87
Beans, Dry	11	23	84	97	79	173
Broad Beans, Dry	0	11	0	14	0	0
Soybeans	0	0	3	36	2	8
Ground-nuts	0	3	0	2	0	104
Cotton Seed	0	0	3	2	1	2
Wheat	0	0	0	11	1	0
Rice	222	577	27	35	29	233
Coarse Grains	12	43	796	1126	78	540
Maize	12	38	648	1072	45	444
Sorghum	0	5	148	52	33	97
Source: FAO Statistical Yearbook						

Table 7: 2004 Value of Agricultural Imports (US$ '000)

	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
Cereals	182,469	204,645	142,562	197,036	109,632	33,042
Wheat	42,705	60,941	55,124	87,400	31,469	22,825
Tobacco	10,932	134,767	10,153	9,531	31,254	14,190
Soy-bean Oil	1,673	94,584	12,533	36,969	968	12,307
Milk	9,532	11,721	44,150	58,768	17,910	8,405
Maize	91,440	105,172	68,314	84,062	35,187	3,487
Potatoes	449	1,772	6,291	1,776	825	2,080
Meat	8,901	5,063	50,047	50,908	21,711	2,052
Pulses	20,914	15,955	7,966	3,431	1,726	1,748
Wine & Vermouth	8,118	14,954	2,365	3,777	1,969	1,279
Apples	8,490	4,679	7,762	7,452	4,849	1,134
Rice	41,898	34,688	16,492	20,174	38,023	996
Ground nuts	1,648	13	2,580	846	267	266
Tea	632	138	224	301	325	190
Coffee Ground	146	218	979	245	420	160
Bananas	245	0	4,693	2,530	335	94
Pine-apples	3	18	1,967	0	86	27
Sugar	10	856	102	2,631	54	27
Cocoa Beans	3,076	0	403	148	308	22
Sun-flower Seed	404	0	198	344	116	3
Soy-beans	76,707	278	245	1,282	897	2
Cotton Lint	481	1,546	32,744	23,279	4,483	0
Barley	0	1,643	2	0	3	0
Source: FAO Statistical Yearbook						

Table 8: 2004 Value of Agricultural Exports (US$ '000)

	Costa Rica	Dominican Republic	El Salvador	Guatemala	Honduras	Nicaragua
Coffee Ground	199,480	5,800	123,416	328,475	223,593	126,816
Meat	34,975	4,615	327	3,433	5,204	115,193
Ground nuts	11	0	58	13	8	39,725
Sugar	42,343	84,173	37,632	188,031	14,006	36,758
Pulses	308	1,729	3,376	1,972	3,419	18,831
Tobacco	952	237,088	19	21,451	95,056	17,786
Bananas	545,420	36,361	0	229,701	188,432	11,211
Cereals	6,165	136	5,333	11,072	2,451	8,754
Milk	23,670	10	1341	2,073	6,414	8,685
Cocoa Beans	702	52,180	23	5	53	557
Soy-bean Oil	3,528	0	153	2,884	17	285
Rice	764	128	596	450	270	136
Maize	0	0	74	7,670	2,083	127
Pine-apples	257,245	581	0	5,488	29,516	57
Soy-beans	51	0	0	716	3	44
Potatoes	205	16	0	2,689	143	36
Tea	171	0	347	218	0	10
Cotton Lint	0	0	3	1,446	0	5
Source: FAO Statistical Yearbook						

Table 9: Main Trading Patterns (% of total) Exports

Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua
US 37.8	US 50.8	US 40.3	US 35.7	US 28.0
China 15.1	Guatemala 13.6	El Salvador 13.1	El Salvador 9.1	El Salvador 14.0
Netherlands 4.9	Honduras 11.2	Honduras 7.9	Guatemala 8.6	Honduras 9.3
Guatemala 3.9	Costa Rica 3.4	Mexico 5.8	Germany 8.5	Costa Rica 7.2

Ref: Economist Intelligence Unit. 2008 Country Profiles.
Available at www.eiu.com/

Table 10: Main Trading Patterns (% of total) Imports

Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua
US 38.6	US 35.6	US 33.2	US 38.6	US 19.9
China 6.4	Mexico 9.8	Mexico 9.1	Guatemala 9.3	Venezuela 13.9
Mexico 5.7	Guatemala 8.5	China 6.6	El Salvador 5.8	Costa Rica 9.0
Japan 5.6	Brazil 3.4	El Salvador 5.5	Costa Rica 4.8	Guatemala 6.9

