Modernization, Social Identity, and Ethnic Conflict

Kazuhiro Yuki*

This version: July 2019
First version: March 2015

Abstract

Empirical evidence suggests that ethnic divisions in a society leads to negative outcomes in civil conflict and economic development, among others. It is often argued that the lack of shared social identity, that is, the dominance of subnational (particularly, ethnic) identities over national identity, lies behind the negative outcomes. If shared national identity is important, how can it be realized? Some scholars stress the effectiveness of nation-building policies in strengthening national identity. Meanwhile, there exist conflicting theses on effects of the modernization of a society on national identity in political science, the classic thesis arguing positive effects, which suggests the importance of policies promoting modernization, and the competing thesis arguing negative effects. Which thesis is more relevant under what conditions? How does modernization affect identity, conflict, and development? How do policies such as nation-building policies affect the outcomes?

In order to examine these questions theoretically, this paper develops a model of social identity, ethnic conflict, and development in which individuals choose a sector to work (between the modern sector and a traditional sector), social identity (between ethnic identity and national identity), and contributions to ethnic conflict.

Keywords: ethnic conflict, social identity, modernization, nation building, economic development

JEL classification numbers: D72, D74, O10, O20

*Faculty of Economics, Kyoto University, Yoshida-hommachi, Sakyo-ku, Kyoto, 606-8501, Japan; Phone +81-75-753-3532; E-mail yuki@econ.kyoto-u.ac.jp. Helpful comments from participants at the ERF workshop on Macroeconomics and the 2016 Asian Meeting of the Econometric Society are gratefully acknowledged. Financial support from JSPS through Grants-in-Aid for Scientific Research 10197395 is acknowledged.
1 Introduction

Empirical evidence suggests that ethnic divisions or diversity in a society lead to negative outcomes in various dimensions, including civil conflict (Esteban, Mayoral, and Ray, 2012) and economic development (Montalvo and Reynal-Quero, 2005) among others. It is often argued that the lack of shared social identity, that is, the dominance of subnational (particularly, ethnic) identities over national identity, lies behind the negative outcomes in ethnically heterogenous societies (Collier, 2009; Michalopoulos and Papaioannou, 2015).

If shared national identity is important, how can it be realized? Miguel (2004), Collier (2009), and Blouin and Mukand (2019), based on case study or statistical analysis, argue that nation-building policies, such as school education or government propaganda emphasizing common history, culture, and values and the promotion of a national language, are effective in strengthening national identity. Meanwhile, in political science, there exist competing theses emphasizing effects of modernization (e.g. industrialization, the diffusion of education, and urbanization) on national identity (Robinson, 2014). The classic thesis, based on the past experience of Europe, argues that modernization leads to widespread national identity at the expense of ethnic and other subnational identities (Deutsch, 1953; Gellner, 1964, 1983; Weber, 1979). Based on post-independent experience of Africa, another influential thesis asserts that modernization breeds ethnic identification due to intensified competition over resources (Melson and Wolpe, 1970; Bates, 1983).

If the classic view is correct, policies promoting modernization might be sufficient, or at least they complement nation-building policies, in attaining shared national identity and good outcomes in conflict and development. Instead, if the competing view is true, such policies have negative effects on national identity and conflict and thus nation-building policies would be critical for good outcomes. Which view is more relevant under what conditions? How does modernization affect social identity, ethnic conflict, and economic development? How do policies such as nation-building policies affect the outcomes?

In order to examine the questions theoretically, this paper develops a model of social identity, ethnic conflict, and economic development. In the model, which builds on the model of social identification and ethnic conflict by Sambanis and Shayo (2013), individuals choose a sector to work (between the modern sector and a traditional sector), social identity (between ethnic and national identities), and contributions to conflict. Thus, the degree of modernization (and output), identity, and conflict interact with each other.

Model: The analysis is based on a contest model of conflict in which multiple ethnic groups contest for exogenous resources. Individuals belong to one of the groups symmetric in every aspect. So the model is concerned with an ethnically diverse society without a dominant ethnic group.

1Miguel (2004) finds that two neighboring rural districts of Tanzania and Kenya, which largely shared geography, history, and colonial institutional legacy, exhibit a sharp difference in the relationship between ethnic diversity and local provision of public goods (school funds and infrastructures), significantly negative for the Kenyan district and positive but insignificant for the Tanzanian district. He also finds that the relationship is insignificant for other local public finance outcomes for Tanzania (no comparable data for Kenya). He argues that sharply different ethnic policies in areas such as national language and public school education of post-independent governments contributed to differences in the strength of national identity and the above-mentioned relationship between the two countries.
There are multiple sectors producing the private good, ethnically-segregated traditional sectors and the integrated modern sector. The traditional sectors correspond to sectors using traditional or rudimentary technologies in the real economy, such as traditional agriculture, urban informal sector, and household production, and the modern sector corresponds to sectors such as modern manufacturing and services, where the former sectors are more ethnically segregated than the latter (Glitz, 2014). Production technologies and factor markets are configured to replicate the situation facing actual developing countries that inefficiently many workers exist in traditional sectors and their shift to the modern sector raises aggregate output (Gollin, Lagakos, and Waugh, 2014).

Ethnic groups contest for exogenous resources that bring forth group-specific club goods, e.g. public services and infrastructures benefiting a specific group. The proportion of the resources a particular group acquires depends on the level of contributions to conflict by members of the group relative to other groups. The cost of conflict to an individual increases with the level of his contribution or "efforts". The resources represent both material resources (e.g. natural resources) and a part of the governmental budget used for producing the group-specific goods. The model describes a country in which the resource allocation over the groups is determined not by rules but by the consequences of violent or non-violent conflict (e.g. rent-seeking activities).

As in Sambanis and Shayo (2013), the utility of an individual depends not only on (i) his material payoff, which is the wage minus the cost of conflict plus the benefit from the group-specific club good, but also negatively on (iii) perceived distance from a social group he identifies with (his ethnic group or the nation) and positively on (iii) the status of the social group, which are important factors affecting social identification and intergroup behaviors, according to influential theories in social psychology (Tajfel and Turner, 1986; Turner et al., 1987) and empirical evidence (Manning and Roy, 2010; Sambanis, Skaperdas, and Wohlforth, 2015). He perceives how close to or far from a social group with the distance between his attributes—nationality, ethnicity, and sectoral affiliation—and average attributes of the group. Following Sambanis and Shayo (2013), the weight on the ethnic attributes (national attribute) in the distance is assumed to increase (decrease) with the level of conflict, which implies that, consistent with evidence such as Rohner, Thoenig, and Zilibotti (2013), when conflict becomes more intense, people care about ethnicity more (nationality less) in measuring distances from social groups. The status of a social group is given by the exogenous difference between the group’s "value" or "importance" and that of comparison groups.

---

2The urban informal sector is a part of the urban economy composed of small-scale businesses supplying basic services (for example, small shops and vendors selling commodities and meals) and basic manufacturing goods.

3Main results are unchanged when the contested resources yield the private good.

4The concept of perceived distance is the basis of a major social psychological theory, self-categorization theory (Turner et al., 1987). Intergroup status differences are major factors affecting intergroup behaviors such as conflict and discrimination, according to a closely-related influential theory, social identity theory (Tajfel and Turner, 1986).

5Evidence suggests that perceived distance and status affect identity. Manning and Roy (2010) find, for the UK, that nonwhites, whose perceived distance from the nation seems to be greater, are less likely to think of themselves as British than whites. Further, they find that immigrants from poorer and less democratic (i.e. lower status) countries assimilate faster into British identity. See footnote 17 for evidence from Sambanis, Skaperdas, and Wohlforth (2015).

6Rohner, Thoenig, and Zilibotti (2013) find, for Uganda, that the proportion of those identifying with their ethnic group over the nation is higher in counties of the higher intensity of armed conflicts, after controlling for individual, ethnic, and spatial characteristics and employing instrumental variable estimation.
In particular, the *national status* represents people’s evaluations of the nation’s standing or reputation, particularly compared to neighboring nations, in “soft” dimensions including culture, history, and widely shared values (such as human rights and democracy) as well as in “hard” dimensions such as military strength and territory. For example, a nation with long history, rich culture, and large territory would have high national status.

The utility function implies that, given that an individual identifies with a particular social group, his utility increases as the perceived distance from the group falls. Thus, he has an incentive to choose actions lowering the distance. However, social identification of an individual is *not fixed*. He can “choose” a group (his ethnic group or the nation) that brings him higher utility either because of higher material payoff, the shorter perceived distance, or the higher status. His identity might change if exogenous variables affecting his utility or choices by others alter. For example, as the level of conflict rises, people place a greater (smaller) weight on the ethnic attributes (national attribute) in the perceived distance, which could change their identities.

Individuals play a two-stage game to maximize their utility. First, they decide which sector to work, which determines labor incomes and sectoral and aggregate production. Then, they choose a social group to identify with and a contribution to conflict simultaneously, which determines the level of conflict, the allocation of the resources over the groups, and individual utilities.

**Results:** Equilibria can be classified into two types, those in which individuals of the same ethnic group share the same identity (*homogenous identity equilibria*) and those they do not (*heterogenous identity equilibria*). In a given equilibrium, modern sector workers are more (less) likely to identify with the nation (their ethnic group) than traditional sector workers, which is consistent with empirical evidence for African nations (Robinson, 2014).

When different equilibria are compared for given parameters and exogenous variables, it is found that the level of conflict is lower, shares of modern sector workers and output are higher, and, under plausible conditions, total output of the private good and aggregate material payoff (the value of private and club good consumption net of the cost of conflict) are higher, when the proportion of individuals identifying with the nation is higher. That is, national identity is associated with not only the lower level of ethnic conflict, which is shown in Sambanis and Shayo (2013), but also higher modern sector shares and higher output.

Whereas all equilibria do exist for certain ranges of parameters and exogenous variables, the set of equilibria that exist changes with their values. Taking into account this, the paper analyzes its focus, interactions among modernization, identity, conflict, and output. A simple dynamics is introduced by supposing that one exogenous variable, the (total factor) productivity of the modern sector, increases over time. The productivity growth raises the modern sector wage, induces the higher proportion of workers to choose the sector, and raises the sector’s share in production. How

---

7As mentioned above, ethnic groups are assumed to be symmetric in every aspect. Hence, the paper focuses on equilibria in which choices of all groups are symmetric. Most of asymmetric equilibria are very difficult to analyze.

8The lower share of modern sector workers under ethnic identity indicates the greater intersectoral gap in earnings. This suggests that strong ethnic identity might partly explain a substantial gap in average labor productivity between agriculture and non-agriculture in many developing countries found by Gollin, Lagakos, and Waugh (2014) and others.
does such modernization of the economy affect social identity, conflict, and aggregate output?

If the national status is at extremes, the society stays in the same equilibrium: when the status is very high (very low), all individuals always identify with the nation (their ethnic group) and the level of conflict is consistently low (high). Otherwise, when the status is relatively high (low), the society tends to shift from a heterogenous identity equilibrium, in which traditional sector workers are more likely to identify with their ethnic group than modern sector workers, to the one in which all workers identify with the nation (their ethnic group) and the level of conflict is low (high). The sectoral shift of workers associated with modernization shakes prevailing social identities in both sectors: modern sector workers become less attached to the national identity and traditional sector workers become less attached to the ethnic identity. When the national status is relatively high (low), the effect on traditional (modern) sector workers determines the equilibrium shift and everyone becomes identified with the nation (his ethnic group). Although increased productivity always raises modern sector’s shares in employment and production, given the productivity level, the society with high (low) national status tends to be in an equilibrium characterized by relatively large (small) modern sector shares and, under plausible conditions, high (low) private good output and material payoff. That is, having sufficiently high national status is crucial in achieving universal national identity, a low level of conflict, high modern sector shares, and high output in the long run.

However, history or ”luck” too is important, as long as the status is not at extremes. Given parameters and exogenous variables including the status, multiple equilibria tend to exist and thus identity, conflict, and output differ depending on which equilibrium is realized. If an equilibrium realized in the initial period happens to be such that a relatively high proportion of individuals identify with the nation, the society tends to be in an equilibrium with relatively strong national identity and relatively good outcomes in other dimensions subsequently.

Similar results hold for contested resources too when ”low (high) status” of the above result is replaced with ”large (small) amount of contested resources”. Specifically, given the national status, when the amount of contested resources is large (small), the society tends to shift from a heterogenous identity equilibrium to the one in which everyone identifies with his ethnic group (the nation). Note that contested resources represent both material resources and a part of the governmental budget for group-specific goods whose allocation over the groups is determined not by rule but by the consequences of conflict. Hence, the result suggests that weak political and economic institutions (such as weak rule of law) as well as the abundance of material resources are hindrances to the good outcomes. Further, an exogenous change making common nationality more salient (or ethnic differences less salient) too has effects similar to a rise of national status.

Implications: The results are consistent with the classic thesis on effects of modernization on social identity, if the national status is high, contested resources are not abundant, institutions are good in quality, or common nationality is valued (and ethnic differences are not emphasized), otherwise, they are consistent with the competing thesis, as far as the relatively long term effect (the effect involving the equilibrium shift) is concerned. Under the former conditions, policies
promoting modernization, such as policies stimulating the technological progress of the modern sector and the construction of transportation infrastructure connecting rural areas to urban areas, might be enough for the good outcomes. By contrast, under the latter conditions, these policies have negative effects on national identity and conflict, and policies raising the national status, improving institutional quality, or making shared nationality more salient (and ethnic differences less salient) in people’s minds become crucial. Nation-building policies, such as school education or government propaganda emphasizing common history, culture, and values and the promotion of a national language, may be interpreted as policies raising the national status or making shared nationality more salient and thus are critical under such conditions. The model shows how nation-building policies can reinforce the identity and bring better outcomes.

Empirical works suggest negative effects of natural resources on civil conflict and development and important effects of institutions on civil conflict, rent-seeking activities, and development. The model reveals a novel mechanism interacting with social identity that resources and institutions affect conflict and development.

Related literature: This paper belongs to the literature examining issues on ethnic conflicts using contest models. Recent contributions include Esteban and Ray (2008, 2011), Besley and Persson (2010), Sambanis and Shayo (2013), Sambanis, Skaperdas, and Wohlforth (2015), and Mariani, Mercier, and Verdier (2018). Most closely related is Sambanis and Shayo (2013), who develop the first formal model of social identification and ethnic conflict using a utility function inspired by theories in social psychology. This paper extends their model by modeling multiple production sectors and associated sectoral choices by workers (and production decisions of firms), in order to examine interactions among modernization, identity, conflict, and output. Besley and Persson (2010) also examines the relation between conflict and development but in connection with capacities of the state to raise revenue and provide market-supporting services. Sambanis, Skaperdas, and Wohlforth (2015) present a model in which decisions of two countries to go to war or not depend on the expected effect of victory on social identification through the increased national status in one of the countries with two opposing social groups. Esteban and Ray (2008) develop a theory explaining the reason why ethnic conflict, rather than class conflict, is salient, especially in societies with distinct economic inequalities. Esteban and Ray (2011) construct a model that connects the level of conflict with three measures of ethnic divisions. Mariani, Mercier, and Verdier (2018) construct a model of conflict between two groups and examine how financial support by emigrants of one of the groups affect the intensity and the likelihood of conflict.

The paper also belongs to the theoretical literature examining interactions between identity and economic or political behaviors, including Fearon and Laitin (2000), Akerlof and Kranton (2000, 2010), Shayo (2009), Benabou and Tirole (2011), Bisin et al. (2011), Grossman and Helpman (2018), and Gennaioli and Tabellini (2019).\(^9\) Fearon and Laitin (2000) propose several mechanisms

\(^9\) Besides already mentioned works, recent empirical and experimental studies on identity in economics and political science include Chen and Li (2009), Benjamin, Choi, and Strickland (2010), Eifert, Miguel, and Posner (2010), Clots-Figueras and Masella (2013), Charnysh, Lucas, and Singh (2015), Cohn, Maréchal, and Noll (2015), Alenzuela and Michelson (2016), Benjamin, Choi, and Fisher (2016), and Wimmer (2017), some of which are mentioned later.
through which social processes of ethnic identity construction affect ethnic conflict and assess their empirical validity by reviewing case studies. Akerlof and Kranton (2000) pioneer formally modeling and examining effects of identity on economic behaviors and Akerlof and Kranton (2010) illustrate how various behaviors can be explained by their framework. Shayo (2009) constructs the basic framework on which Sambanis and Shayo (2013) and this paper are based by generalizing Akerlof and Kranton (2000) and applies it to analyze political economy of income redistribution. Benbou and Tirole (2011) develop a general model of identity management, applicable to both personal and social identities, in which individuals who are uncertain about self-concept make investment in identities, and provide explanations for wide-ranging empirical puzzles. Bisin et al. (2011), building on the cultural transmission model of Bisin and Verdier (2000), develop a dynamic model of identity formation in which children of a minority group receive an identity trait (“mainstream”, i.e. accept the majority’s values, or “oppositional”) from parents or role models and decide the intensity with which they identify with the trait. Motivated by a recent reversal of trade policies in some western countries seemingly influenced by rises of populism and of ethnic tensions, Grossman and Helpman (2018) construct a political economy model of trade policy with the Shayo-type identification process and examine how changes in identification patterns triggered, for example, by increased ethnic tensions affect policies. In order to understand phenomena such as declining demand for redistribution and rising political conflict over immigration in advanced nations, Gennaioli and Tabellini (2019) develop a model in which social identifications of voters distort their beliefs of self and others toward group stereotypes and affect policy choices.

Finally, the paper is also related to the literature that theoretically examines the modernization of an economy, such as Lewis (1954), Banerjee and Newman (1998), Proto (2007), Vollrath (2009), and Yuki (2007, 2008, 2016). In order to examine interactions among modernization, conflict, and social identification with a tractable model, this paper models the inefficient sectoral allocation of workers in a simplest manner and considers modernization induced by exogenous productivity growth. By contrast, these papers model factors leading to the inefficient allocation more explicitly and examine economic mechanisms of modernization more in detail.

