Ethnic income inequality in Canada

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Abstract

The objective of this article is to present simple measures of inter-group inequality that we construct and which capture income disparities among subpopulations. These indices should be of interest to both decision makers and researchers. We take advantage of the fact that the Canadian Census asks respondents about their ethnic origin to construct group income inequality measures based on ethnicity, with a special emphasis on Aboriginal populations. We construct an Ethnic Gini (EG), an Ethnic Polarization (EP) and an Ethnic Fractionalization (EF) index at five levels of geographical aggregation. The main findings are that the Maritimes together with Québec are the more homogeneous provinces while the North together with British Columbia are the more diverse. Although Canada is, for the most part, a diversified and egalitarian society, the Northwest Territories and Nunavut are highly ethnically unequal in terms of income. When adjusting for the degree of diversity, Saskatchewan is the third most ethnically unequal province.

Keywords: sociopolitical conflict, group inequality, polarization, fractionalization, Census Divisions

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1 Introduction

The objective of this article is to present measures that we construct and which capture critical aspects of income disparities among selected subpopulations. We take advantage of the fact that the Canadian Census asks respondents about their ethnic origin to construct group income inequality measures for Canadian communities based on ethnicity, with a special emphasis on Aboriginal populations. More specifically, we construct what we call an Ethnic Gini (EG) and an Ethnic Polarization (EP) indices, as well as an index of ethnic diversity, an Ethnic Fractionalization (EF) index. By construction and intent, these inter-group income inequality measures, the EG and EP indices, are a combination of individual income inequality measures and ethnic diversity measures, such as the EF index. The indices are explained more in detail in section 3.

Income disparities between groups with a strong internal identity prevent the social inclusion of certain subpopulations and generate conflict among groups, with a general negative feedback effect on economic outcomes. In this sense, these indices are also indicators of potential sociopolitical conflict. Sociopolitical conflict is a crucial problem for growth and development. At the extreme, conflict takes the form of civil war but political conflict is extremely disruptive even when it does not reach this level; for example, Abadie and Gardeazabal (2003) show how nationalistic tensions reduced economic growth in the Basque Country. Sociopolitical conflict manifests itself not only as political instability but also as crime, especially crime against property and other appropriation activities (dal Bó and dal Bó forthcoming). This paper is concerned with the interaction between two potential drivers of sociopolitical conflict: economic inequality and ethnic diversity. What we construct are two indices of ethnic income inequality because, as Acemoglu and Robinson (2005) argue, the problem with testing the hypothesis that inter-group inequality should have an effect on sociopolitical instability, with the consequent effect on economic growth, is that inter-group inequality is difficult to measure.

Although the literature refers mostly to developing countries and we are constructing these measures for a developed country, it points to the relevance of these measures. It is also the case that, because of the better data in developed countries, some of these ideas are tested within regions in a developed country.[1] It is our hope that the indices we are constructing will eventually add to the understanding of the causes behind the current global distribution of income.

In any case the issue is of relevance of Canada for two reasons: first, although it is likely that income disparities between groups translate into social conflict (appropriation activities) more than into political conflict in developed countries, social conflict also has an impact on economic growth. The persistent social and economic problems of Aboriginal populations are a source of ethnic tensions in large parts of Canada with a general negative effect on the economy of these areas.

[1] For example, Acemoglu et al. (2010) study the importance of institutions on economic development by looking at different parts of Germany.

Second, measures of group income inequality are important not only because of inequality's impact on growth but also because they are a very important component in the assessment of economic well-being since they complement standard measures of economic welfare such as income per capita and measures of individual income inequality. As the Sarkozy Report (Stiglitz, Sen and Fitoussi 2009) reminds us, absence of inequalities is a substantial component of economic well-being. Canada is a very diverse country, partially because it relies on immigration for population growth; however, there are concerns about the deterioration of earnings of the latest cohorts of immigrants (Aydemir and Skuterud 2005). That inter-group inequalities do not increase or decrease where important should be a concern to Canadian policymakers

The usual Gini (G) coefficient measures individual inequality, commonly in terms of income or wealth. Groups are then constructed based on the distribution; the groups are usually quintiles, percentiles, etc. In this paper we define the groups based on ethnic origin to construct our index of ethnic inequality in terms of income, EG.

Esteban and Ray (1994) and Wolfson (1994) introduce the notion of polarization. Their approach is founded on the postulate that the interaction between group identification and distances among groups, the sense of us versus them, is what leads to antagonism. Polarization is a measure of social exclusion (or its opposite, social cohesion). Our Ethnic Polarization (EP) index is a mixture of an income inequality index and a polarization index in which we define the groups exogenously, according to ethnicity, but the distance between two groups is defined in terms of income. On the one hand we define the groups on terms of ethnicity because, although we acknowledge that the sense of us versus them can be based on income differences in very class-conscious societies, we believe that Canada is characterized by a large middle class and it is not, generally speaking, an unequal society. We think that the ethnic component is much more at play in Canada. On the other hand, the distance between these ethnic groups could be measured in terms of genetic distance. Our choice of difference in incomes as a distance reflects our opinion that access to resources is a much more important factor nowadays.

The third index calculated, the EF index, is basically a Hirschman index that captures the probability of two randomly chosen individuals belonging to different groups.

Using the 2006 cycle Census of Population, we calculate the EF, EG and EP indices at five levels of geographical aggregation and we also contrast these indices with the usual measure of individual income inequality, the Gini (G) index.

What we find is that the Maritimes together with Québec are the more homogeneous provinces (i.e., all the indices are below those of Canada); while the North together with British Columbia are the more diverse (i.e., the indices are above those of Canada). The Prairies together with Ontario are sometimes above and sometimes below the Canadian average. This conclusion changes, although not by a large amount, when we look at the indicators at a more disaggregated level. For example, within Alberta, a highly diversified province,

according to the EF indicator, there are areas of low fractionalization while Québec, a province with a low EF index, shows areas of high fractionalization.

The picture that emerges is, for the most part, that of a diversified and egalitarian Canada except for the Northwest Territories and Nunavut which are highly unequal in terms of ethnicity. The two Census Divisions[2] in the NWT and the three in Nunavut show high indices of inter-group inequality. It should be noticed that less than 0.5% of the Canadian population (less than 120,000 people) live in the remote and vast North. Nevertheless, the indices point at group inequalities as one of the problems of the Canadian North.

Provinces where Visible Minorities comprise an important sector of the population do not perform especially poorly in terms of ethnic income inequality; on the other hand, the provinces with a large percentage of Aboriginal population perform poorly. Therefore, we believe that new immigration is not the major source of ethnic inequality.and this role belongs to the persistent socioeconomic problems of the Aboriginal populations. However, the fact that the provinces seem to show different degrees of success in dealing with these problems is a factor of optimism.

The measures presented in this article are simple measures of inter-group inequality: we are not attempting to perform any decomposition of Canadian inequality between inter-group and intra-group inequality. The literature on polarization indices, a summary review of which is presented in the 3 section, is relatively new and alternative measures are currently being developed, motivated by the empirical findings; i.e., these measures are not standardized yet. Our results for Canada will add to the incipient body of empirical findings and will be contrasted with the findings for other countries. The indices presented in this paper can be further refined but we think they constitute a good starting point for further work.