Ref: Economist Intelligence Unit. 2008 Country Profiles.
Available at www.eiu.com/

Table 11: Accounts in CAFTA Model

Products	COF	Coffee
	BAN	Bananas
	CAR	Cardamon and other Spices
	SUG	Sugar Cane
	MAI	Maize
	PL	Plantains
	PF	Oil Palm Fruit
	PO	Potatoes
	NT	Non-Traditional Crops
	RI	Rice
	OAG	Other Agriculture
	IND	Industry
	SERV	Services
	MT	Meat
	MIL	Milk
Factors	LABOR	Labor
	CAPITAL	Capital
Sectors	RURAL	Rural
	URBAN	Urban
Countries	CR	Costa Rica
	GUA	Guatemala
	Hon	Honduras
	NIc	Nicaragua
	ES	El Salvador
	BL	Belize

Table 12: Estimated Economy wide Impacts of a 10% Decrease in Maize Prices

Percentage Change In...	Country Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador
Wages	0	0	-.01	-0.34	-0.02
Labor Demand					
Rural	-.01	-.0095	-0.26	-3.97	-0.84
Urban	.002	.002	.05	1.2	.07
International Migration	.48	3.10	40.46	745.6	169.58
Income (nominal)	-.0007	-.00068	-.01	-.28	-.02

Source: CAFTA Model Simulations

Table 13: Estimated Economy wide Impacts of a 10% Increase in Coffee Prices

Percentage Change In...	Country Costa Rica	Guatemala	Honduras	Nicaragua	El Salvador
Production					
Coffee	6.19	7.74	6.18	5.99	6.28
Other Ag	-0.03	-0.001.	-.04	-0.39	-.04
Wages	.02	.001	.03	0.32	.03
Labor Demand					
Rural	0.51	0.02	.63	3.74	1.31
Urban	-.09	-.004	-.12	-1.13	-0.11
International Migration	-17.54	-5.41	-98.25	-709.16	-265.71
Income (nominal)	.08	.003	0.10	.82	.10

Source: CAFTA Model Simulations

Table 14: Estimated Economy wide Impacts of a 10% Increase in Meat Prices

Percentage Change In...	**Country Costa Rica**	**Guatemala**	**Honduras**	**Nicaragua**	**El Salvador**
Wages	.0075	.0005	.004	.12	.01
Labor Demand					
Rural	.16	.007	.09	1.44	.46
Urban	-.03	-.001	-.02	-.44	-.04
International Migration	-5.44	-2.44	-13.33	-272.39	-92.72
Income (nominal)	.06	.0035	.03	.69	.08

Source: CAFTA Model Simulations

Table 15: Comparison of Migration Impacts of Price Changes and Currency Devaluation

Country	Estimated Change in Number of Migrants			
	10% Increase in Coffee Prices	10% Decrease in Maize Prices	10% Increase in Meat Prices	10% Currency Devaluation
Costa Rica	-17.54	.48	-5.44	7,191
Guatemala	-5.41	3.10	-2.44	48,117
Honduras	-98.25	40.46	-13.33	28,307
Nicaragua	-709.16	745.6	-272.39	22,048
El Salvador	-265.71	169.58	-92.72	81,799

Source: CAFTA Model Simulations

Table 16 CAFTA:
Results on Emigration with a reduction of prices in basic food crops
(% over base model)

Type of Reform	El Salvador	Guatemala	Honduras	Nicaragua
High	7.64	1.07	0.3	0.58
Intermediate	3.67	1.32	0.03	0.45
Low	0.35	1.16	0.03	0.37

Table 17. CAFTA:
Results on Emigration with a 10% increase in the price of agricultural exports
(% over base model)

	El Salvador	Guatemala	Honduras	Nicaragua
Traditional	-0.19	-0.97	-0.52	-0.14
Non-traditional	-0.78	-0.23	-0.05	0.01