**Organization of the paper:** Section 2 presents the model and Section 3 presents and discusses results. In particular, Sections 3.1 and 3.2 examine homogenous and heterogeneous identity equilibria respectively, Section 3.3 analyzes interactions among modernization, identity, conflict, and output, and Section 3.4 analyzes effects of resources on the interactions. Section 4 concludes. Appendix A presents existence conditions for equilibria, and Appendix B contains proofs.

# 2 Model

Consider a contest model of conflict in which $n_e (\geq 2)$ ethnic groups contest for exogenous resources. The society is populated by a finite number $N$ of individuals who belong to one of the ethnic groups that are symmetric in every aspect (thus the population size of each group is $N/n_e$). So the model is concerned with an ethnically heterogenous society without a dominant ethnic group.
**Production:** There are \( n_e + 1 \) sectors producing the private good, \( n_e \) ethnically-segregated traditional sectors (sectors \( TJ, J = 1, 2, \ldots, n_e \)) and one ethnically-integrated modern sector (sector \( M \)). The traditional sectors correspond to sectors using traditional or rudimentary technologies in the real economy, such as traditional agriculture, urban informal sector, and household production, and the modern sector corresponds to sectors such as modern manufacturing and services,\(^{10}\) where the former sectors are more ethnically segregated than the latter (Glitz, 2014).\(^ {11}\) Traditional agriculture is operated in largely ethnically homogenous rural communities and typical jobs in urban informal sector are neighborhood jobs in ethnically segregated communities.

The production functions of sectors \( TJ (J = 1, 2, \ldots, n_e) \) and \( M \) are

\[
Y_{TJ} = A_T (L_{TJ})^\alpha, \quad \alpha \in (0, 1),
\]

\[
Y_M = A_M \sum_{J=1}^{n_e} L_{MJ},
\]

where \( L_{TJ} \) and \( A_T \) are respectively the number of workers in sector \( TJ \) and the sector’s total factor productivity (TFP), \( L_{MJ} \) is the number of workers of ethnic group \( J \) in sector \( M \), and \( A_M \) is the sector’s TFP. (Each worker supplies a unit of labor inelastically.) Sector \( TJ \) exhibits decreasing returns to labor, which intends to capture the fact that labor productivity tends to fall with the amount of labor input in traditional sectors due to limited arable land (traditional agriculture), limited capital available to credit constrained producers (the urban informal sector), or a decreasing degree of task specialization of each family member (household production).\(^ {12}\)

The wage rate is determined competitively in sector \( M \). By contrast, in sector \( TJ \), as in Lewis (1954) and many subsequent works modeling traditional sectors, labor income is determined so that the product is equally shared among workers.\(^ {13}\) Thus, labor incomes in the sectors are

\[
y_{TJ} = A_T (L_{TJ})^{\alpha - 1},
\]

\[
y_M = A_M.
\]

This setting can generate, in a simplest manner, the situation facing actual developing countries that there are inefficiently many workers in traditional sectors and their shift to the modern sector raises aggregate output (Gollin, Lagakos, and Waugh, 2014).\(^ {14}\)

Individuals of group \( J \) are freely mobile between sector \( M \) and sector \( TJ \), and their sectoral allocation is determined so that their utilities in the two sectors are equated.

---

\(^{10}\)The urban informal sector is a part of the urban economy composed of small-scale businesses supplying basic services (for example, small shops and vendors selling commodities and meals) and basic manufacturing goods.

\(^{11}\)Glitz (2014) finds that ethnic segregation is stronger in smaller establishments and in sectors such as agriculture, construction, and the low-skill service sector in Germany.

\(^{12}\)This is because the number of tasks performed by each family member increases, as more production activities shift from the market to the household and thus the labor input in household production increases.

\(^{13}\)This assumption reflects the fact that typical production units of traditional sectors are family-run farms/firms or households. Except results on total output of the private good and aggregate material payoff, qualitative results below do not depend on this.

\(^{14}\)In the real economy, there are other factors causing the inefficient allocation of workers, including inadequate access to quality education required in many modern sector jobs and inadequate access to capital to start a business in the sector. To make the model analytically tractable, these factors are not modeled but would not affect results.
Conflict: The ethnic groups contest for exogenous resources that bring forth group-specific club goods of value $V$, e.g. public services and infrastructures benefiting a particular group.\textsuperscript{15} The amount of resources each group acquires depends on contributions to the conflict by individuals of each group. In particular, the contested resources are divided among the groups according to the following contest function,

$$
\frac{V_J}{V} = \frac{F_J}{F} \text{ if } F > 0, \quad \text{and } = \frac{1}{n_e} \text{ if } F = 0,
$$

(5)

where $V_J$ is the resources acquired by group $J (J = 1, 2, ..., n_e)$, $F_J = \sum_{i \in J} f_i$ is the total contributions or ”efforts” by members of the group ($f_i$ is the contribution by individual $i$), and $F = \sum_{J=1}^{n_e} F_J$ is the aggregate ”efforts” of the society, which is termed the level of conflict. The contested resources represent both material resources (such as natural resources) and a part of the governmental budget used for producing the group-specific goods.\textsuperscript{16} The model describes a country in which the resource allocation over the groups is determined not by rules but by the consequences of violent or non-violent conflict (such as rent-seeking activities), in which force, mass demonstrations, bribery, or lobbying are employed to influence the outcome.

Individual $i$ contributing $f_i$ to the conflict incurs a cost of $c(f_i)$, which, following Esteban and Ray (2011), takes the following form:

$$
c(f_i) = \frac{1}{\theta} (f_i)^\theta, \quad \theta \geq 2.
$$

(6)

The restriction $\theta \geq 2$ is needed to prove some results ($\theta > 1$ is enough for most results).

Utility: As in Sambanis and Shayo (2013), the utility of an individual depends not only on his material payoff positively, but also negatively on perceived distance from a social group he identifies with (either his ethnic group or the nation) and positively on the status of the social group, which are important factors affecting social identification and intergroup behaviors, according to influential theories in social psychology (Tajfel and Turner, 1986; Turner et al., 1987) and empirical evidence (Manning and Roy, 2010; Sambanis, Skaperdas, and Wohlforth, 2015).\textsuperscript{17}

The material payoff of individual $i$ of ethnic group $J (J = 1, 2, ..., n_e)$ when he works in sector $K (K = T, M)$ is

$$
\pi_i = y_K - \frac{1}{\theta} (f_i)^\theta + \delta \frac{F_J}{F} V,
$$

(7)

where $\delta$ is the value of the group-specific club good in units of the private good.

\textsuperscript{15}Main results would not be affected under the assumption that contested resources yield the private good.

\textsuperscript{16}To be more exact, when the contested resources represent the governmental budget for the club goods, taxation should be modeled. If the government imposes lump-sum tax of the same amount on all individuals, none of results are affected. The only change is that disposable incomes of individuals decrease by the tax payment.

\textsuperscript{17}Evidence suggests that perceived distance and status affect social identity. For example, Manning and Roy (2010) find, for the UK, that nonwhites, whose perceived distance from the ”average” person in the nation seems to be greater, are less likely to think of themselves as British than whites. Further, they find that immigrants from poorer and less democratic (i.e. lower status) countries assimilate faster into a British identity. Sambanis, Skaperdas, and Wohlforth (2015) present episodes suggesting that interstate wars affect social identity through the national status, including increased identification with the state after the victory in the WWII in the USSR and the intensification of a common identity among southern Slavs, including Croats and Slovenes, after Serbian victories against the Ottoman Empire and Bulgaria in the Balkan Wars in 1912–13.
Social groups are groups from which an individual chooses one group he identifies with, which are his ethnic group and the nation $N$.

Individual $i$ who is characterized by three types of attributes perceives how close to or far from a social group with the distance between his attributes and average attributes of the group. The attributes are whether he belongs to (a) the nation or not, (b) particular ethnic groups or not, and (c) particular traditional sectors or not:18

\[
q_i^n = 1 \text{ if } i \in N, \quad q_i^n = 0 \text{ otherwise,} \tag{8}
\]

\[
q_i^J = 1 \text{ if } i \in J, \quad q_i^J = 0 \text{ otherwise, for } J = 1, 2, \ldots, n_e, \tag{9}
\]

\[
q_i^{TJ} = 1 \text{ if } i \in TJ, \quad q_i^{TJ} = 0 \text{ otherwise, for } J = 1, 2, \ldots, n_e. \tag{10}
\]

For example, when he belongs to ethnic group 2 and works in sector $M$, $q_i^n = 1, q_i^2 = 1, q_i^J = 0$ for $J \neq 2$, and $q_i^{TJ} = 0$ for any $J$. The national and ethnic attributes are fixed, while the sectoral attributes are determined endogenously by sectoral choices of workers, which are described later.

The perceived distance between individual $i$ and social group $G$ ($G = J, N$), on which his utility depends negatively, is represented by19

\[
d_{iG}^2 = \omega_n(q_i^n - \bar{q}_G^n)^2 + \omega_e \sum_{j=1}^{n_e} (q_i^j - \bar{q}_G^j)^2 + \omega_s \sum_{j=1}^{n_e} (q_i^{Tj} - \bar{q}_G^{Tj})^2, \tag{11}
\]

where $q_G^n, q_G^j,$ and $q_G^{Tj}$ are average values of the three attributes of the group, and $\omega_n, \omega_e, \omega_s \in (0, 1)$ are weights on the respective attributes and their sum equals 1.

Following Sambanis and Shayo (2013), the weight on the ethnic attributes $\omega_e$ (the national attribute $\omega_n$) is assumed to increase (decrease) with the level of ethnic conflict $F$:

\[
\omega_e = \eta_0 + \eta_1 F, \quad \eta_0 \geq 0, \quad \eta_1 > 0, \quad \eta_0 + \eta_1 F_{\text{max}} < 1 - \omega_s, \tag{12}
\]

\[
\omega_n = 1 - \omega_e - \omega_s = 1 - \omega_s - (\eta_0 + \eta_1 F), \tag{13}
\]

where $F_{\text{max}}$ is the maximum possible level of $F$. The specification implies that, when ethnic conflict becomes more intense, people care about the ethnic attributes more (the national attribute less) in measuring distances from social groups, which is consistent with empirical evidence (Eifert, Miguel, and Posner, 2010; Rohner, Thoenig, and Zilibotti, 2013; Sambanis and Shayo, 2013).20

---

18The reason why sectoral affiliation is a component of the perceived distance is that the type of job (modern sector job or traditional sector job) and the region of residence (urban or rural region) of an individual are considered as important factors affecting the person’s social identity.

19The concept of perceived distance is developed in cognitive psychology in studying how a person categorizes information that comes in to her (stimuli) (Nosofsky, 1986). Turner et al. (1987) apply the concept to the categorization by a person of people, including herself, into social groups, in constructing an influential social psychological theory, self-categorization theory. The theory tries to explain psychological basis of social identification.

20A case analysis of the civil war in Yugoslavia in the 1990s by Sambanis and Shayo (2013) cites evidence showing that the share of people identifying themselves as “Yugoslavs” dropped greatly after the intensification of the conflict despite episodes suggesting the lack of strong ethnic identities before the war. Rohner, Thoenig, and Zilibotti (2013), using individual, county-level and district-level data from Uganda, find that the proportion of individuals identifying with their ethnic group over the nation is higher in counties of the higher intensity of armed conflicts, after controlling for individual, ethnic, and spatial characteristics and employing instrumental variable estimation. Further, Eifert, Miguel, and Posner (2010), based on 22 public opinion surveys in 10 African countries, find that being close to a competitive presidential election is positively associated with ethnic identification.
The utility of an individual also depends positively on the status of social group $G$ ($G = J, N$) he identifies with, which is given by the difference between people’s evaluations of the group’s “value” or “importance” and the reference groups’ one:\footnote{Intergroup status differences are major factors affecting intergroup behaviors such as conflict and discrimination, according to social identity theory (Tajfel and Turner, 1986), an influential social psychological theory closely related to self-categorization theory (footnote 19), which tries to explain collective behaviors mainly based on social identity.} 

$$S_G = \sigma_G - \sigma_{-G},$$ \hspace{1cm} (14)

where exogenous $\sigma_G$ and $\sigma_{-G}$ summarize all factors affecting the group’s and the reference groups’ “value” or “importance”. When $G = J$, the reference group is the other ethnic groups, and when $G = N$, it is other nations. Since ethnic groups are assumed to be symmetric, $S_J = \sigma_J - \sigma_{-J} = 0$, while $S_N = \sigma_N - \sigma_{-N}$ is generally non-zero.\footnote{The assumption on reference groups is made for simplicity. If reference groups of the nation include ethnic groups and vice versa, $S_N = \sigma_N - [\rho \sigma_{-N} + (1 - \rho)\sigma_J]$ ($\rho \in [0, 1]$) and $S_J = \sigma_J - [\rho \sigma_{-J} + (1 - \rho)\sigma_N] = (1 - \rho)(\sigma_J - \sigma_N)$. Results in Section 3 (and Appendix A) remain the same if "$S_N$" is replaced with "$S_N - S_J".}

The exogenous national status $S_N$ represents people’s evaluations of the nation’s international standing or reputation, particularly compared to neighboring nations, in “soft” dimensions such as culture, history, sports, and widely shared values (e.g., human rights and democracy) as well as in “hard” dimensions such as military strength and territory. For example, a nation with long history, rich culture, and large territory would have large positive $S_N$.\footnote{In order to make the model manageable, unlike Sambanis and Shayo (2013), the status does not depend on the group’s total material payoffs (the sum of $\pi_i$). Results would not be affected by considering the economic status, as long as its importance in the utility is not very large.}

From these settings, the utility of individual $i$ who identifies with social group $G$ is given by 

$$u_{iG} = \pi_i - \beta d_{iG}^2 + \gamma S_G, \quad \beta, \gamma > 0.$$ \hspace{1cm} (15)

The utility function implies that, given that an individual identifies with a particular social group, his utility increases as the perceived distance from the group falls. Thus, he has an incentive to choose actions lowering the distance. For example, since the perceived distance depends on differences in the sectoral attributes, others things equal, he has an incentive to choose the same sector as the “average person” of the group.

Social identification of an individual, that is, which group he identifies with, is not fixed. He can “choose” a group (his ethnic group or the nation) that brings him higher utility either because of higher material payoff, the shorter perceived distance, or the higher status. His social identity might change if exogenous variables affecting his utility directly or indirectly through choices by others alter. For example, as the level of conflict rises, people place a greater weight on the ethnic attributes and a smaller weight on the national attribute in the perceived distance, which could change their social identities. Exact timing of their decisions is as follows.

**Timing:** Individuals play a two-stage game to maximize their utility. First, they decide which sector to work (sector $TJ$ or sector $M$ for ethnic group $J$), which in turn determines labor incomes in traditional sectors ($y_{TJ}$) and sectoral and aggregate output ($Y_{TJ}, Y_M$, and $Y \equiv Y_{TJ} + Y_M$). Then, that is, after $L_{TJ}$ and $L_{MJ}$ are determined, they choose a social group to identify with and the

```plaintext
21Intergroup status differences are major factors affecting intergroup behaviors such as conflict and discrimination, according to social identity theory (Tajfel and Turner, 1986), an influential social psychological theory closely related to self-categorization theory (footnote 19), which tries to explain collective behaviors mainly based on social identity.
22The assumption on reference groups is made for simplicity. If reference groups of the nation include ethnic groups and vice versa, $S_N = \sigma_N - [\rho \sigma_{-N} + (1 - \rho)\sigma_J]$ ($\rho \in [0, 1]$) and $S_J = \sigma_J - [\rho \sigma_{-J} + (1 - \rho)\sigma_N] = (1 - \rho)(\sigma_J - \sigma_N)$. Results in Section 3 (and Appendix A) remain the same if "$S_N$" is replaced with "$S_N - S_J". In order to make the model manageable, unlike Sambanis and Shayo (2013), the status does not depend on the group’s total material payoffs (the sum of $\pi_i$). Results would not be affected by considering the economic status, as long as its importance in the utility is not very large.
```
contribution to conflict $f_i$, simultaneously, which determines the level of conflict $F$, the allocation of contested resources $V$ over the groups, and individual utilities.\footnote{The timing of events reflects the fact that the choice between the two sectors made earlier in life largely determines the sector to work for most of life (because, in the real economy, the sectors tend to require different levels of education and different types of skills and be located in different places), while social identity is more likely to change over time, usually gradually (see footnote 17 for the evidence on immigrants), but sometimes in a short period of time triggered by events such as armed conflict and electoral competition (see footnote 20 for the evidence).} The solution concept applied is subgame perfect Nash equilibrium, thus the two-stage game can be solved by backward induction.\footnote{Sambanis and Shayo (2013) apply the concept of the social identity equilibrium to their one-shot game. The equilibrium is similar to the standard Nash equilibrium but the condition on the choice of identities is weaker. In this paper, the concept of the subgame perfect Nash equilibrium is used, because it is familiar and it seems to be easier to apply. Shayo (2009) too employs the standard Nash equilibrium to solve a one-shot game of social identity.}

3 Results

As mentioned earlier, ethnic groups are assumed to be symmetric in every aspect. Hence, the paper focuses on equilibria in which choices of all groups are symmetric\footnote{There also exist subgame perfect Nash equilibria in which different ethnic groups make different choices, which are generally very difficult to analyze.}. These equilibria can be classified into two types, equilibria in which individuals of the same ethnic group share the same identity and those in which they do not. For ease of exposition, homogenous identity equilibria are analyzed first (Section 3.1), then heterogenous identity equilibria are analyzed and compared with homogenous identity equilibria (Section 3.2). These sections compare different equilibria for given parameters and exogenous variables, but which equilibria exist does change with values of exogenous variables. Taking into account this, Section 3.3 analyzes the focus of the paper, interactions among modernization, identity, conflict, and output. Section 3.4 examines how the abundance of contested resources affects the interactions.

In order to simplify the analysis, the following assumption, which is a sufficient condition for $f_i > 0$ and thus $F > 0$ to hold in all equilibria, is imposed.

\begin{equation}
\delta \frac{V}{N} > (\beta \eta_1) \frac{\eta}{\eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\frac{n_e - 1}{n_e}}. \tag{16}
\end{equation}

3.1 Homogenous identity equilibria

There exist two homogenous identity equilibria, the equilibrium in which all individuals identify with their ethnic group and the one in which all individuals identify with the nation.