The rest of the paper is organized as follows: section 2 is a summary review of the literature on diversity, conflict and growth, section 3 explains the data and methodology used, section 4 presents some of the results and section 5 concludes this article.

2 Diversity, conflict and economic growth

We should start by acknowledging that diversity has positive as well as negative effects. The benefits, more related to the production side of the economy although not exclusively so, are the familiar arguments behind the affirmative action policies and the business literature. The costs may have more to do with the preference for relating to people of similar background, preference which may imply an inability to agree on public goods and policies with other dissimilar groups.

Alesina and la Ferrara (2005) contend that a higher level of income per capita raises the benefits of variety. The implication is that the net effect of

[2] A Census Division is a county, regional district, or similar. A more complete definition can be found in section 3.

diversity may be positive at high levels of income per capita and negative at low levels of income per capita; therefore, one may not find a linear relation between income per capita and measures of diversity. Collier (2000) posits a similar empirical relation between diversity and income per capita for a different reason: he argues that democracies are better suited to deal with heterogeneity and, given that democracies are more likely to be high income, the effects of diversity are different for high- and low-income countries.

The focus of this paper is on the negative effects of diversity. As we all know, social conflict is a problem central to growth and development; in fact the reason why many development practitioners believe that development is mainly a political problem. What is usually referred to as the political economy of growth dates back to the mid-nineties and the work of Alesina and his coauthors (for example, Alesina and Perotti 1996, Alesina et al. 1996, etc.) although, obviously, their work is based on previous work on political economy.

At the extreme, social conflict takes the form of civil war. Collier, Chauvet and Hegre's (2008) report for the Copenhagen Consensus is a good survey of the literature on civil war whose potential drivers are low income, inequality, weak political institutions, ethnic divisions, and the existence of natural resources in the jurisdiction; two of these drivers, namely economic inequality and ethnic divisions, are analyzed in this paper.

Civil war is its extreme form but social conflict is extremely disruptive even when it does not reach this level; for example, Abadie and Gardeazabal (2003) demonstrate how ETA significantly reduced growth in Euskadi (Basque Country) since its inception up to that point. The Index of Sociopolitical Instability (SPI), which include assassinations, irregular government changes, riots, political strikes and armed attacks, and which is negatively correlated with income per capita (Zak 2000), is an attempt to measure the degree of social conflict. However, often social conflicts manifests itself as crime and many articles include crime statistics as an indicator of social conflict.

Some of the first articles in the political economy of growth study the effect of economic (income or wealth) inequality on economic growth through the generation of social conflict. Initial inequality has multiple effects on subsequent growth; for instance, through its effects on the accumulation of both physical and human capital. But what Alesina and Perotti (1996) and Perotti (1996) posit is that initial inequality leads to political instability with its negative effect on long-run economic performance. However, this explanation turned out to be controversial. Just as an example, Zak (2000) contends that the correlation of SPI and economic inequality is not clear.

Dal Bó and dal Bó (forthcoming) also question the relation between economic inequality and social conflict. When measuring social conflict, they include crime since social conflict often revels itself as appropriation activities. More than inequality *per se*, they consider class conflicts (the conflict between workers and owners of capital) the base of the social conflict. Their article relates to the natural resource course: according to them, the change in price of a commodity will have asymmetric effects depending on the sector in question being either capital or labour intensive. The price of a labour intensive commodity, such as

coffee, decreases appropriation activities because it increases their opportunity costs while the increase in price of a capital intensive commodity, such as oil, increase the incentives for these activities.[3]

The idea of class conflict is also present in Acemoglu and Robinson (2005) who measure economic inequality using both the Gini coefficient and the labour share. They find no correlation between inequality and democracy whose lack is considered a exponent of the weak political institutions supposed to be one of the potential drivers of social conflict. But the importance that Acemoglu and Robinson confers to the middle class that acts as a buffer make one think that the best way of measuring income inequality in this context may not be the Gini coefficient but the income polarization index developed by Wolfson (1994), an index specifically designed to capture the disappearance of the middle class, a phenomenon Wolfson sees as conflictive.

We now turn to other of the potential drivers of social conflict: ethnic diversity. According to one of the pioneer papers on the relation between diversity and growth, Easterly and Levine's (1997), ethno-linguistic diversity is associated with a lower level of public goods (schooling, physical infrastructure,...).[4] But the other reason for a relation between ethnic diversity and growth may be that, as Esteban and Ray (2008) argue, class confers identity but ethnicity does too and it has advantages over class as a potential conflict generator because it implies larger inter-group cohesion which results in larger social networks; lower cost of information (when the ethnic group has its own language) and sanctions; and, in some cases, identifiable characteristics that facilitate the inclusion or exclusion from access to public goods. Even the within group inequality may be an advantage since then the wealthy can provide the capital (weapons) while the less wealthy can work as soldiers (labour).

Once more, the evidence of the relation between ethnic diversity and conflict is mixed, at least with respect to civil war. Collier and Hoeffler (2004) report that both social (a mix of ethnic and religious) and pure ethnic fractionalization are negatively related to the outbreak of civil war; and Collier and Hoeffler and Söderbom (2004) find that ethnic fractionalization is negatively related to the duration of civil war.

The literature on diversity, conflict and growth raises a couple of questions concerning measurement of diversity. The first is the question of the dimensions: since ethnicity, as sociologists and anthropologists know, is a very fluid concept other dimensions, such as religion and language, are important when self-identifying with a group which is why Easterly and Levine calculated a ethno-linguistic fractionalization index and Collier and Hoeffler use a social (mix of ethnic and religious) fractionalization index. This issue is more of a problem when doing cross-country comparisons and less of a problem in the case of comparisons within a country, such as in this paper, in which the relevant

[3] Similar arguments are used by Besley and Persson (2008) who link civil war to international trade and natural resources: increases in traded goods prices increase the likelihood of war because either increase the incentive (exports) or decrease the wage cost (imports).

[4] They use the *Atlas Narodov Mira*, published by the Academy of Science in Moscow in 1964, to calculate an index of ethno-linguistic fractionalization.

dimensions seem more obvious. In any case, the decision over which dimensions to include is always going to be discretionary, depending on the goal and the judgement of the researcher.

The second question is whether fractionalization is the right measure of diversity in this context. Fractionalization measures the probability that two randomly chosen individuals belong to different groups: it does not take into account the distance between groups. Positing that the interaction between identification with one's group and differences among groups (the sense of us versus them) is what leads to antagonism, a second measure, polarization, introduces distance. If the groups are defined by language, this distance can be measured in terms of how far away the languages are in the linguistic tree; if we are talking ethnic groups, the distance can be the genetic distance between groups as in Montalvo and Reynal-Querol (2005). Since in many cases a distance is extremely difficult to construct, Reynal-Querol (2002) introduces a modification in the polarization defining the distance as 0 if both individuals belong to the same group and 1 if they do not. Alesina et al. (2003) show that, as conjectured, polarization (specifically, the Reynal-Querol index) works better as a predictor of conflict and economic growth; however, ethno-linguistic fractionalization works better as a predictor of provision of public goods and other economic outcomes.