Table 18. Results of an increase in the urban wage and international emigration

	Emigration		Income				Basic Grains				Livestock				Non-Agricultural			
	External	**Total**	**BG**	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**
El Salvador																		
Internal	NA	4.79	8.36	8.61	4.32	0.25	-0.25	-6.93	-2.80	-1.08	NA	-5.81	-3.5	0.08	-10.9	-6.93	-2.12	0.10
International	10.00	0.50	1.02	0.73	1.13	0.14	-0.19	-0.62	-0.58	-0.24	NA	-0.42	-0.7	-0.01	-2.55	-0.50	-0.45	-0.02
Guatemala																		
Internal	NA	4.23	1.15	1.15	2.06	1.66	0.47	-1.12	-1.98	-0.63	-1.23	-1.41	-1.5	-4.5	-0.45	-0.23	NA	NA
International	10.00	7.55	1.49	1.23	1.70	1.22	0.86	-0.83	-1.65	-0.5	-2.63	-0.12	-0.09	0.85	-0.55	-0.15	NA	NA
Honduras																		
Internal	NA	0.83	7.17	0.09	0.09	0.59	0.08	0.00	-0.02	-0.12	-1.84	0.00	0.00	-0.07	-17.9	-0.01	-0.03	-0.69
International	10.00	9.19	3.19	1.65	1.19	1.90	-0.24	-1.38	-1.26	-0.44	-1.15	-0.45	-0.56	-0.7	-11.5	-4.55	-2.4	-6.5
Nicaragua																		
Internal	NA	0.92	4.10	3.52	1.49	0.58	1.37	-0.25	-0.18	-0.41	-0.95	-0.39	-0.16	-0.19	-0.34	-0.18	0.03	0.31
International	10.00	8.93	0.13	2.59	2.48	1.96	-0.18	-1.69	-1.61	-3.14	-4.98	-- 2.60	-1.67	-1.53	NA	-9.29	-5.2	-4.4

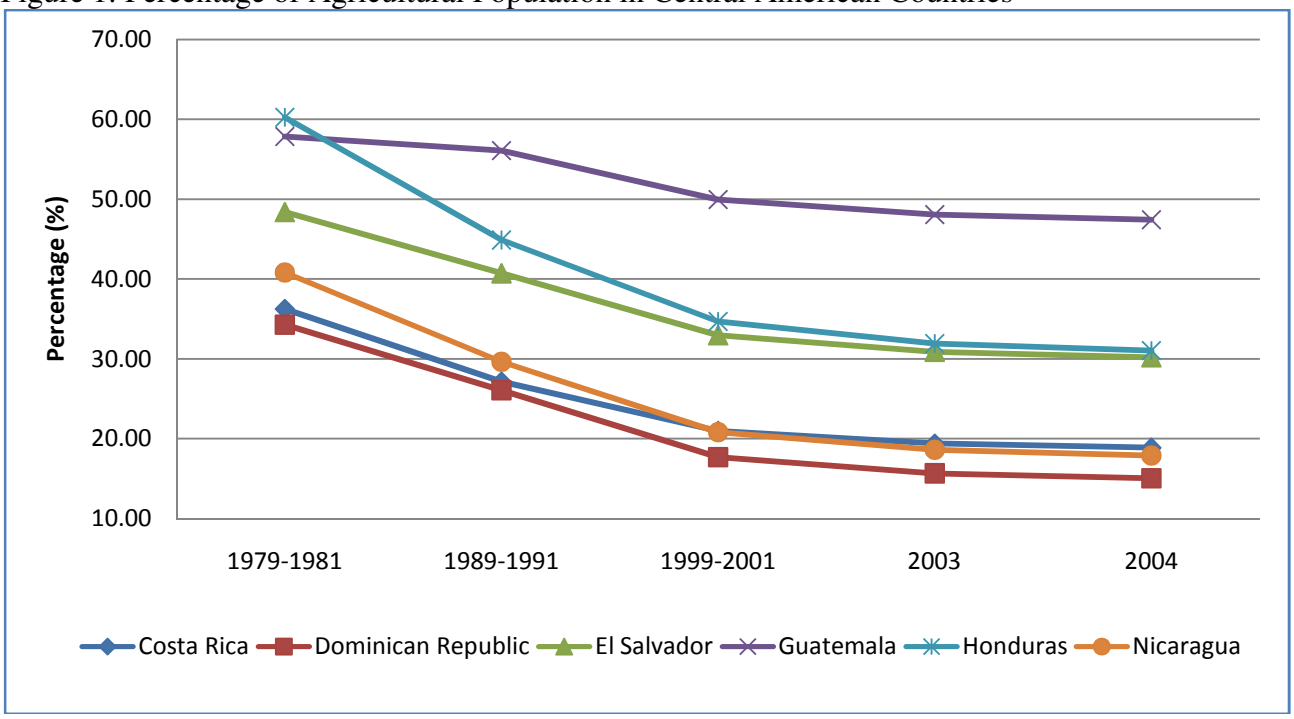
Source: Simulations for each country. **BG**: Producer of Basic Grains; **SP**: Small Commercial Producer;
MP: Medium-Size Commercial Producer; **LP**: Large Commercial Producer