3.1.1 All individuals identify with their ethnic group

Consider the second stage of the game in which sectoral allocation of workers ($L_{TJ}$ and $L_{MJ}$) are given. When individual $i$ of ethnic group $J$ ($J = 1, 2, ..., n_e$) in sector $M$ identifies with his ethnic group, he chooses the contribution to conflict $f_i$ to maximize the following utility (note $q_{tn} = q_{tn} = 1, q_{tj} = q_{tj} = 1, q_k = 0$ for $k \neq n, J, TJ$):
\[ A_M - \frac{1}{\theta}(f_i)^\theta + \delta \frac{F_i}{F} V - \beta \omega_s \left( \frac{L_{TJ}}{N/n_e} \right)^2. \] (17)

From the first-order condition,

\[ f_i = f_{i,e} = \left(\delta \frac{F_i}{F^2} V\right)^{\frac{1}{\theta+1}}, \quad \text{where} \quad F_{-j} = F - F_j. \] (18)

When he is in sector $TJ$ instead, he chooses $f_i$ to maximize $(q_i^{TJ} = 1)$

\[ A_T(L_{TJ})^{\alpha-1} - \frac{1}{\theta}(f_i)^\theta + \delta \frac{F_i}{F} V - \beta \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^2. \] (19)

The solution for $f_i$ is given by (18) as in the previous case.

Since all individuals identify with their ethnic group and the ethnic groups are symmetric, by substituting $F_{-j} = \frac{n_e-1}{n_e} F$ and $f_i = F/N$ into (18), the equilibrium level of conflict $F_e^*$ is obtained:

\[ F_e^* = \left(\frac{n_e-1}{n_e} V\right)^{\frac{1}{\theta}} N \quad \text{from} \quad F_e^* = \left(\frac{n_e-1}{n_e} \frac{V}{F_e^*}\right)^{\frac{1}{\theta}} N. \] (20)

In the first stage, individuals choose sectors taking into account effects of their choices on the second stage. Assume that the following condition holds so that $L_{TJ} = \frac{N}{n_e}$ (all individuals choose sector $TJ$) does not hold in equilibrium.

**Assumption 2:** \[ A_T \left( \frac{N}{n_e} \right)^{\alpha-1} + \beta \omega_s < A_M. \] (21)

Then, the sector allocation of workers is determined so that choosing either sector is indifferent. From (17) and (19), the indifference condition is

\[ A_T(L_{TJ})^{\alpha-1} - \beta \omega_s \left(1 - 2 n_e \frac{L_{TJ}}{N}\right) = A_M, \] (22)

which gives the unique $(L_{TJ})_e^* \in (0, \frac{N}{n_e})$ that decreases with $A_M$ and increases with $A_T$.\(^{27}\)

### 3.1.2 All individuals identify with the nation

Consider the second stage of the game in which sectoral allocation of workers are given. When individual $i$ of ethnic group $J$ in sector $M$ identifies with the nation, he chooses $f_i$ to maximize the following utility (note $\omega_e = \eta_0 + \eta_1 F$, $S_N = \sigma_N - \sigma_{-N}$, $q_i^J = \frac{1}{n_e}, q_N^T = \frac{L_{TK}}{N}$ for any $TK$):

\[ A_M - \frac{1}{\theta}(f_i)^\theta + \delta \frac{F_i}{F} V - \beta \left(\eta_0 + \eta_1 F\right) \frac{n_e-1}{n_e} + \omega_s \left( \frac{L_{TJ}}{N} \right)^2 + \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 \right) + \gamma S_N. \] (23)

From the first-order condition ($f_i > 0$ from (16)),

\(^{27}\)The first derivative with respect to $L_{TJ}$ of the LHS of (22) is $-(1-\alpha) A_T (L_{TJ})^{\alpha-2} + \beta \omega_s 2 n_e \frac{L_{TJ}}{N}$, which equals $-\infty$ at $L_{TJ} = 0$ and equals 0 at $L_{TJ} = \left[ \frac{(1-\alpha) A_T}{\beta \omega_s 2 n_e} \right]^{\frac{1}{\alpha-2}}$, and the second derivative equals $(2-\alpha)(1-\alpha) A_T (L_{TJ})^{\alpha-3} > 0$. Thus, from (21) and the fact that the LHS of (22) at $L_{TJ} = 0$ equals $+\infty$, there exists unique $L_{TJ} \in (0, \frac{N}{n_e})$ satisfying (22). The relations of $(L_{TJ})_e^*$ with $A_M$ and $A_T$ are straightforward from the shape of the LHS of (22).
\[ f_i = f_{i,n} \equiv \left( \frac{F - F_j}{F^2} V - \beta \eta_1 \frac{n_e - 1}{n_e} \right)^{\frac{1}{\theta - 1}}, \text{ where } F - J \equiv F - F_j. \] (24)

When he is in sector \( TJ \) instead, he chooses \( f_i \) to maximize

\[ A_T(L_{TJ})^{\alpha - 1} - \frac{1}{\theta} (f_i)^{\theta} + \delta \frac{F_j}{F} V - \beta \left( \eta_0 + \eta_1 F \right) \frac{n_e - 1}{n_e} + \omega_s \left( 1 - \frac{L_{TJ}}{N} \right) + \frac{L_{TK}}{N} - \frac{L_{TJ}}{N} \] + \gamma S_N, \] (25)

whose solution is given by (24).

Since all individuals identify with the nation and the groups are symmetric, by plugging \( F - J = \frac{n_e - 1}{n_e} F \) and \( f_i = F/N \) into (24), the equilibrium level of conflict \( F^*_n \) is obtained as a solution for

\[ F^*_n = \left( \frac{N}{n_e} \left( \frac{V}{F^*_n} - \beta \eta_1 \right) \right)^{\frac{1}{\theta - 1}} N. \] (26)

In the first stage, the indifference condition for sectoral choices equals, from (23) and (25),

\[ A_T(L_{TJ})^{\alpha - 1} - \frac{1}{\theta} \omega_s \left( 1 - \frac{2L_{TJ}}{N} \right) = A_M, \] (27)

which gives the unique \((L_{TJ})^*_n \in (0, (L_{TJ})^*_e)\) that decreases with \( A_M \) and increases with \( A_T \).\(^{28}\)

3.1.3 Analysis

The following proposition compares the two homogenous identity equilibria for given parameters and exogenous variables in terms of the level of conflict, the sectoral distribution of individuals, and output of the private good. As explained in Section 3.3 and detailed in Appendix A, there do exist combinations of parameters and exogenous variables such that both equilibria exist.

**Proposition 1** Given parameters and exogenous variables, the following holds for two homogenous identity equilibria.

(i) The level of conflict is lower when all identify with the nation, i.e. \( F^*_n < F^*_e \).

(ii) \( L_{TJ} \) and thus the proportion of workers in traditional sectors are lower when all identify with the nation, i.e. \((L_{TJ})^*_n < (L_{TJ})^*_e \).

(iii) Output of the private good \( Y \) is higher under the national identity, if \( \alpha \) (the parameter of the traditional sector production function) or \( \beta \) (the importance of the perceived distance in the utility) is not very high. The output is higher under the ethnic identity if \( \alpha \) or \( \beta \) is high enough.

(iv) Aggregate material payoff is higher under the national identity, unless \( \alpha \) or \( \beta \) is very high.

Individuals contribute less to conflict and thus the level of conflict \( F \) is lower when they identify with the nation, because, in choosing \( f_i \), they take into account the undesirable effect of conflict on the perceived distance from the "average national": higher \( F \) raises the weight on ethnicity, \( \omega_e \), and lowers the weight on nationality, \( \omega_n \), thereby highlighting differences among citizens and raising the distance. This result is shown in Sambanis and Shayo (2013) and is consistent with evidence such as Eifert, Miguel, and Posner (2010) and Rohner, Thoenig, and Zilibotti (2013) (footnote 20).\(^{28}\) From the comparison of the LHS of (27) with that of (22) and the discussion in footnote 27, it is clear that, when (21) is assumed, the unique solution \((L_{TJ})^*_n \in (0, (L_{TJ})^*_e)\) that decreases with \( A_M \) and increases with \( A_T \) exists.
What is new is the effect on the sectoral distribution of individuals and total output. Given parameters and exogenous variables, $L_{TJ}$ and thus the proportion of workers in traditional sectors are lower when they identify with the nation. Under the national identity, the utility when they choose the traditional sector of their ethnic group is lower for given $L_{TJ}$ and thus the smaller proportion of them choose the sector. This is because the perceived distance from the ”average citizen” rises by choosing the ethnically segregated sector over the integrated modern sector under the national identity, whereas, under the ethnic identity, the perceived distance from the ”average member” of the ethnic group falls (if $L_{TJ} > \frac{N}{2n_e}$, i.e., the majority is in the traditional sector) or rises less (if $L_{TJ} < \frac{N}{2n_e}$) by choosing the traditional sector.

In this model, the sectoral allocation of workers is generally inefficient, i.e. it does not maximize total output of the private good, because labor income is greater than marginal labor productivity in traditional sectors (note, $\alpha < 1$, decreasing returns to labor in the sectors) and the perceived distance term in the utility function distorts sectoral choices by inducing workers to choose the same sector as the ”average individual” of the group they identify with. The former leads to too many traditional sector workers, while the latter leads to too few traditional sector workers under the national identity and to too many (few) workers in the sectors under the ethnic identity when $L_{TJ} > (\leq) \frac{N}{2n_e}$.

If $\alpha$ is not very high, the first effect dominates and thus $L_{TJ}$ is higher than the efficient level. Total output is higher under the national identity because $L_{TJ}$ is smaller than under the ethnic identity and thus closer to the efficient level. The condition would be more relevant to developing nations, since small $\alpha$ implies strong decreasing returns in traditional sectors.29 The same result holds for any $\alpha$, if the importance of the perceived distance in the utility, $\beta$, is not very high so that the effect of social identity on sectoral misallocation (the second effect) does not exceed the economic effect (the first effect), which would be plausible.30 Finally, aggregate material payoff (the value of private and club good consumption net of the cost of conflict) is higher under the national identity because of the lower cost of conflict, unless $\alpha$ or $\beta$ is very high.31

To summarize, national identity is associated with not only the lower level of conflict but also higher shares of modern sector workers and production and, under plausible conditions, higher levels of total output of the private good and of aggregate material payoff. Note that the result on output and material payoff is obtained despite the model does not assume the plausible negative effect of conflict on modern sector productivity (relative to traditional sector productivity). The result would be strengthened if such effect is considered.32

29Remember that the decreasing returns to labor intends to capture the fact that labor productivity tends to fall with the amount of labor input in the sectors due to limited arable land (traditional agriculture), limited capital available to credit constrained producers (the urban informal sector), or a decreasing degree of task specialization of each family member (household production).

30By contrast, $Y$ is lower under the national identity, if $\alpha$ or $\beta$ is high enough that the second effect dominates and thus $L_{TJ}$ is lower than the efficient level. However, even in this case, aggregate material payoff would be higher under the national identity because of the lower cost of conflict, unless $\alpha$ or $\beta$ is very high and thus $Y$ is much lower.

31Club good consumption $\frac{F}{n_e}V$ is always equal to $\frac{1}{n_e}V$.

32The easiest way to include this effect is to assume that $A_M(F), A_M'(F) < 0$, and individuals do not consider effects of their actions on $A_M(F)$ in making decisions. Then, only the indifference conditions for sectoral choices change.
3.2 Heterogenous identity equilibria

Now, equilibria in which individuals of the same ethnic group have different identities are examined. There exist three heterogenous identity equilibria, the equilibrium in which sector $M$ (sector $TJ$) workers identify with the nation (their ethnic group), the one in which sector $M$ workers are divided over identities and sector $TJ$ workers identify with their ethnic group, and the one in which sector $TJ$ workers are divided over identities and sector $M$ workers identify with the nation.

3.2.1 Sector $TJ$ workers identify with their ethnic group and sector $M$ workers identify with the nation

In the second stage of the game, workers in sector $M$ work with the national identity choose $f_i$ to maximize (19) and the solution is given by (18), while sector $M$ workers with the national identity choose $f_i$ to maximize (23) and the solution is given by (24).

Because the ethnic groups are symmetric, by substituting $F_{-J} = \frac{n_e-1}{n_e} F$ into (18) and (24), and plugging them into $F = f_{i,n_e} L_{TJ} + f_{i,n}(N-n_e L_{TJ})$, the level of conflict $F$ given $L_{TJ}$ is obtained:
\[
F = \left(\frac{n_e-1}{n_e}\right)^{\frac{1}{\theta^*}} \left[ \left(\frac{\delta \gamma S N}{\eta_1}\right)^{\frac{1}{\theta^*}} n_e L_{TJ} + \left(\frac{\delta \gamma S N}{\eta_1} - \beta \eta_1 \right)^{\frac{1}{\theta^*}} (N-n_e L_{TJ}) \right] ,
\]
which increases with $L_{TJ}$ and is denoted by $F_d(L_{TJ})$ ($d$ is for "divided identities").

In the first stage, the indifference condition for sectoral choices equals, from (18), (19), (23), (24), and (28),
\[
A_T(L_{TJ})^{\alpha-1} - \frac{1}{\theta} \left(\frac{\delta \gamma S N}{\eta_1} \right)^{\frac{1}{\theta}} - \beta \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^{2}
\]

\[
= A_M - \frac{1}{\theta} \left[\frac{n_e-1}{n_e} \left(\frac{\delta \gamma S N}{\eta_1} \right)^{\frac{1}{\theta}} - \beta \left\{ \frac{\left[\eta_0 + \eta_1 F_{d}(L_{TJ})\right] n_e-1}{n_e} + \omega_s n_e \left(\frac{L_{TJ}}{N/n_e}\right)^{2} \right\} \right] + \gamma S N
\]

\[
\Rightarrow A_T(L_{TJ})^{\alpha-1} + \beta \left\{ \frac{\left[\eta_0 + \eta_1 F_{d}(L_{TJ})\right] n_e-1}{n_e} + \omega_s n_e \left(\frac{L_{TJ}}{N/n_e}\right)^{2} \right\} = A_M,
\]
which gives solution $(L_{TJ})^*_d \in (0, \frac{N}{n_e})$. Appendix B proves its uniqueness when $\theta = 2$. The equilibrium level of conflict, $F^*_d$, is obtained from the substitution of $(L_{TJ})^*_d$ into (28).

3.2.2 Sector $M$ workers are divided over identities and sector $TJ$ workers identify with their ethnic group

In the second stage of the game, workers in sector $TJ$ identifying with their ethnic group choose $f_i$ to maximize (19) and the solution is given by (18), while those in sector $M$ are indifferent between identifying with the nation, in which case $f_i$ is chosen to maximize (23) and the solution is given by (24), and identifying with their ethnic group, in which case $f_i$ is chosen to maximize (17) and the solution is given by (18).

\textsuperscript{33}When $\theta > 2$, the uniqueness of $(L_{TJ})^*_d$ cannot be proved, but whether $(L_{TJ})^*_d$ is unique or not does not affect results below.
Thus, the indifference condition for \textit{identity} choices when ethnic groups are symmetric is
\[
A_M - \frac{1}{2} (f_{i,e})^9 + \delta \frac{\hat{E}_V}{\beta} V - \beta \omega_s \left( \frac{L_{TJ}}{N/n_e} \right)^2
= A_M - \frac{1}{2} (f_{i,n})^9 + \delta \frac{\hat{E}_V}{\beta} V - \beta \left[ (\eta_0 + \eta_1 F) \frac{n_{e-1}}{n_e} + \omega_s n_e \left( \frac{L_{TJ}}{N/n_e} \right)^2 \right] + \gamma S_N
\]
\[
\Rightarrow \beta \left[ (\eta_0 + \eta_1 F) \frac{n_{e-1}}{n_e} + \omega_s n_e (n_e - 1) \left( \frac{L_{TJ}}{N/n_e} \right)^2 \right] - \frac{1}{2} \left( \frac{n_{e-1}}{n_e} \right)^{\frac{\eta}{\eta_1}} \left[ (\delta \frac{V}{\beta})^{\frac{\theta}{\eta_1}} - (\delta \frac{V}{\beta} - \beta \eta_1)^{\frac{\theta}{\eta_1}} \right] = \gamma S_N,
\]
where \( F = f_{i,n} P_{M,n} (N - n_e L_{TJ}) + f_{i,e} [n_e L_{TJ} + (1 - P_{M,n}) (N - n_e L_{TJ})] \)
\[
= \left( \frac{n_{e-1}}{n_e} \right)^{\frac{1}{\eta_1}} \left[ (\delta \frac{V}{\beta} - \beta \eta_1)^{\frac{1}{\eta_1}} P_{M,n} (N - n_e L_{TJ}) + (\delta \frac{V}{\beta})^{\frac{1}{\eta_1}} [n_e L_{TJ} + (1 - P_{M,n}) (N - n_e L_{TJ})] \right],
\]
where \( P_{M,n} \) is the proportion of sector \( M \) workers identifying with the nation. Since the LHS of (31) decreases with \( L_{TJ} \) and increases with \( F \), \( F \) satisfying (31) increases with \( L_{TJ} \).

The indifference condition for sectoral choices in the first stage is given by (22) and thus the same as the equilibrium in which all identify with their ethnic group from (19) and (30). Thus, the equilibrium condition for sectoral choices in the first stage is given by (22) and thus the same as the equilibrium in which all identify with their ethnic group from (19) and (30). Thus, the equilibrium level of \( L_{TJ} \), \( (L_{TJ})^*_M \), equals \((L_{TJ})^*_e\), and the equilibrium level of conflict \( F^*_M \) is obtained by substituting \((L_{TJ})^*_e\) into (31) and solving it for \( F \).

### 3.2.3 Sector \( TJ \) workers are divided over identities and sector \( M \) workers identify with the nation

In the second stage, those in sector \( M \) identifying with the nation choose \( f_i \) to maximize (23) and the solution is (24), while those in sector \( TJ \) are indifferent between identifying with the nation, in which case \( f_i \) is chosen to maximize (25) and the solution is given by (24), and identifying with their ethnic group, in which case \( f_i \) is chosen to maximize (19) and the solution is given by (18).