What we address in this paper is the interaction between these two potential drivers of social conflict: economic inequality and ethnic diversity. What we construct are two indices of inter-group income inequality, specifically of ethnic income inequality, that we call the Ethnic Gini and the Ethnic Polarization. As Acemoglu and Robinson (2005, 59) write, "Inter-group inequality should have an effect on the equilibrium of political institutions ... The problem, however, is that the relevant notion of inter-group inequality is difficult to measure (i.e., when it is between two different ethnic groups)." In this paper we measure inter-group income inequality between different ethnic groups.

To this end we use as a distance the access of the different groups to economic resources. Access to resources can also be defined in political terms (representation at different level of governments); and an important component of access to economic resources is access to knowledge or education. We suspect a high correlation between economic and political power which is one of the reasons why we use differences in income as our distance, the other being just plain availability. However, this is an empirical question that we plan to address in future research. Likewise, we would like to investigate the issue of access to education.

3 Data and methodology

Suppose we have m groups in a society; n_i is the share of population of group i and δ_{ij} the distance between groups i and j. Esteban and Ray (2009) argue that the level of conflict is a combination of three indices:

1. Fractionalization ($F = \sum_{i=1}^{m} n_i(1 - n_i)$),

2. Group Gini ($G = \sum_{j=1}^{m} \sum_{i=1}^{m} n_i n_j \delta_{ij}$), and

3. a composite of these two, Group Polarization ($P = \sum_{j=1}^{m} \sum_{i=1}^{m} n_i^2 n_j \delta_{ij}$).[5]

The first index, developed by Hirschman (1945, 157-162), captures the probability that two randomly chosen individuals belong to different groups. However, highly fractionalized societies are not necessarily conflictive. As seen above, it does not take into account the distance between groups.

The usual Gini coefficient measures individual inequality, commonly in terms of income or wealth. The groups are then based on the distribution, they are usually quintiles, percentiles, etc., and the distance is the difference in income or wealth. However, the groups can be defined in an exogenous way (over politics, ethnicity, religion, gender, etc.) and the distance can be defined in terms of access to power or public goods, genetic distance, etc.

Esteban and Ray (1994) introduce the notion of polarization. Their approach is founded on the postulate that the interaction between group identification (intra-group polarization) and distances among groups (alienation, inter-group polarization) is what leads to antagonism. The above index is a special case of their more general measure $P = \sum_{j=1,m} \sum_{i=1,m} n_i^{1+\beta} n_j \delta_{ij}$ for $\beta \in [0.25, 1]$ (Duclos, Esteban and Ray 2004). Polarization is a measure of social exclusion (or its opposite, social cohesion). The original idea in Esteban and Ray (1994) has been extended by Esteban, Gradín and Ray (2007) and used extensively (see, for example, Duro 2005; Gradín 2000; Montalvo and Reynal-Querol 2005, Reynal-Querol 2002).

It should be mentioned that Wolfson (1994) developed an alternative pure income polarization index in which income itself defines social groups (endogenous partition, in a similar fashion as with the usual Gini coefficient), an index specifically designed to capture the disappearance of the middle class.

In this article we take advantage of the fact that the Canadian Census asks respondents about their ethnic origin to construct the above mentioned indices based on ethnicity (i.e., the groups are defined in an exogenous way) and contrast them to the usual Gini. The Census asks the respondents to identify themselves as Visible Minorities or not and, if the answer to the first question is not, it asks the respondents to identify themselves as Aboriginals or not. If the respondents identify themselves as a visible minority, the questionnaire asks them to classify themselves as belonging to one of eleven groups according to origin. The subgroups are: Chinese, South Asian, Filipino, South East Asian,

[5] Reynal-Querol (2002) explains that the three can be encompassed by a unique formula in which one changes the value of the parameters.

Korean, Japanese, Black, Latin American, Arab, Western Asian, and other (or multiple) visible minority.

We calculate the three conflict indices plus the inequality (Gini) index at five different levels: 1) for Canada as a whole, 2) for each province, 3) at Census Division (CD) level, 4) at Consolidated Census Subdivision (CCS) level and 5) at Census Subdivision (CSD) level. According to du Plessis et al (2001, 5),

> A census subdivision (CSD) includes municipalities (i.e., incorporated towns, rural municipalities, cities, etc., determined by provincial legislation) or their equivalent such as Indian reserves, Indian settlements and unorganised territories. A census consolidated subdivision (CCS) is a grouping of census subdivisions. The general case is where a small town (i.e. a CSD) is surrounded by a rural municipality (i.e. another CSD) and the two CSDs are grouped to form a CCS. A census division refers to areas established by provincial law, which are intermediate geographic areas between the municipality (i.e., a CSD) and the province. Census divisions represent counties, regional districts, regional municipalities and other types of provincially legislated areas. In Newfoundland, Manitoba, Saskatchewan and Alberta, provincial laws does not provide for these administrative geographic areas. In these provinces, census divisions have been created by Statistics Canada in co-operation with these provinces to facilitate the dissemination of statistical data. In the Yukon Territory, the census division is equivalent to the entire territory.

As explained above, the term polarization reflects the idea that the interaction between identification with one's group and differences among groups is what leads to antagonism. Sometimes, this sense of us versus them may be based on mere income differences, as in class-defined societies where income differences are large, but Canada is characterized by a large middle class and it is not an unequal society: Deininger and Squire (1996) classify Canada as below the average of the Industrial Countries which, in their turn, have the lowest Gini average, except for Eastern Europe. We think that the ethnic component is much more at play in Canada. The distance between groups can be measured in terms of genetic distance as in Montalvo and Reynal-Querol (2005) but we think that access to resources is a much more important factor. This access can be political (representation at different level of governments) but we suspect a high correlation between economic and political power which is why we use differences in income as our distance.

Because the indices are based on ethnic groups, the polarization index is the original Esteban and Ray (1994) index. In Esteban, Gradín and Ray (2007) the groups are endogenously determined, chosen to maximize the distance among groups. However, in this maximized polarization index the number of groups is still chosen a priori in an exogenous way. We think it is much more intuitive to take the groups as exogenously determined, especially when the issue is ethnic inequality. In any case, this is a good starting point for further work.

The measures herein presented are simple measures of inter-group inequality. We are not attempting to perform any decomposition of Canadian inequality between inter-group and intra-group inequality; just to measure inter-group inequality.[6]

The results are produced using the 2006 Census. The variable we use is Economic Family Income, after tax and adjusted for family size. We include single individual households along with the families. The results are weighted, as per StatsCan requirement[7], and we dropped all the Consolidated Census Subdivisions (CCSs) and Census Subdivisions (CSDs) smaller than 250 inhabitants, also as per StatsCan requirements. We also drop negative incomes.

The Gini coefficient that we calculate for Canada equals 36.3. The one reported by StatsCan in its website for the year 2004 equals 31.5. In this case we use the Census and the Gini reported by StatsCan is based on a combination of the Survey of Consumer Finances (SCF) and the Survey of Labour and Income Dynamics (SLID). Frenette, Green and Picot (2004) argue that the SCF/SLID under-represents the very low and very high incomes as compared with the Census; thus, inequality estimates based on the Census are larger.[8]

A caveat is in order at this point. According to Statistics Canada, "On some Indian reserves and Indian settlements in the 2006 Census, enumeration was not permitted or was interrupted before it could be completed. Moreover, for some Indian reserves and Indian settlements, the quality of the enumeration was considered inadequate." There are 22 of these geographical areas: 7 in Quebec, 10 in Ontario, 1 in Saskatchewan, 3 in Alberta, 1 in British Columbia, and none in the Maritimes, Manitoba or the three territories. The population of these areas would constitute at most 0.2% of the provincial population. However, the absence of these data may distort the indices for 21 of the 288 Census Divisions and 22 of the 2208 Consolidated Census Subdivisions.[9]

4 Results

4.1 Ethnic Fractionalization

Canadians tend to think of British Columbia and Ontario (maybe Québec) as the most diverse provinces in Canada.[10] These are the provinces that receive most

[6] See, for example, Elbers et al. (2007) for the problems that the decomposition of inequality between inter- and intra-group inequality poses.

