International Migration, Multicultural Reforms, and Ethnic Identity Shift in Guatemala and Nicaragua

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Abstract

For the past few decades, the volume of international migrants and their impact on sending societies has increased considerably in Guatemala and Nicaragua. One significant impact brought by international migration in these countries is ethnic identity shift from indigenous to mestizo. A surprisingly similar feature between multicultural reforms and international migration is that while both offer unprecedented opportunities to indigenous people, they also threaten indigenous groups. I propose a mathematical model that describes the difference in rates of ethnic identity shift in communities in Guatemala and Nicaragua. Agent-based computational simulation suggests that when the definition of indigenousness is wide, indigenous people are more likely to shift their ethnic identity. Since international migration tends to broaden such a definition, we should be concerned that the combination of multicultural reforms and international migration can pressure more indigenous people to abandon their ethnic identity, obscuring various ethnicity-related social problems present in these countries.

1 Introduction

For the past few decades, the volume of international migrants has increased considerably in both Guatemala and Nicaragua. As a result, the impact of international migration on sending societies (their communities of origin) has become much more prevalent and diverse in these Central American countries. Examples include changes in socioeconomic status among migrants and their households. In addition, international migration may affect people's ideas about their communities, various socioeconomic factors, and inter-personal relations in sending societies. These changes often pressure and motivate indigenous people in these countries to abandon their identity as indigenous, identifying themselves with mestizo (mixed-blood), which is often referred to as "ladino" in Guatemala.

Ethnic identity shift among migrants and their families has been discussed extensively in research on international migration in terms of assimilation in receiving countries (e.g. Alba and Nee 1997; Portes and Zhou 1993; Rumbaut 1994). However, few scholars have examined whether international migration also affects the shift in ethnic identity among people in migrants' areas of origin. One reason for the lack of such research can be attributed to the fact that research on assimilation in receiving countries focuses on the second and later generations of migrants. Interestingly, it is rare to observe ethnic identity shift among people in European countries that sent a number of migrants to the New World. This is not the case in Guatemala and Nicaragua where changes in ethnic identity can occur over the course of a person's life. Indeed, ethnic identity shift is not rare at all in these countries. It is my contention that such a shift is especially relevant in Latin America countries including Guatemala and Nicaragua where ethnic boundaries, especially between mestizos and ethnic minorities, have rarely been clear.

Ethnic identity shift, I contend, is one of the most significant changes that international migration brings in Guatemala and Nicaragua because such a shift transforms these countries' ethnic structures and even endangers the existence of the indigenous population in these countries. In this regard, international migration and multicultural reforms, which have also drastically influenced Guatemala and Nicaragua's ethnic structure, have a very similar impact on indigenous groups in these countries. That is, as Hale (2002) argues on multicultural reforms, both offer indigenous people unprecedented opportunities and perils at the same time. While we cannot negate the fact that both international migration and multicultural reforms do offer indigenous groups opportunities, without resolving fundamental problems such as the very high ethnic inequality level, the majority of indigenous people cannot take advantage of these new opportunities. As a result, both multicultural reforms and international migration may simply widen the gap between and within ethnic groups.

In this study, I present a mathematical model of ethnic identity shift. The proposed model explores how a combination of various factors such as the level of socioeconomic inequality and a community's ethnic compositions affect the rate of ethnic identity shift. The model is constructed taking into account findings from several previous studies on international migration in Latin America and my own field observations in the indigenous communities of Cantel, Guatemala and Puerto Cabezas, popularly called Bilwi, Nicaragua. While the demographic composition and migration patterns of people in Cantel and Bilwi differ considerably, I observed that in both communities impacts of international migration on ethnic identity among indigenous people are very similar: migration increases the number of indigenous people who aspire to change their ethnic identity from indigenous to mestizo.

At the same time, ethnic identity shift seems much more prevalent in Bilwi than in Cantel. A seemingly obvious reason for this finding is that most residents of Cantel are indigenous while Bilwi is composed of people of several ethnic backgrounds. However, this factor alone cannot explain a more rapid ethnic identity shift in Bilwi. Indeed, one important finding from my fieldwork is that two persons who are socioeconomically very similar to each other can end up in having quite opposite ethnic identities through their own or their household's migration experience. This point merits serious consideration. However, it has been impossible to rigorously study ethnic identity shift in Guatemala and Nicaragua beyond field observations due to lack of quantitative data.

Computational simulation is one way to overcome such a difficulty. Recent technological development has given social scientists an opportunity to examine social processes in experimental settings using computers. Computational simulation is one way that allows us to examine processes that generate phenomena we are interested rather than simply analyzing a correlation between factors. With the proposed model, I present the usefulness of computational simulation in the social sciences to understand processes of social phenomena of interest, to take advantage of both quantitative and qualitative findings, and to make predictions and policy recommendations.

In Section 2, I provide some historical background on indigenous populations and international migration in Guatemala and Nicaragua. In addition, I discuss ethnicity as a social process and briefly present findings from my field observations. Section 3 presents the mathematical model and related mechanisms, as well as parameters included in the model. Results from computational simulation will be presented in Section 4. Finally, in Section 5, I present conclusions and give some outlook on ethnic identity shift in Guatemala and Nicaragua and how it is influenced by international migration.

2 Literature Review

2.1 Indigenous Peoples in Guatemala and Nicaragua

The proportion of indigenous people and other ethnic minorities (such as Garífunas and Creoles) in Guatemala and Nicaragua differs considerably. The latest national demographic census (2002) indicates that about 41% of Guatemalans are indigenous today. On the other hand, the 2005 Nicaraguan census indicates that only about 8% of Nicaraguans are considered as indigenous and other ethnic minorities such as Creoles. In addition, while Guatemalan indigenous people are spread across the country, Nicaraguan ethnic minorities concentrate in the Atlantic Coast of the country.

Despite these notable differences, indigenous peoples in both countries have severely suffered from similar problems such as civil wars and political conflicts as well as ethnic discrimination (Chase-Dunn 2000; Dennis 1993; Hale 1994; Wynia 1990). Indigenous people in the two countries are much more likely to encounter socioeconomic problems than their non-indigenous counterparts (Hall et al. 2006). Indigenous peoples' disadvantaged socioeconomic situation is a consequence of the repression of and discrimination against them since the onset of the colonial period (Booth et al. 2006; Davis 2002; Jonas 2000; Sieder 2002). Nevertheless, ethnic differences did not in the past, usually reflect the region's politics or legal and administrative arrangements (Hall et al. 2006) because problems such as poverty and inequality were regarded as class-based issues. The state attitude that viewed

social problems as class-based issues resembles what classical sociological theorists such as Karl Marx and Max Weber predicted either implicitly or explicitly: that the importance of ethnicity would decline through modernization and social changes.

However, contrary to their prediction, the majority of indigenous groups in Guatemala and the Atlantic Coast region of Nicaragua maintained their ethnic identity. More importantly, ethnicity has recently become a key concept in explaining the formation of nation-state, political and social movements and international migration patterns in various Latin American countries. Since the 1990s, several events including the 1992 Nobel Prize and the Zapatista's revolt against the inauguration of NAFTA in 1994, dramatically changed the environment that surrounds indigenous people. The Quincentenary celebrations also led the world to pay unprecedented attention to indigenous populations in Latin America. Not only do indigenous populations attract more attention, they are now pressing for rights that states did not recognize for a long time. For example, the Guatemalan government signed the 1995 Accord on the Identity and Rights of Indigenous Peoples promising to take measures to recognize and compensate indigenous people (England 2003; Jonas 2000). Similarly, people on the Atlantic Coast of Nicaragua won the right to autonomy in the Atlantic Coast region of the country. The Nicaraguan government also began to recognize the rights of indigenous groups, their distinctive characteristics and autonomy (Hooker 2005).