Thus, the indifference condition for \textit{identity} choices when ethnic groups are symmetric is
\[
A_T (L_{TJ})^{\alpha - 1} - \frac{1}{2} (f_{i,e})^9 + \delta \frac{\hat{E}_V}{\beta} V - \beta \omega_s \left( 1 - \frac{L_{TJ}}{N/n_e} \right)^2
= A_T (L_{TJ})^{\alpha - 1} - \frac{1}{2} (f_{i,n})^9 + \delta \frac{\hat{E}_V}{\beta} V - \beta \left[ \omega_s \frac{n_{e-1}}{n_e} + \omega_s \left( 1 - \frac{L_{TJ}}{N/n_e} \right)^2 + (n_e - 1) \left( \frac{L_{TJ}}{N/n_e} \right)^2 \right] + \gamma S_N
\]
\[
\Rightarrow \beta \left[ (\eta_0 + \eta_1 F) \frac{n_{e-1}}{n_e} + \omega_s (n_e - 1) \frac{L_{TJ}}{N/n_e} \right] - \frac{1}{2} \left( \frac{n_{e-1}}{n_e} \right)^{\frac{\theta}{\eta_1}} \left[ (\delta \frac{V}{\beta})^{\frac{\theta}{\eta_1}} - (\delta \frac{V}{\beta} - \beta \eta_1)^{\frac{\theta}{\eta_1}} \right] = \gamma S_N,
\]
where \( F \) satisfies
\[
F = f_{i,n} [P_{TJ,n} n_e L_{TJ} + (N - n_e L_{TJ})] + f_{i,e} (1 - P_{TJ,n}) n_e L_{TJ}
= \left( \frac{n_{e-1}}{n_e} \right)^{\frac{1}{\eta_1}} \left[ (\delta \frac{V}{\beta} - \beta \eta_1)^{\frac{1}{\eta_1}} [P_{TJ,n} n_e L_{TJ} + (N - n_e L_{TJ})] + (\delta \frac{V}{\beta})^{\frac{1}{\eta_1}} (1 - P_{TJ,n}) n_e L_{TJ} \right],
\]
where \( P_{TJ,n} \) is the proportion of sector \( TJ \) workers identifying with the nation. \( F \) satisfying (34) decreases with \( L_{TJ} \) because the LHS of (34) increases with \( L_{TJ} \) and \( F \). After the negative dependence of \( F \) on \( L_{TJ} \) is taken into account, \( P_{TJ,n} \) increases with \( L_{TJ} \) from (35).

The indifference condition for sectoral choices in the first stage is given by (27) and thus the same
as the equilibrium in which all identify with the nation from (23) and (33). The equilibrium level of $L_{TJ}^T$, $(L_{TJ}^T)_n^*$, equals $(L_{TJ}^T)_d^*$, and the equilibrium level of conflict $F_{Td}^*$ is obtained by substituting $(L_{TJ}^T)_n^*$ into (34) and solving it for $F$.

3.2.4 Analysis

In all the heterogenous identity equilibria, modern sector workers are more (less) likely to identify with the nation (their ethnic group) than traditional sector workers: when some workers in traditional sectors identify with the nation, all workers in the modern sector do (and when someone in the modern sector identifies with his ethnic group, everyone in traditional sectors does). Roughly speaking, this is because the modern sector is ethnically integrated (and traditional sectors are ethnically segregated) and thus the perceived distance of modern sector workers from the "average national" is smaller than the distance from the "average member" of their ethnic group and the opposite holds for traditional sector workers, as long as sectoral attributes are considered.

3.2.4 Proposition

Given parameters and exogenous variables, the following holds when three heterogenous identity equilibria, together with two homogenous identity equilibria, are compared.

(i) The level of conflict is lower when the proportion of individuals identifying with the nation is higher, i.e. $F_n^* < F_{Td}^* < F_d^* < F_{Md}^* < F_e^*$.

(ii) $(L_{TJ}^T)_n^* = (L_{TJ}^T)_d^* < (L_{TJ}^T)_M^* = (L_{TJ}^T)_e^*$.

(iii) $Y_{Td}^* = Y_n^* < Y_d^* < Y_{Md}^* = Y_e^*$ if $\alpha$ or $\beta$ is not very high. The relation is opposite if $\alpha$ or $\beta$ is high enough.

(iv) Aggregate material payoff is higher when the proportion of individuals identifying with the nation is higher, unless $\alpha$ or $\beta$ is very high.

34 That there do not exist equilibria in which modern sector workers are less likely to identify with the nation than traditional sector workers is formally shown in the proof of Proposition A2 of Appendix A.

35 The total perceived distance of modern sector workers from the "average national" could be greater than the distance from the "average member" of their ethnic group, since ethnic attributes contribute to raising the distance from the "average national". However, the difference between the total perceived distance under the national identity and the one under the ethnic identity is always smaller for modern sector workers than for traditional sector workers.

36 Robinson (2014) classify workers into the formal and informal sectors based on their occupation: formal sector occupations are military/police, clerical worker, business person, professional worker, civil servant, teacher, etc., and informal sector occupations are subsistence farmer, informal manual labor, herder, housewife, etc.

37 By contrast, Eifert, Miguel, and Posner (2010), based on surveys in 10 African countries, find that being a farmer or fisherman, whom they classify as traditional sector workers, is negatively correlated with ethnic identity. However, there is no option for national identity in the surveys (other options are religious and class/occupational identities) and, unlike Robinson (2014), they classify those in the urban informal sector as modern sector workers.
The level of conflict is lower when the proportion of individuals identifying with the nation is higher. That is, among the heterogenous identity equilibria, the equilibrium in which all sector $M$ workers identify with the nation and sector $TJ$ workers are divided over identities has the lowest conflict level, and the one in which sector $M$ workers are divided over identities and sector $TJ$ workers identify with their ethnic group has the highest level. Among all the equilibria, the two homogenous identity equilibria have the highest and the lowest conflict levels.

Roughly speaking, the reason is that those identifying with the nation contribute less to conflict, which is because, in choosing $f_i$, they take into account that higher $F$ raises the perceived distance from the "average citizen" by highlighting differences among ethnic groups.

The above explanation presumes that, among the heterogenous identity equilibria, the proportion of individuals identifying with the nation is highest when sector $TJ$ workers are divided over identities (and sector $M$ workers share the national identity) and lowest when sector $M$ workers are divided over identities (and sector $TJ$ workers share the ethnic identity). The result on the fraction of workers in traditional sectors, $(L_{TJ})^*_{td} = (L_{TJ})^*_{n} < (L_{TJ})^*_{d} < (L_{TJ})^*_{Md} = (L_{TJ})^*_{e}$, confirms that this is the case. $(L_{TJ})^*_{n} < (L_{TJ})^*_{d} < (L_{TJ})^*_{e}$ holds because, in the equilibrium in which sector $TJ$ workers identify with their group and sector $M$ workers identify with the nation, the proportion of those identifying with the nation, who gain less from choosing the traditional sector, is higher (lower) than in the equilibrium in which all share the ethnic (national) identity. $(L_{TJ})^*_{td} = (L_{TJ})^*_{n}$ and $(L_{TJ})^*_{Md} = (L_{TJ})^*_{e}$ hold for the remaining heterogenous identity equilibria, because individuals who identify with a particular identity are in both sectors (the national identity for the former equilibrium and the ethnic identity for the latter) and they are indifferent between the sectors as in the corresponding homogenous identity equilibrium.

Finally, the result on total output of the private good is similar to Proposition 1 and can be explained as before. Under plausible conditions, total output is generally higher as the proportion of individuals having the national identity is higher, although $Y^*_{Td} = Y^*_{n}$ and $Y^*_{Md} = Y^*_{e}$ are true. Further, aggregate material payoff is strictly higher when the proportion of those identifying with the nation is higher because of the lower cost of conflict.

To summarize, similar results to Proposition 1 hold when heterogenous identity equilibria too are considered: national identity is associated with not only the lower level of conflict but also higher shares of modern sector workers and production and, under plausible conditions, higher levels of total output of the private good and of aggregate material payoff (the value of private and club good consumption net of the cost of conflict). The results are consistent with the oft-made argument (Collier, 2009; Michalopoulos and Papaioannou, 2015) that the dominance of subnational (particularly, ethnic) identities over national identity lies behind poor performance in various dimensions, including conflict and economic development, in ethnically heterogenous societies.38 Note that the lower share of modern sector workers under ethnic identity indicates

---

38Michalopoulos and Papaioannou (2015) find a positive relationship between identification with the nation and a measure of state capacity in protecting property rights and a positive relationship between ethnic identification and a measure of inefficiency of legal system, based on Afrobarometer Surveys covering 18–20 sub-Saharan nations.
the greater intersectoral gap in earnings. This suggests that strong ethnic identity might partly explain a substantial gap in average labor productivity between agriculture and non-agriculture in many developing countries found by Gollin, Lagakos, and Waugh (2014) and others.

3.3 Interactions among modernization, identity, conflict and output

The previous sections compared different equilibria for given parameters and exogenous variables, but which equilibria exist changes with values of exogenous variables, as examined in detail in Appendix A. Taking into account this, this section analyzes the focus of the paper, interactions among modernization, identity, conflict, and output.

A simple dynamics is introduced into the model by supposing that the TFP (total factor productivity) of sector $M$, $A_M$, increases over time. In the real economy, the TFP growth corresponds to the technological progress of the modern sector and the improvement in quality of institutions supporting the sector’s economic activities. The productivity growth raises the modern sector income, induces the higher proportion of workers to choose the sector, i.e. lowers $L_TJ$, and raises the sector’s share in production. How does modernization driven by the productivity growth affect social identity, conflict, and aggregate output? The next proposition, based on the propositions in Appendix A, shows that the effect differs depending on the status of the nation $S_N$. Note that changes in other exogenous variables including a decrease in contested resources $V$ have similar effects to an increase in $S_N$, as shown later in Propositions 4 and 5.

**Proposition 3** Suppose that the TFP of sector $M$, $A_M$, increases over time. Then,

(i) If the status of the nation $S_N$ is very high (very low), all individuals always identify with the nation (their ethnic group) and the level of conflict $F$ is consistently low (high).

(ii) Otherwise, when $S_N$ is relatively high (low), the society tends to shift from a heterogenous identity equilibrium to the one in which all individuals identify with the nation (their ethnic group). Given parameters and exogenous variables including $S_N$, multiple equilibria tend to exist and thus social identity, conflict, and output differ depending on which equilibrium is realized.

(iii) For given $A_M$, when $S_N$ is relatively high (low), the society tends to be in an equilibrium with low (high) $F$ and $L_TJ$ and, unless $\alpha$ or $\beta$ is very high, high (low) levels of aggregate output of the private good $Y$ and of aggregate material payoff.

If the status of the nation $S_N$ is at extremes, the society stays in the same equilibrium: when the status is very high (very low), all individuals always identify with the nation (their ethnic group) and the level of conflict $F$ is consistently low (high).

Otherwise, when $S_N$ is relatively high (low), the society tends to shift from a heterogenous identity equilibrium, in which traditional sector workers are more likely to identify with their

---

Note that modernization is not the same as urbanization: traditional sectors correspond to the urban informal sector as well as traditional agriculture and household production in the real economy. Many developing countries have experienced rapid urbanization without significant modernization.
ethnic group than modern sector workers, to the equilibrium in which all individuals identify with the nation (their ethnic group) and the level of conflict is low (high). The sectoral shift of workers associated with modernization shakes prevailing social identities in both sectors: modern sector workers become less attached to the national identity and traditional sector workers become less attached to the ethnic identity. When $S_N$ is relatively high (low), it is usually the case that the effect on traditional (modern) sector workers determines the equilibrium shift and all become identified with the nation (their group).

Although the increase of the modern sector productivity, $A_M$, always lowers $L_{TJ}$ and raises the sector’s share in production, for given $A_M$ (i.e. given level of modern sector technology and quality of institutions supporting the sector’s economic activities), the society with high (low) national status $S_N$ tends to be in an equilibrium characterized by relatively large (small) modern sector shares in employment and production and, under plausible conditions, high (low) levels of aggregate output of the private good $Y$ and of aggregate material payoff. Hence, having sufficiently high national status is crucial in achieving universal national identity, a low level of conflict, high modern sector shares, and large output in the long run.

However, history or "luck" too is important, as long as the status is not at extremes. Given parameters and exogenous variables including $S_N$, multiple equilibria tend to exist and thus, as shown in Propositions 1 and 2, social identity, conflict, and output differ depending on which equilibrium is realized.\footnote{In the model of Sambanis and Shyao (2013) too, multiple equilibria exist when the status is not at extremes.} Suppose that an equilibrium realized initially is sustained in subsequent periods, if the equilibrium continues to exist. Then, if the initial equilibrium happens to be such that a relatively high proportion of individuals identify with the nation, the society tends to maintain relatively strong national identity and relatively good conditions in terms of conflict, modern sector shares, and aggregate output subsequently.

### 3.3.1 Mechanism

The result would be understood more easily, first by looking at the result when $\eta_1 = 0$, that is, when weights on ethnic attributes $\omega_e$ and on the national attribute $\omega_n$ of the perceived distance do not depend on the level of conflict $F$ (see (12) and (13) in Section 2). In this case, $F$ is the same in all equilibria and equilibrium is unique for given parameters and exogenous variables. Figure 1 illustrates how the realized equilibrium differs depending on $S_N$ and $L_{TJ}$ when $\eta_1 = 0$. As $A_M$ increases over time, $L_{TJ}$ decreases, whose value is determined by the indifference condition for the sectoral choice of the corresponding equilibrium. Thus, in the figure, the society moves leftward with the productivity growth.

When the status of the nation is very high (very low), all individuals always identify with the nation (their ethnic group). By contrast, when the status is neither very high nor very low, the realized equilibrium changes with the productivity growth. When the status is relatively high (low), the society shifts from the equilibrium in which sector $M$ workers identify with the nation....
and sector $TJ$ workers identify with their ethnic group to the equilibrium in which all identify with the nation (their ethnic group). That is, the social identity initially associated with modern (traditional) sector workers becomes the shared identity eventually, when the status is high (low). The growth of $A_M$ raises the modern sector income and induces the higher proportion of workers to choose the sector. As a result, modern sector workers become less attached to the national identity, i.e. the difference between their utility under the national identity and under the ethnic identity decreases, because the perceived distance of these workers under the ethnic identity falls more than the distance under the national identity. Urban modern sector workers, who used to find little affinity with most of their ethnic group in rural areas or the urban informal sector, feel closer to their group because they have more coethnics in occupation or lifestyle similar to themselves. By contrast, traditional sector workers become less attached to the ethnic identity, because the smaller proportion of their fellow group are in their sector. That is, the sectoral shift of labor associated with modernization shakes long-standing identities in both sectors. When the national status is high, the latter effect on traditional sector workers determines the equilibrium shift (because utilities under the national identity are relatively high and thus the "identity shock" to modern sector workers is less severe) and all become identified with the nation, while when the status is low, the former effect on modern sector workers determines the shift and all become identified with their ethnic group.

When $\eta_1 > 0$, that is, when the weight on ethnic attributes $\omega_e$ increases and the one on the national attribute $\omega_n$ of the perceived distance decreases with $F$, $F$ is lower in an equilibrium with

---

41 The perceived distance of modern sector workers falls under either identity, because the higher proportion of workers are in the sector. But the fall under the ethnic identity is greater, because changes in the average sectoral attributes are greater (see (17) and (23)).
the higher proportion of individuals identifying with the nation (Propositions 1 and 2). Unlike when \( \eta_1 = 0 \), multiple equilibria could exist for given parameters and exogenous variables, and two heterogenous identity equilibria in which workers in one of the sectors are divided over identities too could exist. Multiple equilibria could arise because of two-way positive causations between conflict and identity: when the level of conflict is high (low), people care about ethnicity more (less) in measuring the distance from social groups and thus they are more (less) likely to identify with their ethnic group, whereas when the proportion of those with the ethnic identity, who do not care about the distance from other ethnic groups, is high (low), the level of conflict is high (low). The two heterogenous identity equilibria could exist because the level of conflict depends on identity when \( \eta_1 > 0 \): workers in one of the sectors can be indifferent between the two identities, only if their identity choice affects \( f_i \) and \( F \) and thus utilities (the indifference conditions (31) and (34) do not hold when \( \eta_1 = 0 \) and thus \( F \) does not depend on identity).

Figure 2 illustrates how realized equilibria differ depending on \( S_N \) and \( L_{TJ} \) when \( \eta_1 > 0 \), based on Propositions A1 and A2 in Appendix A.\(^42\) The equilibrium in which all identify with the nation (their ethnic group) exists in the region above the upward-sloping solid curve (on or below the downward-sloping solid curve). The equilibrium in which sector \( M \) workers identify with the nation and sector \( TJ \) workers identify with their ethnic group exists in the region with triple-dashed double-dotted lines, the one in which sector \( M \) workers are divided over identities and sector \( TJ \) workers share the ethnic identity exists in the region with negatively-sloped lines, the figure is for the case when \( \omega_s \) is relatively high and \( \eta_1 \) is relatively low. Appendix A presents a figure when \( \omega_s \) is relatively low and \( \eta_1 \) is relatively high (Figure 5). Although relative positions of several curves are different, basic features of the figure are similar to this one.

\(^42\)
and the one in which sector TJ workers are divided over identities and sector M workers share the national identity exists in the region with positively-sloped lines.

Suppose, for example, that the society starts with the equilibrium in which sector M workers identify with the nation and sector TJ workers identify with their ethnic group. As long as it stays in this equilibrium, with the growth of $A_M$, $L_{TJ}$ and thus the proportion of individuals identifying with their ethnic group decrease, which leads to a fall in the level of conflict and increases in shares of the modern sector in employment and production, aggregate output and material payoff. Eventually, this equilibrium ceases to exist and the society shifts to a different equilibrium. If $S_N$ is relatively high (low), it shifts to the equilibrium in which all individuals identify with the nation (their ethnic group) and the level of conflict falls (rises), where the rise of $F$ when $S_N$ is low may be interpreted as a rise in non-violent conflict such as rent-seeking activities if the shift occurs at relatively low $L_{TJ}$, i.e. at a later stage of economic development. The sectoral shift and output growth continue, but, given the modern sector productivity $A_M$, $L_{TJ}$ is lower, and modern sector shares, output, and material payoff are higher in the equilibrium of universal national identity.