[7] Weights, having to do with the sampling process, are provided by StatsCan.

[8] As a comparison, Frenette, Green and Milligan (2006) calculate a Gini of 32.2 for the same variable, after-tax income, and the 2000 Census. The conclusion of their paper is that inequality is rising in Canada.

[9] The list of *Incompletely Enumerated Indian Reserves and Indian Settlements*, as they are called by Statistics Canada, can be found at http://www12.statcan.gc.ca/census-recensement/2006/ref/notes/aboriginal-autochtones-eng.cfm which also includes the affected Census Divisions.

[10] The Canadian provinces are: Newfoundland and Labrador (NFLL), Prince Edward Island (PEI), Nova Scotia (NS), New Brunswick (NB), Québec, Ontario (ONT), Manitoba (MAN), Saskatchewan (SASK), Alberta (ALTA), British Columbia (BC), Yukon, Northwest Territories

of the immigration and recent immigration, as opposed to older immigration, is not in its majority of European stock. When we think about diversity we tend to think about what the Census calls Visible Minorities, and we tend to count the number of different groups or ethnicities.

As explained in section 3, we construct the Ethnic Fractionalization index as $EF = \sum_{i=1,m} n_i(1 - n_i)$ where m refers to the number of ethnic groups and n_i is the share of population of ethnic group i. What the Ethnic Fractionalization index does is to weight each group and that produces different results than just counting the number of groups. For example, a country with only two groups split equally can result in a higher fractionalization index (0.5) than a country with three groups in which one of them represents 70% and the other two are split equally (0.465). In the Canadian case, weighting the number of groups by their share increases the importance of Aboriginals.

To show that the perception of Canadians about the provinces comes from the impact of recent immigration, let us see the ranking of the provinces when we divide the population in two groups: Visible Minorities (VM) and others (Table 1). The ranking, from lowest to highest degree of fractionalization, roughly corresponds to the perceptions: British Columbia and Ontario are the ones with the highest degree of fractionalization, with Canada as a whole situated between Ontario and Alberta. Québec's is not very high which probably means that the perception is based mostly on Montréal and the rest of the Province is much more homogeneous, likely the result of Québec having its own immigration policy.

TABLE 1—Fractionalization ranking (VM and non-VM)

NFLL
PEI
NNV
NB
SASK
YUKON
NS
NWT
QUEBEC
MAN
ALTA
ONT
BC

Now let us introduce a third group, the ones identifying themselves as Aboriginals: the ranking (shown as **Three** in Table 2) changes completely. Even though British Columbia continues to rank high, the Northwest Territories, the Yukon and Manitoba show as the most fractionalized provinces.

The other two columns in Table 2 show how sensitive the ranking is to the decomposition of the Visible Minorities group into the eleven subgroups in the

(NWT) and Nunavut (NNV).

questionnaire, specified in section 3 (shown as **Thirteen** in Table 2). We group these original eleven groups into five for the purpose of comparison: Asians, Black, Latin American, West Asians, and other or multiple Visible Minorities (shown as **Seven** in Table 2). The only change occurs in the 4th-5th position between Manitoba and Ontario: Ontario's index is 0.382 with three groups while Manitoba is 0.404, but with seven groups the index is practically the same: 0.409 for Manitoba and 0.410 for Ontario, reflecting the fact that most of these groups are more important in Ontario than in Manitoba (indices for the provinces and Canada are to be found in the Appendix).

TABLE 2—Fractionalization ranking

3 groups	**7 groups**	**13 groups**
PEI	PEI	PEI
NB	NB	NB
NFLL	NFLL	NFLL
NS	NS	NS
QUÉBEC	QUÉBEC	QUÉBEC
NNV	NNV	NNV
SASK	SASK	SASK
CAN	ALTA	ALTA
ALTA	**CAN**	**CAN**
ONT	MAN	MAN
MAN	ONT	ONT
YUKON	YUKON	YUKON
BC	BC	BC
NWT	NWT	NWT

The index for Canada is 0.353 for 13 groups. As a comparison, Montalvo and Reynal-Querol (2005) report an index for Canada of 0.767. Theirs is an ethnolinguistic (not just ethnic) index and they use the WCE (World Christian Encyclopedia) which reports data for 49 Canadian cities. According to the WCE, there are 157 groups in these cities. The difference raises the question of the sensitivity to the number of groups. The decision over which ones to include is always going to be discretionary, depending on the goal and the judgement of the researcher. The question arising in this context is why treating Aboriginals as a group while splitting Visible Minorities in eleven subgroups (other than the obvious reason of because that is the way the Census questionnaire is built). Our take is that the identification (intra-group polarization) factor is the issue here: a Cree and a Mohawk feel that they share many issues while a Canadian of Latin American origin and another of Chinese origin do not see each other as having anything in common.

4.2 Ethnic Gini and Ethnic Polarization

In accordance with section 3, let us define the Ethnic Gini as $EG = \sum_{j=1,m} \sum_{i=1,m} n_i n_j \delta_{ij}$, where δ_{ij}, the distance between groups i and

j, is measured by differences in income. The Ethnic Gini thus constructed is a way of capturing differences in income among ethnic groups with a single indicator. As with the Lorenz curve and the Gini coefficient, looking at the whole distribution will always result in a clearer picture while a single coefficient is always going to hide something, but to do statistical analyses we need to collapse distributions to a single indicator. Likewise in this case we can graph shares of population versus income shares, we can compare average income of the groups, etc., but we still need a way of collapsing this information into a single indicator. Were only two groups considered, the obvious single indicator would be the income gap, as we do when comparing women to men; once more than two groups are considered we need another indicator: the indices herein presented constitute such an indicator.

Compared with the usual Gini, the numbers look really small (for Canada, $EG = 0.042$ and $G = 0.363$) but this is not surprising. Take for example the case of Manitoba where Aboriginal comprise 15% of the population and have access to 10% of income: this difference is small when compared to the fact that usually the poorest quintile in a country have access to less than 5% of income.

The appendix not only list the indices but also the ratio EG/G for each province and Canada. Not only is the Gini extremely high for Nunavut, this ratio EG/G is more than three times the Canadian average for both the Northwest Territories and Nunavut, suggesting that ethnic inequality in income contributes to a large extent to income inequality in these two provinces.[11]

As explained in section 3, our Ethnic Polarization index $EP = \sum_{j=1,m} \sum_{i=1,m} n_i^2 n_j \delta_{ij}$ also uses differences in income as the distance with the result that the Ethnic Gini and the Ethnic Polarization indices that we construct are extremely highly correlated.