Despite these remarkable changes, inequalities between indigenous and non-indigenous populations have persisted in Latin America during the Indigenous Peoples' Decade from 1994-2004 (Hall et al. 2006). Hale (2002) attempts to explain this paradoxical phenomenon using the concept of "neoliberal multiculturalism." According to the author, multiculturalism took place in Latin America "in the general context of neoliberal political and economic reforms" (2002: 493). As a result, multicultural reforms affirm new rights without resolving socioeconomic inequalities (Hamel 1994). Since indigenous people in both Guatemala and Nicaragua belong to the poorest group, the recognition of indigenous cultural rights alone cannot help them to escape from poverty because the high level of inequality in income and access to needed services segregates citizens by their social class (Roberts 2005).

2.2 Guatemalan and Nicaraguan Migration

Under the current sensitive situation, the only resource for many poor Guatemalans and Nicaraguans—both indigenous and non-indigenous alike—to achieve socioeconomic upward mobility is international migration to the US and other countries. Unlike the Mexican-US migration stream that has largely been influenced by economic factors, two major factors led people from Central America to migrate internationally: economic and political factors. These factors are difficult to separate because they are rarely mutually exclusive. Often, these two factors have simultaneously affected an individual's decision to migrate (Lundquist and Massey 2005; McBride 1999; Zolberg 1995). During the late 1970s, massive numbers of Central Americans, especially Guatemalans, Nicaraguans and Salvadorans, started to migrate to the US, many of them as refugees, to escape from political conflicts (Enríquez 1991; 1997; Hagan 1994; Hale 1994; Hamilton and Chinchilla 1991; Jonas 2000; Lundquist and Massey 2005; Manz 1988; McBride 1999).

Indeed, since the late 1970s, the number of Guatemalan and Nicaraguan living abroad has increased considerably and migrant networks that formed during this period now serve the social infrastructure for new migrants (Jonas 2000). The amount of economic remittances sent to Guatemala and Nicaragua coincides with an increasing number of Guatemalans and

Nicaraguans living abroad. The amount of official inward remittance flow in 2006 was US$3.6 billion in Guatemala and US$656 million in Nicaragua. These amounts account for 12.2% of GDP in Guatemala and 10.3% of GDP in Nicaragua (Ratha and Xu 2008). The impact of economic remittances is difficult to ignore in my two research communities. For example, in communities that sent a large number of migrants, we can easily find houses by migrant households that are much larger than those owned by non-migrant households.

Nevertheless, while the impact of economic remittances is hard to deny in migrants' communities of origin, the most significant impact of international migration among indigenous groups is probably ethnic identity shift from indigenous to mestizo. It is often the case that those with migration experience start identifying themselves as mestizo rather than indigenous. For example, in Bilwi, one Miskitu man talked about his neighbor:

> *My neighbor was a very humble woman. She never went to school and her family was very poor. But she was a very nice person and I often found her talking with her neighbors including myself. But things changed since her sons went to the US. They built a new house in the same place but she does not talk to us anymore. She prefers to go out with other people now. Their sons also changed. When they visit their mother, they say that they forgot Miskitu and know only Spanish and English. How is it possible that they forget their languages, if they left here when they were like 25? When they visit here, they hang out only with mestizos and they don't even talk to their former friends, saying that they cannot communicate with them because of the language.*

Such a shift can also be observed among migrant household members as well as non-migrants. As will be discussed, the decrease in the proportion of indigenous people in Guatemala and Nicaragua due to ethnic identity shift can have disastrous effect on indigenous and other ethnic minority groups. Hence, I argue that it is urgent to understand this process and take appropriate action to deter more indigenous people to abandon their ethnic identity.

2.3 Ethnic Identity as Social Process

To see why ethnic identity shift can take place and why it is probably more prevalent in Latin American countries including Guatemala and Nicaragua than in other parts of the world, it is imperative to realize that ethnicity is a fluid concept. Max Weber (1978:389) defines ethnic groups as "those human groups that entertain a subjective belief in their common descent because of similarities of physical type or of customs or both, or because of memories of colonization and migration; conversely, it does not matter whether or not an objective blood relationship exists." The author also argues that it is the social contact with others rather than cultural difference per se that leads to definitions of "us" and "them."

Weber's position suggests that ethnic identities are not fixed. Rather, it depends on one's position in society and involves social interaction. I posit that the transformation of two factors: 1) images of ethnic groups, and 2) ethnic boundaries, leads to changes in ethnic identity. The transformation of ethnic images and boundaries derive from changes in individuals' relative position in society and the level of interaction across ethnic groups. For example, migrants and their households that benefit from economic remittances improve their relative positions in their communities. Such changes lead to the transformation of individuals' images of social structure. For example, Davis et al.(1941) and Lindenberg (1977) argue that those who are placed lower in a rank-order of society distinguish fewer

categories in this rank order. Hence, one's image of society and its related factors including ethnicity, differs depending on her or his relative social position.

Indeed, changes in one's social position in and perception of a society appear to strongly affect his or her attitude toward indigenousness. In both Bilwi and Cantel, I have heard that ethnic identity shift takes place quite drastically and such a change can occur with or without international migration experience. Therefore, when people's relative positions in a society can have strong impacts on images of indigenous groups. Furthermore, changes in relative social positions also lead to the re-construction of ethnic boundaries. Tilly (2005) states that people organize a significant part of their social interaction around the formation, transformation, activation, and suppression of social boundaries. According to the author, to understand boundary changes, we must distinguish between two different types of mechanisms: 1) those that precipitate boundary change (encounter, imposition, borrowing, conversation, and incentive shift), and 2) those that constitute boundary change and produce its direct effects (inscription, erasure, activation, deactivation, site transfer, and relocation). I argue that international migration affects boundary change by influencing factors that precipitate boundary change as changes in socioeconomic status probably leads to the re-creation and modification of social network.

Indeed, in my field observations, I have encountered various examples that reconfirm the fact that ethnicity is a fluid concept. For example, in one interview, a Miskitu woman indicated how family relations can affect their ethnic identity.

> *I have a friend who married an American woman and now lives in Florida with their daughter. Their daughter was born in the US and has never lived here. She occasionally visits here with her parents. But to my surprise, she speaks our language (Miskitu)! I was very curious why and asked her father. He said that his wife loves our culture and she speaks Miskitu very well. Since their daughter was born, she often spoke to her daughter in Miskitu and always placed an importance on her daughter's Miskitu heritage. This is why their daughter is now proud of her ethnic background and speaks the language very well.*

If international migration indeed affects the factors that initiate boundary changes, it can also have impacts on images of indigenousness. That is, while images are cognitive and boundaries are socially interactive, images emerge in interactions. What this link between boundaries and images indicates is that if international migration helps selected indigenous people to cross ethnic boundaries becoming mestizos, they tend to have negative images of indigenousness. As the proportion of mestizos increases and that of indigenous people decreases, indigenous groups enter into a vicious cycle that endangers indigenous cultures: Images of their groups continue to degrade and those who identify themselves as indigenous remain poor and isolated from the mainstream indigenous groups, further diving a country into two distinctive societies instead of one multicultural society.

Therefore, both boundaries and images of indigenousness are closely correlated with social interactions. One important question that we must consider is: Why have a large number of indigenous people in Guatemala and in the Atlantic Region of Nicaragua maintained their identity as indigenous despite the fact that the severe level of ethnic inequality existed for centuries? In the case of Guatemala, the primary reason relates to the fact that there were few opportunities for indigenous people. As a result, little incentive existed for them to learn Spanish (Garzon 1998; Richards 2003) and without the Spanish language skill, it is almost

impossible to cross the ethnic boundary in Guatemala. The fact that bilingual education started quite late in Guatemala and the country lacked an official discourse of *mestizaje* (Hale 2002; Hall et al. 2006) also helped Guatemalan indigenous groups to maintain their ethnic identity and languages. Similarly, in Nicaragua, indigenous and other minority groups in the Atlantic region were geographically isolated from the rest of the country, limiting interactions with mestizos, most of whom live outside the Atlantic region. In addition, their association with the Moravian Church and the positive relationship with the British and American cultures and the negative relationship with the Sandinista administration encouraged indigenous groups in the Atlantic region to maintain their ethnic identity.