The figure shows that there are several regions in which multiple equilibria exist. Suppose, for example, that the society starts with the region in which the following three equilibria—the equilibrium in which sector M workers identify with the nation and sector TJ workers identify with their ethnic group, the one in which all identify with their ethnic group, and the one in which sector M workers are divided over identities (and sector TJ workers share the ethnic identity)—exist. Depending on which equilibrium happens to be realized initially, social identity, the level of conflict, sectoral composition, and aggregate output in subsequent periods differ; clearly the outcome is worst when the society starts with the equilibrium in which all identify with their ethnic group and is best at least temporarily when it starts with the equilibrium in which sector M (sector TJ) workers identify with the nation (their ethnic group).

3.3.2 Discussion

As mentioned in Introduction, there exist competing theses on effects of modernization on social identity in political science. The classic thesis, which is based on the past experience of Europe, argues that modernization leads to widespread national identity at the expense of ethnic and other subnational identities (Deutsch, 1953; Gellner, 1964, 1983; Weber, 1979), while another influential thesis (“second-generation” thesis) mainly focusing on Africa argues that modernization rather breeds ethnic identification (Melson and Wolpe, 1970; Bates, 1983).

The proposition shows that, when the status of the nation is relatively high (low), the society tends to shift from a heterogenous identity equilibrium to the one in which all individuals identify with the nation (their ethnic group) characterized by a low (high) level of conflict, relatively high (low) modern sector shares in employment and production, and high (low) aggregate output and material payoff. Thus, the result is consistent with the classic view when the status is relatively

---

43 The equilibrium shift changes $F$ discontinuously, while it changes $L_{TJ}$ continuously.
high, while it is consistent with the "second-generation" view when it is relatively low, as far as the relatively long term effect of modernization (the effect involving the equilibrium shift) is concerned.

Robinson (2014), using cross-sectional individual-level survey data of sixteen African nations, finds that GDP per capita is significantly and positively related to identifying with the nation above their ethnic group, after controlling for various individual-level (such as formal sector employment), group-level and country-level variables. She interprets the evidence as suggesting that modernization (higher GDP per capita) leads to national identity. The evidence may be regarded as capturing the relatively short term effect in an economy with a low degree of modernization, considering that it is based on cross-sectional data of mostly poor African nations. Indeed, the effect of an increase in $A_M$ under a given equilibrium is consistent with her interpretation, when $S_N$ is not at extremes and $L_{TJ}$ is sufficiently high that the society is in a heterogenous identity equilibrium, unless sector $TJ$ workers are divided over identities, in which case the effect is negative (see Figure 2). 44 The evidence can also be interpreted differently, however, and certain results of the model are consistent with the alternative interpretations. 45

The proposition also shows that multiple equilibria exist and the outcome depends on history or "luck" when the national status is not at extremes. As Sambanis and Shayo (2013) stress, this is consistent with the empirical finding that countries similar in ethnic diversity, geography, economic conditions, and political institutions have diverse histories regarding levels of ethnic conflict.

What are policy implications of the result that having sufficiently high national status is crucial in achieving the good outcome? The national status represents people’s evaluations of the nation’s international standing or reputation, particularly compared to neighboring nations, in "soft" dimensions such as culture, history, sports, and widely shared values (e.g. human rights and democracy) as well as in "hard" dimensions such as military strength and territory. Clearly, policies can affect some of them. Miguel (2004), Collier (2009), and Blouin and Mukand (2019), based on case study or statistical analysis, argue that nation-building policies, such as school education or government propaganda emphasizing common history, culture, and values and the promotion of a national language, are effective in strengthening national identity. Classic modernization theories of nationalism also stress the importance of the unification of language and the spread of common culture and values through school education and universal military service for widespread national

---

44In the equilibrium in which sector $TJ$ workers are divided over identities, $F$ increases with a decrease in $L_{TJ}$ from (34). Then, the number of those identifying with their ethnic group, $(1-P_{TJ,n})n_e L_{TJ}$, increases with a decrease in $L_{TJ}$ from (35).

45The evidence is partly consistent with the story that, for given modern sector productivity $A_M$, national identity and modernization are positively related through positive effects of the national status on these variables (Figure 2 and Proposition 3 (iii)). That is, when $S_N$ is higher, for given $A_M$, the society tends to be in an equilibrium with the higher proportion of individuals identifying with the nation and lower $L_{TJ}$ (thus the higher degree of modernization). Further, the evidence can partly be explained by multiple equilibria too, because national identity and modernization are positively related among different equilibria for given parameters and exogenous variables (Propositions 1 and 2). In order to distinguish the different stories empirically, it would be important to estimate regression models with enough control variables (including measures capturing the national status and the modern sector productivity) using longitudinal data, although such data is not available presently. Analysis using longitudinal data is also called for examining empirically the relatively long term effect of modernization, on which this paper and the above-cited studies in political science focus.
identity, drawing on the experience of Europe.

According to the model, these nation-building policies can be interpreted as policies raising the national status \( S_N \).\(^{46}\) The model shows how they can reinforce national identity and brings the good outcome in conflict and development. The result suggests that they are critical for the good outcome in countries where the status is low because of the lack of shared culture, history, and values, such as many African nations. In such countries, partly due to low national status, people stick to their ethnic identity, ethnic conflict is frequent, and, for given modern sector productivity, the degree of modernization and output are low. Without nation-building policies, policies promoting modernization (policies raising \( A_M \)) have negative effects on national identity and ethnic conflict. By contrast, the result suggests that, in countries with high national status, policies promoting modernization, such as policies stimulating the technological progress of the modern sector, the reform of institutions supporting the sector’s economic activities, and the construction of transportation infrastructure connecting rural areas to urban areas, might be enough for the good outcome.\(^{47}\)

Alternatively, some of nation-building policies such as the promotion of a national language may be interpreted as policies making shared nationality more salient and ethnic differences less salient, i.e. raising \( \omega_n \) and reducing \( \omega_e \) in the perceived distance. Indeed, the following proposition shows that a decrease in \( \eta_0 \) that raises \( \omega_n \) and lowers \( \omega_e \) has similar effects to an increase in \( S_N \).

**Proposition 4** Suppose that \( A_M \) increases over time. Then, results similar to Proposition 3 hold for \( \eta_0 \) when "high (low) \( S_N \)" is replaced with "low (high) \( \eta_0 \)". Specifically, when \( \eta_0 \) is low (high), the society tends to shift from a heterogenous identity equilibrium to the one in which all individuals identify with the nation (their ethnic group), given other things equal.

Graphically, this result holds because all the dividing lines of Figure 2 shift downward when \( \eta_0 \) decreases.

The importance of nation-building policies on social identity seems to be supported empirically. Miguel (2004) bases the above-mentioned argument on findings from the comparison of Tanzania and Kenya, which largely shared geography, history, and colonial institutional legacy, but conducted sharply different ethnic policies after independence in areas such as national language and public school education and exhibit large differences in the strength of national identity. Clots-Figueras and Masella (2013) examine effects of the introduction of a bilingual (Catalan and Spanish) education system in Catalonia and find that the number of years exposed to the bilingual system is positively related to the strength of Catalan identity and the propensity to vote for a party with a Catalanist platform. Blouin and Mukand (2019), based on field and lab experiments in postgenocide Rwanda, find that ethnicity is less salient in regions exposed more to government radio propaganda intended to change interethnic attitudes.

\(^{46}\)Alesina, Giuliano, and Reich (2018), by contrast, model nation-building policy as the policy of homogenizing the cost of the preference distance from the government of individuals heterogenous in preferences.

\(^{47}\)The effect of transportation infrastructure can be examined in the slightly modified model in which earnings in the traditional sector are lower than earnings in the modern sector partly due to the presence of the cost of moving from the former sector to the latter. Improved infrastructure lowers the moving cost and stimulates modernization.
3.4 Effects of contested resources

Finally, effects of the amount of contested resources are examined. Specifically, how does it affect the level of conflict and how does it influence the effects of the productivity growth on identity, conflict, and development?

**Proposition 5**

(i) The level of conflict $F$ increases with resources $V$ in all equilibria.

(ii) Suppose that the TFP of sector $M$, $A_M$, increases over time. Then, results similar to Proposition 3 hold for $V$ when "low (high) $S_N$" is replaced with "large (small) $V$". Specifically, when $V$ is large (small), the society tends to shift from a heterogenous identity equilibrium to the one in which all individuals identify with their ethnic group (the nation).

The first result, which is consistent with empirical studies on armed internal conflict such as Collier and Hoeffler (2004) is standard and intuitive: as the amount of contested resources increases, people contribute more to conflict and thus the conflict level increases.

The second result states that similar results to Proposition 3 hold when "low (high) $S_N$" of the proposition is replaced with "large (small) $V$". Specifically, given the national status, when the amount of contested resources is large (small), the society tends to shift from a heterogenous identity equilibrium to the equilibrium in which all individuals identify with their ethnic group (the nation) with increased modern sector productivity. That is, the abundance of contested resources is an impediment for the society to achieve universal national identity, a low level of conflict, high modern sector shares, and high output. Note that contested resources represent both material resources (such as natural resources) and a part of the governmental budget for group-specific club goods, whose allocation over the groups is determined not by rule but by the consequences of violent or non-violent conflict (such as rent-seeking activities). Hence, the result suggests that not only the abundance of material resources per se but also the lack of strong political and economic institutions (such as weak rule of law), which raises the amount of contested resources, are hindrances to the desirable outcome. The result is consistent with the classic thesis on effects of modernization on social identity if resources are not abundant or institutions are good in quality, otherwise consistent with the competing thesis, as far as the relatively long term effect of modernization is concerned.

Graphically, the result holds because all the dividing lines of Figure 2 shift upward when $V$ increases. When the amount of contested resources increases, the level of conflict rises in all equilibria and thus people care about ethnicity more, i.e. $\omega_e$ increases, (nationality less, i.e. $\omega_n$ decreases) in measuring perceived distances from social groups. Given the national status, this makes identifying with their ethnic group relatively more attractive compared to identifying with the nation.

Consistent with the result, Mehlum, Moene, and Torvik (2006) find negative effects of natural resources on economic development when institutions are weak. Empirical works also suggest that political and economic institutions have important effects on civil conflict (Renyal-Querol, 2002), rent-seeking activities (Easterly, 2001), and development (Rodrik, Subramanian, and Trebbi, 2004).
The above result reveals a novel mechanism interacting with social identity that resources and institutions affect ethnic conflict and development.

In the real society, modernization often increases the amount of contested resources, such as public-sector jobs, approvals and licenses for regulated business activities, and budgets for local schools and infrastructures, when political and economic institutions are weak. The above result implies that, as "second-generation" modernization theories of nationalism (Melson and Wolpe, 1970; Bates, 1983) argue, modernization has, through the increased contested resources, negative effects on national identity, ethnic conflict, and development in a society with low institutional quality. The result in Section 3.3, however, shows that, even when contested resources do not increase with modernization, modernization could lead to negative outcomes in a society with low institutional quality, low national status, or people who care much about ethnic differences.

4 Conclusion

Empirical evidence suggests that ethnic divisions or diversity in a society leads to negative outcomes in various dimensions, including civil conflict and economic development. It is often argued that the lack of shared social identity, that is, the dominance of subnational (particularly, ethnic) identities over national identity, lies behind the negative outcomes in ethnically heterogeneous societies. If shared national identity is important, how can it be realized? In political science, there exist conflicting theses emphasizing effects of modernization on national identity, the classic thesis claiming the positive effect and the competing one claiming the negative effect. Which thesis is more relevant under what conditions? How does modernization affect identity, conflict, and output? How do nation-building policies, such as school education or government propaganda emphasizing common history, culture, and values and the promotion of a national language, affect the outcomes?

In order to examine these questions theoretically, this paper has developed a model of social identity, ethnic conflict, and development. In the model, individuals choose a sector to work (between the modern sector and a traditional sector), social identity (between ethnic identity and national identity), and contributions to conflict. The degree of modernization (and output), identity, and conflict interact with each other in the model.

It has been found that a society with higher national status, less contested resources, better institutions, or people who care less about ethnic differences tends to be in an equilibrium with the higher proportion of people identifying with the nation, the lower level of conflict, higher modern sector shares in employment and production (higher degree of modernization), and higher output. Simple dynamic analysis has shown that, as modernization proceeds, a society tends to shift to an equilibrium with uniformly national identity and good outcomes in conflict and development, if the status is high, the resources are not abundant, institutions are good in quality, or ethnic differences are not salient; otherwise, it tends to shift to an equilibrium with uniformly ethnic identity and the worse outcomes in other dimensions. Hence, the model is consistent with the classic (competing) thesis on effects of modernization on identity under the former (latter) situation. The
result suggests that, under the latter situation, policies improving institutional quality, raising the national status, or making shared nationality more salient are crucial for the good outcomes. The model shows how nation-building policies, which may be interpreted as policies raising the national status or making shared nationality more salient, can reinforce national identity and bring better outcomes. The model also has revealed a novel mechanism interacting with identity that resources and institutions affect conflict and development.

References


Appendix A Existence conditions of equilibria

This Appendix presents precise conditions (combinations of parameters and exogenous variables) under which each equilibrium exists. The propositions in this Appendix are the basis for Propositions 3–5 and Figures 1 and 2 in Section 3.

A.1 Homogenous identity equilibria

The next proposition presents the existence conditions for the two homogenous identity equilibria. In the proposition, $\beta \Delta d^2[F,c_s] \equiv \beta \left[ \theta_0 + \eta_1 F \frac{n_{c_s} - 1}{n_{c_s}} + c_s \omega \right]$ ($c_s$ is a coefficient on $\omega_s$), $\Delta c(F) \equiv \frac{1}{\beta} \left( \frac{n_{c_s} - 1}{n_{c_s}} \right)^{\sigma-1} \left[ \left( \frac{\beta L^2}{\beta \omega} \right)^{\sigma-1} - \left( \frac{\beta L^2}{\beta \omega - \beta \eta_1} \right)^{\sigma-1} \right]$.  

Proposition A1 (i) The equilibrium in which all individuals identify with their ethnic group exists for any $L_{TJ}$ when $\gamma S_N \leq \beta \Delta d^2 \left[ F^*_e, -\frac{n_{c_s} - 1}{n_{c_s}} \right] - \Delta c(F^*_e)$, and for $L_{TJ} \in [0, (L_{TJ})]$ when $\gamma S_N \in \left( \beta \Delta d^2 \left[ F^*_e, -\frac{n_{c_s} - 1}{n_{c_s}} \right] - \Delta c(F^*_e), \beta \Delta d^2 [F^*_e, 0] - \Delta c(F^*_e) \right)$, where $L_{TJ} = (L_{TJ})$ is the solution for (22) and $(L_{TJ})$ is the one for $\beta \Delta d^2 \left[ F^*_e, -n_c(n_c - 1) \left( \frac{(L_{TJ})^{\sigma-1}}{N} \right)^{\gamma S_N} \right] - \Delta c(F^*_e) = \gamma S_N$.

(ii) The equilibrium in which all identify with the nation exists for any $L_{TJ}$ when $\gamma S_N > \beta \Delta d^2 \left[ F^*_n, \frac{n_{c_s} - 1}{n_{c_s}} \right] - \Delta c(F^*_n)$, and for $L_{TJ} \in [0, (L_{TJ})]$ when $\gamma S_N \in \left( \beta \Delta d^2 [F^*_n, 0] - \Delta c(F^*_n), \beta \Delta d^2 \left[ F^*_n, \frac{n_{c_s} - 1}{n_{c_s}} \right] - \Delta c(F^*_n) \right)$, where $L_{TJ} = (L_{TJ})$ is the solution for (27) and $(L_{TJ})$ is the one for $\beta \Delta d^2 \left[ F^*_n, (n_c - 1) \left( \frac{(L_{TJ})^{\sigma-1}}{N} \right)^{\gamma S_N} \right] - \Delta c(F^*_n) = \gamma S_N$. 


A.2 Heterogenous identity equilibria

The next proposition presents the existence conditions for the heterogenous identity equilibria. Note that both equilibria exist in the region with slant lines. Given $L_{TJ}$, the former (latter) equilibrium tends to exist when $S_N$ is high (low), and given $S_N$, the equilibria tend to exist when $L_{TJ}$ is low, where $L_{TJ}$ is determined by the indifference condition for sectoral choices of the corresponding equilibrium. Note that both equilibria exist in the region with slant lines.

**Proposition A2**

(i) The equilibrium in which sector $TJ$ workers identify with their ethnic group and sector $M$ workers identify with the nation exists iff

$$
\gamma S_N \leq \beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) < \gamma S_N < 
$$

(ii) The equilibrium in which sector $M$ workers are divided over identities and sector $TJ$ workers identify with their ethnic group exists iff

$$
\beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) < \gamma S_N < 
$$

To be more detailed, the equilibrium exists for $L_{TJ} \in \left[(L_{TJ})^2, \frac{N}{n_e}\right]$ when

$$
\gamma S_N \in \left\{ \max_{L_{TJ}} \left\{ \beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) \right\}, \beta \Delta d^2 \left[F_d, \frac{n_e - 1}{n_e}\right] - \Delta c(F_d) \right\} \right. \quad \text{and for } L_{TJ} \geq \max\{(L_{TJ})^2, 0\} \text{ satisfying } \beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) < \gamma S_N \text{ when } \gamma S_N \in 
$$

$$
\left\{ \min_{L_{TJ}} \left\{ \beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) \right\}, \max_{L_{TJ}} \left\{ \beta \Delta d^2 \left[F_d(L_{TJ}), -(n_e - 1)n_e \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_d(L_{TJ})) \right\} \right\}.
$$
The equilibrium in which sector $TJ$ workers are divided over identities and sector $M$ workers identify with the nation exists for $L_{TM} \in (L_{TM})^t, (L_{TM})^s$ when $\gamma S_N \in (\beta \Delta d^2[F^*_{n}, 0] - \Delta c(F^*_{n}), \beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n})$, and for $L_{TM} \in (L_{TM})^s, \frac{N}{\nu_e}$ when $\gamma S_N \in (\beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n}), \beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n})$, where $L_{TM} = (L_{TM})^t$ is the solution for (27), $(L_{TM})^t$ is the one for $\beta \Delta d^2[F_d((L_{TM})^t), (n_e-1)\frac{(L_{TM})^t}{N} - \Delta c(F_d((L_{TM})^t))] = \gamma S_N$, and $(L_{TM})^s$ is the one for $\beta \Delta d^2[F_d,(n_e-1)\frac{(L_{TM})^s}{N} - \Delta c(F_d)] = \gamma S_N$.