As a point of comparison, let us take the pure income polarization index that Gradín (2000) calculated for Spain: the index ranges between 0.124 (in 1990 and for 2 groups) and 0.16 (in 1973 and for 3 groups). Gradín's methodology cuts the groups in such a way that it maximizes the differences (i.e., it maximizes the polarization index). What this means is that the Northwest Territories ($EP = 0.130$) and Nunavut ($EP = 0.147$) are highly polarized societies in terms of ethnicity and income since our index should be much smaller that an index constructed in Gradín's way; a polarization that is the outcome of historical relations in which an educated high-income white minority was recruited and sent to the North to govern the "Territories".

4.3 Province Ranking

Within Canadian provinces, British Columbia and Alberta enjoy the reputation of being the more unequal in terms of income and, as we can see in Table 3 (constructed for three groups and arranged in increasing order), the reputation conforms to reality if we consider income inequality between families (G), but the

[11] Care should be taken not to put too much weight on this ratio as a measure of the decomposition of inequality between inter-group and intra-group inequality, as mentioned in the methodology.

North (Nunavut, the Northwest Territories and the Yukon) is the more unequal, followed by the Prairies (Manitoba and Saskatchewan) and British Columbia, when we consider income inequality between groups (EG). Ontario and Alberta are also above the Canadian average. As we can see in Table 3, British Columbia is more ethnically unequal according to the EG but Saskatchewan is more polarized, according to the EP; in fact, Saskatchewan jumps almost three places in the ranking since the index is as high as that of Manitoba. This is one of the few differences that we encounter using the two indices, EG and EP.

TABLE 3—Rankings with 3 groups

G	EG	EP	EF
PEI	PEI	PEI	PEI
NB	NFLL	NFLL	NB
NFLL	NB	NB	NFLL
NS	NS	NS	NS
MAN	QUEB	QUEB	QUEB
QUEB	**CAN**	**CAN**	NNV
YUK	ALTA	ALTA	SASK
SASK	ONT	ONT	**CAN**
CAN	SASK	BC	ALTA
NWT	BC	SASK	ONT
ONT	MAN	MAN	MAN
BC	YUK	YUK	YUK
ALTA	NWT	NWT	BC
NNV	NNV	NNV	NWT

If instead of using three groups, we use seven (Table 4), we observe the differences in the fractionalization index that were pointed at in subsection 4.1. It also looks as if Alberta is now less fractionalized than Canada as a whole, but the difference is small with both three groups (the EF index for Alberta is 0.333 and for Canada 0.331) and seven groups (the EF index for Alberta is 0.341 and for Canada 0.344). Basically, Alberta is as fractionalized as Canada as a whole and vice-versa.

TABLE 4—Rankings with 7 groups

EG	EP	EF
PEI	PEI	PEI
NFLL	NFLL	NB
NB	NB	NFLL
NS	NS	NS
QUEB	QUEB	QUEB
CAN	**CAN**	NNV
ALTA	ALTA	SASK
ONT	ONT	ALTA
SASK	BC	**CAN**
BC	SASK	MAN
MAN	MAN	ONT
YUK	YUK	YUK
NWT	NWT	BC
NNV	NNV	NWT

When using thirteen groups (Table 5)—when breaking the Asian group into smaller subgroups—the only appreciable difference is that Saskatchewan looks slightly more ethnically unequal than British Columbia but, once again, the differences are small: with seven groups, Saskatchewan's Ethnic Gini (EG) is 0.059 and British Columbia's is 0.060 while with three groups Saskatchewan's EG is 0.063 and British Columbia's is 0.062. Once more, although in terms of the EG, British Columbia and Saskatchewan are similar, Saskatchewan is more polarized.

TABLE 5—Rankings with 13 groups

EG	EP	EF
PEI	PEI	PEI
NFLL	NFLL	NB
NB	NB	NFLL
NS	NS	NS
QUEB	QUEB	QUEB
CAN	**CAN**	NNV
ALTA	ALTA	SASK
ONT	ONT	ALTA
BC	BC	**CAN**
SASK	MAN	MAN
MAN	SASK	ONT
YUK	YUK	YUK
NWT	NWT	BC
NNV	NNV	NWT

The EG and EP indices try to capture the potential for conflict which is a function of both the diversity and the inequality; the polarization index may be small because of low diversity but ion this case the potential for conflict is small.

However, it may seem unfair to compare indices of ethnic inequality among provinces with different degrees of diversity. The last column in the tables in the Appendix shows the ratio EG/EF for the provinces and Canada. The reason for this column is twofold: first, this is a simple and unsophisticated normalization among the provinces. While Newfoundland and Labrador's ratio is still well below the Canadian average, the ratios for the other Maritimes are more in line with the Canadian average and, once we take into account that Québec is not very diverse, its ethnic inequality looks larger than those of Ontario and British Columbia. Likewise, while the ratios for the NWT and Nunavut are still the largest, once we take into account Yukon's diversity, its ethnic inequality looks smaller than those of Manitoba and Saskatchewan. Adjusting for the degree of diversity, Saskatchewan looks like the third most ethnically unequal province in terms of income, something that should worry the political powers of this province.

Table 6—Ranking according to the EG/EF ratio

13 groups	**7 groups**	**3 groups**
NFLL	NFLL	NFLL
CAN	PEI	PEI
NS	NS	NS
NB	NB	NB
PEI	CAN	CAN
BC	BC	BC
ONT	ONT	ONT
QUÉBEC	QUÉBEC	QUÉBEC
ALTA	ALTA	ALTA
YUKON	YUKON	YUKON
MAN	MAN	MAN
SASK	SASK	SASK
NWT	NWT	NWT
NNV	NNV	NNV

The second reason for the ratio EG/EF is another check of the robustness of the indices to the breaking of Visible Minorities into smaller subgroups. As explained above, polarization indices capture the fact that a third group can act as a buffer. For example, consider the case in which there exist two groups, each of which represents half of the population, and normalize the distance among these groups to one: the polarization index would be 0.25. Now let us imagine that a third group is situated half way between these two groups and it represents 20% of the population, so each of the other two groups represents 40%; the polarization index is now 0.176. The conclusion of this section is that, assuming that most of the ethnic tensions arise from the differences between Aboriginals and Caucasians, the introduction of Visible Minorities shows as a positive decrease in the index; but once this third group is introduced, the indices are quite robust to the breaking of the Visible Minorities group into smaller subgroups.

A look at these tables shows that, while Visible Minorities are important in BC (24.7%), Alberta (13.9%) and Ontario (22.8%)—the provinces that attract most new immigrants, these three provinces do not perform poorly in terms of ethnic income inequality; thus, new immigration does not seem to be the source of this ethnic inequality. Are the provinces with a large percentage of Aboriginal population—Manitoba (15.4%), Saskatchewan (14.7%), the NWT (49.9%), Nunavut (84.9%) and Yukon (24.5%)—the ones that perform poorly but the performance is not correlated with the percentage of Aboriginal population, which leads us to believe that this ethnic inequality is mostly a result of the socioeconomic problems of the Aboriginal peoples, and that the provinces show different degrees of success in dealing with these problems.

4.4 At a more disaggregated level

Statistics Canada divides the thirteen provinces into 288 Census Divisions (CDs), further divided into Census Subdivisions (CSDs): 3,842 subdivisions with population larger than 250. There is a third disaggregation level, in between the CDs and the CSDs, the Consolidated Census Subdivisions (CCSs): 2208 with population larger than 250 for the 2006 Census.