Table 19. Results of the dynamic effect of an increase of the urban wage rate by 10% and international emigration

	Basic Grain				Livestock				Non-Traditional				Non-Agricultural			
	BG	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**	**BG**	**SP**	**MP**	**LP**
El Salvador																
Internal	1.85	0.88	0.55	0.00	0.00	0.89	0.53	0.00	NA	0.83	0.49	0.00	13.40	0.84	0.45	0.00
International	0.23	0.07	0.14	0.00	0.00	0.07	0.13	0.00	NA	0.07	0.12	0.00	1.66	0.07	0.11	0.00
Guatemala																
Internal	0.19	3.46	0.74	1.25	2.06	4.13	1.20	1.63	1.48	-0.83	0.64	0.70	2.09	3.83	NA	NA
International	0.24	3.68	0.54	0.89	2.60	4.43	1.00	1.26	1.88	-0.94	0.51	0.49	2.68	4.10	NA	NA
Honduras																
Internal	0.40	0.01	0.01	0.14	2.69	0.03	0.04	0.32	2.96	0.01	0.00	0.02	4.91	0.00	0.03	-0.04
International	0.18	0.35	0.34	0.39	1.20	0.57	0.52	1.02	1.33	0.24	0.28	0.03	2.24	-0.2	0.27	-0.12
Nicaragua																
Internal	4.09	1.52	0.39	0.05	1.78	0.89	0.30	0.22	NA	-2.47	-0.83	-0.52	3.95	1.33	0.48	0.45
International	2.64	1.09	0.65	0.37	1.10	0.63	0.48	0.81	NA	-1.97	-1.40	-1.51	2.59	0.99	0.79	1.35

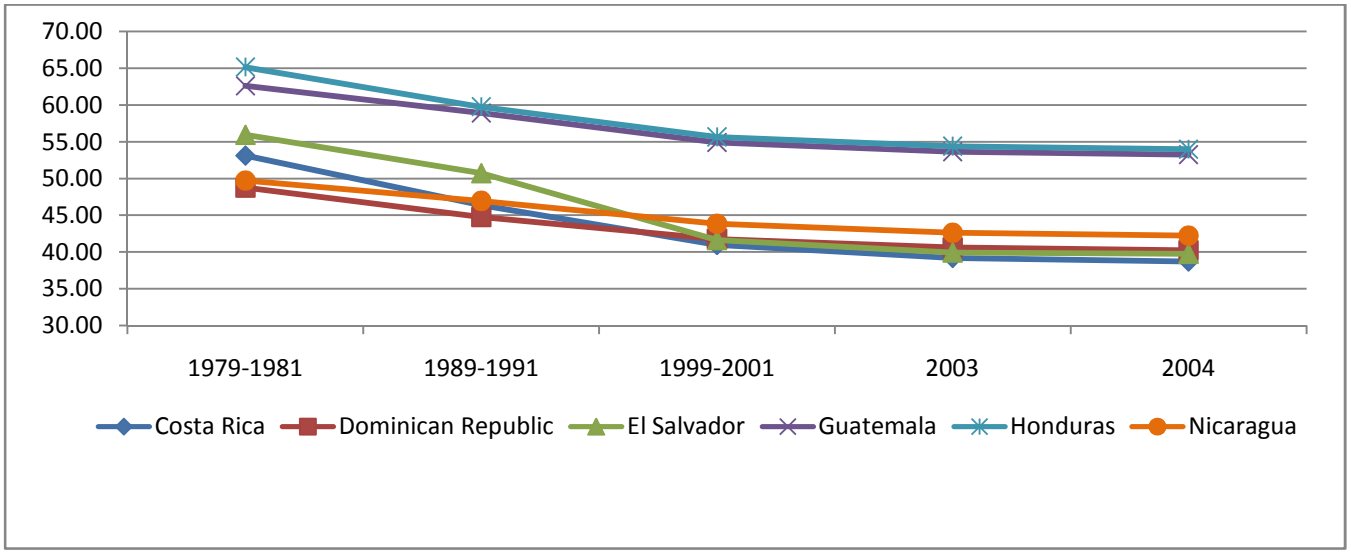
Source: Simulations for each country. **BG**: Producer of Basic Grains; **SP**: Small Commercial Producer;
MP: Medium-Size Commercial Producer; **LP**: Large Commercial Producer

Figure 1: Percentage of Agricultural Population in Central American Countries



Source: FOA Statistical Yearbook

Figure 2: Percentage of Rural Population in Central American Countries



Source: FOA Statistical Yearbook