Based on the proposition, Figure 4 illustrates combinations of $L_{TM}$ and $S_N$ under which each equilibrium including the homogenous identity equilibria exists when $\omega_e$ (the weight on sectoral attributes in the perceived distance) is relatively high and $\eta_1$ (the strength of the effect of $F$ on the weights on ethnic and national attributes) is relatively low. The equilibrium in which sector $TJ$ workers identify with their ethnic group and sector $M$ workers identify with the nation exists in

\[ \beta \Delta d^2[F^*_{e}, -n_e(n_e-1)\left(\frac{L_{TM}}{N}\right)^2] - \Delta c(F^*_{e}), \text{ where } L_{TM} = (L_{TM})^t \text{ is the solution for (22).}^{39} \]

(iii) The equilibrium in which sector $TJ$ workers are divided over identities and sector $M$ workers identify with the nation exists for $L_{TM} \in (L_{TM})^t, (L_{TM})^s$ when $\gamma S_N \in (\beta \Delta d^2[F^*_{n}, 0] - \Delta c(F^*_{n}), \beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n})$, and for $L_{TM} \in (L_{TM})^s, \frac{N}{\nu_e}$ when $\gamma S_N \in (\beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n}), \beta \Delta d^2[F^*_{n}, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_{n})$, where $L_{TM} = (L_{TM})^t$ is the solution for (27), $(L_{TM})^t$ is the one for $\beta \Delta d^2[F_d((L_{TM})^t), (n_e-1)\frac{(L_{TM})^t}{N} - \Delta c(F_d((L_{TM})^t))] = \gamma S_N$, and $(L_{TM})^s$ is the one for $\beta \Delta d^2[F_d,(n_e-1)\frac{(L_{TM})^s}{N} - \Delta c(F_d)] = \gamma S_N$.

Based on the proposition, Figure 4 illustrates combinations of $L_{TM}$ and $S_N$ under which each equilibrium including the homogenous identity equilibria exists when $\omega_e$ (the weight on sectoral attributes in the perceived distance) is relatively high and $\eta_1$ (the strength of the effect of $F$ on the weights on ethnic and national attributes) is relatively low. The equilibrium in which sector $TJ$ workers identify with their ethnic group and sector $M$ workers identify with the nation exists in $\gamma S_N \in \max_{L_{TM}} \left\{ \beta \Delta d^2[F_d(L_{TM}), -n_e(n_e-1)\frac{(L_{TM})^2}{N}] - \Delta c(F_d(L_{TM})) \right\}$ and for $L_{TM} < \min\{(L_{TM})^{t1}, \frac{N}{n_e} \}$ satisfying $\beta \Delta d^2[F_d(L_{TM}), -n_e(n_e-1)\frac{(L_{TM})^2}{N}] - \Delta c(F_d(L_{TM})) = \gamma S_N$ when $\gamma S_N \in \left\{ \min_{L_{TM}} \left\{ \beta \Delta d^2[F^*_n, 0] - \Delta c(F^*_n), \beta \Delta d^2[F^*_n, -\frac{n_e-1}{n_e}] - \Delta c(F^*_n) \right\}, \max_{L_{TM}} \left\{ \beta \Delta d^2[F_d(L_{TM}), -n_e(n_e-1)\frac{(L_{TM})^2}{N}] - \Delta c(F_d(L_{TM})) \right\} \right\}$, where $(L_{TM})^{t1}$ is $L_{TM}$ satisfying $\beta \Delta d^2[F^*_e, -n_e(n_e-1)\frac{(L_{TM})^2}{N}] - \Delta c(F^*_e) = \gamma S_N$.

To be more accurate, this is the case when $\beta \Delta d^2[F^*_n, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_n) > \beta \Delta d^2[F^*_n, 0] - \Delta c(F^*_n)$ holds, where $\beta \Delta d^2[F^*_n, \frac{\nu_e-1}{\nu_e}] - \Delta c(F^*_n)$ is the value of $\gamma S_N$ at the intersection of the upward-sloping
the region with triple-dashed double-dotted lines (the lower borderline is not included), the one in which sector $M$ workers are divided over identities and sector $TJ$ workers identify with their ethnic group exists in the region with negatively-sloped lines (both borderlines are not included), and the one in which sector $TJ$ workers are divided over identities and sector $M$ workers identify with the nation exists in the region with positively-sloped lines (both borderlines are not included). As in Figure 3, the equilibrium in which all identify with the nation (their ethnic group) exists in the region above the upward-sloping solid curve (on or below the downward-sloping solid curve).

Given $L_{TJ}$ (which is determined by the indifference condition for sectoral choices of the corresponding equilibrium), the heterogeneous identity equilibria tend to exist when $S_N$ is neither very high nor very low, and given $S_N$, the equilibrium in which sector $TJ$ workers identify with their ethnic group and sector $M$ workers identify with the nation tends to exist when $L_{TJ}$ is large. Note that there are several regions in which multiple equilibria exist. In particular, the two equilibria in which workers in one of the sectors are divided over identities exist only in such regions. All five equilibria exist in the small triangular region on the left side of the figure.

Figure 5 illustrates combinations of $L_{TJ}$ and $S_N$ under which each equilibrium exists when $\omega_s$ is relatively low and $\eta_1$ is relatively high. Unlike Figure 4, the value of $S_N$ at the intersection of the downward-sloping solid curve with $L_{TJ} = 0$ is greater than the one at the intersection of the upward-sloping solid curve with $L_{TJ} = \frac{N}{n_e}$, and the value of $S_N$ at the intersection of the bottom dotted curve with $L_{TJ} = 0$ is smaller than the one at the intersection of the curve with $L_{TJ} = \frac{N}{n_e}$. However, basic features of the figure are similar to the previous one.

$S_N$ is the value of $\gamma S_N$ at the intersection of the bottom dotted curve with $L_{TJ} = \frac{N}{n_e}$, which is the value of $\gamma S_N$ at the intersection of the bottom dotted curve with $L_{TJ} = \frac{N}{n_e}$. The LHS of the last inequality increases with $\omega_s$, while the RHS can be shown to increase with $\eta_1$. The (downward-sloping) solid curve with $L_{TJ} = \frac{N}{n_e}$ ($L_{TJ} = 0$), and $\beta \Delta d^2[F^*_e, 0] - \Delta c(F^*_e)$ ($\beta \Delta d^2[F^*_e, \frac{N-n_e}{ne}] - \Delta c(F^*_e)$) is the value of $\gamma S_N$ at the intersection of the bottom dotted curve with $L_{TJ} = 0$ ($L_{TJ} = \frac{N}{n_e}$). The LHS of the last inequality increases with $\omega_s$, while the RHS can be shown to increase with $\eta_1$. The
Appendix B  Proofs (Possibly not for publication)

Proof of the uniqueness of \((L_{TJ})_T^*\). The derivative of the LHS of (29) with respect to \(L_{TJ}\) equals

\[-(1-\alpha)AT(L_{TJ})^{\alpha-2}+2\beta\omega_s \frac{n_e}{N} \left[1-(n_e-1)\frac{LTJ}{N}\right] + \frac{n_e-1}{n_e} \left\{ \beta \eta_1 + \frac{1}{\eta-1} \delta \frac{V}{(F_d(L_{TJ}))^2} \left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} \left[ \left( \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{\eta-1}} - \left( \frac{V}{F_d(L_{TJ})} - \beta \eta_1 \right)^{\frac{1}{\eta-1}} \right] \right\} F_d'(L_{TJ}), \tag{36}\]

where, from (28),

\[F_d'(L_{TJ}) = \frac{\left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} \left[ \left( \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{\eta-1}} - \left( \frac{V}{F_d(L_{TJ})} - \beta \eta_1 \right)^{\frac{1}{\eta-1}} \right] n_e}{1 + \frac{1}{\eta-1} \delta \frac{V}{(F_d(L_{TJ}))^2} \left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} \left( \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{\eta-1}} - \left( \frac{V}{F_d(L_{TJ})} - \beta \eta_1 \right)^{\frac{1}{\eta-1}} (N-n_e L_{TJ})} > 0. \tag{37}\]

The second derivative of the LHS of (29) with respect to \(L_{TJ}\) equals

\[(2-\alpha)(1-\alpha)AT(L_{TJ})^{\alpha-3} - 2\beta\omega_s \frac{n_e(n_e-1)}{N} + d \left( \frac{n_e-1}{n_e} \right) \left\{ \beta \eta_1 + \frac{1}{\eta-1} \delta \frac{V}{(F_d(L_{TJ}))^2} \left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} \left[ \left( \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{\eta-1}} - \left( \frac{V}{F_d(L_{TJ})} - \beta \eta_1 \right)^{\frac{1}{\eta-1}} \right] \right\} F_d'(L_{TJ}) \right\} \frac{dL_{TJ}}{dL_{TJ}}. \tag{38}\]

Since, as shown in the proof of Proposition 2 (iii), the LHS of (29) is always lower than that of (22), \((L_{TJ})_T^* < (L_{TJ})_T^d\) holds. Thus, the derivative of the LHS of (22) for \(L_{TJ} \leq (L_{TJ})_T^d\) is negative, that is, \(-(1-\alpha)AT(L_{TJ})^{\alpha-2}+2\beta\omega_s \frac{n_e}{N} < 0\). From this inequality, the first part of (38) is positive for \(L_{TJ} < (L_{TJ})_T^d\), since it is greater than \((1-\alpha)AT(L_{TJ})^{\alpha-3} \left[ (2-\alpha) - L_{TJ} \frac{n_e-1}{N} \right] > 0\).

The second part of (38) is positive at \(L_{TJ} \leq (L_{TJ})_T^*\) when \(\theta = 2\), since the second part of (36) equals

\[\frac{n_e-1}{n_e} \beta \eta_1 \left[ 1 + \frac{\delta V}{(F_d(L_{TJ}))^2} \left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} \right] \frac{n_e-1}{n_e} \beta \eta_1 \frac{n_e}{1 + \frac{\delta V}{(F_d(L_{TJ}))^2} \left( \frac{n_e-1}{n_e} \right)^{\frac{1}{\eta-1}} N}, \tag{39}\]

which clearly increases with \(L_{TJ}\). Hence, the second derivative of the LHS of (29) is positive for \(L_{TJ} < (L_{TJ})_T^d\) and thus \((L_{TJ})_T^*\) is unique when \(\theta = 2\) (remember that the LHS of (29) is always lower than that of (22) whose solution is unique \((L_{TJ})_T^d\)).

Proof of Proposition 1. (i) Evident from (20) and (26). (ii) Shown in footnotes 27 and 28.

(iii) Denote total output of the private good in the equilibrium in which all individuals identify with the nation (their ethnic group) by \(Y_n^* (Y_e^*)\). From (1) and (2),

\[Y_n^* > Y_e^* \iff AT((L_{TJ})_n^*)^\alpha - A_M(L_{TJ})_n^* > AT((L_{TJ})_e^*)^\alpha - A_M(L_{TJ})_e^*. \tag{40}\]

The derivative of \(AT((L_{TJ})^\alpha - A_M(L_{TJ})\) with respect to \(L_{TJ}\) equals \(\alpha A_T(L_{TJ})^{\alpha-1} - A_M\), which decreases with \(L_{TJ}\). Thus, since \((L_{TJ})_n^* > (L_{TJ})_n^d\), the above condition holds if \(\alpha A_T(L_{TJ})^{\alpha-1} - A_M \leq 0 \iff (L_{TJ})_n^* \geq \left( \frac{\alpha A_T}{A_M} \right)^{1/\alpha - 1}\). Because \((L_{TJ})_n^*\) is the solution to (27), the condition holds if

\[\frac{A_M}{\alpha} - \beta\omega_s \left[ 1 - \frac{2}{N} \left( \frac{\alpha A_T}{A_M} \right)^{1/\alpha} \right] > A_M. \tag{41}\]
Hence, $Y_n^* > Y_e^*$ is true when $\beta$ is not very large so that the inequality holds.

The derivative of the LHS of the above inequality with respect to $\alpha$ equals

$$-rac{\Delta M}{\alpha^2} + \beta \omega_s \frac{2}{\mathcal{N}} \left( \frac{\ln(\Delta M)}{1-\alpha} + 1\right) \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right)^{\frac{1}{1-\alpha}}$$

and the second derivative equals

$$2 \frac{\Delta M}{\alpha^2} + \beta \omega_s \frac{2}{\mathcal{N}} \left( \frac{\ln(\Delta M)}{1-\alpha} + 1\right) \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right)^{\frac{1}{1-\alpha}}$$

From the equation, when

$$\frac{\ln(\Delta M)}{1-\alpha} + 1 \leq \frac{1}{2(1-\alpha)} \ln \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right) + \frac{1}{1-\alpha} \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right)^{\frac{1}{1-\alpha}}$$

we have

$$2 \frac{\Delta M}{\alpha^2} + \beta \omega_s \frac{2}{\mathcal{N}} \left( \frac{\ln(\Delta M)}{1-\alpha} + 1\right) \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right)^{\frac{1}{1-\alpha}}$$

equal to

$$2 \frac{\Delta M}{\alpha^2} + \beta \omega_s \frac{2}{\mathcal{N}} \left( \frac{\ln(\Delta M)}{1-\alpha} + 1\right) \left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right)^{\frac{1}{1-\alpha}}$$

(43)

from $\left( \frac{\ln(\Delta M)}{1-\alpha} + 1 \right) > 1$.

Because (41) holds as $\alpha \to 0$, does not hold as $\alpha \to 1$, and the first derivative of the LHS of the equation is $-\infty$ as $\alpha \to 0$, and it increases as $\alpha$ goes up, there exists a $\alpha < (0,1)$, which depends on exogenous variables and parameters, below which $(L_{TJ})_{n}^* \geq \left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}}$ and thus $Y_n^* > Y_e^*$ hold.

By contrast, $Y_n^* < Y_e^*$ holds when $(L_{TJ})_{e}^* \leq \left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}}$, which is always true if $\left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}} > \frac{\mathcal{N}}{n_e}$. Otherwise,

$$(L_{TJ})_{e}^* \leq \left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}} \iff \frac{\Delta M \alpha}{\alpha - \beta \omega_s \left[1 - 2n_e \left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}}\right]} \leq \alpha M_{TJ}$$

(44)

From the equation, when $\beta$ is large enough, $(L_{TJ})_{e}^* \leq \left(\frac{\ln(\Delta M)}{1-\alpha}\right)^{\frac{1}{1-\alpha}}$ and thus $Y_n^* > Y_e^*$ hold. Also, from a similar reasoning as above, there exists a $\alpha \in (0,1)$ above which $Y_n^* < Y_e^*$ hold. **Proof of Proposition 2.** (i) $F_n^* < F_{Td}^*$ is from (26) and (32), $F_{Md}^* < F_{e}^*$ is from (20) and (35), and $F_{Td}^* < F_{d}^*$ is from (28), (32), and (35) and $(L_{TJ})_{Td}^* < (L_{TJ})_{d}^*$ is shown in (ii).

(ii) $(L_{TJ})_{Td}^* = (L_{TJ})_{n}^*$ and $(L_{TJ})_{Md}^* = (L_{TJ})_{e}^*$ are shown in Sections 3.2.2 and 3.2.3. As shown in footnote 27, the LHS of (22), the indifference condition whose solution is $(L_{TJ})_{e}^*$, decreases with $L_{TJ}$ for $L_{TJ} \leq (L_{TJ})_{e}^*$.

Hence, $(L_{TJ})_{d}^* < (L_{TJ})_{e}^*$ holds, if the LHS of (29), the indifference condition whose solution is $(L_{TJ})_{d}^*$, is smaller than that of (22) at $L_{TJ} = (L_{TJ})_{d}^*$, which is true because

$$\beta \left\{ \theta_0 + \eta_1 F_d(L_{TJ}) \left[ n_e - 1 \right] \omega_s \left[ 1 - \frac{L_{TJ}}{\mathcal{N}} \right] \right\}$$

$$- \frac{1}{\theta} \left( \frac{n_e - 1}{n_e} \right) \left[ \left( \frac{\theta}{\theta - 1} \right) \left( \frac{\theta}{\theta - 1} \right) \right] - \frac{1}{\theta} \left( \frac{n_e - 1}{n_e} \right) \left[ \left( \frac{\theta}{\theta - 1} \right) \left( \frac{\theta}{\theta - 1} \right) \right] - \gamma S_N \leq - \beta \omega_s \left[ 1 - 2n_e \frac{L_{TJ}}{\mathcal{N}} \right]$$

(45)

$$\Rightarrow \beta \left\{ \theta_0 + \eta_1 F_d(L_{TJ}) \left[ n_e - 1 \right] \omega_s \left[ 1 - \frac{L_{TJ}}{\mathcal{N}} \right] \right\} - \frac{1}{\theta} \left( \frac{n_e - 1}{n_e} \right) \left[ \left( \frac{\theta}{\theta - 1} \right) \left( \frac{\theta}{\theta - 1} \right) \right] - \gamma S_N \leq - \beta \omega_s \left[ 1 - 2n_e \frac{L_{TJ}}{\mathcal{N}} \right]$$

(46)

where the inequality holds from (79) in the proof of Proposition A2.