Historically, as a result of the separation between the indigenous and non-indigenous populations, and a very unequal relationship between the two groups, the proportion of indigenous population in Guatemala and the Atlantic region of Nicaragua remained high. However, this may no longer be true because of recent changes—international migration and multicultural reforms—that took place in the region. Furthermore, people in Latin America may cross ethnic boundaries more easily because the fluidity of ethnicity is stronger in Latin America. That is, there is a continuum of racial and ethnic categories, at least more than in the US where the category 'black' supposedly includes anyone with a known 'drop of black blood' (Wade 1997). The category of mestizo symbolizes such a continuum. However, this feature alone cannot explain the above noted shift. For example, Wimmer (2008) argues that fuzzy ethnic distinctions and boundaries may allow people to maintain membership in several categories or switch identities situationally. To my knowledge, encountering indigenous individuals who present several ethnic categories in this manner is very rare in Guatemala and Nicaragua. This is because while the ethnic boundary can be very fuzzy in Latin America, social classes are very closely correlated with ethnic backgrounds. These two features are key factors to understanding why international migration and multicultural reforms can threaten ethnic identity as indigenous.

Multicultural reforms and international migration have drastically changed some of the conditions that surround indigenous groups. As noted, since multicultural reforms in the two countries have not been accompanied with necessary structural changes, the majority of indigenous people remain poor. Similarly, while international migration may help migrant households through economic remittances, it does not usually help non-migrant households to advance socioeconomically. As a result, indigenous people are motivated to cross the boundary into the mainstream mestizo culture to escape from poverty and discrimination. Indeed, the continuing discrimination along with changes brought by both multicultural reforms and international migration induced a more rapid shift in ethnic identity. One such change is bilingual education that covers both Guatemala and Nicaragua extensively today. While it is a welcoming fact that more indigenous children have access to education, the acquisition of Spanish language is a double edge sward for indigenous groups and cultures. In both countries, Spanish is seen as one of the power symbols of the mainstream society as Hill and Hill (1980) discuss about Mexican indigenous groups. Therefore, while today's multicultural reforms certainly help some indigenous people to overcome hardships and to be included in the mainstream society, the changes that seem apparently beneficial to indigenous people can be detrimental to their cultures. For example, in one of my interviews in Cantel, one professional indigenous Mayan woman recalls her experience with one of her friends:

A few years ago, one of my friends asked me whether she could borrow one of my daughter's corte and huipil (Guatemalan traditional clothes). I asked why and she said that she wanted her daughter to wear them at her school activity. She said that the corte and huipil are good costume for surprise. I cordially declined her request because I felt that she regarded our traditional clothes as those costumes her daughter could wear for...say Halloween.

As this woman's comment suggests, ethnic discrimination continues to exist today albeit in a more nuanced way than in the past. Similarly, Garzon (1998) states on Guatemalan Mayan groups that indigenous population's integration into mestizo society has often resulted in the internalization of negative images attached to indigenous groups among indigenous people themselves. Since the end of the civil war in the two countries, more indigenous people are in frequent contact with mestizos. However, indigenous people who encounter mestizos in a more egalitarian manner frequently face a higher risk of losing indigenous languages and identities because indigenous people continue to face hostility and derision from the dominant mestizo group, both explicitly and implicitly. As a result, some indigenous people decide to abandon their ethnic identity and assimilate into the mainstream mestizo culture. Since they usually speak Spanish well and have other socioeconomic capitals, such as formal education, it is easier for them to abandon their indigenous languages and shift their identity (Garzon 1998).

While changes brought by international migration and multicultural reforms pressure indigenous people to shift their ethnic identity, processes of such a shift remains obscure. The main purpose of the proposed model is therefore to understand the processes of ethnic identity shift and to rigorously analyze what can be done to reverse this trend. Computer simulation is useful to achieve this objective since by changing parameter values, we can observe combinations of parameter values that most likely induce ethnic identity shift.

3 Methods

To understand ethnic identity shift, I propose a mathematical model and run a computational simulation based on the model with various parameter combinations. Both recent theoretical advances in the natural sciences and the decreased cost of computer technology have made it feasible to use computational models as tools to tackle problems and questions in the social sciences (Cederman 2005). In addition to its availability, there are other important reasons why I use computational model to examine ethnic identity change. First, to my knowledge, there is no data set that enables us to study ethnic identity shift trends in Guatemala and Nicaragua. Second, ethnic identity shift presents a nonlinear dynamics and the use of statistical methods is not appropriate for studying this type of phenomena. Third, the main purpose of the current study is to understand the process of ethnic identity shift rather than the correlation between factors and such a shift. As Barth (1981) asserts, it is not sufficient to identify an association between factors, especially when one aims to understand why a phenomenon of interest takes place. We should rather focus on understanding how such a phenomenon was generated. Hence we need to be able to describe the processes that generate the phenomenon (Barth 1981; Cederman 2005). Computer simulation enables us to observe and examine processes generating social phenomena of interest and test whether our assumptions hold true.

3.1 Model Description

The model takes into account findings from several previous studies of migration, especially those that deal with cases in Guatemala and Nicaragua. Although there is few studies to date that discusses ethnic identity change among people in migrants' communities of origin, several studies examine possible impacts of two factors: international migration and economic remittances on the inequality level in migrants' communities of origin and other socioeconomic factors. For example, Funkhouser (1992) states that among Nicaraguans, migrants are positively selected based on their socioeconomic status. Therefore, while economic factors are not the only factors that motivated Guatemalans and Nicaraguans to migrate internationally, migrants are selected based on their socioeconomic status at least to some degree. Additionally, Cox Edwards and Ureta (2003) state that controlling for other socioeconomic factors, economic remittances have positive impacts on children's schooling in El Salvador. This finding is consistent with Adams' (2006) study in Guatemala that shows that remittance recipient households spend a larger proportion of their income on children's education. These findings suggest that because of the selectivity of migrants, migration probably widens the economic gap between migrant and non-migrant households. Migration can also worsen the gap across and within ethnic groups since the vast majority of indigenous households are poor.

I use a network approach to examine and explain ethnic identity shift from indigenous to mestizo. Network phenomena are relevant to numerous biological and social outcomes such as obesity and diffusion of ideas (e.g. Christakis and Fowler 2007). In addition, the previous literature on international migration suggests that migrant network is one of the most important factors influencing a person's probability of migration (e.g. Palloni et al. 2001). I use the network approach because types of neighbors that an individual has can affect perceptions of discrimination and such perceptions influences the way people define their identities. Therefore, an agent's neighbors have impacts on his or her probability of shifting their identity from one state to another. Indeed, as Nagel (1994) states, individual ethnic identification is strongly limited and influenced by external forces that shape the options, feasibility, and attractiveness of various ethnicities. My field observation noted earlier that two very similar persons can end up holding opposite ethnic identities justifies the use of network approach.

Networks used in this study are structured in a similar way to the construction of random network. That is, individuals are represented by vertices with contacts between members denoted by edge and each individual has the identical number of linked neighbors. However, agents (persons) are not linked to others at random. Instead, the probability of one agent being connected to another one is determined by agents' socioeconomic status and ethnicity so that connections between agents would resemble the actual situation that I encountered in my fieldwork. While it is also possible to let agents be connected to others following other types of networks such as spatial or small-world (Watts and Strogatz 1998), the current framework reflects the actual situation in the two research communities most suitable.

3.2 Modeling Ethnic Identity Mechanism: Transmission on the Network

Below I define a macro-level formation of the ethnic identity shift mechanism using tools from theoretical and mathematical epidemiology. I first divide the population of interest into two groups: indigenous and mestizo (Figure 1). Note that in the case of the city of

Bilwi, non-indigenous groups cannot simply be viewed as one group since there are mestizos and Creoles. However, because Creoles rarely (if ever) change their ethnic identity, dividing the population into two ethnic groups would suffice for the objective of this study. The indigenous population is then divided into five states (S, E, I, L and ID) and the model assumes that all indigenous agents are situated in State S at the beginning (i.e. time 0). The mestizo group is divided into two groups: those in State L_p hold positive ideas about indigenous groups while the opposite is true for those in L_n. The description of each state is provided in Table 1.