We know that the three constructed indices are going to be highly correlated; in fact, the simple correlation between the Ethnic Gini and the Ethnic Polarization is 0.987.[12] But how correlated are these measures with the normal distribution of income? It turns out that not very much at the subdivision level, as seen in Table 6 which shows simple correlations between the indices at the subdivision level.

TABLE 7—Simple correlations (CSDs)

	EG	**EP**	**EF**
Gini	0.297	0.293	0.178
EG	–	0.987	0.742
EP		–	0.706

Once we aggregate the subdivisions into divisions, though, there is more correlation between the distribution of income and our measures of fractionalization and polarization, as seen in Table 7 which shows the same simple correlations at the division level.

TABLE 8—Simple correlations (CDs)

	EG	**EP**	**EF**
Gini	0.668	0.643	0.547
EG	–	0.989	0.845
EP		–	0.799

[12] This is not unusual: Heisz (2007) reports a correlation between the usual Gini and Wolfson's pure-income polarization index P of 0.96 using time series for after-tax Canadian data.

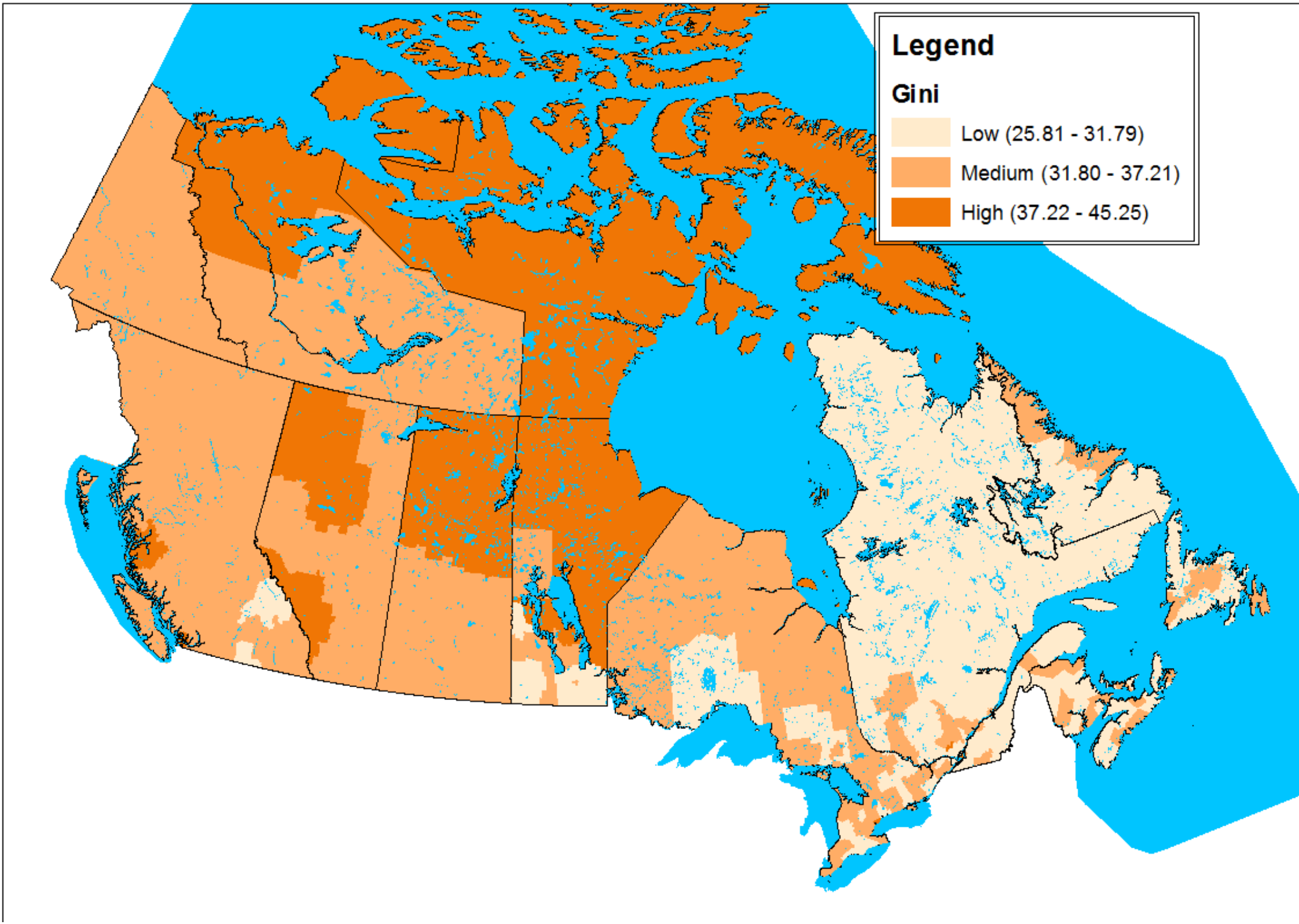
At the more disaggregated level we can also observe great variations within provinces. The maps in this subsection are constructed at the Census Division (CDs) level and the indices, both in the maps and the rest of this section, are expressed as percentages.