As shown in footnote 28, the shape of the LHS of (27), the indifference condition whose solution is $(L_{TJ})_{d}^*$, is similar to that of (22). Hence, $(L_{TJ})_{d}^* > (L_{TJ})_{d}^*$ holds if the LHS of (29) is greater than that of (27) at $L_{TJ} = (L_{TJ})_{d}^*$, which is true because
\[
\beta \left\{ (\eta_0 + \eta_1 F_d(L_{TJ})) \frac{n_e - 1}{n_e} + \omega_s \left[ a_n \left( \frac{L_{TJ}}{N} \right)^2 - (1 - n_e \frac{L_{TJ}}{N}) \right] \right\}
- \frac{1}{4} \left( \frac{n_e - 1}{n_e} \right)^{\frac{\theta}{2}} \left[ \left( \frac{\delta \left( \frac{L_{TJ}}{N} \right)}{\delta \left( \frac{L_{TJ}}{N} \right)} - \beta \eta_1 \right) \right] - \gamma S_N \geq -2 \omega_s \left( 1 - 2 \frac{L_{TJ}}{N} \right)
\]
\[
\Leftrightarrow \beta \left\{ (\eta_0 + \eta_1 F_d(L_{TJ})) \frac{n_e - 1}{n_e} + \omega_s \left[ a_n \left( \frac{L_{TJ}}{N} \right)^2 - (1 - n_e \frac{L_{TJ}}{N}) \right] \right\}
- \frac{1}{4} \left( \frac{n_e - 1}{n_e} \right)^{\frac{\theta}{2}} \left[ \left( \frac{\delta \left( \frac{L_{TJ}}{N} \right)}{\delta \left( \frac{L_{TJ}}{N} \right)} - \beta \eta_1 \right) \right] \geq \gamma S_N.
\]

where the inequality holds from (80) in the proof of Proposition A2.

(iii) Denote total output of the private good in the equilibrium in which those in sector \( M \) (sectors \( TJ \)) identify with the nation and their ethnic group by \( Y^*_d \). From (1) and (2), \( Y^*_n > Y^*_d > Y^*_e \) \( \Leftrightarrow A_T((L_{TJ})^n) - A_M(L_{TJ})^n > A_T((L_{TJ})^d) - A_M(L_{TJ})^d > A_T((L_{TJ})^e) - A_M(L_{TJ})^e \). Because \((L_{TJ})^n < (L_{TJ})^d < (L_{TJ})^e\), if \( \beta \) is not very large so that (41) in the proof of Proposition 1 (iii) holds, \( A_T((L_{TJ})^n) - A_M(L_{TJ})^n \) decreases with \( L_{TJ} \) for \( L_{TJ} \geq (L_{TJ})^n \) and thus \( Y^*_n > Y^*_d > Y^*_e \) is true. If \( \beta \) is large enough that (44) in the proof of the proposition holds, \( A_T((L_{TJ})^d) - A_M(L_{TJ})^d \) increases with \( L_{TJ} \) for \( L_{TJ} \leq (L_{TJ})^d \) and thus \( Y^*_n < Y^*_d < Y^*_e \) is true. As for the relationship between \( \alpha \) and the magnitude relation of \( Y^*_e \) and \( Y^*_n \) or \( Y^*_d \), the corresponding proof of Proposition 1 applies since \((L_{TJ})^n > (L_{TJ})^d > (L_{TJ})^e\) holds. \( Y^*_T = Y^*_n \) and \( Y^*_M = Y^*_e \) are evident from \((L_{TJ})^n = (L_{TJ})^d \) and \((L_{TJ})^e = (L_{TJ})^e\).

(iv) The total cost of conflict is \((N_n + N_e) \) are respectively numbers of those identifying with the nation and their ethnic group. A \( \frac{1}{2} \left[ (f_{i,n})^\theta N_n + (f_{i,e})^\theta N_e \right] \) \( = \frac{1}{2} \left[ (f_{i,n})^\theta + (f_{i,e})^\theta \right] \) \( = \frac{1}{2} \left( \frac{n_e - 1}{n_e} \right) \) \( \delta \left( \frac{L_{TJ}}{N} \right) \) \( f_{i,n} N_n + \delta \left( \frac{L_{TJ}}{N} \right) \) \( f_{i,e} N_e \) \( = \frac{1}{2} \left( \frac{n_e - 1}{n_e} \right) \) \( \delta V \) \( + \beta \eta_1 f_{i,n} N_n \), where the second equality is from the first order conditions of utility maximization and \( F_{-i} = \frac{n_e - 1}{n_e} F \). The total cost decreases with \( N_n \) since \( f_{i,n} \) increases with \( N_n \) from (24) and Proposition 2. From this result and (iii), aggregate material payoff increases with \( N_n \) unless \( \alpha \) or \( \beta \) is very high.

Proof of Proposition 4. It is enough to prove that the terms on the opposite side of \( \gamma S_N \) of all equilibrium conditions—the LHSs of (64) and (75) in the proof of Proposition A1 and of (79) and (80) in the proof of Proposition A2— increase with \( \eta_0 \) (that is, all dividing lines in Figure 2 shift upward with an increase in \( \eta_0 \)). As for the homogeneous identity equilibria, since \( F \) is independent of \( \eta_0 \), the result is straightforward from (64) and (75). As for the equilibrium in which those in sector \( T \) identify with their ethnic group and those in sector \( M \) identify with the nation, since \( F \) is independent of \( \eta_0 \) for given \( L_{TJ} \) from (28), the result is straightforward from (79) and (80). (Each term of the conditions of the remaining equilibria are same as one of these terms.)

Proof of Proposition 5. (i) Straightforward from the equation determining \( F \) of each equilibrium, (20), (26), (28), (29), (31), and (34).

(ii) It is enough to prove that the terms on the opposite side of \( \gamma S_N \) of all equilibrium conditions—the LHSs of (64) and (75) in the proof of Proposition A1 and of (79) and (80) in the proof of Proposition A2— increase with \( V \).

[The equilibrium in which all identify with their ethnic group] The derivative of the LHS of
\[ \frac{1}{\vartheta} (V)^{-1} \left\{ \beta \eta_1 \frac{n_e - 1}{n_e} F_e^* - \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left[ \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} - \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} \right] \delta V \right\} \]

\[ > \frac{1}{\vartheta} (V)^{-1} \left\{ \beta \eta_1 \frac{n_e - 1}{n_e} F_e^* - \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{\beta}{\vartheta}} \right\} = \frac{1}{\vartheta} (V)^{-1} \frac{n_e - 1}{n_e} F_e^* \left( \beta \eta_1 - \frac{1}{N} \frac{\delta V}{\delta V} \right). \]  

(49)

For \( F_e^* = \left( \frac{n_e - 1}{n_e} \frac{V}{F_e} \right)^{\alpha \frac{\beta}{\vartheta}} N \) and \( F_e^* = \left[ \frac{n_e - 1}{n_e} \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right) \right]^{\alpha \frac{\beta}{\vartheta}} N \) not to be too close, \( \beta \eta_1 \) must be of a similar order of magnitude to \( \frac{V}{F_e} \) and \( \frac{\delta V}{\delta V} \). Then, \( \beta \eta_1 - \frac{1}{N} \frac{\delta V}{\delta V} > 0 \) and the derivative is positive.

The equilibrium in which all identify with the nation] Since
\[ \frac{d E^*}{d V} = \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \]

from (26), the derivative of the LHS of (75) with respect to \( V \) is,
\[ \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left\{ \beta \eta_1 \frac{n_e - 1}{n_e} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left[ \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} - \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} \right] \frac{1}{\vartheta \frac{1}{\vartheta}} \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right) \right\} \]
\[ = \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left\{ \beta \eta_1 - \frac{1}{N} \left[ \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{\beta}{\vartheta}} - \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} \right] \beta \eta_1 \right\} \]
\[ > \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \beta \eta_1 - \frac{1}{N} \frac{\delta V}{\delta V} \right) > 0. \]  

(50)

The equilibrium in which sector \( T \) workers identify with their ethnic group and sector \( M \) workers identify with the nation] From (28),
\[ \frac{d F_d(T) \frac{L(T)}{d V}}{d V} = \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \]
\[ 1 + \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \].

(51)

\[ \frac{d \left( \frac{V}{F_d(T)} \right) }{d V} = \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \]
\[ 1 + \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \].

(52)

Thus, the derivative of the LHS of (79) or (80) with respect to \( V \) is,
\[ \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \]
\[ 1 + \frac{1}{\vartheta^{-1} \frac{\delta V}{\delta V} - \beta \eta_1} \left( \frac{n_e - 1}{n_e} \right)^{\alpha \frac{\beta}{\vartheta}} \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \]
\[ \times \left[ \beta \eta_1 - \left( \frac{\delta V}{\delta V} \right)^{\alpha \frac{1}{\vartheta}} n_e L_T + \left( \frac{\delta V}{\delta V} - \beta \eta_1 \right)^{\alpha \frac{1}{\vartheta}} (N - n_e L_T) \right] \].

(53)

where the expression inside the large square bracket is greater than
\[ \beta \eta_1 - \frac{\left( \delta \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{1-\theta}}}{\left( \delta \frac{V}{F_d(L_{TJ})} \right)^{\frac{1}{1-\theta}} - \eta_1 L_{TJ}} > \beta \eta_1 - \frac{1}{N} \delta \frac{V}{F_d(L_{TJ})} > 0. \] (54)

Each term of the equilibrium condition of the remaining equilibria are same as one of the above terms.

**Proof of Proposition A1.** (i) The equilibrium in which all identify with their ethnic group:

[Sector M] The utility of individual \( i \) of ethnic group \( J \) in sector \( M \) equals, from (17) and (18),

\[ A_M - \frac{1}{\theta} (f_{i,n})^\theta + \delta \frac{F_j}{F} V - \beta \omega_s \left( \frac{L_{TJ}}{N/n_e} \right)^2. \] (55)

If he deviates and identifies with the nation, the highest utility he gets is

\[ A_M - \frac{1}{\theta} (f_{i,n})^\theta + \delta \frac{F_j}{F} V - \beta \left( \eta_0 + \eta_1 F \right) \frac{n_e - 1}{n_e} + \omega_s \left[ \left( \frac{L_{TJ}}{N} \right)^2 + \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 \right], \] (56)

where \( (f_{i,n})' = \left[ \frac{F_j}{F} V - \beta \eta_1 \frac{n_e - 1}{n_e} \right]^{\frac{1}{1-\theta}}, \) not \( (f_{i,n})' = 0, \) from the assumption (16), \( (f_j)' = (f_{i,n})' + \left( \frac{N}{n_e} - 1 \right) f_{i,e}, \) and \( F' = (f_j)' + F_{-J}. \)

When \( N \) is large enough, the deviation by one player affects aggregate values \( (f_j)' \) and \( F' \) very little, thus the above equation is approximated very well by the following equation that is marginally larger than the original one

\[ A_M - \frac{1}{\theta} (f_{i,n})^\theta + \delta \frac{F_j}{F} V - \beta \left( \eta_0 + \eta_1 F \right) \frac{n_e - 1}{n_e} + \omega_s \left[ \left( \frac{L_{TJ}}{N} \right)^2 + \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 \right], \] (57)

where \( f_{i,n} \) is given by (24).

Thus, the deviation is not profitable if

\[ -\frac{1}{\theta} (f_{i,n})^\theta - \beta \omega_s \left( \frac{L_{TJ}}{N/n_e} \right)^2 \geq -\frac{1}{\theta} (f_{i,n})^\theta - \beta \left( \eta_0 + \eta_1 F \right) \frac{n_e - 1}{n_e} + \omega_s \left[ \left( \frac{L_{TJ}}{N} \right)^2 + \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 \right] + \gamma S_N \] (58)

\[ \Leftrightarrow \beta \left( \eta_0 + \eta_1 F \right) \frac{n_e - 1}{n_e} + \omega_s \left[ \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 - (n_e - 1) \left( \frac{L_{TJ}}{N} \right)^2 \right] - \frac{1}{\theta} (f_{i,n})^\theta \geq \gamma S_N. \] (59)

[Sector TJ] The utility of individual \( i \) of ethnic group \( J \) in sector TJ is, from (19) and (18),

\[ A_T(L_{TJ})^{\alpha - 1} - \frac{1}{\theta} (f_{i,e})^\theta + \delta \frac{F_j}{F} V - \beta \omega_s \left( 1 - \frac{L_{TJ}}{N/n_e} \right)^2. \] (60)

If he deviates and identifies with the nation, the highest utility is well approximated by

\[ A_T(L_{TJ})^{\alpha - 1} - \frac{1}{\theta} (f_{i,n})^\theta + \delta \frac{F_j}{F} V - \beta \omega_s \left( 1 - \frac{L_{TJ}}{N/n_e} \right)^2 + \omega_s \left[ \left( 1 - \frac{L_{TJ}}{N} \right)^2 + \sum_{K \neq J} \left( \frac{L_{TK}}{N} \right)^2 \right] + \gamma S_N. \] (61)

The deviation is not profitable if
\[-\frac{1}{\theta}(f_{i,e})^\theta - \beta \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^2 \geq -\frac{1}{\theta}(f_{i,n})^\theta - \beta \left(\omega_e \frac{n_{e-1}}{n_e} + \omega_s \left(1 - \frac{L_{TJ}}{N}\right)^2 + \sum_{k \neq j} \left(\frac{L_{Tk}}{N}\right)^2\right) \right] + \gamma S_N \] (62)

\[\Leftrightarrow \beta \left(\eta_0 + \eta_1 F_e \frac{n_{e-1}}{n_e} - \omega_s n_e (n_e - 1) \left(\frac{L_{TJ}}{N}\right)^2 \right) - \frac{1}{\theta} \left(\frac{n_{e-1}}{n_e} \right)^\theta \left[ \left(\frac{V}{F_e}\right)^{\theta - 1} - \left(\frac{V}{F_e} - \beta \eta\right)^{\theta - 1} \right] \geq \gamma S_N \] (64)

where $F_e^*$ is given by (20), and $\Delta d^2[\cdot], \Delta c(\cdot)$, and $S_N$ are as defined just before the proposition.

The condition holds for any $L_{TJ} \in [0, \frac{N}{n_e}]$ when $\gamma S_N \leq \beta \Delta d^2 \left[F_e^*, -\frac{n_{e-1}}{n_e}\right] - \Delta c(F_e^*)$. When $\gamma S_N \in \left(\beta \Delta d^2 \left[F_e^*, -\frac{n_{e-1}}{n_e}\right] - \Delta c(F_e^*), \beta \Delta d^2[F_e^*, 0] - \Delta c(F_e^*)\right)$, the condition holds for $L_{TJ} \in [0, (L_{TJ})^{11}]$, where $(L_{TJ})^{11}$ is the solution for $\beta \Delta d^2 \left[F_e^*, -n_e (n_e - 1) \left(\frac{L_{TJ}}{N}\right)^2\right] - \Delta c(F_e^*) = \gamma S_N$.

(ii) The equilibrium in which all individuals identify with the nation: [Sector $TJ$] The utility of individual $i$ of ethnic group $J$ in sector $TJ$ is, from (25) and (24),

\[A_T(L_{TJ})^{\alpha-1} - \frac{1}{\theta}(f_{i,n})^\theta + \delta \frac{F_{TJ}}{F} V - \beta \left(\omega_e \frac{n_{e-1}}{n_e} + \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^2 + \sum_{k \neq j} \left(\frac{L_{Tk}}{N}\right)^2\right) \right] + \gamma S_N. \] (66)

If he deviates and identifies with his ethnic group, the highest utility he gets is

\[A_T(L_{TJ})^{\alpha-1} - \frac{1}{\theta} \left(\frac{F_{TJ}}{F} \right)^\theta - \beta \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^2 \right], \] (67)

where \((f_{i,e})'' = \left[\frac{F_{TJ}}{F''} V\right]^{1/\theta}\) and \((F)'' = (f_{i,e})'' + \frac{N}{n_e-1} f_{i,n}\), and \((F)'' = (F_j)'' + F_{-J}.

When $N$ is large enough, the deviation by one player affects aggregate values $(F_j)''$ and $(F)''$ very little, thus the above equation is approximated very well by the following equation that is marginally smaller than the original one

\[A_T(L_{TJ})^{\alpha-1} - \frac{1}{\theta} (f_{i,e})^\theta + \delta \frac{F_{TJ}}{F} V - \beta \omega_s \left(1 - \frac{L_{TJ}}{N/n_e}\right)^2, \] (68)

The deviation is not profitable if$^{51}$

$^{51}$The equation must hold with strict inequality because the deviant’s approximate utility is marginally smaller than the true utility.
\[-\frac{1}{\theta}(f_{i,n})^\theta - \beta \left\{ \omega \left( \frac{n_e-1}{n_e} \right) + \omega_s \left( 1 - \frac{L_{TF}}{N} \right)^2 + \sum_{k \neq j} \left( \frac{L_{TK}}{N} \right)^2 \right\} + \gamma S_N > -\frac{1}{\theta}(f_{i,c})^\theta - \beta \omega_e \left( 1 - \frac{L_{TF}}{N/n_e} \right)^2 \quad (69)\]

\[\Leftrightarrow \beta \left( (\eta_0 + \eta_1 F) n_e - \omega_s \left( \sum_{k \neq j} \left( \frac{L_{TK}}{N} \right)^2 + (n_e - 1) \frac{L_{TF}}{N} \left( 2 - (n_e + 1) \frac{L_{TF}}{N} \right) \right) \right) - \frac{1}{\theta} (f_{i,c})^\theta - (f_{i,n})^\theta < \gamma S_N. \quad (70)\]

[Sector M] The utility of individual i of ethnic group J in sector M equals, from (23) and (24),

\[A_M - \frac{1}{\theta}(f_{i,n})^\theta + \delta \frac{F_j}{F} V - \beta \left( (\eta_0 + \eta_1 F) n_e - \omega_s \left( \frac{L_{TT}}{N} \right)^2 + \sum_{k \neq j} \left( \frac{L_{TK}}{N} \right)^2 \right) + \gamma S_N. \quad (71)\]

If he deviates and identifies with his ethnic group, the highest utility is well approximated by

\[A_M - \frac{1}{\theta}(f_{i,c})^\theta + \delta \frac{F_j}{F} V - \beta \omega_e \left( \frac{L_{TT}}{N/n_e} \right)^2. \quad (72)\]

The deviation is not profitable if

\[-\frac{1}{\theta}(f_{i,n})^\theta - \beta \left\{ \eta_0 + \eta_1 F \right\} n_e - \omega_s \left( \sum_{k \neq j} \left( \frac{L_{TK}}{N} \right)^2 (\eta_0 - 1) \left( \frac{L_{TF}}{N} \right)^2 \right) - \frac{1}{\theta} (f_{i,c})^\theta - (f_{i,n})^\theta < \gamma S_N. \quad (73)\]

[The equilibrium condition] From this equation and (70), if the condition for sector TJ holds, so does the one for sector M. Hence, (70) is the condition for the existence of this equilibrium when \(L_{TT}J\) is the solution for (27). Since ethnic groups are symmetric, (70) becomes

\[\beta \left[ (\eta_0 + \eta_1 F_n^*) \left( n_e - 1 \right) \left( \frac{L_{TF}}{N} \right) \right] - \frac{1}{\theta} \left( \frac{n_e-1}{n_e} \right)^{\theta \gamma} \left[ \left( \frac{V}{F_n^*} \right)^{\theta \gamma} - \left( \frac{V}{F_n^*} - \beta \eta_1 \right)^{\theta \gamma} \right] < \gamma S_N \quad (75)\]

\[\Leftrightarrow \beta \Delta d^2 \left( F_n^* \left( n_e - 1 \right) \left( \frac{L_{TF}}{N} \right) \right) - \Delta c(F_n^*) < \gamma S_N, \quad (76)\]

where \(F_n^*\) is the solution for (26).