Figure 1. About Here

Table 1. About Here

In the proposed model, the ethnic identity change takes place as equations shown below indicate and Table 2 gives a description of each parameter:

$$\begin{aligned}
\dot{S} &= -\beta SE + \epsilon\beta ES - \epsilon\beta ID \\
\dot{E} &= \beta SE - \beta EI - \epsilon\beta ES - \epsilon\beta EID + \epsilon\beta IE \\
\dot{I} &= \beta EI - \beta IL - \epsilon\beta IE \\
\dot{L} &= \beta IL \\
\dot{ID} &= \epsilon\beta SID + \epsilon\beta EID
\end{aligned}$$

As Figure 1 indicates, in the current model, mestizos never change their ethnic identity, which is consistent with my field observation. However, their attitude toward indigenous people can change. In this study, I assume that each agent has some ideas or images about indigenous groups. For the process of how such image is generated, which is beyond the scope of this paper, I follow the algorithm presented in Fararo and Kosaka (2003). In the current model, agents are assigned a mean value of the image and its standard deviation. Agents interact with others and may modify their images at probability p, which is also assigned at model setup.

Mestizos are situated either in State L_n or L_p depending on the mean value of images they have. I assign two different distributions of the average image that people have on indigenous people: one for the indigenous population and the other for the mestizo population. I assign these distributions using a gamma distribution. I use gamma distribution because in the fieldwork, it has become clear that the image of a particular ethnic group does not usually follow a normal distribution. Rather, the distribution is probably skewed and gamma distributions are very flexible in creating numerous shapes of distributions. Once each agent is assigned the average image, mestizos with images that are higher than the average image of the whole population will be situated in State L_p while those whose image is lower than the whole population's average will be in State L_n .

Another important feature of the proposed mechanism is that the probability identity shift from one state to another is constant and identical except when an agent's identity as indigenous becomes solidified (from S to ID and E to ID) and when a reversal of identity shift (i.e. from E to S and from I to E) occur, in which cases β is multiplied by the

reverse parameter ϵ. In my fieldwork, while it has become clear that indigenous people who eventually change their identity to mestizo tend to have at least some periods to rethink about their identity, whether the rate from one state to another differs is still unclear.

Therefore, it is more appropriate using the same value of β for indigenous agents' shift in state. In addition, note in Figure 1 that States *ID* and *L* are absorbing states indicating that once individuals enter these states (whether identified as indigenous or mestizo), they will never change their ethnic identity again in the model. In reality, the probability of agents to change their state from these two states may not be zero. Nevertheless, this assumption appears to be reasonable according to my findings in the fieldwork.

Finally, as noted above, the proposed model follows a network approach. More specifically, while the assigned value of β is identical across all agents, the probability of indigenous agents to move from a state to another is contingent on the types of neighbors they have. For example, an agent's probability of moving from State S to E is higher when he or she has mestizo neighbors than when all neighbors are indigenous.

3.3 Ethnic Image Transformation and Rewiring Process

As noted, while mestizos do not change their ethnic identity, their attitude toward indigenous groups can. When the modification process takes place, each agent evaluates their linked neighbors' socioeconomic status and if any of their neighbors' socioeconomic status is as high as or higher than that of the agent, they may adapt the image of that neighbors. This is probably the most important feature included in the proposed model since changes in an agent's socioeconomic location in society tends to stimulate the transformation of their images about society and ethnic groups, which is also an important factor on ethnic identity shift.

For the mechanism of image transformation, I adapt the mechanism presented in Deffuant et al. (2005). Let us imagine that two Agents i and j have different images of indigenous groups and that Agent j 's socioeconomic status is higher than that of Agent i. Segments of image for Agent i is defined as:

$$s_i = [x_i - u_i, x_i + u_i],$$

while for Agent j:

$$s_j = [x_j - u_j, x_j + u_j].$$

We examine the agreement of Agents i and j as the overlap of s_i and s_j, minus the non-overlapping part. The overlap h_{ij} is given by:

$$h_{ij} = \min(x_i + u_i, x_j + u_j) - \max(x_i - u_i, x_j - u_j)$$

And the non-overlapping width is:

$$2u_j - h_{ij}.$$

The agreement is the overlap minus the non-overlap.

$$h_{ij} - (2u_j - h_{ij}) = 2(h_{ij} - u_j)$$

Then *iff* $h_{ij} > u_j$, the modification of Agent i's (i.e. x_i) occurs by the interaction with Agent j are multiplied by the relative agreement:

$$x_i = x_i + \mu \left(\frac{h_{ij}}{u_j} - 1 \right) \cdot (x_j - x_i)$$

where μ is a scale parameter determining the weight that the interaction with Agent j can have on the new image possessed by Agent i. Note that unlike Deffuant et al. (2005), I do not modify u through interaction since I assign the fixed standard deviation for each agent's image. Rather, agents maintain the same width (i.e. sd) of their images. As the above formula indicates, if $x_i < x_j$, then Agent i's image of indigenous groups will become more positive after the interaction between Agents i and j while the opposite is the case when $x_i > x_j$.

In addition to their images of indigenous groups, agents can change their network ties at the same rate as the rate of image transformation if they are dissatisfied with their neighbors. An agent is dissatisfied with his or her neighbor if the neighbor's socioeconomic status is lower than the agent's or if the neighbor's ethnicity is not consistent with the agent's preference. The agent's ethnic preference depends on his or her current state. For example, while the dissatisfaction of mestizos in State L_p never depends on the neighbor's ethnicity, this is not the case among agents in State L_n. If an agent is dissatisfied with at least one of his or her neighbors, he or she identifies one such neighbor and disconnects a tie with him or her. Then, the agent creates a tie with another agent following the same algorithm of networks used at the setup of the initial network.

3.4 Limitations

The proposed model presented here is the first attempt to explore how international migration reinforces ethnic identity shift and why the pace of such an identity shift differs across communities and countries. Therefore, while the model takes into account the above mentioned features, I have simplified it. As a result, the model contains various shortcomings. In the current model, I do not differentiate those indigenous people whose ethnic identity as indigenous has been solidified and robust (State *ID* in my model). It is clear that there can be various sub-categories within this group. For example, extremists may claim their own ancestral land and even try to construct their own nations. Meanwhile, others may present a more moderate political attitude. Moreover, while indigenous agents' images of their groups can also change through interactions with other agents, their states do not change given their value of images. This is because it is still unclear how much change is necessary for indigenous agents to shift their state. Despite these weaknesses, the proposed model is useful in exploring ethnic identity shift and the model can be improved when more information is available.

4 Simulation Results

I ran simulations with 30 different parameter combinations for 100 repetitions each, for a total of 3000 simulation runs. Below, I present results from four parameter combinations. To see if my argument that the proportion of the indigenous population in a community is not necessarily the leading cause of ethnic identity shift holds true, I fix the proportion of indigenous population in the current study at 0.5 for all simulation runs. Therefore, half of the population is indigenous while the other half is mestizo. Since I set the population size at 300 agents, there are 150 indigenous agents and 150 non-indigenous agents. In the

simulation runs, each agent has ties with exactly three other agents and the probability of being connected to another agent is conditional on both agents' ethnic and socioeconomic status as well as the parameter values presented in Table 3. For example, the probability of two agents with the identical socioeconomic status to have ties each other is higher if they share the same ethnicity (0.7) than when their ethnic backgrounds differ (0.3).

Table 3 About Here

Each simulation takes 520 steps and for convenience, I treat one step as one week. Hence, 520 steps can be seen as the length of 10 years. The value of ethnic identity shift rate reflects a composite measure of factors influencing the shift such as media and community characteristics. Note, however, that the value of identity shift rate (0.5) was assigned arbitrarily since it is difficult to compute this rate empirically. Hence, the goal of the simulation runs is to examine which parameter combinations are likely to lead to a high ethnic identity shift rather than exactly what proportion of people continue to identify themselves as indigenous after 10 years.