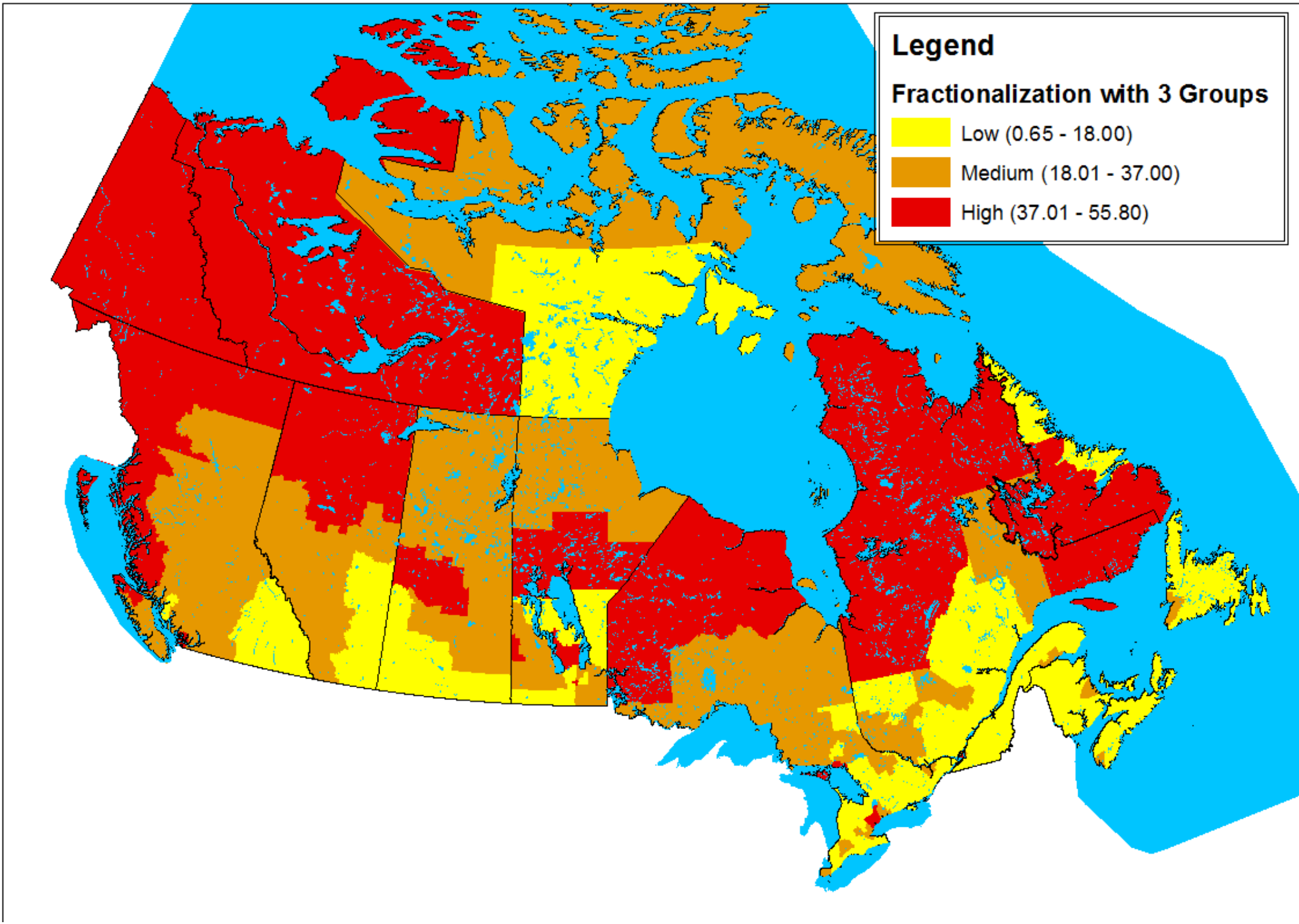
The first map shows the CDs classified into three categories according to the Gini coefficient: those with a high Gini (larger than 37.3), those with a low Gini (smaller than 31.8) and those in between. As provinces only Nunavut and Alberta show a Gini higher than 37.3 and only Prince Edward Island shows a Gini lower than 31.8 (Table A.1). Nunavut's divisions show a high Gini and the Yukon's are consistently at medium level but the Northwest Territories' are a mix of high and medium. Most jurisdictions in British Columbia are at medium level; the inequality stems from the Vancouver area. Alberta also shows inequality around its two large cities while Saskatchewan shows an unequal North and a medium South, around the two cities. Manitoba shows large areas with high Ginis but the densely populated areas (South of the province) show as low or medium. Most of the jurisdictions in Ontario are either at low or medium level but the one above average is in the most densely populated area, around Toronto, hardly seen in this map. Finally, most of the divisions in Québec and the Maritimes are either at medium or low level.

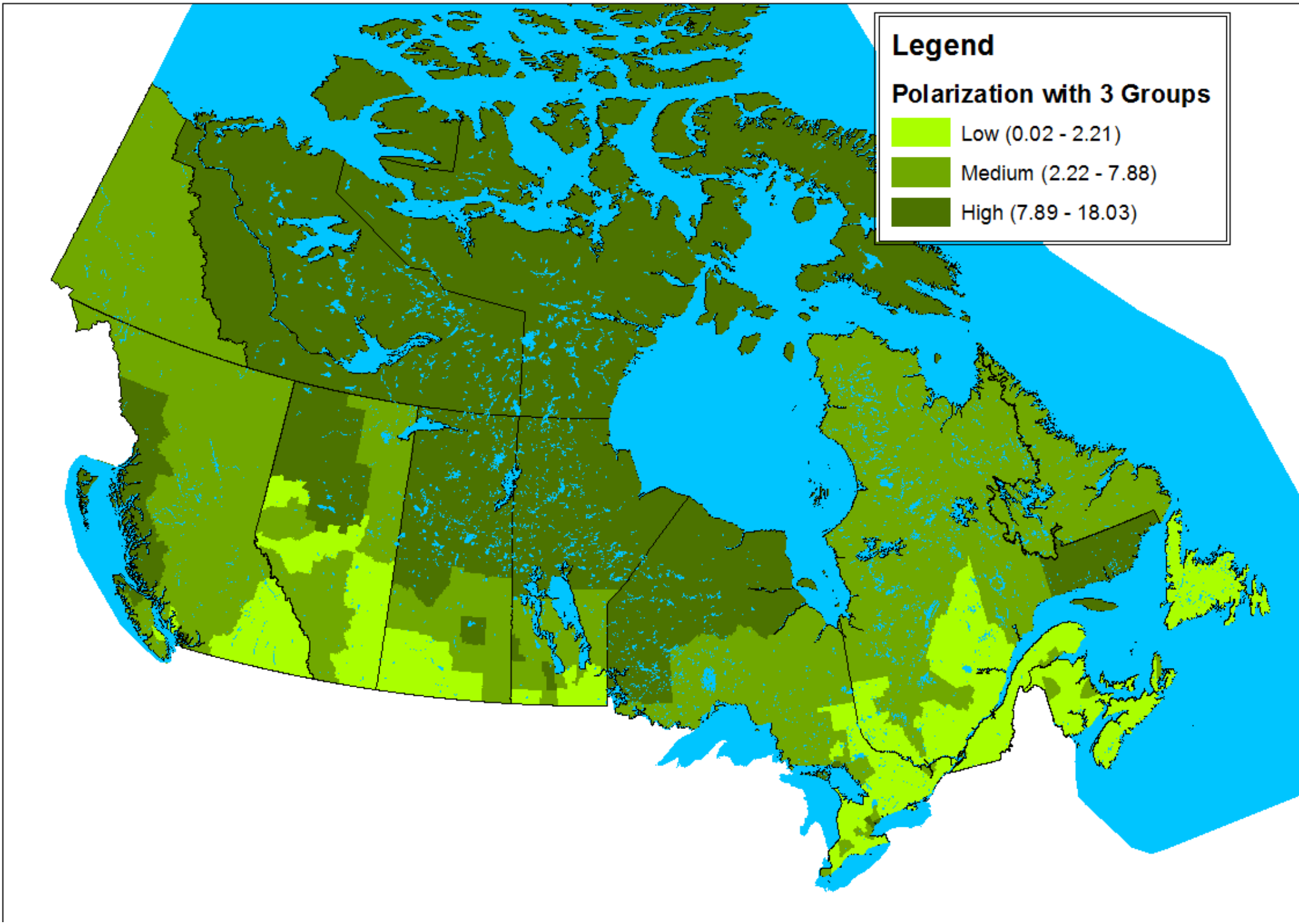
The second map shows the Census Divisions classified into three categories according to the Ethnic Fractionalization index based on three groups: those divisions with an EF larger than 37, those with an EF index lower than 18, and those in between. It should be noticed that with these cut-off points, Canada as a whole as well as Saskatchewan, Alberta and Nunavut would be classified as medium; the Maritimes would show low fractionalization and Ontario, Manitoba, British Columbia, the Yukon and the Northwest Territories are highly fractionalized. Québec's index is 18.6 (Table A.1). Consistent with the provincial ranking, Yukon and the Northwest Territories show as highly fractionalized. Nunavut shows areas of medium and low fractionalization. The rest of the provinces have Census Divisions in the three groups except for New Brunswick, Nova Scotia and Prince Edward Island, almost uniformly low.