The above inequality holds for any \(L_{TTJ} \in [0, \frac{N}{n_e}]\) when \(\gamma S_N > \beta \Delta d^2 \left( F_n^* \left( \frac{n_e-1}{n_e} \right) - \Delta c(F_n^*) \right)\), and for \(L_{TTJ} \in [0, (L_{TTJ})^{\#}]\) when \(\gamma S_N \in (\beta \Delta d^2 [F_n^*, 0] - \Delta c(F_n^*) + \beta \Delta d^2 \left( F_n^* \left( \frac{n_e-1}{n_e} \right) - \Delta c(F_n^*) \right)\), where \((L_{TTJ})^{\#}\) is the solution for \(\beta \Delta d^2 \left( F_n^* \left( n_e - 1 \right) \left( \frac{L_{TF}}{N} \right) \right) - \Delta c(F_n^*) = \gamma S_N. \]

**Proof of Proposition A2.** [The proof that no other heterogenous identity equilibria exist] If workers in sector M weakly prefer to identify with their ethnic group, from (59), the following must hold in a symmetric equilibrium:

\[\beta \left[ (\eta_0 + \eta_1 F) n_e - \omega_s \left( n_e - 1 \right) \left( \frac{L_{TF}}{N} \right) \right] - \frac{1}{\theta} \left( \frac{n_e-1}{n_e} \right)^{\theta \gamma} \left[ \left( \frac{V}{F} \right)^{\theta \gamma} - \left( \frac{V}{F} - \beta \eta_1 \right)^{\theta \gamma} \right] \geq \gamma S_N. \quad (77)\]

If workers in sector TJ weakly prefer to identify with the nation, from (70), the following must hold in a symmetric equilibrium:

\[\beta \left[ (\eta_0 + \eta_1 F) \left( n_e - 1 \right) \left( \frac{L_{TF}}{N} \right) \right] - \frac{1}{\theta} \left( \frac{n_e-1}{n_e} \right)^{\theta \gamma} \left[ \left( \frac{V}{F_n^*} \right)^{\theta \gamma} - \left( \frac{V}{F_n^*} - \beta \eta_1 \right)^{\theta \gamma} \right] \leq \gamma S_N. \quad (78)\]
Both conditions cannot hold simultaneously and thus such situations do not arise in equilibrium.

(i) The equilibrium in which sector $T$ workers identify with their ethnic group and sector $M$ workers identify with the nation: [Sector $M$] Because sector $M$ workers identify with the nation, the condition for them not to deviate from the equilibrium is given by (63) as in the equilibrium in which all identify with the nation. In the symmetric equilibrium, the equation becomes

$$
\beta \left[ \gamma_0 + \gamma_1 F_d(L_{TJ}) \frac{\eta - 1}{\eta} \right] - \frac{1}{\eta} \left( \frac{\eta - 1}{\eta} \right)^{\lambda - 1} \left[ \delta \frac{\eta}{F_d(L_{TJ})} \right] - \frac{\eta}{\eta} \frac{\eta}{\beta} < \gamma S_N,
$$

$$
\Leftrightarrow \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) < \gamma S_N,
$$

where $F_d(L_{TJ})$ is the solution for (28) and increases with $L_{TJ}$.

The relation between the LHS of the equation and $L_{TJ}$ is ambiguous, but the relation is positive for small $L_{TJ}$ because the derivative of the LHS at $L_{TJ} = 0$ is positive.

[Sector $TJ$] Because sector $TJ$ workers identify with their ethnic group, the condition for them not to deviate from the equilibrium is given by (63) as in the equilibrium in which all identify with their group. In the symmetric equilibrium, the equation becomes

$$
\beta \left[ \gamma_0 + \gamma_1 F_d(L_{TJ}) \frac{\eta - 1}{\eta} \right] - \frac{1}{\eta} \left( \frac{\eta - 1}{\eta} \right)^{\lambda - 1} \left[ \delta \frac{\eta}{F_d(L_{TJ})} \right] - \frac{\eta}{\eta} \frac{\eta}{\beta} \geq \gamma S_N,
$$

$$
\Leftrightarrow \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) \geq \gamma S_N,
$$

where the LHS increases with $L_{TJ}$ from (28).

Thus, the condition holds for any $L_{TJ} \in [0, \frac{N}{\eta c}]$ when $\gamma S_N \leq \beta \Delta d^2 [F_d^*, 0] - \Delta c(F_d^*)$, and for $L_{TJ} \in [(L_{TJ})^*, \frac{N}{\eta c}]$ when $\gamma S_N \leq \beta \Delta d^2 [F_d^*, 0] - \Delta c(F_d^*)$, where $L_{TJ}^*$ is the solution for $\beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) = \gamma S_N$.

[The equilibrium condition] Hence, the equilibrium exists if $\beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) < \gamma S_N \leq \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ}))$, where $F_d(L_{TJ})$ is the solution for (28) and increases with $L_{TJ}$ and $L_{TJ} = (L_{TJ})^*$ is the solution for (29).

To be more detailed, the equilibrium exists for $L_{TJ} \in [(L_{TJ})^*, \frac{N}{\eta c}]$ when

$$
\gamma S_N \leq \left[ \max_{L_{TJ}} \left\{ \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) \right\} \right], \beta \Delta d^2 \left[ F_e, \frac{n_e - 1}{n_e} \right] - \Delta c(F_e^*)
$$

and for $L_{TJ} \geq \max \{ (L_{TJ})^*, 0 \} \text{ satisfying } \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) n_e \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) < \gamma S_N$ when $\gamma S_N \leq \left[ \min_{L_{TJ}} \left\{ \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) \right\} \right]$, where $\gamma S_N \leq \left[ \max_{L_{TJ}} \left\{ \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1) n_e \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) \right\} \right]$.  

(ii) The equilibrium in which those in sector $M$ are divided over their identities and all in sectors $TJ$ identify with their ethnic group: [Sector $M$] As shown in Section 3.2.2, the following indifference condition for identity choices of sector $M$ workers must hold.
\[
\beta \left[ (\eta_0 + \eta_1 F) \frac{n_{-1} - \omega_s n_e (n_e - 1)}{n_e} \right] - \left( \frac{n_{-1}}{n_e} \right)^{\frac{\beta}{\gamma}} \left[ \left( \frac{\delta V}{V} \right)^{\frac{\gamma}{\beta}} - \left( \frac{\delta V}{V} - \beta \eta_1 \right)^{\frac{\gamma}{\beta}} \right] = \gamma S_N, \quad (31)
\]

where \( F \) satisfies
\[
F = \left( \frac{n_{-1}}{n_e} \right)^{\frac{1}{\beta}} \left\{ \left( \frac{\delta V}{V} - \beta \eta_1 \right)^{\frac{1}{\beta}} P_{M,n} (N - n_e L_T) + \left( \frac{\delta V}{V} \right)^{\frac{1}{\beta}} [n_e L_T + (1 - P_{M,n})(N - n_e L_T)] \right\}. \quad (32)
\]

Given \( L_{TJ} \), the LHS of (31) increases with \( F \) and \( F \) satisfying (32) decreases with \( P_{M,n} \). Hence, \( F \) and \( P_{M,n} \) satisfying both equations exist if
\[
\beta \left[ (\eta_0 + \eta_1 F_d(L_{TJ})) \frac{n_{-1} - \omega_s n_e (n_e - 1)}{n_e} \right] - \left( \frac{n_{-1}}{n_e} \right)^{\frac{1}{\beta}} \left[ \left( \frac{\delta V}{V} \right)^{\frac{1}{\beta}} - \left( \frac{\delta V}{V} - \beta \eta_1 \right)^{\frac{1}{\beta}} \right] < \gamma S_N < \beta \left[ (\eta_0 + \eta_1 F^*_{n, n_{-1} - \omega_s n_e (n_e - 1)}) \frac{L_{TJ}^2}{N} \right] - \left( \frac{n_{-1}}{n_e} \right)^{\frac{1}{\beta}} \left[ \left( \frac{\delta V}{V} \right)^{\frac{1}{\beta}} - \left( \frac{\delta V}{V} - \beta \eta_1 \right)^{\frac{1}{\beta}} \right], \quad (82)
\]
where \( F^*_{n} \) is given by (20) and \( F_d(L_{TJ}) \) is given by (28) and increases with \( L_{TJ} \).

The second inequality of (82) holds for any \( L_{TJ} \in [0, \frac{N}{n_e}] \) when \( \gamma S_N < \beta \Delta d^2 [F^*, \frac{n_{-1}}{n_e}] - \Delta c(F^*) \), and for \( L_{TJ} \in [0, (L_{TJ})^{\dagger}] \) when \( \gamma S_N \in \left[ \beta \Delta d^2 [F^*, \frac{n_{-1}}{n_e}] - \Delta c(F^*), \beta \Delta d^2 [F^*, 0] - \Delta c(F^*) \right] \), where \( (L_{TJ})^{\dagger} \) is \( L_{TJ} \) satisfying \( \beta \Delta d^2 [F^*, -n_e (n_e - 1) \frac{L_{TJ}^2}{N}^2] - \Delta c(F^*) = \gamma S_N \).

The LHS of the first inequality is same as (29) in (i), thus the relation between the LHS and \( L_{TJ} \) is positive for small \( L_{TJ} \) but generally ambiguous.

[Sector TJ] Because workers in sector TJ identify with their ethnic group, the condition for them not to deviate from the equilibrium is given by (74) as in the equilibrium in which all identify with their ethnic group. In the symmetric equilibrium, the condition becomes
\[
\beta \left[ (\eta_0 + \eta_1 F_d(L_{TJ})) \frac{n_{-1} - \omega_s n_e (n_e - 1)}{n_e} \right] - \left( \frac{n_{-1}}{n_e} \right)^{\frac{1}{\beta}} \left[ \left( \frac{\delta V}{V} \right)^{\frac{1}{\beta}} - \left( \frac{\delta V}{V} - \beta \eta_1 \right)^{\frac{1}{\beta}} \right] \geq \gamma S_N, \quad (83)
\]
where \( F \) is the solution for (31) and (32). When (82) and thus (31) hold, it holds clearly.

[The equilibrium condition] Hence, from (82), the equilibrium exists if \( \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1)n_e \frac{L_{TJ}^2}{N} \right] - \Delta c(F_d(L_{TJ})) < \gamma S_N < \beta \Delta d^2 \left[ F^*, -n_e (n_e - 1) \frac{L_{TJ}^2}{N} \right] - \Delta c(F^*) \), where \( F_d(L_{TJ}) \) is the solution for (28) and increases with \( L_{TJ} \) and \( L_{TJ} = (L_{TJ})^{\dagger} \) is the solution for (22).

To be more detailed, the equilibrium exists for \( L_{TJ} \in [0, (L_{TJ})^{\dagger}] \) when
\[
\gamma S_N \in \left[ \max_{L_{TJ}} \left\{ \min \left\{ \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1)n_e \frac{L_{TJ}^2}{N} \right] - \Delta c(F_d(L_{TJ})) \right\}, \beta \Delta d^2 \left[ F^*, 0 \right] - \Delta c(F^*) \right\} \right], \quad (L_{TJ})^{\dagger} \text{ satisfying } \beta \Delta d^2 \left[ F_d(L_{TJ}), -(n_e - 1)n_e \frac{L_{TJ}^2}{N} \right] - \Delta c(F_d(L_{TJ})) < \gamma S_N \text{ when } \gamma S_N \in \left( \min \left\{ \beta \Delta d^2 \left[ F^*, 0 \right] - \Delta c(F^*), \beta \Delta d^2 \left[ F^*, -n_e (n_e - 1) \frac{L_{TJ}^2}{N} \right] - \Delta c(F^*) \right\} \right].
\]

(iii) The equilibrium in which sector TJ workers are divided over identities and sector M workers identify with the nation: [Sector TJ] From Section 3.2.3, the indifference condition for identity choices must hold:
\[ \beta \left[ (\theta_0 + \eta_1 F)n - 1 \right] + \omega_s n_e - 1 \] 
\[ = \frac{n_e - 1}{n_e} \left( \frac{\eta_1 F}{\omega_s} \right) - \frac{1}{\beta} \left( \frac{n_e - 1}{n_e} \right)^{\theta - 1} \left[ \left( \frac{\omega_s}{\beta} \right)^{\theta - 1} - \left( \frac{\omega_s}{\beta - \eta_1} \right)^{\theta - 1} \right] = \gamma S_N, \]  
(34)

where \( F \) satisfies
\[ F = \left( \frac{n_e - 1}{n_e} \right)^{\theta - 1} \left[ \left( \frac{\omega_s}{\beta} \right)^{\theta - 1} - \left( \frac{\omega_s}{\beta - \eta_1} \right)^{\theta - 1} \right] \left[ P_{TJ,n} + \eta_1 n_e \right] + \left( N - n_e L_TJ \right) \right]. \]  
(35)

Given \( L_{TJ} \), the LHS of (34) increases with \( F \) and \( F \) satisfying (35) decreases with \( P_{TJ,n} \). Hence, \( F \) and \( P_{TJ,n} \) satisfying both equations exist if
\[ \beta \left[ (\theta_0 + \eta_1 F)n - 1 \right] + \omega_s n_e - 1 \] 
\[ < \beta \left[ (\theta_0 + \eta_1 F_d(L_{TJ}))n - 1 \right] + \omega_s n_e - 1 \] 
\[ - \frac{1}{\beta} \left( \frac{n_e - 1}{n_e} \right)^{\theta - 1} \left[ \left( \frac{\omega_s}{\beta} \right)^{\theta - 1} - \left( \frac{\omega_s}{\beta - \eta_1} \right)^{\theta - 1} \right], \]  
(84)

where \( F_d^* \) is given by (26) and \( F_d(L_{TJ}) \) is given by (28) and increases with \( L_{TJ} \).

Thus, the first inequality of (84) holds for any \( L_{TJ} \in [0, \frac{N}{n_e}] \) when \( \gamma S_N > \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \), and holds for \( L_{TJ} \in [0, (L_{TJ}^*)_{\text{st}}] \) when \( \gamma S_N \in \left( \beta \Delta d^2 \left[ F_d^*, 0 \right] - \Delta c(F_d^*) \right), \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \),

where \( (L_{TJ})_{\text{st}} \) is \( L_{TJ} \) satisfying \( \beta \Delta d^2 \left[ F_d^*, (n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d^*) = \gamma S_N. \)

The second inequality of (84) holds for any \( L_{TJ} \in [0, \frac{N}{n_e}] \) when \( \gamma S_N < \beta \Delta d^2 \left[ F_d^*, 0 \right] - \Delta c(F_d^*) \), and for \( L_{TJ} \in [(L_{TJ})^t, \frac{N}{n_e}] \) when \( \gamma S_N \in \left( \beta \Delta d^2 \left[ F_d^*, 0 \right] - \Delta c(F_d^*) \right), \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \),

where \( (L_{TJ})^t \) \( (L_{TJ})_{\text{st}} \) from \( F_d^* < F_d(L_{TJ}) \) is \( L_{TJ} \) satisfying \( \beta \Delta d^2 \left[ F_d(L_{TJ}), (n_e - 1) \frac{L_{TJ}}{N} \right] - \Delta c(F_d(L_{TJ})) = \gamma S_N. \)

[Sector M] Because workers in sector \( M \) identify with the nation, the condition for them not to deviate from the equilibrium is given by (74) as in the equilibrium in which all identify with the nation. In the symmetric equilibrium, the condition becomes
\[ \beta \left[ (\theta_0 + \eta_1 F)n - 1 \right] + \omega_s n_e - 1 \] 
\[ = \frac{n_e - 1}{n_e} \left( \frac{L_{TJ}}{N} \right)^{\theta - 1} - \frac{1}{\beta} \left( \frac{n_e - 1}{n_e} \right)^{\theta - 1} \left[ \left( \frac{\omega_s}{\beta} \right)^{\theta - 1} - \left( \frac{\omega_s}{\beta - \eta_1} \right)^{\theta - 1} \right] < \gamma S_N, \]  
(85)

where \( F \) is the solution for (34) and (35). When (84) and thus (34) hold, this condition holds.

[The equilibrium condition] Hence, when \( L_{TJ} \) is the solution for (27), the equilibrium exists for \( L_{TJ} \in ((L_{TJ})^t, (L_{TJ})_{\text{st}}) \) when \( \gamma S_N \in \left( \beta \Delta d^2 \left[ F_d^*, 0 \right] - \Delta c(F_d^*) \right), \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \), and exists for \( L_{TJ} \in ((L_{TJ})^t, \frac{N}{n_e}) \) when \( \gamma S_N \in \left( \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \right), \beta \Delta d^2 \left[ F_d^*, \frac{n_e - 1}{n_e} \right] - \Delta c(F_d^*) \).