The four parameter combinations are composed of different distributions of agents' images of indigenous groups at the population level and different widths (in terms of standard deviation) of images that each agent possesses. More specifically, Figure 2 presents two distributions of ethnic images used in the current study. Figure 2a shows a narrow distribution (with indigenous $\alpha = 8$, indigenous $\beta = 1.5$, mestizo $\alpha = 10$, and mestizo $\beta = 3$) and we can find a wider distribution in Figure 2b (for indigenous $\alpha = 0.8$ and $\beta = 0.15$ and for mestizo, $\alpha = 1$ and $\beta = 0.3$). The mean value of the images for each group is identical across the two kinds of distributions. However, we can see that the distribution of images at the population level is much wider in 2b than in 2a.

The first distribution resembles the population of Cantel, where the vast majority of its population (approximately 95%) are indigenous. In addition to its ethnic composition, I argue that the distribution of agents' images of indigenous group is likely to be narrow at the population level in Cantel because of the following reasons: 1) The average years of schooling is very low in Cantel among peoples of ages 18-64 and many elderly people—especially women—are illiterate. The level of educational attainment is related to images of ethnic groups that individuals hold because education is strongly correlated with types of occupations people have as well as people with whom they interact. In addition, types of media people are most exposed to are important influential factors on the images they hold have a strong relation with one's educational attainment; and 2) According to the 2002 demographic census and my own observations, currently, there are few people migrating into this community. Therefore, Cantel is a very closed community and since residents know that most of their neighbors were born in the community, it is rare that they talk about a person's origin of community or ethnicity. Because of these reasons, I assert that people in Cantel hold similar ideas about indigenous groups.

On the other hand, people in Bilwi appear to posses diverse images of ethnic groups since the city is quite different from Cantel. For example, while the level of education is low among elderly people, young people in Bilwi tend to receive many more years of schooling that their counterparts in Cantel. Furthermore, not only does Bilwi send many migrants abroad, it also receives a number of incoming migrants from many rural communities in the Atlantic region of Nicaragua. Ethnic backgrounds of these incoming migrants include the Miskitu group and other ethnic groups such as Mayangnas (another indigenous group in

Nicaragua) and Creoles, and mestizos both from inside and outside the Atlantic region. As a consequence, images of indigenousness have in Bilwi are likely to vary more than those possessed by people in Cantel.

As noted, in addition to the distributions of images at the population level, an agent's width of image varies in the four combinations. In one case, an agent's image has a standard deviation of 0.5 making 95% of his or her image approximately ranges from the mean $\pm$ 1. In the second case, the standard deviation is 1.5, making an agent's image much wider (i.e. mean $\pm$ 3). While the individual-level distribution may seem similar to the population-level distribution, the two distributions are quite different. A narrow individual image indicates that a person has quite a firm idea about indigenousness regardless of whether people share different images of indigenous groups or not. On the other hand, when an individual possesses wide images, they are less clear about what they think about indigenous groups. Wider images can be attributed to various factors including more frequent inter-ethnic contacts or when mestizos have few contacts with indigenous people and have little idea about them.

FIGURE 2. ABOUT HERE

I vary the distributions of images in the simulation because my fieldwork suggests that it is images of ethnic groups that international migration most likely affects. That is, through the migration experience, migrants, especially indigenous migrants, tend to be more aware of their ethnic backgrounds and think more often about the meaning of their ethnic backgrounds in their societies. Of course, such changes also derive from changes in agents' social interactions, which reflects changes in ethnic boundaries. In a similar vein, I have observed that as impacts of migration in a community increase, people observe more drastic changes brought by migration including the establishment of luxury houses and the improved economic situation among migrant households. Often, socioeconomic status has a stronger impact on people's social interactions than one's ethnicity in both Cantel and Bilwi. At the same time, ethnicity continues to be an important factor for such interactions even though its meaning may be more nuanced. These changes can lead inhabitants to feel unsure about their ethnic backgrounds and to possess a wider definition of indigenousness. The results from the simulation runs based on the four parameter combinations aim to explore possible consequences that changes in distributions of images can have on ethnic identity shift.

FIGURE 3. ABOUT HERE

Figure 3 presents results from the simulation runs based on the four parameter combinations. Plots in the upper row (3a and b) show simulation runs of the population with the narrow image distribution at the population level. Let us suppose that 3a represents the population before massive international migration begins and 3b, after the noticeable number (e.g. 10% and up) of the population from the same community left, migrating abroad. These populations resemble the population in Cantel, except for the proportion of the mestizo population that is much higher (0.5) than the actual demographic characteristics of Cantel (0.05). In Figure 3a, in which each agent possesses a narrower image of indigenous groups (i.e. sd = 0.5), we can find that more indigenous people have solidified their ethnic identity as indigenous than become ladinized (begin identifying themselves as mestizo). While at earlier steps (fewer than 100 steps), more indigenous people are exposed to negative images of being indigenous (situated in States E or I) as the number of indigenous people who have reaffirmed their identity as indigenous increases, fewer people are exposed to negative ideas

of being indigenous and even fewer are found in State I. This is because as the number of indigenous people with a robust identity as indigenous increases, other indigenous agents tend to be surrounded by those who are not affected by negative images of being indigenous. Therefore, even the ethnic identity shift rate remains the same throughout the simulations, the risk of agents moving to States E, I and L decreases. As a result, while about 20% of the total population (i.e. 40% of indigenous agents) are situated in State ID at the last step, more indigenous agents have solidified their ethnic identity.

We encounter quite a different outcome when agents have wider images of indigenousness even when the distribution of agents' average images remains the same at the population level (Figure 3b). In this scenario, at the end of the 520 steps, we find many more indigenous agents who identify themselves as mestizo than those who solidified their ethnic identity as indigenous. Nearly 60% of indigenous agents identify themselves as mestizos at the end of the simulation while only about 20% of indigenous agents (i.e. 10% of the total population) has a robust identity as indigenous. In addition, note that in this scenario, we see a much lower number of mestizo agents who have a positive idea about indigenous groups at the end of the simulation runs as compared to the initial state. This finding derives from two factors: 1) the average image of indigenousness possessed by mestizos is more negative than that possessed by indigenous agents, and 2) mestizo agents are socioeconomically more advantageous than their indigenous counterparts. Both of these factors are consistent with the situations in my two research communities as well as in other parts of the two countries. As a result, mestizo agents tend to adapt to their images of indigenous people with mestizo agents more than with indigenous agents. Since more mestizos hold negative ideas about indigenous groups, when exchanges of images take place between mestizo agents, their images tend to degrade.

Another important result from the simulations based on this population is that the number of steps indigenous agents spend in States S, E and I is shorter than the number when each agent's distribution of images is narrow. This is because of the high number of agents in States E, I and L as well as the increasing number of mestizo agents in state L_n. Indeed, as compared to the scenario in 3a, indigenous agents tend to be surrounded by neighbors with negative ideas about being indigenous more often. Hence, their risk of abandoning their original ethnic identity increases. As a consequence, even though the probability of indigenous agents to have mestizo neighbors across the two scenarios does not differ at first, their chance identifying themselves as mestizo is higher in 3b than in 3a since interactions with mestizos with negative images of indigenousness pressure indigenous agents to shift their ethnic identity.

The figures found in the lower row (Figures 3c and d) present results from simulation runs based on the population with a wide distribution of images of indigenous groups at the population level. This population is similar to that of Bilwi as discussed earlier. In these simulation runs, we can find several different results from those simulations based on the narrow distribution at the population level. For example, the shift in attitudes toward indigenous groups among mestizo people takes place much less often as indicated by very flat lines representing the proportion of two kinds of mestizo groups (i.e. L_p and L_n). Since the distribution is much wider in these scenarios than the case of the previous two scenarios, the sufficient overlap of images between two agents required for the modification occurs less frequently, especially when individual's definition and image of indigenousness is narrow (3c). Note that in 3c, although the modification of images of indigenous possessed by agents takes place infrequently, indigenous agents nevertheless shift their ethnic identities. The number

of indigenous agents who have solidified their ethnic identity slightly surpasses the number of those agents who shifted their identity from indigenous to mestizo in 3c.