Finally, the third map shows CDs classified according to the Ethnic Polarization index based on three groups as well. In this case the cut-off points are 7.9 and 2.2. As provinces only the Northwest Territories and Nunavut show an EP index greater than 7.9, the Maritimes show polarization lower than 2.2 and Canada and the rest of the provinces lie in the middle (Table A.1). In this case, Nunavut and the Northwest Territories show as highly polarized while the Yukon shows a medium level of polarization. The rest of the provinces have Census Divisions in the three groups except for New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador.

Of the 288 CDs, 20 show an EP index greater than 9: 1 in Quebec (out of 98), 3 in Ontario (out of 49), 4 in Manitoba (out of 23), 3 in Saskatchewan (out of 18), 1 in Alberta (out of 19), 3 in BC (out of 28), 2 (out of 2) in NWT and 3 (out of 3) in Nunavut. It should be noticed that less than 0.5% of the Canadian population (less than 120.000 people) live in the remote and vast North; most Canadians live close to the US border. Nevertheless, the indices point at group


Legend
Gini
Low (25.81 - 31.79)
Medium (31.80 - 37.21)
High (37.22 - 45.25)


Legend
Fractionalization with 3 Groups
Low (0.65 - 18.00)
Medium (18.01 - 37.00)
High (37.01 - 55.80)


Legend
Polarization with 3 Groups
Low (0.02 - 2.21)
Medium (2.22 - 7.88)
High (7.89 - 18.03)

inequalities as one of the problems of the North.

5 Conclusion

This article presents the Ethnic Gini (EG), Ethnic Polarization (EP) and Ethnic Fractionalization (EF) indices that we construct for Canadian communities based on the 2006 Census. The EG and EP indices are measures of inter-group income inequalities, inequalities that prevent the social inclusion of certain subpopulations and generate social conflict with a negative effect on economic outcomes. Measures of group income inequality are also important because absence of inequalities is a substantial component of economic well-being. For these two reasons, these measures should be of interest not only to researchers but also to decision makers and advisors at all levels of government.

What we have seen is that, and somewhat in disagreement with the usual perceptions, the Maritimes (Prince Edward Island, Nova Scotia, New Brunswick, and Newfoundland and Labrador) together with Québec are the more homogeneous provinces (i.e., the indices are below those of Canada) in all senses: income, fractionalization and polarization; while the North (Yukon, Nunavut and the Northwest Territories) together with British Columbia are the more diverse (i.e., the indices are above those of Canada). The Prairies (Alberta, Saskatchewan and Manitoba) together with Ontario are sometimes above and sometimes below the Canadian average. Although for the most part Canada is a diversified but egalitarian country, the Northwest Territories and Nunavut are highly unequal in terms of ethnicity and this ethnic inequality contributes largely to the inequality in these provinces. Once we adjust for the degree of diversity, Saskatchewan is the third most ethnically unequal province. The ethnic inequality in income seems to stem mostly from the socioeconomic problems of the Aboriginal populations since provinces with a large percentage of Visible Minorities do not perform too poorly on this regard.

The next step of this project would replicate this study for the 1991, 1996 and 2001 Censuses, with the aim of seeing the changes, if any, in the last decade and a half. We also want to study the interactions into income inequality and ethnicity more in depth. In particular we want to see the differences in income distribution within the three main groups and whether these differences have improved or worsened during the last decade and a half since it is possible that affirmative action (employment equity in Canada) policies benefit only some individuals within the minority while having little impact on the majority of the group, thus increasing the within group income inequalities.[13]

Later in the project we will test the usefulness of these indices by using measures of social conflict (crime rates, etc.) since it is likely that ethnic polarization translates into social problems more than into political problems in

[13] The group inequality indices at CD, CCS and CSD level will be posted at the Canada Rural Economy Research Lab (C-RERL) webpage, http://crerl.usask.ca/crerlv2/, when available for the four Censuses mentioned in the text. The indices for the 2006 Census are available by request.

Canada. Likewise, we would like to investigate the relation between the indices herein presented and the provision of public goods, as well as construct indices of group inequality in access to political resources and education; and the relation between access to political and economic resources. It should be noted that the EP index has already been used as an explanatory variable in a paper that investigates which communities are good candidates for place-based policies (Olfert et al. 2010).

A Indices

Table A1—Indices with 13 groups

Province	EG	EP	EF	G	EG/G	EG/EF
NFLL	0.009	0.009	0.096	0.329	0.028	0.096
PEI	0.007	0.006	0.051	0.305	0.021	0.127
NS	0.016	0.015	0.129	0.332	0.049	0.126
NB	0.010	0.010	0.082	0.320	0.032	0.127
QUÉBEC	0.027	0.024	0.192	0.338	0.079	0.139
ONT	0.056	0.042	0.425	0.365	0.154	0.133
MAN	0.065	0.054	0.411	0.338	0.193	0.159
SASK	0.063	0.058	0.310	0.350	0.179	0.202
ALTA	0.049	0.039	0.348	0.383	0.127	0.140
BC	0.062	0.044	0.485	0.371	0.168	0.128
YUKON	0.067	0.062	0.429	0.339	0.198	0.157
NWT	0.145	0.130	0.552	0.364	0.399	0.263
NNV	0.151	0.147	0.260	0.425	0.355	0.579
CAN	0.042	0.033	0.353	0.363	0.117	0.120

Table A2—Indices with 7 groups

Province	EG	EP	EF	EG/G	EG/EF
NFLL	0.009	0.008	0.096	0.026	0.091
PEI	0.006	0.005	0.051	0.018	0.108
NS	0.015	0.014	0.129	0.044	0.112
NB	0.009	0.009	0.082	0.029	0.114
QUÉBEC	0.026	0.024	0.192	0.078	0.138
ONT	0.055	0.045	0.410	0.150	0.134
MAN	0.065	0.055	0.408	0.192	0.159
SASK	0.059	0.055	0.310	0.169	0.190
ALTA	0.048	0.040	0.341	0.126	0.142
BC	0.060	0.050	0.453	0.162	0.132
YUKON	0.067	0.062	0.428	0.198	0.156
NWT	0.145	0.130	0.551	0.399	0.264
NNV	0.151	0.147	0.260	0.355	0.579
CAN	0.042	0.034	0.344	0.115	0.121

Table A3—Indices with 3 groups

Province	EG	EP	EF	EG/G	EG/EF
NFLL	0.008	0.008	0.096	0.024	0.082
PEI	0.005	0.005	0.051	0.018	0.108
NS	0.014	0.014	0.128	0.043	0.113
NB	0.009	0.009	0.082	0.029	0.115
QUÉBEC	0.026	0.026	0.186	0.078	0.141
ONT	0.053	0.051	0.382	0.146	0.140
MAN	0.065	0.055	0.404	0.191	0.160
SASK	0.059	0.055	0.309	0.167	0.189
ALTA	0.048	0.043	0.332	0.125	0.144
BC	0.059	0.053	0.439	0.160	0.135
YUKON	0.067	0.062	0.427	0.198	0.157
NWT	0.145	0.131	0.549	0.399	0.264
NNV	0.151	0.147	0.260	0.355	0.579
CAN	0.041	0.037	0.331	0.113	0.123

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