At the same time, we observe that when the individual level distribution is wider (3d), which resembles the case of Bilwi more than the population 3c, the proportion of indigenous people who identify themselves as mestizo at the end of the simulation runs surpasses the number of indigenous people who solidify their identity as indigenous. About 40% of indigenous agents shifted their ethnic identity from indigenous to mestizo while less than 30% of indigenous agents solidified their origin ethnic identity. It is because the wider definition of indigenousness for each agent allows more agents to have a sufficient overlap in images between them. Indeed, we observe that the number of mestizo agents with negative images of indigenousness is higher at the end of the simulation than the number of such agents at the beginning.

As noted previously, the population presented in Figure 3a represents the case of Cantel most while the population in 3d resembles Bilwi. The results from simulation runs based on these two populations are different in various ways. For example, the number of indigenous agents who have solidified their original ethnic identity is much higher in Figure 3a than in 3d. At the same time, the numbers of indigenous agents who shifted their ethnic identity in the two cases differ only slightly. What do these findings indicate? They suggest that when indigenous agents have a wider image of being indigenous, they tend to see a higher probability of being able to identify themselves with mestizos (especially the case when the distribution of images at the population level is narrow (3b)) because the modification of images takes place often. Such agents are often pressured to shift their ethnic identity to succeed socioeconomically as well as to avoid unwanted attention and discrimination. In a similar vein, when the individual level image distribution is wide, mestizos' images of indigenous groups tend to be more negative than at the beginning because the overlaps of images happen more often when one's image distribution is wider. Since the shift in ethnic identity takes place almost always unidirectionally, from indigenous to mestizo, and implicit discrimination against indigenous groups continue to exist in both Guatemala and Nicaragua, the more frequent modification of images of indigenous groups tends to deteriorate the average image of being indigenous and further decreases the proportion of the indigenous population in these countries.

5 Conclusions

This paper has explored a little studied but very important aspect of international migration in Guatemala and Nicaragua—impacts of international migration on ethnic identity shift. The simulation runs have indicated that the pace of ethnic identity shift among indigenous people varies considerably depending on the distribution of ethnic images agents possess regardless of the proportion of the indigenous population in the society. I argue that this finding explains more the seemingly rapid rate of ethnic identity shift in Bilwi than in Cantel. There are several reasons to believe why the distribution of images of being indigenous is wider in Bilwi than in Cantel. First, indirectly related to the lower proportion of the indigenous population in town, several languages (Spanish, Miskitu, Creole English, standard American English, and Mayangna) are spoken in Bilwi while only two (Spanish and K'iche) are spoken in Cantel. Furthermore, most young people in Cantel speak only Spanish today. The variety of languages available and more frequent inter-ethnic contacts in Puerto Cabezas

surely affects what it means to be indigenous in this town. Hence, daily interactions in Puerto Cabezas remind its inhabitants of people's ethnic backgrounds more often than the same events in Cantel.

Additionally, the existence of a large number of incoming migrants, mostly Miskitu and Mayangna indigenous people, usually migrating from nearby indigenous communities, who often speak little Spanish at first, lead people to situate indigenous people at the bottom of ethnic hierarchy. Since they also interact with people in Bilwi, residents in Bilwi tend to see indigenous as poor and less competent both socioeconomically and culturally. This perception is often the case among many indigenous people themselves. As a result, the distribution of images of indigenous tends to be wider at the population level among people in Bilwi than in Cantel since such incoming migrant flow is nonexistent in Cantel. It is also important to realize that because the level of educational attainment in Bilwi is considerably higher than indigenous children in Guatemala, indigenous children are much more likely to interact with children of other ethnic background in school. These interactions can also threaten the further decline in the number of indigenous groups. Additionally, the fact that Guatemalan traditional clothes can be an icon of prosperity may be one reason why more indigenous people in Cantel maintain their ethnic identity than their counterparts in Bilwi since these clothes are more expensive than western clothes and rich indigenous women tend to wear very pricey traditional clothes.

While the situation in Cantel appears to be better than the case in Bilwi, indigenous cultures in Cantel are also threatened. Currently, the pace of the ethnic identity shift is much slower in this community as compared to the pace in Bilwi, despite the fact that the distribution of images at the population level seems to be narrow. This finding can be attributed to the very high proportion of the indigenous population in this community as well as the narrow definition of images of indigenous groups that each agent in Cantel possesses. However, as I have noted, even in this community, the ethnic identity shift is taking place. In the past, it occurred mainly among individuals who migrated to Guatemala City in search of opportunities and to a lesser degree, those who work in nearby Quetzaltenango, popularly called Xela–the second largest city in Guatemala. The situation in Cantel is much different today. More and more children attend school for a longer period of time in Cantel, especially among children of migrant households. I found that often times, these children attend school in Xela where they usually interact with non-indigenous children. My interviews with people in Cantel have revealed how fragile identity as indigenous can be when the pressure from peers is strong.

The model of ethnic identity shift and the simulation runs presented in this paper suggest the maintenance of ethnic identity as indigenous will be a much more difficult task than in the past. We should also be concerned that recent qualitative changes in inter-ethnic relations may also lead some non-indigenous people to be hostile towards indigenous people even if they may have had positive images of these people in the past. That is, the new type of inter-ethnic relationship may induce a tension between indigenous and non-indigenous groups. The increased contact between ethnic groups leads not only indigenous, but also non-indigenous people to rethink ethnic hierarchies and relations in a society. Economically less advantaged mestizos are most likely to interact with indigenous groups in their daily lives, such interactions may lead to the perception of abandonment among mestizos. Therefore, if these mestizos show hostile attitudes toward indigenous people, indigenous people themselves may feel more pressure to shift their ethnic identities to free from unwanted

problems. Therefore, one very serious problem of multicultural reforms today is its emphasis on equality in the existence of severe socioeconomic inequality. This problem can make the protection of indigenous cultures even more difficult. The rejection of the constitutional reforms in Guatemala reflects such a difficulty (Montejo 2002).

Finally, I must admit that the model presented in the current work is very simple and holds many assumptions that can be criticized such as the choice of the distribution of images at the population level and the width of such images for each agent, as well as parameter values used in the simulation runs. As noted, the proposed model is an initial step to understand ethnic identity change in migrants' communities of origin and the model can be improved or totally changed based on further empirical evidence. However, despite the above-noted limitations, the findings presented in this paper highlight possible hidden dangers of international migration on migrants areas of origin and how such dangers are similar closely related to negative consequences of multicultural reforms suggested by Yoshioka (forthcoming). In both Guatemala and Nicaragua, well-paid jobs are scarce, stimulating many to leave their countries in search of better economic opportunities. Since this is a tough reality that the majority of indigenous people in both Guatemala and Nicaragua face, it is difficult to prevent people from migrating to other countries. To conserve indigenous cultures and prevent more indigenous people from abandoning their ethnic identities, we need to assure that indigenous people feel pride in their cultures while they participate in national economy and politics under the strong pressure caused by changes originating from international migration and multicultural reforms. I have argued that both international migration and multicultural reforms work again such a goal. Since the trend of international migration and multicultural reforms are difficult to be reversed, we need to work hard to find a way to make a more equal society and also, the importance of respecting different cultures. Understating how images and boundaries of ethnicity are constructed and transformed is an essential step to finding solutions to the above-noted dilemma and achieving a robust multicultural society.

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Table 1. Description of States

State	Description
S	General and susceptible indigenous population
E	Indigenous individuals who are exposed to the negative image associated with being indigenous
I	Indigenous individuals who have negative images associated with being indigenous and also transmits such negative images
L	Indigenous individuals who have abandoned their ethnic identity as indigenous and currently identify themselves as mestizos
ID	Indigenous individuals whose identity as indigenous has been solidified and is robust
L_p	Mestizo individuals who have positive images of indigenous groups
L_n	Mestizo individuals who have negative images of indigenous groups

Table 2. Description of Parameters

Parameter	Description
β	Rate of ethnic identity shift
ϵ	Identity reverse parameter that varies $0 < \epsilon < 1$

Table 3. List of Parameter Values Fixed in the Current Study

Name	Value	Description
Population Size	300	Number of agents
Number of Links	3	Number of links each agent possesses
Proportion Indigenous	0.5	Proportion of indigenous population in total population
Same Ethnicity	0.7	Probability of having a tie with an agent of the same ethnicity when SES is controlled
Ethnic Inequality	50	Level of socioeconomic inequality between indigenous and non-indigenous agents. 0 indicates no inequality. Ranges from 0 to 100
Migrant Selectivity	20	Level of migrant selectivity in terms of agents' socioeconomic status.
Migration Success Probability	0.75	Probability of migration success. If successful, an agent's socioeconomic status increases by one rank (e.g. from poor to middle)
Ethnic Identity Shift Rate	0.5	Rate of Ethnic Identity Change per 52 steps (for each 100 agents)
Poor	0.6	Proportion of agents who are classified as poor
Middle	0.3	Proportion of agents who are classified as middle class
Rich	0.1	Proportion of agents who are classified as rich
Same SES	0.5	Probability of an agent to possess a tie with another agent of the same SES when agents' ethnicity is controlled
Different SES 1	0.35	Probability of an agent to possess a tie with another agent whose SES is one rank different when agents' ethnicity is controlled
Different SES 2	0.15	Probability of an agent to possess a tie with another agent whose SES is two ranks different when agents' ethnicity is controlled
Propensity Score	0.5	Weight the importance of ethnicity and socioeconomic status when creating ties among agents
Reverse Rate	0.8	ϵ as presented in Table 2
Image Update/Rewiring Frequency	2	Average frequency of image updates and rewiring per 52 steps (for each 100 agents)
Scale Parameter	0.3	Weight of interaction with another agent when creating a new image of indigenous groups

Figure 1. Scheme of Indigenous Ethnic Identity Shift

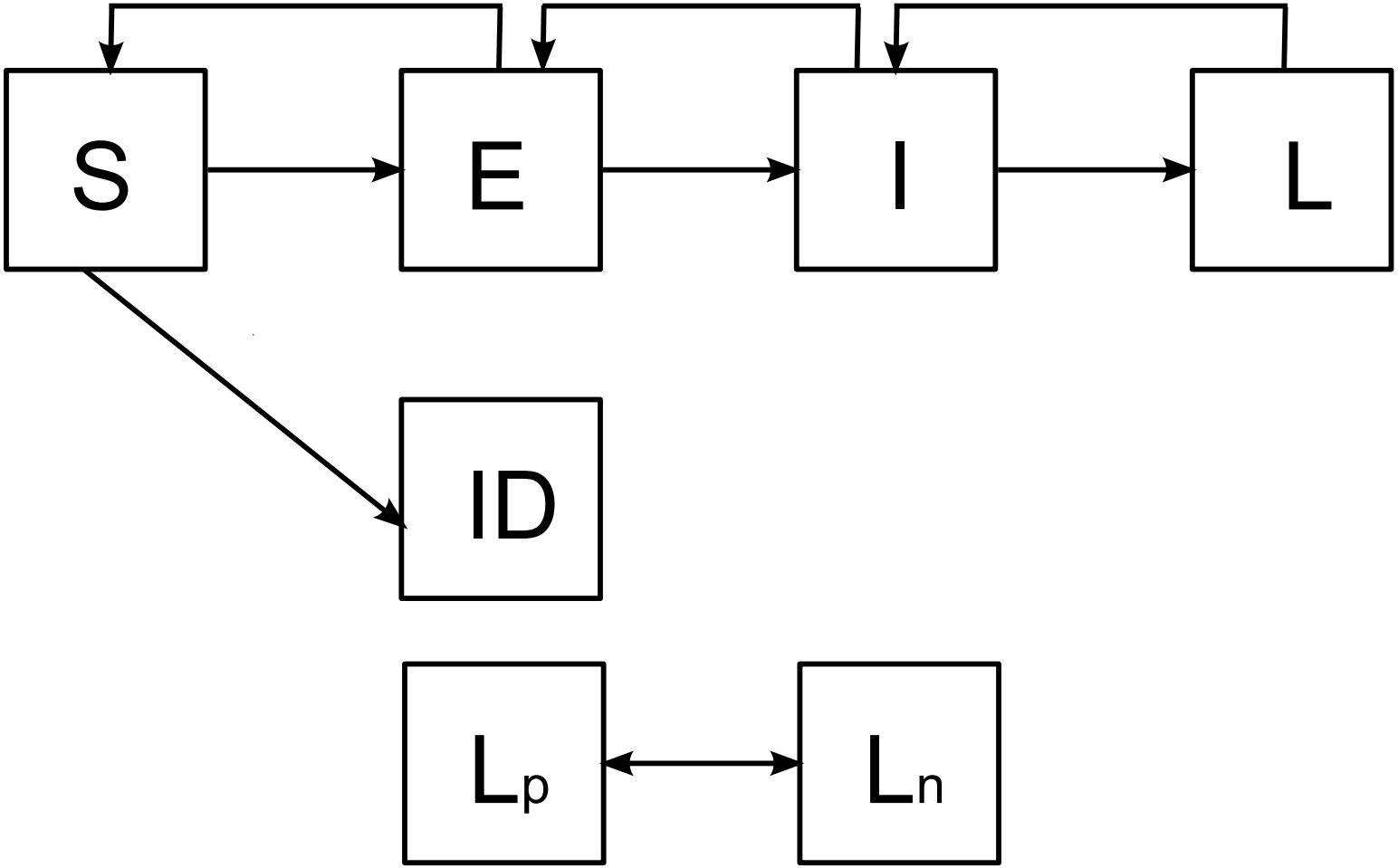
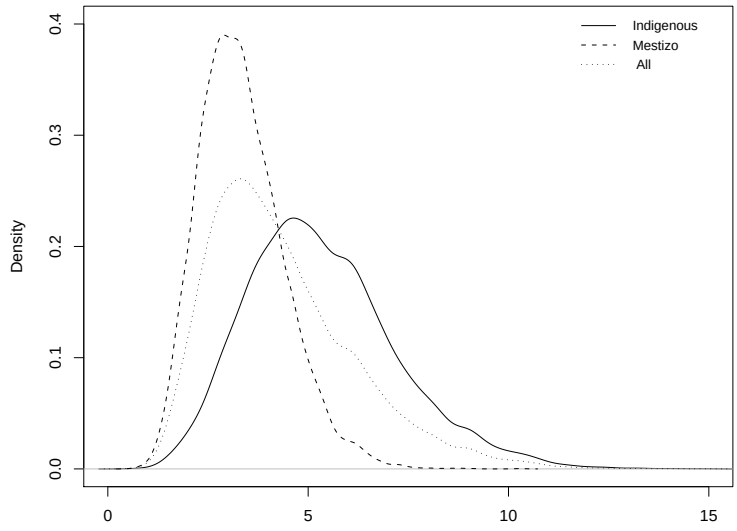
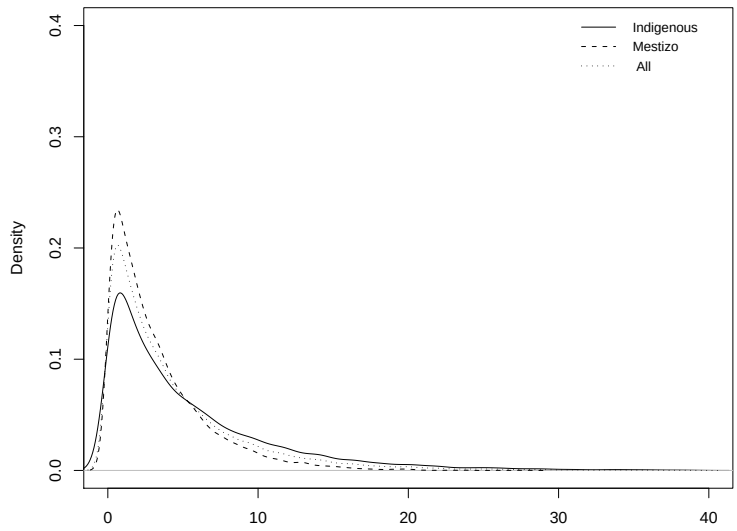


Figure 2. Two Distributions of Images of Indigenous Groups at Population Level

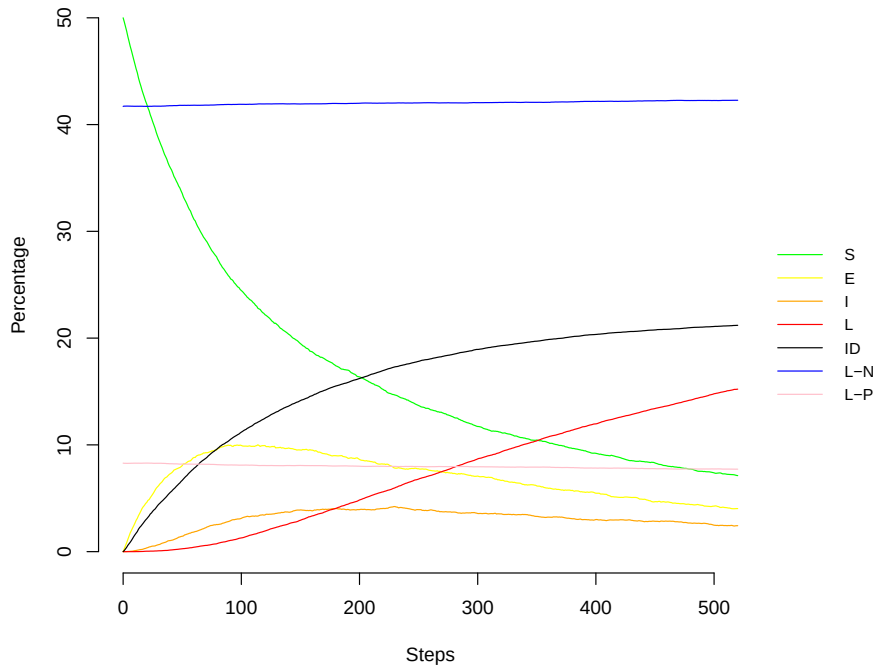


a



b

Figure 3. Results from the Simulation Runs of the Four Parameter Combinations



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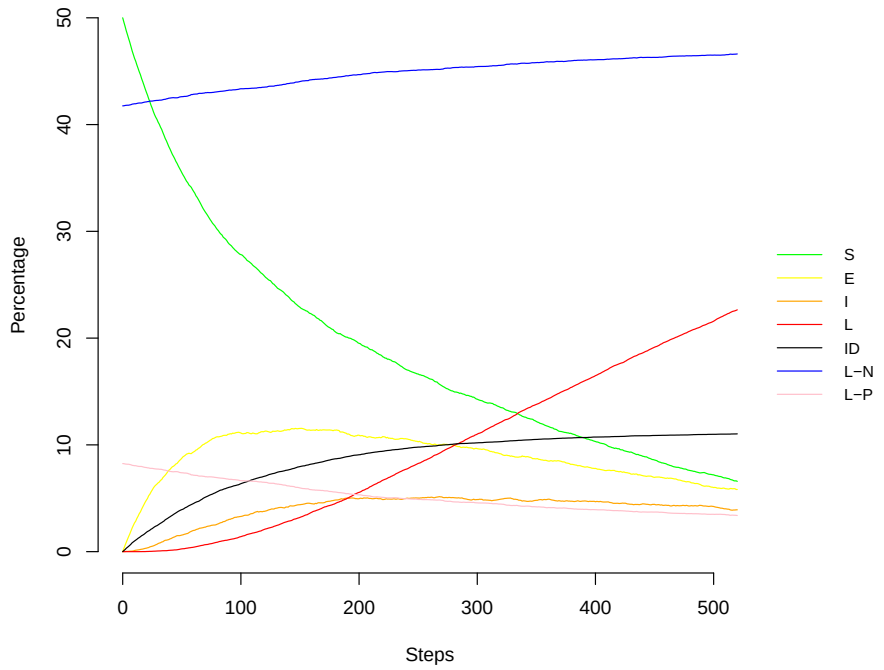

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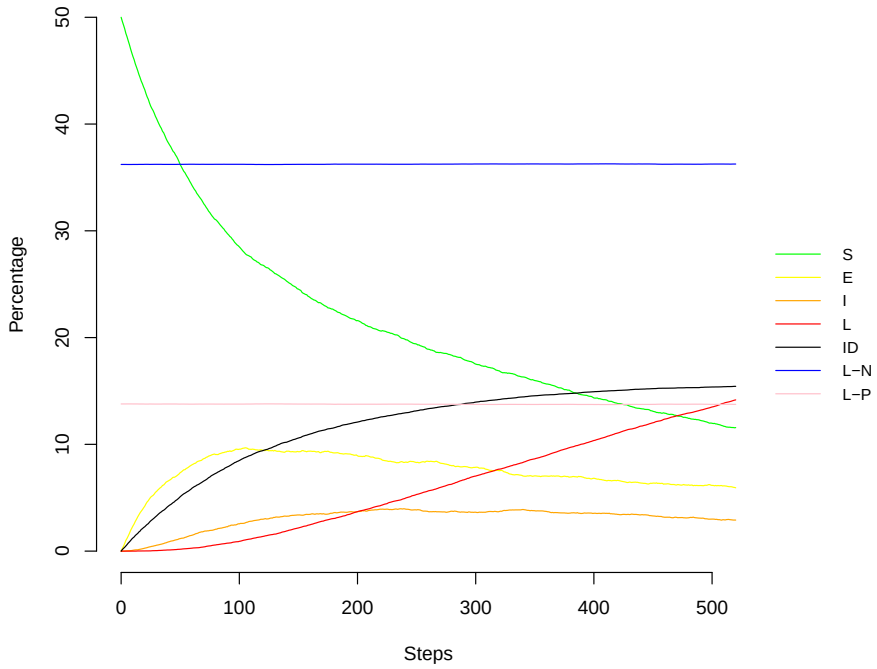
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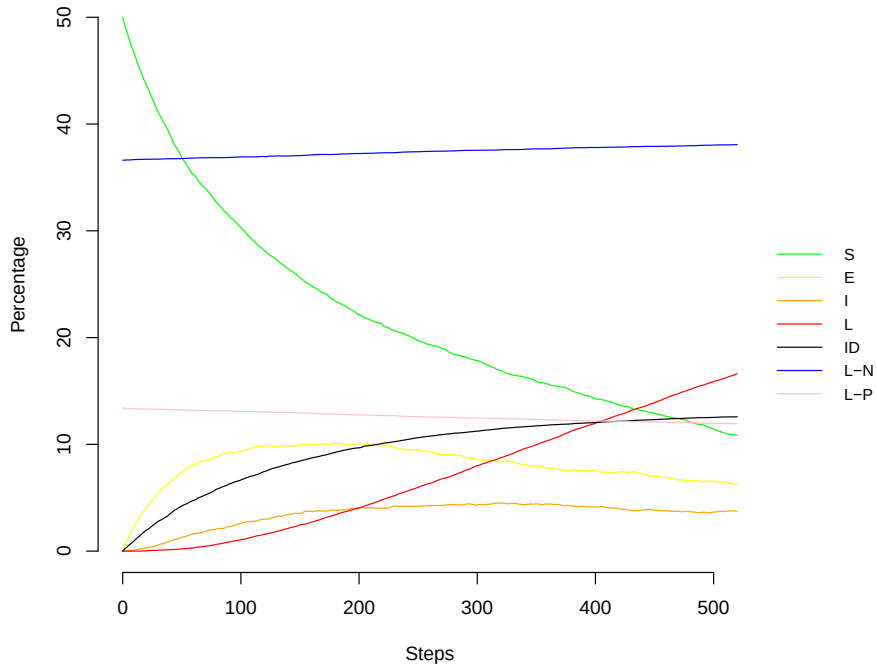
c


Percentage
0
10
20
30
40
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d